

**DOCUMENTATION AND QUALITY EVALUATION OF
SELECTED TRADITIONAL FOODS OF
CENTRAL ZONE OF KERALA**

By

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THESIS

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requirement for the degree of

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Kerala Agricultural University, Thrissur

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COLLEGE OF HORTICULTURE

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KERALA, INDIA

2009

DECLARATION

I, hereby declare that the thesis entitled "**Documentation and quality evaluation of selected traditional foods of central zone of Kerala**" is a bonafide record of research work done by me during the course of research and that it has not been previously formed the basis for the award to me of any degree, diploma, fellowship or other similar title, of any other University or Society.

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Dedicated to my husband

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LIST OF ABBREVIATIONS

A	:	Ambient condition
CH	:	Christian
DAS	:	Day after storage
EZ	:	Ezhava
HI (PKD)	:	Hindus of Palakkad
KB	:	Kerala Brahmin
MAS	:	Month after storage
MU	:	Muslim
PE	:	Polyethylene
PLM	:	Polyethylene lined laminated aluminum pouch
PS	:	Period of storage
PT	:	Pet jar
R	:	Refrigerated condition
SC	:	Scheduled Caste
TB	:	Tamil Brahmin
TP	:	Type of packing
VP	:	Vacuum packing
WAS	:	Week after storage

Introduction

1. INTRODUCTION

**“From earth sprang herbs, from herbs food, from food seed and from seed man.
From food all creatures come into being”**

(Taittiriya Upanishad)

Food is a culture, emotion, hospitality, prestige and power and is closely knitted with tradition. Traditional knowledge is a community based functional knowledge system, developed, preserved and refined by generations through continuous interaction, observation and experimentation with their surrounding environment. It includes beliefs, values, and practices gathered from the practical experience of older generation, and its whole function is survival and development of culture of people.

Traditional foods are also known as heritage foods, vintage foods, ethnic foods, cultural foods and it is reported that there are over 5000 products being made in different regions of our country. According to Trichopoulou *et al.* (2007) traditional foods are those that are consumed locally or regionally for an extensive period and the methods for the preparation of such foods have been passed down through generations.

Traditional foods, originated from ancestral kitchens are developed through ages, invented, modified, utilised and evolved to improve nutritional and social well being of the people around the world. Most of them are culture specific, region specific, environment specific, community specific and season specific. These foods are socially, culturally and economically important and provide food security, enhance livelihood and improve nutritional and social well being of people. Food culture arises out of the place of a people's origin, and so traditional local foods hold the potential to bind and stabilise communities and enable a cultural continuity through conserving their histories. Indian cuisine is represented as a wide spectrum of food cultures with distinctive regional differences and preferences (Achaya, 1998).

During the last few decades, with the stretch of rapid globalisation, urbanisation, changes in life style and infiltration of western style in food habits, drastic changes in food pattern and food habits have been occurred. As an impact of this dietary transition,

traditional foods are progressively replaced by globalised food culture and many traditional food preparations are on the verge of being lost. Moreover, traditional food products are now facing a severe competition from commercially processed foods like fast foods and tin foods. So, the interest on traditional food is decreasing among the younger generation.

The substitution of traditional foods not only led to a loss of production of traditionally and culturally appropriate food, but also in the loss of traditional knowledge related to food production. It created serious health and socio economic problems among community members (Diaz, 2005). Hence, the traditional foods which reflect the rich heritage of regional cultures should be saved from extinction and the skills gained through generations have to be preserved.

Factors such as international migration, the communication revolution and culinary tourism have contributed to globalisation of food habits and this has paved the path towards global food culture (Everett, and Aitchison, 2008). According to Hollingsworth (2000), one of every sevenfold dollar over the next decade would be spent on ethnic foods and efforts to export them are now expanding. Hence, traditional foods are now considered competitive products, with its unique materials and production techniques. Upliftment of these regional food items from local standards to global standards necessitates development of new policies and strategies for quality standardisation.

The vast potential of our classical food technologies and the truly scientific principles underlying the multitude of our traditional food formulations and processes have remained largely unresearched and under explored. Authentic documentation regarding the prevalence of different products in different parts of the country, their history, evolution, ingredients used, preparation mode, characteristics, perishability and such other information, is a must to modernise this sector. It is obvious that documentation and commercialisation of traditional food items and related skills are of enormous archeological value for future generation.

No reliable documentation seems to be in existence containing authentic information on traditional recipes. Hence, the present study entitled “Documentation and quality evaluation of selected traditional foods of central zone of Kerala” has been undertaken with the following objectives.

1. To identify and collect information on the various traditional foods of central zone of Kerala and to document their mode of processing
2. To evaluate the quality characteristics of the selected less used traditional foods.

Review of literature

2. REVIEW OF LITERATURE

Literature relevant to the present study entitled “Documentation and quality evaluation of traditional foods of central zone of Kerala” is reviewed under the following heads.

2.1 Importance of Traditional Knowledge (TK)

2.2 Traditional foods-History, cultural background, meaning, concept and definition

2.3 Traditional foods of different groups

2.4 Health and nutritional dimensions of traditional foods

2.5 Key challenges in the production and use of traditional foods

2.6 Future, scope and opportunities of traditional foods

2.1 IMPORTANCE OF TRADITIONAL KNOWLEDGE (TK)

“When an old man dies, a book is lost”

Traditional and Indigenous Knowledge have been used for centuries by indigenous and local communities under local laws, customs and traditions. It has been transmitted and evolved from generation to generation. Traditional knowledge has played, and still plays, an important role in vital areas such as food security, the development of agriculture and medical treatment. The importance of traditional and indigenous knowledge for its creators and for the world community at large, and the need to foster, preserve and protect such knowledge, has gained growing recognition at international level.

Traditional Knowledge (TK) comprises of knowledge which has been developed in the past, but which still continues to be developed. Most TK is of non-contemporary nature and it has been used for generations. However, TK is not static; it

evolves and generates new information as a result of improvements or adaptation to changing circumstances (Agarwal, 2004).

To ignore people's knowledge is almost to ensure failure in development (Brokensha *et al.*, 1980). Since, indigenous knowledge is essential to development, it is often suggested that it must be gathered and documented in a coherent and systematic fashion (Brokensha *et al.*, 1980; Warren *et al.*, 1993). Brokensha *et al.* (1980); Compton (1989); Niamir (1990); Warren (1990) also indicated that indigenous knowledge has become pivotal in discussions on sustainable resource use and balanced development.

Indigenous knowledge, however, is closed, non-systematic, holistic rather than analytical, without an overall conceptual framework, and advances on the basis of new experiences and not on the basis of a deductive logic (Howes and Chambers 1980; Banuri and Marglin, 1993). According to Thrupp (1989) indigenous knowledge encompasses non-technical insights, wisdom, ideas, perceptions and innovative capabilities. The author also indicated that traditional knowledge is the knowledge that we are born with, that we have inherited, that we contribute to in our lifetime and pass on to future generations and its whole function is survival and the development of a culture of people.

Halewood (1999) described indigenous knowledge as being integrally related to environmental concerns which is embedded in, and inextricably linked to, "the land and as an amalgam of interrelated spiritual, practical, and innovative practices, all of which revolve around reverence for the land and the land's sustainable use. In addition, indigenous knowledge is frequently described as being collectively derived and held, holistic in nature, stressing the interconnectedness of all things, incrementally developed, and closely tied to the geographical environment of the culture in which that knowledge adheres. This knowledge can be generally known within a community, or known only to specific people, or groups of people within the community.

Michael (2001) reported that Indigenous knowledge systems are by and large ecological, equipped to take the complexity of interrelationships in nature fully into

account, while the scientific knowledge is characterised by reductionism and fragmentation. World Intellectual Property Organisation (WIPO, 2001); Stoll and Hahn, (2004) also made a distinction between traditional knowledge and indigenous knowledge and indicated that indigenous knowledge is a subset within the traditional knowledge category and indigenous knowledge is traditional knowledge held and used by communities, people and nations that are indigenous.

The World Intellectual Property Organisation (WIPO, 2001) indicated that the term traditional knowledge refers to both tangible and non-tangible components, the tangible component refers mainly to genetic resources, whereas the intangible component refers mainly to the knowledge. WIPO also used the term "Traditional Knowledge (TK)" to refer to tradition-based literary, artistic or scientific works, performances, inventions, scientific discoveries, designs, marks, names and symbols, undisclosed information and all other tradition-based innovations and creations resulting from intellectual activity in the industrial, scientific, literary or artistic fields.

According to Sakarkar *et al.* (2003), indigenous cultural practices and traditional knowledge are meant to ensure the subsistence and survival of the community and maintain the balance between the natural world, the environment, and people.

Indigenous Knowledge (IK) is a community based functional knowledge system, developed, preserved and refined by generations of people through continuous interaction, observation and experimentation with their surrounding environment (Gupta, 2004). The author considered indigenous knowledge as a dynamic system, ever changing, adapting and adjusting to the local situations and had close links with the culture, civilization and religious practices of the communities.

According to Diaz (2005) traditional knowledge is a concept that encompasses tangible and intangible creations, cultural manifestations, technologies, science, agricultural knowledge, designs, literatures, and visual and performance arts derived from oral and written traditions. The author also indicated that traditional knowledge is also

connected to indigenous traditional territories, lands, natural and genetic resources and, is transmitted from generation to generation.

According to Friedberg (2006) Indigenous Knowledge is a system or body of knowledge and it is not just knowing the recipes or the local village, but knowing the context of these by knowing the variations in recipes and their reasons for these variations, as well as knowing the entire region within which the locality is set.

Akhtar *et al.* (2006) had the opinion that traditional knowledge is the sum total of the knowledge, skills and practices based on theories, beliefs and experiences indigenous to different cultures, known since antiquity and used in the maintenance of health and in the prevention, diagnosis, improvement or treatment of physical and mental illnesses. Varkey (2007) reported traditional knowledge as a body of knowledge, spirituality, and art forms based on customary laws and protocols which reflected their history, culture, ethics and creativity of aboriginal people. The author also indicated a cultural orientation to traditional knowledge which is integral to the cultural identity of the social group in which it is operated and preserved. Traditional knowledge had a crucial role to establish sustainable relationship between man and nature in the society (Rathakrishnan *et al.*, 2008).

Wikipedia (2009) referred traditional knowledge (TK), indigenous knowledge (IK), and local knowledge to the matured long-standing traditions and practices of certain regional, indigenous, or local communities and encompasses the wisdom, knowledge, and teachings of these communities. In many cases, traditional knowledge has been orally passed for generations from person to person.

According to Rajagopalan (2007) *Nattarivu*, is the traditional wisdom and technology with which people live in accordance with their habitat ensuring its balanced use and indicated that the development of a society should be based on its traditional wisdom and technology which ensures optimum use of the eco friendly natural resources.

Sreedharan (2004) had of the opinion that traditional knowledge are passed orally from generation to generation and continually modified on the basis of new discoveries and insights and changing environmental conditions. Subbulakshmi (2005) considered traditional knowledge as an “orthodox wisdom” generated through the practical experience of older generation, and indicated that these were dying fast with the disappearance of older generation.

Overwalle (2005) indicated indigenous knowledge (IK) as the accumulated knowledge and philosophy of life acquired by local people from observing the practical effects of the activities of their daily life in tune with nature and considered IK as an ignored wisdom.

Correa (1999) opined that traditional knowledge typically distinguishes one community from another and reflected a community's interest and had a personal and spiritual meaning. The author also indicated that traditional knowledge is not recognized as knowledge by all who study it since it includes beliefs, values and practices. Ghale and Upreti (1999) indicated the importance of indigenous knowledge (IK) for house hold food security and national food security.

2.2 TRADITIONAL FOODS – HISTORY, CULTURAL BACKGROUND, MEANING, CONCEPT AND DEFINITION

2.2.1 History and Cultural Background of traditional foods

Food is an integral part of any culture-Bhagavad Githa says-“from food do all creatures come into being”.

Traditional food processing in India began when man ceased to be a food hunter (Potty, 1986). Traditional foods evolved hundreds of years ago are indispensable for majority of people (Tyn, 1986).

According to Achaya (1998) food choices and food habits are an outcome of cultural heritage and economic and social factors. The traditional foods and cuisines in India could be traced as far back as to the Aryan times, some even to the pre Aryan times, with the Muslim and European influence contributing later to new dishes that enriched the native cuisine of India. The author also pointed out that every community in India had their own and distinct food ethos.

According to Azizi *et al.* (1998) traditional foods have evolved through centuries taking into consideration the prevailing climatic conditions, availability of local materials and socio- economic conditions. Parpia (1999) indicated that traditional Indian foods were developed as part of at least forty indigenous cultures over centuries.

Pratima (2000) reported that India is the home for ageless culinary art, and had a rich heritage of a wide variety of traditional foods. Traditional foods are an expression of culture, history and lifestyle (Slimani *et al.*, 2002).

Patil (2000) pointed out that Indian society continued to maintain its original food barriers and ate community or regional food, which was their legacy for generations. According to the author, caste and religion were the main partitions of society and food and eating habits reflected these divisions clearly.

Oniang'o *et al.* (2003) considered food habits as one of the oldest and most entrenched aspects of many cultures that exert deep influence on the behaviour of people. The cultural background determines what to eat as well as when and how to eat. People's culture had a lot of influence on the kind of foods people eat in each community. In every part of the society, people had diverse feeding habits inherited from generation to generation.

The people of India created many dietary preparations from combinations of a variety of primary food materials that nutritionally complement and supplement each other through a long period of trial and error (Parpia, 2004). The author also indicated that

the diets of all the Indian cultures put together consisted of more than 5000 traditional preparations, mostly of plant origin, which provided the people balance in the required quantities within their means

According to George *et al.* (2002) Kerala is endowed with a rich and varied cultural heritage rooted in indigenous traditional knowledge systems which were utilized for development when compared to other states of India.

Food culture arises out of the place of a people's origin, whether they still live there or not, and shaped by resources like climate, land, soil, water, and fuel and also by religion, literacy, communication, ethnicity as well as by technology, food processing and storage, transport, cooking, colonisation, health status and health care (Wahlqvist and Lee, 2007).

Traditions, region and culture linked to the food products were considered as important quality features (Holt and Amilien, 2007). The authors also indicated traditional and regional products as part of the national cultural heritage which hold the potential to bind and stabilise communities.

According to Trichopoulou *et al.* (2007) investigation and registration of traditional foods contribute to the preservation of important elements of a nation's culinary heritage and culture and allows future generations, both from the native population and from other countries, to be acquainted with traditional foods.

2.2.2 Meaning, Concept and Definition

Traditional foods are foods based on solid foundation of culture, customs and natural environment of a country or a region of the world and eaten by the people for a long time (Tokuji, 1986). Kuhnlein and Receveur (1996) defined a traditional food as food from a particular culture available from local resources and culturally accepted and

includes socio cultural meanings, acquisition/processing techniques, use, composition, and nutritional consequences for people using the food. Azar and Aminpour (1996) defined traditional food as a specific food in a region whose raw materials are locally available and which is not used in other regions.

Rao and Srivastava (1998) defined traditional foods as those evolved out of necessity to make maximum use of local foods, utilizing available artifacts and expertise and carried down through generations. According to Jordana (2000) a traditional product is a “representation” of a group, which belonged in a defined space, and is part of a culture that implies the cooperation of the individuals operating in that territory. The author also indicated that in order to be traditional, a product must be linked to a territory and it must also be part of a set of traditions, which will necessarily ensure its continuity over time.

According to Rangarao (2001) our individuality, living conditions, friendship, family conditions, as well as our self esteem and the vast array of traditions we hold are all influenced by what we choose to eat. The author also indicated that traditional foods are prepared with the use of ingredients unique to a particular area and people. Shin (2004) considered traditional foods as historic foods which are transferred from generation to generation with some local variations. The author also referred traditional food as food products with a long history, developed by people with the same life style belonging to the same region and cooked using materials produced in the region, and enjoyed by most people in the area.

Inamdar *et al.* (2005) indicated that traditional foods are the foods based on sound foundation of culture, custom, natural environment and consumed by people over long time developed through ages, invented, modified, utilized and evolved to overcome the monotony in the diet.

Drew and Henne (2006) referred ‘traditional food’ to a product with specific raw materials, and/or with a recipe known for a long time, and/or with a specific process.

According to Trichopoulou *et al.* (2007) traditional foods are foods that have been consumed locally or regionally for an extensive time period and the methods for the preparation of such foods have been passed down through generations. The authors also indicated that traditional food is a food of a specific feature or features, which distinguish it clearly from other similar products of the same category in terms of the use of “traditional ingredients” or “traditional composition” or “traditional type of production and/ or processing method”. Cayot (2007) considered traditional local food as "a specific food in a region whose raw materials are locally available and which is not used in other regions".

Geertz (1983) considered “local food” as a broad term containing several different complementary and dynamic dimensions and emphasized differences between place and space, with a “place aspect that often underlines the historical, cultural and social features, while physical space obviously focuses on the typicality of the products from this special place. According to Tellstrom *et al.* (2005) “local food” is a rather broad term containing several different aspects like the cultural aspect connected to the food product or the geographical aspect related to both the place where the food is produced and the space where it is distributed.

According to Patil (2000) Indian food is by its every nature, exotic, scintillating and immensely varied and became one of the top three cuisines in the world.

Guy (2002) emphasised the potential of the traditional local foods to bind and stabilise communities. According to Heinrich *et al.* (2005) geographical approximation, related to ingredients which were gathered, grown or produced locally and prepared into dishes often represented a local specialty and gave regional identity. The authors also indicated that since many of the local traditions escaped the attention of a broader public it is essential to highlight the character of such products as an element of geographical well defined tradition.

Traditional food is at the core of indigenous cultures and economies and practices regarding harvesting, preserving and preparing food reinforce indigenous culture and

identity (Damman *et al.*, 2008).

2.3 TRADITIONAL FOODS OF DIFFERENT GROUPS

There are definite rules in each culture as to what composes a meal, how the meals should be served and consumed and thus food is intricately connected with the culture of people (Misra, 1986). Pattanayak (1986) indicated that traditional foods varied not only around the world but also within the region. According to Dwivedi (2000) customs, rules, taboos and superstitions are associated with foods and all social events and festivals focused on special meals.

Tandoori also known as *roti* is a traditional baked product common among the diets of Indian's (Rao and Srivastava, 1998). *Chapathi* or *roti*, the unleavened bread normally prepared from whole wheat flour is the staple food of more than 60 percent of Indian population (Kaur and Bajwa, 2000). *Parotta*, a wheat flour based, circular and creamish white coloured product is a traditional South Indian food (Dasappa and Rao, 2004).

Kanji is a typical traditional food used by people of Kerala from time immemorial (Kadaloor, 2007 and Lalithambika, 2007). *Puttu* prepared from rice is another traditional breakfast food of Kerala (Kadaloor, 2007).

Idli and *dosa*, the two important South Indian breakfast items prepared with proper cereal – pulse combination, stuffed *parathas* with potato, methi, radish and palak in North India and *poha* prepared with onion, potato, nuts and pulses in Maharashtra were considered as excellent traditional breakfast foods (Subbulakshmi, 2005). The cooked rice kept overnight in water was consumed as a delicious breakfast item by South Indians after mixing with curd (Subbulakshmi, 2005). Bengal gram *sattu*, a popular traditional breakfast food was produced commercially in Bihar and Uttar Pradesh (Mridula *et al.*, 2007).

One of the traditional rice products popular in Assam namely *hurum* is a special product among the Ahom community of Assam (Mishra *et al.*, 2000). *Ambil*, is the traditional food of Madiya tribes of Gadchiroli District (Patankar and Tankhiwale, 2004). *Puras* or pancakes are widely accepted as traditional Indian foods (Jindal *et al.*, 2004). Rice and finger millet based traditional foods like *arsha*, *dhuska*, *chhilka*, *pua*, *letto*, *dumbo*, *latha*, *roti* were relished by the *Munda*, and *Oraon* tribes of Eastern India (Lakra *et al.*, 2006).

Dhokla is a fermented food prepared from rice and bengal gram, and *khaman* another traditional product similar to *dhokla* is made entirely from bengal gram (Steinkraus, 1989). *Wari* is a partially fermented legume based products prepared in Utter Pradesh from split black gram, dried fenugreek leaves, coriander powder, cumin seeds, red chilly powder and black pepper (Kulkarni *et al.*, 1997 and Soni *et al.*, 2001). *Kinema*, a soya bean based fermented product is consumed as curry in Darjeeling hills and Sikkim in India (Tamang, *et al.*, 1998). *Soibum*, an indigenous fermented food produced from succulent bamboo shoots is an indispensable constituent of the diet of Manipur and neighbouring states (Giri and Janmejay, 2000). *Vattayappam* is a popular traditional fermented dish prepared by the Christian community of Central Travancore in Kerala and has sacred tradition of being prepared during Christmas and on Easter eve (Emmanuel, 2006).

Flaked or beaten rice is a very popular Indian traditional product consumed either as snack after toasting or frying or as a breakfast dish after soaking in water and seasoning with spices and vegetables (Arya, 1990).

Dahi Bhalla, one of the most relished traditional snack is prepared at house hold and cottage level throughout India with dehusked split black gram dhal, dehusked split bengal gram dhal, and spices (Teotia *et al.*, 2002). *Sattu* is a traditional popular snack of North India. (Deshpande *et al.*, 2004 and Prakash and Swamy, 2006). Khasi tribes of Meghalaya consumed traditional rice based snacks like *Pumaloi*, *Pudoh*, *Jashulia*, *Putharo*, *Pukhlein*, *Pusaw*, *Pusla* and *Putyndong* (Murugkar and Subbulakshmi, 2005). Commonly used snack items of Karnataka included *chakkali*, *sev*, *khara gritters*, *laddu*,

and *hurigalu* (Kulkarni *et al.*, 2006). *Khakra*, is an Indian traditional snack made from wheat flour, popular in Gujarath (Shirsath and Landge, 2006). *Puranpoli* also known as *holige*, *bobattu*, and *bhakshalu* in different parts of India is a traditional sweet prepared by stuffing *chapathi* with sweet legume based preparation (Bikash *et al.*, 2006 and Dipali and Rodrigues, 2006). *Bori*, an Indian traditional food is an open air sun dried nuggets prepared from black gram batter (Swami *et al.*, 2006).

Papads, a low moisture traditional Indian savoury food item is prepared from blend of pulse flour namely black gram or green gram, cereal flour and edible starch with other ingredients (Patil *et al.*, 2000).

Among the fried products based on rice and legumes, *chakli or murukku*, *tengolal*, *muchorai and kodbak* are popular in India (Arya, 1990). *Wadi* is legume based savoury prepared from black gram or green gram dhal in India (Pruthi *et al.*, 1992). Kalra *et al.*, (1996) indicated *mathi* as one of the most important traditional savoury products popular among the people of Northern states of India. *Matar*, a deep fat fried snack prepared from *maida* was found to be very popular in North India (Bawa and Singh, 1998). *Mongra*, an important traditional savoury based on bengal gram flour is popular among the northern states of India (Kalra *et al.*, 1998).

A variety of popped or puffed cereal like popcorn, puffed rice like *khull*, *khoi*, *aralu and nelpuri*, puffed sorghum called *khull*, puffed ragi and barley namely *danl*, *saty* and legume like bengal gram are consumed as snack items by all segments of the Indian population. Popped products were generally used as snack foods either after spicing or sweetening (Arya, 1990 and Srivastava and Batra, 1998).

Among milk based sweets, *gulabjamun* occupies a prominent place throughout India and is prepared from a mixture of khoa, refined wheat flour and baking powder (Gulhati *et al.*, 1992). *Peda* is a highly popular Indian sweet prepared from khoa-a milk solid (Thakar *et al.*, 1992). *Khoa* is an important indigenous heat coagulated and partially dehydrated milk product (Sharma and Lai, 1999).

Shrikhand, an indigenous sour fermented milk product is popular in Western India (Rao *et al.*, 1987, Bramhapurkar *et al.*, 2007 and Deshpande *et al.*, 2008). According to Subramonian *et al.* (1997) *Shrikhand* is made from *chakka* obtained by draining of whey from dahi kneaded with cream, sugar and other ingredients.

Churpi, a hard variety of cheese, is traditionally consumed by the people of Nepal, Bhutan and Darjeeling hills and Sikkim (Karki, 1986; Pal *et al.*, 1993 and Tamang *et al.*, 1998).

Pinni, a traditional sweet is prepared by roasting urd dhal paste, khoa and sugar and molded into round elliptical shape (Saxena *et al.*, 1996). Egg *halwa* is a traditional Indian sweet dish which is a combination of milk, liquid, whole egg and sugar (Kalra *et al.*, 1998). Chhana based sweet *chhana podo* is a typical milk product from Orissa which is light brown in colour and has a sponge cake like texture (Dash *et al.*, 1999). *Dudh churpi*, a traditional milk product is popular in North-Eastern parts of India (Hossain *et al.*, 1999).

Mishti Doi, a popular variety of sweet meal *dahi* is common in the Eastern region of the country (Gupta *et al.*, 2000). *Sandesh* is a *chhana* based milk sweet popular both in India and neighbouring countries (Kumar and Das, 2003). *Kalam*, a milk based sweetmeat similar to *Pedha*, is popular in Maharashtra (Ghorpade, *et al.*, 2006). *Chendamurian*, a traditional sweetened milk based delicacy prepared from *nendran* variety of banana is popular in Southern part of Kerala (Sudhakaran, 2006). *Malai pedha* is a popular traditional sweet prepared from condensed milk (Ingole and Ananathanarayan, 2006)

Traditional festive foods of Kerala included *vishu kanji* and *vishu katta* prepared respectively by Nair and Ezhava communities, *ukkara*, *mysorepak* and *maaladu* prepared by Tamil Brahmins and *neychoru* and *biriyani* of Muslims and *achappam*, *kuzhalappam* and *vattayappam* of Christians (Shyna and Indira, 2003). Noojum (2007) indicated endangered food items of Malabar areas of Kerala which constituted *eendum pidi*, *pana verakiyathu*, *ottada*, *poola pathiri*, *koova theli*, *andikanji*, *poola putt*, and *aleesa*.

Hindu families of Karnataka included various millet based traditional foods like bajra roti, *hirakkholige*, *tambittu*, *allittu*, puffed jowar, jowar *wade* and jowar *dosa* during

festivals (Inamdar and Chimmad, 2004). Hindus of Amaravathi city celebrated the festivals by preparing different traditional foods like *saupith*, *gahu*, *ravashhera*, *purinarli*, *bhat*, *moong vada*, *dahibandikala* and *modak* (Dandge and Mane, 2004). Sweet *boondi*, a deep-fat fried popular product prepared from bengal gram flour (*besan*), was found to be an integral part of Indian social fabric and used during all occasions (Semwal *et al.*, 2005).

Subbulakshmi (2005) reported various traditional foods prepared during religious ceremonies and festivals which included *modakams* prepared for *Ganesh Chathurthi*, sweets and savouries prepared for *Deepavali*, *poha*, prepared as *naivedhyam* on *Gokulashthami* and *ramdana*, *agathi keerai*, *amla chutney* and *sundaikai kozhambu* used to break the fast of *Ekadashi*.

Andarjanam (2003) reported different traditional foods prepared during festivals and ceremonies in Kerala which included *injithairu* and *varutha upperi* prepared for *ayaniyoonu* of Kerala Brahmins; *ada*, *karolappam*, *malaru* and *avalu* for *naivedyam* among Hindus; *ettangadi* and *koova verakiyathu*, for *thiruvathira*.

Chiroti, a wheat based traditional product popular in southern India is an invariable part of lunch or dinner especially on marriage occasions (Chetana *et al.*, 1996). Srivastava (1996) reported that popped sorghum and millet flours are traditionally used in weaning mixes in India. *Pej*, *panjiri* and *sattu* are the cereal based traditional weaning foods popularly consumed by tribal, urban and rural people of Madhya Pradesh respectively (Alpana and Meera, 2006).

Traditional health foods of Kerala included garlic *lehyam*, onion *lehyam*, *kozhi marunnu*, *pookula lehyam*, *paettiratti lehyam*, *puli lehyam* and jaggery with dried ginger consumed by pregnant and lactating women and *pathila* curry, *uluva kanji*, *paal kanji*, *paachoru*, *kakkum kaya kanji*, *navara kanji*, *navadhanya kanji*, *marunnu kanji*, curd rice, lemon rice, gingelly rice and coconut rice consumed during the month *karkkidakam* and *dhanu* (Shyna and Indira, 2002). Jose, (2007), Lalithambika (2007) and Ramani (2007) also indicated about different types of medicated *kanji* like *uluva kanji*, *njavara kanji*,

karkkidaka kanji, malar kanji, manjal kanji, navadhanya kanji, kurunthotti kanji, paal kanji as the traditional health foods prepared by elder women of Kerala. *Pal kanji* is another traditional cereal and milk based Kerala delicacy prepared with milk, and rice (Achuthan and Emmanuel, 2006). *Pookula rasayana*, a traditional health food of Kerala is used to improve the health of body and skeletal system of women after parturition (George *et al.*, 2006).

Kaffir, an important fermented beverage prepared from corn or sorghum was consumed by the people of Ghana (Koleoso and Kuboye, 1986). *Magaw/mahewa*, a traditional sour, non alcoholic maize beverage was reported to be popular among the Bantu people of Africa (Hoizapfel, 1989). *Pulqe*, is a milky slightly foamy, acidic and somewhat viscous beverage of Mexico obtained by fermentation of *agumiel*, and *juices* of cacti often called 'Century plant' (Steinkraus, 1992). Several traditional fermented foods and beverages produced at household level in Zimbabwe included maize porridge, and milk products like *mukaka* and *amasi* as well as non alcoholic cereal based beverages namely *mahewu*, *tobwa* and *mangisi* (Gadaya *et al.*, 1999). Medicated coffee or tea prepared using pepper, dry ginger, thulasi, and jaggery were the traditional beverages used for fever, cold, cough etc in Kerala (Andarjanam, 2007). *Hadia*, a rice based liquor is consumed by the Munda and Oraon tribes of Eastern India (Lakra *et al.*, 2006).

Important traditional foods prepared in Korea from cereals included instant rice gruel or drink prepared from roasted rice powder and different varieties of rice cakes namely *chaldeok*, *songpyam* and *sirudeok* (Lee, 1986). Traditional foods such as *baotzs*, *jiaotsc*, *wonton* and *springroll* prepared from wheat flour dough with stuffing and fillings were found to be popular in China (Lun, 1986). The author also reported steamed bun and steamed roll as the traditional staple foods in North China. According to Tokuji (1986) rice and processed wheat products like *chapati*, *nan*, and *noodles* constituted the popular staple foods of Japan.

Tamea is a popular traditional food of Sudan made from chick pea and is served at breakfast and supper (Kareem, 1986). *Injera*, *shiro*, *dubbe*, *kik* and *kinche* were reported to

be some of the important traditional foods of Ethiopia (Osman, 1986). Azizi *et al.* (1998) indicated that *Tarkhunah* a non fermented food prepared from a mixture of barley, tomato, curd and vegetable is used along with bread in Iran.

Mumu, is a traditional, ready-to-eat Nigerian cereal-based food product (Ingbian and Akpapunam, 2005). Kuda *et al.* (2005) mentioned about a water extract prepared from dried *Scytosiphon lomentaria*, a brown algae, used as a traditional food in the Noto area in Japan. *Sushi* is an ancient Japanese art popularized as the crown prince of Pacific Rim party food (D'Silva and Yamao, 2006)

Ogi, a popular maize product obtained by soaking and wet extraction of maize is a traditional food consumed widely in Nigeria (Umoh and Fields, 1981). Another traditional food namely *agidi* prepared after cooking *Ogi*, is also given to infants and adults in Nigeria (Akpapunam *et al.*, 1997). Aminigo and Oguntunde (2000) indicated that grain maize is often consumed after boiling or roasting in South Western Nigeria while the mature grain is mostly eaten as *ogi* and *agidi*.

Cereal based fermented foods like *nan*, and *roti* and, *andrana* pancake made from rice flour and legume were the traditional foods consumed by Pakistanis (Shah, 1986). Fermented maize products were also widely used as an important breakfast item and as weaning foods in Nigeria (Steinkraus, 1989).

Fermented traditional foods prepared from soya bean like sauce, paste, fermented curd and *thua-rao* were consumed by the people of Thailand (Long, 1986). Popular fermented products in Korea included *meju* and *kochujang* both prepared from soyabean (Lee, 1986). *Kinema*, another soyabean based fermented product is consumed as curry in Nepal and Bhutan (Tamang, 1996, and Tamang *et al.*, 1998).

Tempe is a popular fermented soy food of Indonesia (Vaidehi *et al.*, 1996). *Tempe*, and *tofu*, two important soy products were used as meat substitutes in Japan and China (Jeng *et al.*, 1998 and Ono *et al.*, 2004).

Gundruk, a fermented and dried vegetable product in Nepal is produced by shredding and placing the leaves of mustard, raddish and cauliflower in an earthen ware pot for five to seven days for fermentation (Karki, 1986). Various fermented vegetable protein foods like *iru*, *ogiri*, *ughu*, *ogiri-jybo* and *ogiri-nwan* were prepared traditionally by people of Nigeria (Odunfa, 1986). Vegetable based traditional fermented food products of Thailand included *horn-dong* (fermented red onion), *naw -mai-dong* (fermented young bamboo shoots) and *pak-gard-dong* (fermented leaf of mustard) (Tyn, 1986). *Kawal*, used as a meat replacer is a strong smelling, protein rich food prepared in Sudan by fermenting the leaves of wild African legume *Cassia obtusifdica* (Dirar, 1992).

Mulah sharmout, a mixture of dried meat, dried okra and onion is considered as one of the national dishes of Sudan (Kareem, 1986). The most favourite traditional animal food consumed in Burma included *nag-pi*, a fermented fish and shrimp sauce, *pone-ye-gyi*, a fermented fish and horse gram paste and pickled products of fish, prawn, fruits and vegetables (Tyn, 1986). The fermented fishery products of Korea included *jotkal* and *sik-hae* (Lee, 1986). *Kaidu digla* a fermented food made from the vertebrae of the back bone of animals after chopping, sun drying and pounding is a traditional food consumed in Sudan (Dirar, 1992). In the traditional Iranian cuisine, meat is cooked with fruits like pomegranate, dried pomegranate seeds, lemon, raisins and nuts like walnut, almonds, pine seed and *rhuharh* (Basaran, 1999). *Mehiawah* is a fermented fish product of Iran (Jedah *et al.*, 1999).

2.4 HEALTH AND NUTRITIONAL DIMENSIONS OF TRADITIONAL FOODS

2.4.1 Health and nutritional advantages of traditional foods

Nutritive value of three traditional foods namely *Khoa pinni*, *dhal pinni*, and *panjiri* was evaluated by Kaur and Kawatra (1996) and found that *dhal pinni* had more protein and ash than *Khoa pinni* and *panjiri*. *Dhudh chupri*, a popular traditional milk product of North Eastern part of India was found to be rich in energy, protein and minerals (Hossain *et al.*,

1999). Proximate and mineral composition of 30 traditional and popular Indian foods were evaluated by Prasad *et al.* (2000) and indicated that traditional foods provided approximately 350-660 Kcal/100 g and found that the lead and aluminium content of traditional foods were well below the permissible limits. Pattan *et al.* (2001) evaluated the nutritional qualities of *madeli*, a traditional ready to eat sweet product and found that it contained 6.98g protein, 4.4g fat, and 1.19g of crude fibre per 100g and had a shelf life of 21 days. *Khakra* consumed for breakfast, snack or in the main meal was considered as a carrier of dietary fibre and minerals (Shirsath and Landge, 2006). *Sattu*, the nutritious popular traditional food of North India is an energy drink with medicinal properties like prevention of gastritis and sunstroke (Prakash and Swamy, 2006).

Traditional foods of North Karnataka namely *appam*, *obbattu*, *paniyaram*, *ragi vada*, *dhal adai*, *achappam*, *aval kesrai*, *malayal adai*, *cheeroti* and *bisibelebhath* were reported to provide one fourth to one fifth of energy requirement of a sedentary adult (Devadas, 1999). The author also indicated that *cheeroti* and *bisibelebhath* provided one third of the protein requirements and supplied calcium, iron and carotene. *Modakams* prepared during *Ganesh Chaturthi* and *Naivedyam* prepared during *Gokulashtami* complemented amino acids and provided good quality protein (Subbulakshmi, 2005). *Halu bayi*, the traditional processed food product of Karnataka was found to be highly nutritious with good protein, carbohydrate and vitamins (Nagaraja, 2006). Kulkarni *et al.* (2006) indicated the nutritional advantages of *chakkali*, *sev*, *khara gritters*, *laddu* and *hurigale* the traditional snack items of Karnataka.

Superior nutritional quality of four Punjabi traditional food combinations were reported by Kiran *et al.* (2000) and maximum protein and available lysine contents were found in the combination of *chapati* and moong moth dhal, fat in *kheer* and *pura*, ash in maize *roti* and *sarson saag*. The combination of maize *roti* and *sarson saag* also provided maximum iron, zinc and copper and *kheer* and *pura* combination provided maximum total and available calcium.

Traditional supplementary foods consumed by the lactating women provided 1/3rd of the daily requirement of protein and carbohydrate per serving (Kaushik and Mathew, 1988). Traditional supplementary foods consumed by lactating women of Gujarat namely wheat *rab*, *hydku* and *gond ka soont* had high energy, protein and fibre respectively (Mulimani *et al.*, 2001). The authors also indicated superior nutritional quality of *kotta* and *battisa ladu*. Gupta *et al.* (2003) observed high calcium, iron, zinc, copper and phosphorous in *ajwain* followed by *gond panjiri*, *kangni* and *halwa* the traditional foods consumed by lactating women of India. The authors also indicated better protein and starch digestibility in traditional supplementary foods.

Lalithambika (2007) indicated the importance given to *kanji*, the traditional food of Kerala in ayurveda especially in diseased condition due to its easy digestibility. Sharon *et al.* (2006) indicated the nutritional significance of *puttu*, *ada*, and *idiyappam*, the traditional breakfast foods of Kerala with high protein, carbohydrate and energy density. *Paal kanji*, a traditional cereal and milk based Kerala delicacy was reported to be rich in protein, phosphorous, vitamin C, thiamin, riboflavin, iron, calcium, choline, copper, manganese and magnesium with good digestibility (Achuthan and Emmanuel, 2006). *Chendamurian*, the traditional banana delight of southern Kerala was found to contain highly nutritive milk proteins, milk solids and potassium and had laxative properties (Sudhakaran, 2006). The nutritional advantages of traditional foods namely *putu*, *laddu*, *ada* and coffee prepared using rice bran as the main ingredient were reported by Aneena and Indira (2007) and indicated that the foods had good amount of B complex vitamins, fibre, calcium and iron.

Nutritional advantages and the importance of traditional foods in Human physiological activities were indicated by Shin (2004).

The supplementary protein value of different fermented traditional vegetable protein foods of Nigeria namely *iru*, *ogiri*, *ughu*, *ogiri-jybo* and *ogiri-nwan* was indicated by Odunfa (1986). Tyn (1986) indicated the nutritional advantages of traditional fermented products with respect to proteins, calories and vitamins. Vaidehi *et al.* (1996)

indicated the nutritional advantage of *tempe*, a popular fermented soy food of Indonesia with high B complex vitamins. The traditional food of Japan and China namely *tempe*, and *tofu* had 38 percent lipid and 52 percent protein on dry weight basis (Ono *et al.*, 1997). Kuhnlein *et al.* (2002) evaluated 236 Canadian Arctic foods for macronutrients, minerals and fatty acids, and indicated considerable amount of nutrients in these traditional foods. A study conducted by Evans *et al.* (2003) on 36 traditional and imported foods of Tonga indicated that people preferred traditional foods and perceived traditional foods as more nutritious. Considerable amount of micronutrients were found in traditional foods namely *karat banana* and *pulque* prepared from Agave species, and *gac fruit* (Kuhnlein, 2004). The water extract prepared from the brown algae, the traditional food of Noto area in Japan had strong antioxidant activity (Kuda, *et al.*, 2005).

Rasala, the *dahi* based milk product with good nutritional and medicinal attributes was found to be effective against bleeding disorders, burning sensation and thirst (Warrier and Sudhakaran, 2006). *Karkkidaka marunnu kanji*, a traditional herbal concoction was found to be beneficial for the purification of the body and soul, providing nourishment to the whole body and augmenting the immune status (Asha *et al.*, 2006). *Pulissery*, a prominent culinary item prepared from curd in Kerala had health promoting and therapeutic properties with the nutritional benefits of fermented milk products (Shifa, 2006). Vijayakrishnan (2007) indicated excellent medicinal value of Kerala *sadya* and reported that the combination of pepper, cumin seeds and curd in *Kalan*, a side dish of the traditional *sadya* gave protection against *thridosham* of ayurveda. Sour curd used in *Kalan* was reported to be good for digestion and pepper and cumin seeds avoided gastritis and acted as antimucotic agent.

Traditional staples of Australian Aborigines and Pacific islanders were found to be beneficial for diabetic patients due to their slow digestibility when compared to western foods (Thorburn 1987). Uauy *et al.* (2001) indicated the protective effect of traditional diet in chronic diseases and obesity. According to Frohlich *et al.* (1997) the traditional fermented foods had a protective effect against cancer. Li *et al.* (2004) observed functional materials in traditional fermented soyabean foods namely *sufu* and *douchi*.

Apparent health benefits of traditional Greek foods were reported by Trichopoulou *et al.* (2007). The traditional Mediterranean diet of Greece was associated with reduced total mortality as well as reduced mortality from coronary heart disease and cancer (Trichopoulou, *et al.* 2007).

2.4.2 Impact of dietary transition on health and disease

The nutrition transition had direct implications in the upsurge of non-communicable diseases (Zimmet, 2000). Dietary transition refers to changes in the quantity and composition of the diet due to improved economic development leading to lack of physical activity, weight gain, lifestyle changes, development of diabetes mellitus, high blood pressure and increased risk of heart diseases and some forms of cancer (Seshadri, 2005).

In developing countries, rate of obesity, diabetes, cardiovascular disease and cancer increased as a consequence of urbanisation and socioeconomic changes (Albala *et al.* (2001) and Popkin *et al.* (2001). Jimaima *et al.* (2001) reported an increased consumption of introduced foods and an increased prevalence of diabetes among the indigenous population. The authors also indicated increased incidence and prevalence of non-communicable diseases due to deviation from the traditional food consumption pattern and traditional lifestyle. Lako (2001) also observed increased incidence and prevalence of non-communicable diseases among Fijians due to drastic changes in the dietary pattern and deviation from the traditional food consumption pattern and traditional lifestyle.

Direct relationship between decreased consumption of traditional foods and decreased physical activity with obesity and related chronic diseases was observed by Uauy *et al.* (2001) and Kuhnlein *et al.* (2004). Yusuf *et al.*, (2001), Kuhnlein *et al.*, (2002) and Kumanyika *et al.*, (2002) also documented the relationship between the dietary changes associated with urbanisation and globalisation and increased prevalence of numerous obesity-related chronic diseases around the developing world, including diabetes and cardiovascular diseases.

Receveur *et al.* (1997) indicated negative health consequences of exclusive inclusion of market food instead of traditional food mainly due to increased intake of energy, carbohydrates, fat and saturated fat. Consumption of market food and decreased consumption of traditional food, coupled with decreased physical activity, resulted in increased incidence of obesity and its correlated diseases like diabetes, heart disease and dental caries. Kuhnlein (2003) indicated that in addition to obesity and other associated diseases increased consumption of industrially processed foods lead to poor intake of micronutrients.

Urbanisation and westernisation forced people to give up their traditional food habits and inclusion of high saturated fat containing processed foods leading to various health hazards (Roy, 2001). As an impact of westernisation, Blazose (2002) indicated that traditional plant-based cuisines became energy dense due to increased proportion of animal food and fat and decreased proportion of plant foods.

Mendez *et al.* (2004) compared the diets in urban areas with traditional diet and indicated increased consumption of fat and more prevalence of obesity among low and middle income groups residing in urban areas. Damman *et al.* (2008) also indicated increased prevalence of chronic disease among indigenous communities due to nutrition transition characterized by a rapid westernisation of diet and lifestyles.

Schultz (2004) showed problems related to eating habits and food sustainability among Fijian population due to urbanisation and urban drift. An impact of global nutrition transition with increased caloric intake and obesity among adult women and children in Latin America was reported by Barria and Amigo (2006).

Transition in the dietary pattern characterized by shift towards high intake of calorie, saturated fat and cholesterol was observed by Schmidhuber (2004).

Substantial decline in the intake of potassium was observed due to consumption of westernised diet by Demigne *et al.* (2004) when compared to traditional diet. Seshadri (2005) also indicated the presence of high sodium content in processed foods compared to their natural counterparts and its health impact.

Nutrition related problems due to consumption of processed, ready to cook and ready to serve foods among career women was pointed out by Subbulakshmi (2005) due to their increased purchasing power and lack of time for cooking traditional foods.

2.5 KEY CHALLENGES IN THE PRODUCTION AND USE OF TRADITIONAL FOODS

Oniang'o (1999) indicated that the faster the people adapt to the new globalized food patterns, the less likely traditional knowledge will be transferred to the next generation. The author also indicated that the loss of knowledge leads to reduced culture-specific food activity. Traditional foods and food habits were progressively replaced by the globalized food culture of the multinational corporations leading to disastrous impact over the past several decades (Zimmet, 2000). Indigenous and traditional foods and food systems were found to disappear, leading to significant loss and threat to personal health and security at the regional and international level (Kuhnlein, 2003). Diaz (2005) also indicated that substitution of traditional foods not only led to a loss of production of traditional and culturally appropriate food, but also led to loss of traditional knowledge related to food production.

Urbanisation, growth in income, and changes in lifestyle affected food consumption patterns, with an increased substitution of high-value processed foods instead of traditional foods (Shin, 1999). According to Regmi and Gehlar (2001) urbanisation and occupations away from home, increased the intake of processed foods, ready-to-eat meals and snacks, and street foods, restaurant and fast foods. Evans *et al.*, (2003) indicated one of the important effects of globalisation as the increased reliance on imported foods, rather than traditional foods. The impact of globalisation of food industry on the food

habits and dietary patterns of people of Tanzania, Asia, Latin America and some African nations and Korea were reported by Kinabo (2004), Erdos (2004), Roe (2004) and Shin (2004)

Urbanisation and globalisation enhance access to non traditional foods due to changing prices and production practices, as well as trade and marketing practices (Lang, 1999, Evans *et al.*, 2003 and Chopra, *et al.*, 2002,). Disappearance of traditional food stores was observed in Spain by Vignali *et al.* (2001) with increased emergence of hypermarkets and supermarkets. Sunanta (2005) indicated that the corporate masters of the so called new world order and their agenda for global harmony created a globalised food culture.

Foreign investment had contributed to the rise of fast food restaurants and western-style supermarkets, which also influenced consumer food choices by offering greater variety, quality, convenience and competitive prices in high-value added foods (Regmi and Gehlar (2001), Reardon, *et al.*, 2003). Apart from urbanisation, foreign direct investment in markets of developing countries, increasing income, increased number of women in the workforce, rural to urban migration, the availability and increased affordability of diverse foods and shift in home-prepared and home-based meals to pre-prepared or ready-to-eat meals consumed away from home were considered as the prime factors for the increased consumption of processed food items (FAO, 2004).

Laurie *et al.* (2006) listed the factors like reduced density of species and available harvesting areas, restricted harvesting in accessible areas, time and energy limitations for traditional harvesting, interruption of knowledge transfer to youth due to employment of adults and schools for children, availability and accessibility of new food products, acceptability of new food products as a result of media, social contact and education, and concerns for wholesomeness and the presence of contaminants in traditional food which contributed to change environment, change in lifestyle and ultimately to dietary change of indigenous people.

Advancement in technology and western culture influenced the dietary culture Subbulakshmi (2005). According to Seshadri (2005) the important factors which contributed to nutrition transition included availability of processed foods containing high energy, fat and sodium, increased frequency of eating outside the home, proliferation of fast food industries which provided quick access to cheap meals, take away and home services; and shift away from traditional time intensive food preparation towards precooked convenience foods. Priyadharshini and Anuradha (2006) indicated westernisation and work culture as the key factors for drastic transition in dietary pattern in the traditional cuisines of Tamil Nadu.

Lartey (1975) listed the disadvantages of the indigenous technologies as high labour input, uneconomical operations, low efficiency and time consuming nature of the processes and lack of quality assurance. Desikachar (1986) and Kareem (1986) also indicated that the culinary practices involved in the preparation of traditional foods are laborious, time consuming and expensive. Mageshwari and Thilagamani (2006) also indicated the arduous processes involved in the preparation of traditional foods as the important factor for a tremendous change in the modern world and shift of traditional menu to convenience and fast foods.

Increased purchasing power, change in socio- economic status and life styles were considered as the factors which contributed to enhanced consumption of processed and convenience products (Kumar and Anjaneyalu, 1998). Ranjini *et al.* (2000) also indicated the availability of processed foods as the main reason for the tremendous change in the modern day consumption pattern of convenience and fast foods.

The diversity of India is reflected in diverse nature of traditional foods and this restricts the market potential of traditional foods (Chaudhry, 2006). Kulkarni and Unnikrishnan (2006) observed limited shelf life as the key challenge in the marketing of traditional products.

Bedekar (2006) indicated that majority of traditional Indian processed foods were made most unhygienically in unorganized sector with an adoption of low level of mechanization. The main challenge in the traditional food industry according to Ramesh (2006) was the design of machineries because of lack of adequate data on engineering properties of traditional foods. Lack of adoption of modern food technological principles in terms of ingredients, processing and packaging technology to deliver consistent quality, shelf stability were reported as the prime challenges in traditional food industry (Chaudhry, 2006).

Natarajan and Balachandran (2006) observed lack of suitable packaging materials and related technology as the practical challenge in the industry of traditional milk sweets. The authors also indicated the need for mechanization as the basic need to overcome inherent disadvantages of conventional methods of manufacture of traditional foods.

In order to meet the international standards, it is necessary to develop new policies and strategies, like development of traditional foods for foreign consumption, fusion foods, adaptation and brand marketing and scientific and safety guarantees (Shin (2004). The author also emphasised the need for international standardization of traditional food and improvement of packaging and design.

2.7 FUTURE, SCOPE AND OPPORTUNITIES OF TRADITIONAL FOODS

Traditional foods, used more as seasonal and banquet food or for religious ceremonies rather than as staple food, had become popular as a delicacy food (Shin, 1999). According to Hollingsworth (2000) one of every sevenfold dollar over the next decade would be spent on ethnic food. The author also predicted that food manufacturers would compete for market share in the faster growing ethnic cuisines like Thai, Caribbean, Mediterranean and Indian. Hill (2001) indicated that locally-produced food items generated almost twice as much income for the local economy as the same amount spent in a typical supermarket.

According to Parpia (2004) the value of traditional processed foods accounts for nearly 75 per cent of the processed foods in the market in India. Since, traditional food has been considered as a competitive product, with unique materials and production techniques, efforts to export them are expanding nowadays (Shin, 2004). Traditional food market in India had witnessed a rapid growth over last five to eight years and large scale production and preservation of traditional foods had become the need of the hour due to the scope of these products for indigenous consumption, export purposes and the interest showed by multinational companies (Dipali and Rodrigues, 2006). With rapid urbanisation and advancement of heritage food production technologies, traditional convenience and ready to serve foods were pouring in the market from time to time (Manjula *et al.*, 2006).

Metropolitan customers who dine in the ethnic restaurant showed interest in consuming not only traditional foods but also the experience of being and eating in ethnic restaurants (Bell and Valentine, 1997).

Ohiokpehai (2003) indicated that women's indigenous knowledge on traditional foods could be harnessed to improve nutrition security.

Though, the traditional food systems of indigenous people contained a wealth of micronutrients, in public-health promotion programmes and health training programmes, these information were not used due to lack of scientific coverage (Kuhnlein, 2003). Traditional food strategies could be used not only for alleviating malnutrition, but also for developing locally relevant programmes for stemming the nutrition transition and preventing chronic diseases particularly among indigenous and traditional people who had the knowledge of using food species in their local ecosystems (Kuhnlein, 2004).

Potty (2001) indicated about the deployment of organized food industry and development and promotion of the western oriented food product ignoring the vast array of ethnic foods which require developmental attention from industry and scientific

commodities. Diaz (2005) indicated the essentiality to develop and design a “*sui generis*” system to protect indigenous peoples’ traditional knowledge.

Factors such as international migration, the communication revolution and international tourism had contributed to an internationalisation of food habits (Senauer and Venturini, 2005). The impact of tourism and migration, the two manifestations of globalisation on the culinary culture indicated that tourism has encouraged the reproduction of the feasting aspect of the country’s culinary culture, on the basis of an internationalised food economy (Dixon and Jamieson, 2005).

Globally, contribution of food to sustainable tourism had received very little attention (Rand *et al*, 2006). Skuras *et al.*, (2006) observed significant part of the total rural tourism expenditures on purchasing local food.

Levasseur (2007) observed the growing trend of culinary tourism. The author also indicated the involvement of culinary and agri – food activities in culinary tourism with value on food and drinks which provided opportunities to tourists to discover dishes and wines that are unique to a particular region.

Everett and Aitchison (2008) indicated correlation between increased levels of food tourism interest and the retention and development of regional identity. The authors also stressed the conservation of traditional heritage, skills and ways of life, the social and cultural benefits and the benefits of the production of local food.

Materials and Methods

3. MATERIALS AND METHODS

This chapter deals with the methods and tools followed in the various phases of the study and the details are presented under the following headings:

3.1 Locality of the study

3.2 Selection of sample

3.3 Plan of study

3.3.1 Collection of information regarding traditional food habits

3.3.2 Documentation of traditional foods

3.3.3 Selection of endangered traditional foods

3.3.4 Replication of the selected endangered traditional foods

3.3.5 Chemical composition of replicated traditional foods

3.3.6 Organoleptic qualities of replicated traditional foods

3.3.7 Quality evaluation of replicated traditional foods during storage

3.3.8 Computation of cost of production of the replicated traditional foods

3.4 Statistical analysis

3.1 Locality of the study

Four districts of Central Kerala, namely Ernakulam, Thrissur, Palakkad and Malappuram were purposively selected for the study as there exist wide diversity in food habits, religion, and culture and socio economic conditions among the selected districts. From the selected four districts, 10 study locations in each district traditionally known for regional and religious preparations were also identified through snow ball sampling technique. Thus, 40 study locations were selected for the study and the list of identified study locations are given in Table 1. Snow ball sampling is a non probability sampling method, basically sociometric. In social science research, snow ball sampling is a technique for developing a research sample where existing study subjects recruit future subjects from among their acquaintances. Thus, the sample group appears to grow like a rolling snow ball. As the sample builds up, enough data is gathered to be useful for research (Goodman, 1961).

Table 1. Details of locations selected for the study

Sl.No	Ernakulam	Thrissur	Palakkad	Malappuram
1	Angamali	Aarangottukara	Kalpathy	Angadippuram
2	Edavanakkad	Chavakkad	Kottayi	Edappal
3	Kaladi	Chelakkara	Mannarkad	Kondotty
4	Malyankara	Cherpu	Nalleppilli	Parappanagadi
5	Manjali	Kandassankadavu	Nenmara	Pattikkad
6	Moothakunnam	Kunnamkulam	Ottappalam	Ponnani
7	Muzhikulam	Ollur	Pallassana	Thenjipalam
8	North Paravoor	Pavaraty	Peringottukurrissi	Thirur
9	Panangad	Perinjanam	Peruvemba	Vazhakkad
10	Thrippunithura	Punkunnu	Thathamangalam	Vengara

3.2 Selection of sample

Elderly persons above the age of 60 years with expertise in traditional food preparations were also selected randomly from each study locality. As traditional food habits differ with respect to region, religion, and caste, the selected experts were categorised based on the communities they represent. Thus, six communities namely Kerala Brahmin (KB), Tamil Brahmin (TB), Ezhava (EZ) and Scheduled Caste (SC) belonging to Hindu community, Muslim (MU) and Christian (CH) with distinct regional and religious diversified culinary culture were selected purposively. As Hindus except Brahmins of Palakkad district had unique food habits, Hindus of Palakkad (HI PKD) was also included in the study. A total of 247 elderly persons were selected as the sample for the study and the number of respondents belonging to each community in each district is given in Table 2.

Table 2. Distribution of respondents selected for the study

Sl. No	Communities	Ernakulam	Thrissur	Palakkad	Malappuram	Total
1	Kerala Brahmin (KB)	-	19	11	-	30
2	Tamil Brahmin (TB)	-	20	15	-	35
3	Ezhava (EZ)	17	18	-	-	35
4	Hindu (HIPKD)	-	-	40	-	40
5	Scheduled Castes (SC)	8	19	-	9	36
6	Muslim (MU)	-	12	-	24	36
7	Christian (CH)	20	15	-	-	35
	Total					247

3.3 Plan of study

Based on the objectives of the study, the plan of the study was designed. The study comprised

- 3.3.1 Collection of information regarding traditional food habits
- 3.3.2 Documentation of traditional foods
- 3.3.3 Selection of endangered traditional foods
- 3.3.4 Replication of the selected endangered traditional foods
- 3.3.5 Chemical composition of replicated traditional foods
- 3.3.6 Organoleptic qualities of replicated traditional foods
- 3.3.7 Quality evaluation of replicated traditional foods during storage
- 3.3.8 Computation of cost of production of the replicated traditional foods

3.3.1 Collection of information regarding traditional food habits

From the identified study locations, information regarding the traditional foods and food habits of each community associated with religious customs, festivals, special occasions, rituals, physiological conditions and their method of preparation, were collected through Participatory Learning Action (PLA). PLA was conducted using tools like focus group interview, trend line/ time line and flow chart analysis to identify

traditional food preparations and present state of the identified food preparations. PLA methods were used for shared learning between local people and outsiders to enable the researcher to collect information (Witcomb *et al.*, 1996).

Group discussions and focus group interviews were conducted in the identified study locations. Group discussions were conducted among members of different organisations like Kudumbasree, Integrated Child Development Services (ICDS), pensioner's association, Sree Narayana Dharma Paripalana (SNDP) Yogam, Namboodiri Yoga Kshema Sabha and Pandi Samooha Madom to elicit general information about traditional foods and to collect information about the skilled experts.

Focus group interview is a semi structured interview where the investigator attempts to focus the discussion on the actual effects of a given experience to which the respondents have been exposed (Merton *et al.*, 1990). Focus group interviews were conducted to elicit general information regarding details of traditional food items and preparations, traditional methods adopted for the preparation and storage, traditional foods used in daily, seasonal, festival, special occasions, rituals and physiological conditions, preserved foods prepared at home, traditional kitchen utensils and equipments. A semi structured interview schedule was developed to collect these information and the schedule is given Appendix I.

3.3.2 Documentation of traditional foods

From the group discussions and focus group interviews, the details of different traditional foods of different communities were identified and a list of traditional foods thus identified is given in Appendix II. In depth interviews and case studies were also conducted with selected skilled experts to collect detailed information of method of preparation of selected traditional foods. Community information sharing of traditional wisdom of the selected experts was also organized in preferred cases wherein documentation of the process through photographic and written methods was done.

The history of selected traditional foods and the changes occurred to traditional food preparations were also collected from the skilled experts using time/trend line and focus group interviews. Time line helps in conceptualizing the relevant issues through a chain of events and provides a historical perspective both spatially and temporarily (Parvathy, 2004). To elicit information regarding traditional foods and their method of preparation, changes occurred in the preparation of traditional foods and the level of adoption of the changes by the respondents, a pretested schedule was used and the schedule is presented in Appendix III.

3.3.3 Selection of endangered traditional foods

From the list of traditional foods of different communities, to arrive at a rationale for the selection of most endangered foods, the frequency of preparation of traditional foods in the pre categorized groups that is most frequently prepared, less frequently prepared, and not prepared were found out. To collect these details a rating scale was used and applied among the younger generation in the age group of 25 to 40 years belonging to the families of the skilled experts. The rating scale used is given in Appendix IV.

The frequency groups were further subdivided according to the reasons suggested by the respondents for the decreasing trend in the frequency of preparation of different traditional foods in each community. The percentage analysis for the reasons was also worked out for each traditional food and thus, reasons and the corresponding percentages for each food were computed and tabulated. Total score for each reason was arrived for each traditional food. The total scores thus derived for traditional foods of different communities are given in Table 3 to 9.

Table 3. Score chart for traditional foods of Kerala Brahmins

Sl.No	Items Reasons	Sum of scores			
		1	2	3	4
1	<i>Ada</i>	0	0	100	0
2	<i>Aval nanachathu</i>	0	0	0	0
3	<i>Cheeda</i>	57.5	50	92.5	0
4	<i>Erimanga/Neerambazham</i>	0	0	200	0
5	<i>Ettangadi puzhukku</i>	104.17	70.83	25	0
6	<i>Inji thairu</i>	0	100	0	0
7	<i>Kalan</i>	0	0	100	0
8	<i>Kadumanga</i>	42.86	54.55	27.27	75.32
9	<i>Kaipa kondattam</i>	0	83.33	116.67	0
10	<i>Karolappam</i>	0	0	100	0
11	<i>Koova payasam</i>	0	0	0	0
12	<i>Malarpodi</i>	46.51	0	18.6	34.88
13	<i>Manga thera</i>	0	71.43	28.57	0
14	<i>Mulaku kondattam</i>	0	33.33	166.67	0
15	<i>Mulakushyam</i>	0	0	0	0
16	<i>Ney payasam</i>	0	0	0	0
17	<i>Olan</i>	0	100	0	0
18	<i>Pal payasam</i>	0	0	0	0
19	<i>Pathila curry</i>	0	7.143	0	192.86
20	<i>Payaru kondattam</i>	0	104.2	95.8	0
21	<i>Shradha erissery</i>	0	0	0	0
22	<i>Shradha olan</i>	0	0	0	0
23	<i>Shradha pulissery</i>	0	0	0	0
24	<i>Thavidappam</i>	0	30	0	170
25	<i>Uppumanga</i>	0	54.55	45.45	0
26	<i>Varattu erissery</i>	0	0	0	0

1. Don't have skill 3. Difficult to make,
2. Don't prefer 4. Ingredient not available

Table 4. Score chart for traditional foods of Tamil Brahmins

Sl.No	Items Reasons	Sum of scores			
		1	2	3	4
1	<i>Ada dosai</i>	33.33	66.67	0	0
2	<i>Ammini kozhukkatai</i>	0	81.82	18.18	0
3	<i>Cheeli</i>	129.31	6.89	63.79	0
4	<i>Kondattam</i>	0	0	100	0
5	<i>Koozhu</i>	0	200	0	0
6	<i>Maaladu</i>	64.29	0	135.71	0
7	<i>Madhura puttu</i>	103.37	18.75	77.88	0
8	<i>Manihakkali chundal</i>	0	40	0	160
9	<i>Muthusaram</i>	49.74	0	150.26	0
10	<i>Neyyappam</i>	0	0	200	0
11	<i>Pollavada</i>	82.04	28.79	89.16	0
12	<i>Poruvelangai</i>	46.74	21.74	131.52	0
13	<i>Putharichunda chundal</i>	0	63.41	17.39	119.2
14	<i>Seva</i>	11.11	0	88.89	0
15	<i>Thengai theratti pal</i>	50	0	150	0
16	<i>Thenkozhal</i>	0	0	200	0
17	<i>Theratti pal</i>	50	0	150	0
18	<i>Ubbittu</i>	62.5	37.5	100	0
19	<i>Ukkarai</i>	71.05	38.82	90.13	0
20	<i>Vella cheeda</i>	65	47.5	87.5	0

1. Don't have skill 3. Difficult to make,
 2. Don't prefer 4. Ingredient not available

Table 5. Score chart for traditional foods of Ezhavas

Sl.No	Items	Reasons	Sum of scores					
			1	2	3	4	5	6
1	<i>Achappam</i>		29.17	0	50	0	29.17	91.67
2	<i>Andiunda</i>		0	0	0	80.77	0	119.23
3	<i>Ari aluva</i>		50	0	127.5	0	22.5	0
4	<i>Ariunda</i>		23.53	20.83	0	0	61.03	94.61
5	<i>Aval vilayichathu</i>		0	100	0	0	0	0
6	<i>Avilosu podi/unda</i>		100	0	57.69	0	42.308	0
7	<i>Avilunda</i>		58.33	100	11.11	0	30.56	0
8	<i>Chakkarayappam</i>		100	0	0	100	0	0
9	<i>Chukkunda</i>		61.29	138.71	0	0	0	0
10	<i>Ellunda</i>		100	0	0	0	0	100
11	<i>Kala kala</i>		100	0	0	0	100	0
12	<i>Kalathappam</i>		53.13	0	89.63	0	57.21	0
13	<i>Kallappam</i>		100	0	0	55.82	25.58	18.6
14	<i>Kappa puttu</i>		0	41.18	110.1	0	47.82	0
15	<i>Kapplandiunda</i>		93.55	0	106.46	0	0	0
16	<i>Kari nellikka</i>		0	100	0	0	0	0
17	<i>Karuka ila ada</i>		0	0	0	73.68	26.32	0
18	<i>Kinnathappam</i>		0	18.52	0	0	81.48	0
19	<i>Kokku vada</i>		15.38	0	53.59	0	101.03	30
20	<i>Kolli puzhukku</i>		17.91	0	0	29.86	0	52.24
21	<i>Koova podi palaharam</i>		100	0	0	0	0	0
22	<i>Kozhukatta</i>		0	200	0	0	0	0
23	<i>Kumbilappam</i>		100	0	23.53	23.53	52.94	0
24	<i>Kuzhalappam</i>		0	0	0	0	0	0
25	<i>Madura seva</i>		0	0	0	0	42.86	57.14
26	<i>Mangayandi mavu palaharam</i>		100	0	0	0	0	0
27	<i>Maniputtu</i>		0	17.39	43.48	0	39.13	0
28	<i>Murukku</i>		64.71	0	80.46	0	0	54.84
29	<i>Mutta pathiri</i>		0	61.52	0	0	38.46	0
30	<i>Noolappam</i>		0	0	30.43	0	69.57	0
31	<i>Ottada</i>		0	0	35.48	0	64.52	0
32	<i>Paal kanji</i>		100	100	0	0	0	0
33	<i>Pazham aluva</i>		50	0	127.5	0	22.5	0
34	<i>Pazham unda</i>		0	158.82	0	0	41.18	0
35	<i>Peechampidi</i>		0	75	0	0	25	0
36	<i>Poriunda</i>		100	50	50	0	0	0
37	<i>Pulinguru mavu palaharam</i>		0	100	0	0	0	0
38	<i>Unniyappam</i>		0	0	0	0	66.67	33.33
39	<i>Uppuma</i>		0	100	0	0	0	0
40	<i>Vazha ila ada</i>		0	0	0	0	100	0
41	<i>Velichenna appam</i>		0	176.92	23.08	0	0	0
42	<i>Vettappam</i>		0	57.43	0	0	142.58	0
43	<i>Vishu katta</i>		62.5	0	60.22	77.27	0	0

1. Don't have skill
2. Don't prefer
3. Difficult to make

4. Ingredient not available
5. Don't have time
6. Commercially available

Table 6. Score chart for traditional foods of Hindus of Palakkad

Sl.No	Items	Reasons	Sum of scores					
			1	2	3	4	5	6
1	<i>Ada</i>		0	0	0	0	0	0
2	<i>Adamanga</i>		83.17	34.375	82.45	0	0	0
3	<i>Arikondattam</i>		0	118.18	27.27	0	54.55	0
4	<i>Aripappadam</i>		0	100	69.69	0	30.3	0
5	<i>Arivaruthunda</i>		0	134.61	65.38	0	0	0
6	<i>Athirasam</i>		73.91	126.09	0	0	0	0
7	<i>Avalosu podi/avilosunda</i>		8.33	0	61.11	0	30.56	0
8	<i>Avil payasam</i>		75	67.11	0	0	57.89	0
9	<i>Avil pori</i>		0	0	100	0	0	0
10	<i>Banana peel kondattam</i>		0	100	0	0	0	0
11	<i>Banana psuedostem kondattam</i>		0	116.67	25	0	58.33	0
12	<i>Chama kanji</i>		0	100	0	0	0	0
13	<i>Cheeda</i>		126.79	36.36	18.42	0	0	18.42
14	<i>Cheena mulaku kondattam</i>		0	0	25	0	131.25	43.75
15	<i>Cheppappam</i>		85.71	29.63	0	0	0	84.66
16	<i>Kai murukku</i>		58.06	0	0	0	0	41.94
17	<i>Kalathappam</i>		122.22	3.7	25.93	0	48.15	0
18	<i>Kappa papadam</i>		56.1	14.63	100	29.27	0	0
19	<i>Kesari</i>		0	138.46	0	0	61.54	0
20	<i>Koova payasam</i>		0	46.67	0	53.33	0	0
21	<i>Malar pori</i>		0	0	100	0	0	0
22	<i>Muthira payasam</i>		62.5	80	57.5	0	0	0
23	<i>Mutta palada</i>		0	0	0	0	0	0
24	<i>Neyyappam</i>		6.061	26.41	134.19	0	33.33	0
25	<i>Pana verakiyathu</i>		0	0	0	100	0	0
26	<i>Panakoombu vevichathu</i>		0	0	0	100	0	0
27	<i>Paniyaram</i>		126.67	16.67	30	0	26.67	0
28	<i>Papada vada</i>		123.33	0	26.67	0	13.33	36.67
29	<i>Parippu ada</i>		0	51.61	48.39	0	0	0
30	<i>Payaru kondattam</i>		0	15.79	0	0	184.21	0
31	<i>Poondanga unda</i>		0	0	0	100	0	0
32	<i>Pulinkuru unda</i>		55.26	49.62	95.11	0	0	0
33	<i>Pumpkin/ash gourd peel kondattam</i>		0	200	0	0	0	0
34	<i>Ragi verakiyathu</i>		46.15	134.62	19.23	0	0	0
35	<i>Rankayyan.</i>		84.38	115.63	0	0	0	0
36	<i>Rava unda</i>		15.79	109.89	74.32	0	0	0
37	<i>Sukhiyan</i>		0	15.79	0	0	84.21	0
38	<i>Thamara valayam kondattam</i>		0	0	0	100	0	0
39	<i>Unniyappam</i>		0	0	0	0	0	100
40	<i>Uralappam</i>		60.6	115.15	24.24	0	0	0
41	<i>Vazhuthana kondattam</i>		0	157.89	26.32	0	15.79	0
42	<i>Vendakkai kondattam</i>		0	100	0	0	0	0
43	<i>Wheat kanji</i>		100	100	0	0	0	0

1. Don't have skill
2. Don't prefer
3. Difficult to make

4. Ingredient not available
5. Don't have time
6. Commercially available

Table 7. Score chart for traditional foods of Scheduled Castes

Sl.No	Items	Reasons	Sum of scores				
			1	2	3	4	5
1	<i>Ada</i>		0	0	0	0	0
2	Ash gourd leaves <i>thoran</i>		0	200	0	0	0
3	Banana flower <i>thoran</i>		0	36.36	36.36	27.27	0
4	Banana rhizome <i>thoran</i>		0	36.36	36.36	27.27	0
5	Banana stem <i>thoran</i>		0	36.36	36.36	27.27	0
6	<i>Chama kanji</i>		0	200	0	0	0
7	<i>Chama uppuma</i>		0	100	0	0	0
8	<i>Chekkurmanis thoran</i>		0	93.75	0	106.25	0
9	Chilly leaves <i>thoran</i>		0	200	0	0	0
10	Colocasia stem <i>thoran</i>		0	160	0	40	0
11	Cowpea leaves <i>thoran</i>		0	100	0	100	0
12	<i>Eendu</i> (cycus seed) flour <i>palaharam</i>		0	0	100	0	0
13	Jack fruit <i>kondattam</i>		0	0	72.89	0	127.11
14	Jack fruit seed <i>kondattam</i>		0	0	86.67	0	113.33
15	<i>Kanniyappam</i>		0	100	0	0	0
16	<i>Muringa</i> leaves/flower <i>thoran</i>		0	175	0	25	0
17	<i>Ottada</i>		66.67	0	100	0	33.33
18	<i>Pana verakiyathu</i>		0	0	0	100	0
19	<i>Panamkoombu</i> curry		0	0	0	100	0
20	<i>Pulinkuru unda</i>		0	50	50	0	0
21	Pumpkin leaves <i>thoran</i>		0	168.42	0	31.58	0
22	Rice <i>kondattam</i>		0	0	100	0	100
23	Tapioca <i>puttu</i>		7.14	69.78	92.31	0	30.77
24	<i>Thakara</i> leaves <i>thoran</i>		0	125	0	75	0
25	<i>Thavidum chakkarayum unda</i>		0	18.37	22.45	59.18	0
26	<i>Thazhuthama ila thoran</i>		0	70.27	0	129.73	0
27	<i>Thumba</i> leaves <i>thoran</i>		0	200	0	0	0
28	<i>Vaata manga</i>		0	0	38.71	0	161.29
29	<i>Vatterachi</i>		90	10	0	0	0
30	<i>Vellachoru</i>		0	100	0	0	0
31	Wheat <i>kanji</i>		0	200	0	0	0
32	Yam leaves/flower <i>thoran</i>		0	150	0	50	0

1. Don't have skill

4. Ingredient not available

2. Don't prefer

5. Don't have time

3. Difficult to make

Table 8. Score chart for traditional foods of Muslims

Sl.No	Items	Sum of scores					
		Reasons	1	2	3	4	5
1	<i>Aleesa</i>	0	0	0	100	0	15
2	<i>Allahu Aalam</i>	0	0	0	82.35	17.65	13
3	<i>Ambayathin ada</i>	18.92	165.49	0	30.77	0	64.05
4	<i>Areerappam</i>	54.17	0	0	0	16.67	47.17
5	<i>Biriyani</i>	0	0	0	0	0	28
6	<i>Chiratta mala</i>	0	0	0	100	0	104
7	<i>Chukkappam</i>	38.89	194.44	0	0	0	40.33
8	<i>Jeeraka kanji</i>	0	0	0	0	0	17
9	<i>Kai pathiri</i>	0	0	0	0	0	22
10	<i>Kalathappam</i>	9.09	0	0	0	0	111.91
11	<i>Karakka appam</i>	0	154.55	0	0	0	78.73
12	<i>Kidutha</i>	41.38	123.81	0	38.1	0	66.62
13	<i>Kozhiyada</i>	31.58	138.46	0	30.77	0	77.42
14	<i>Manda</i>	0	0	0	57.89	0	158.11
15	<i>Mutta mala</i>	0	0	0	0	200	2
16	<i>Mutta marichathu</i>	0	0	0	0	100	20
17	<i>Mutta pathiri</i>	55.56	0	0	0	44.44	24
18	<i>Mutta surukka</i>	0	0	0	0	200	3
19	<i>Neychoru</i>	0	0	0	0	0	0
20	<i>Niracha pathiri</i>	62.5	0	0	100	0	51.5
21	<i>Paalayikkappam</i>	0	0	0	0	100	27
22	<i>Paalooda</i>	0	0	0	0	100	26
23	<i>Pazham nirachathu</i>	100	0	0	0	0	29
24	<i>Pazham vetti</i>	0	0	0	0	0	25
25	<i>Tharippola</i>	28.57	0	0	0	42.86	47.57
26	<i>Unnakkaya</i>	100	0	0	0	0	11
27	<i>Unnkkaya pal</i>	0	0	0	0	200	12
28	<i>Varutha pathiri</i>	71.43	0	0	0	28.57	23
29	<i>Vettucake</i>	85.71	168.83	0	0	0	50.45

1. Don't have skill
2. Don't prefer
3. Difficult to make

4. Ingredient not available
5. Don't have time
6. Commercially available

Table 9. Score chart for traditional foods of Christians

Sl.No	Items	Reasons	Sum of Scores					
			1	2	3	4	5	6
1	<i>Achappam</i>		60	40	100	0	0	0
2	<i>Avilosu podi/Avilosunda</i>		0	200	0	0	0	0
3	Chicken with ashgourd curry		0	0	0	0	0	0
4	<i>Inderiyappam</i>		0	0	80	20	0	0
5	<i>Kalathappam</i>		62	40	98	0	0	0
6	<i>Kaliyadakka</i>		0	0	100	0	0	0
7	<i>Karayum koorayum</i>		0	128.57	71.43	0	0	0
8	<i>Kinnathappam</i>		0	180	0	0	20	0
9	<i>Kozhimbidi</i>		100	0	0	0	0	0
10	<i>Kozhukkatta</i>		0	0	64	0	36	0
11	<i>Kuzhalappam</i>		45.24	0	107.54	0	0	47.22
12	<i>Muttappachoru</i>		100	0	0	100	0	0
13	<i>Muttayappam</i>		71.43	0	0	128.57	0	0
14	<i>Noolappam</i>		0	58.82	41.18	0	0	0
15	<i>Paachoru</i>		0	39.61	146.11	0	14.29	0
16	<i>Peecham pidi</i>		28.57	53.57	92.86	0	25	0
17	Pork with yam/plantain/jackfruit/bread fruit		0	100	0	0	0	0
18	<i>Thamukku</i>		0	200	0	0	0	0
19	<i>Vattayappam</i>		0	0	40.57	0	75.6	103.6
20	<i>Velichennappam</i>		102.94	0	47.059	0	50	0
21	<i>Vellayappam</i>		80.95	0	71.83	0	0	47.22
22	Wine		100	0	50	50	0	0

1. Don't have skill
2. Don't prefer
3. Difficult to make

4. Ingredient not available
5. Don't have time
6. Commercially available

From this list, the most endangered foods were selected by avoiding less preferred foods, commercialized foods and foods which involve ingredients which are difficult to collect and 12 least used, nutritionally viable and organoleptically acceptable traditional foods which can also be popularised were selected for replication and quality evaluation under laboratory conditions. The list of selected endangered traditional foods is given in Table 10.

Table 10. List of endangered foods selected for replication

Sl.No	Endangered foods
1	<i>Inderiyappam</i>
2	<i>Kala kala</i>
3	<i>Kaliyadakka</i>
4	<i>Karinellikka</i>
5	<i>Madhura puttu</i>
6	<i>Manda</i>
7	<i>Muttayappam</i>
8	<i>Niracha pathiri</i>
9	<i>Paniyaram</i>
10	<i>Poruvelangai</i>
11	<i>Rankayyan</i>
12	<i>Vishu katta</i>

To select the most endangered beverages, the same rating scale was applied among selected respondents and the reasons suggested for the decreasing trend in the frequency of preparation and the percentage analysis was worked out. The total scores were arrived by summation over the corresponding reasons for the decreasing trend in the frequency of preparation of the beverages. The scores thus obtained are given in Table 11. From this list, most endangered beverages were selected by avoiding less preferred beverages and ingredients which are difficult to procure and three beverages which are nutritionally viable, organoleptically acceptable and can be popularized were selected for replication under laboratory level. Thus, three traditional beverages namely *cherunaranga then vellam*, *inji paaneeyam* and *paanakam* were selected for replication and quality evaluation.

Table 11. Score chart for traditional beverages

Sl.No	Items	Reasons	Sum of scores				
			1	2	3	4	5
1	<i>Badam chaya</i>		0	0	0	100	28
2	<i>Chaya</i>		0	0	0	0	2
3	<i>Chakkara kappi</i>		0	185.71	0	0	61.14
4	<i>Chakkara vellam</i>		0	0	0	100	1
5	<i>Chambakka paaneeyam</i>		0	0	0	100	32
6	<i>Chembarathi poo paaneeyam</i>		0	0	0	87.5	47.5
7	<i>Cherunaranaga then vellam</i>		0	0	0	100	20
8	<i>Chukku kappi</i>		0	0	0	0	107
9	<i>Chukku vellam</i>		0	0	0	0	211
10	<i>Inji sherbath</i>		0	0	0	100	27
11	<i>Jeeraka vellam</i>		0	0	0	0	113
12	<i>Kaapi</i>		0	0	0	0	103
13	<i>Kachiya moru</i>		0	0	0	0	22
14	<i>Kakkarikka paaneeyam</i>		0	0	0	100	30
15	<i>Karingali vellam</i>		0	0	0	0	212
16	<i>Kashumanga paaneeyam</i>		0	0	0	42.5	72.5
17	<i>Kuruppettikapi</i>		100	0	0	0	105
18	<i>Malar kappi</i>		0	0	0	100	10
19	<i>Malar vellam</i>		0	0	0	100	16
20	<i>Malli kappi</i>		0	0	0	0	208
21	<i>Mutta chaya</i>		0	0	0	81.25	24.75
22	<i>Nalikerappal chaya</i>		0	0	0	0	129
23	<i>Nannari sherbath</i>		0	0	0	100	26
24	<i>Nellikka paaneeyam</i>		0	0	0	100	24
25	<i>Nerinjil vellam</i>		0	0	0	100	18
26	<i>Omam vellam</i>		0	0	0	100	14
27	<i>Paanakam</i>		0	0	0	100	36
28	<i>Pacha manga paaneeyam</i>		0	0	0	100	34
29	<i>Passion fruit paaneeyam</i>		100	0	0	0	133
30	<i>Pathimukham vellam</i>		0	0	0	0	223
31	<i>Palooda</i>		0	0	0	76.92	148.08
32	<i>Ramacha vellam</i>		100	0	0	100	19
33	<i>Thanni mattan paaneeyam</i>		100	0	0	0	31
34	<i>Then vellam</i>		0	0	0	100	21
35	<i>Thulasi kappi</i>		0	30	0	0	109
36	<i>Vayalchulli vellam</i>		100	0	0	100	17

1. Don't have skill

4. Ingredient not available

2. Don't prefer

5. Don't have time

3. Difficult to make

3.3.4 Replication of the selected endangered traditional foods

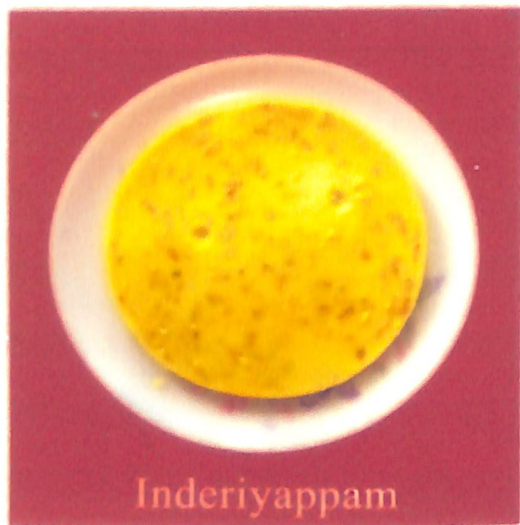
The selected endangered traditional foods were replicated under the laboratory conditions with existing facilities using the recipes collected from skilled experts. The details of the prepared foods are given in plate I to III. The details of ingredients, quantity of ingredients and the method of preparation of replicated foods and beverages are given in Appendix V.

3.3.5 Chemical composition of replicated traditional foods

The chemical constituents present in the replicated traditional foods and beverages were estimated depending upon the ingredients used for each preparation. The details of constituents estimated in each of the replicated traditional foods and beverages are presented in Table 12. All analysis were carried out in triplicate samples and the amount of each constituent is expressed in 100g of foods on Fresh Weight Basis (FWB). The constituents present in beverages are expressed per 100 ml of beverages.

Table 12. Chemical parameters analysed in the replicated traditional foods

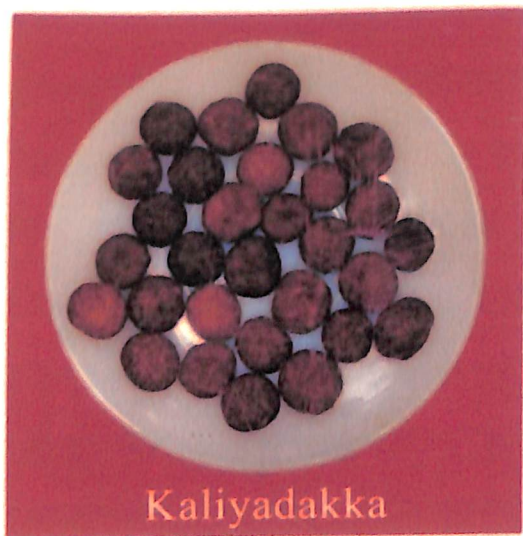
Sl.No	Endangered foods	Nutrients analysed
1	<i>Inderiyappam</i>	Moisture, Total carbohydrates, Protein, Fat, Fibre, Calcium, Iron, Sodium, Potassium
2	<i>Kala kala</i>	
3	<i>Kaliyadakka</i>	
4	<i>Madhura puttu</i>	
5	<i>Manda</i>	
6	<i>Muttayappam</i>	
7	<i>Niracha pathiri</i>	
8	<i>Paniyaram</i>	
9	<i>Poruvelangai</i>	
10	<i>Rankayyan</i>	
11	<i>Vishu katta</i>	
12	<i>Karinellikka</i>	Moisture, Total carbohydrates, Protein, Fat, Fibre, Calcium, Iron, Sodium, Potassium, Vitamin C
13	<i>Cherunaranga then vellam</i>	Acidity, Vitamin C, Calcium, Iron, Sodium, Potassium
14	<i>Inchi paneeyam</i>	
15	<i>Paanakam</i>	



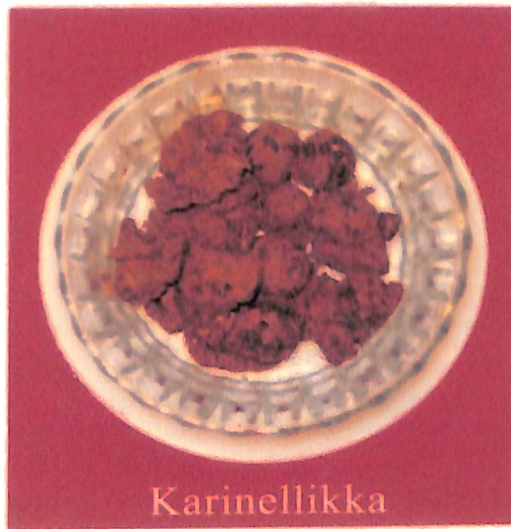
Inderiyappam



Kala kala



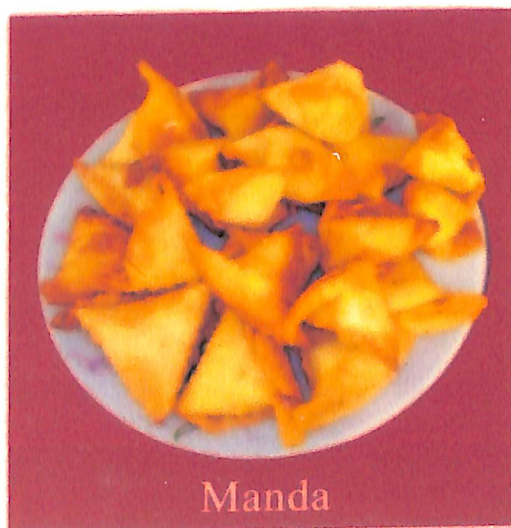
Kaliyadakka



Karinellikka

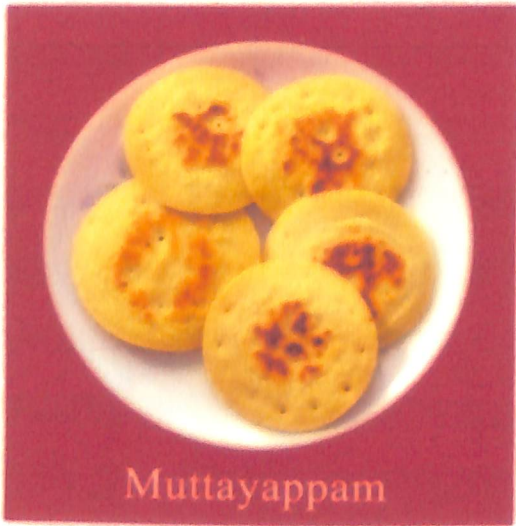


Madhura puttu

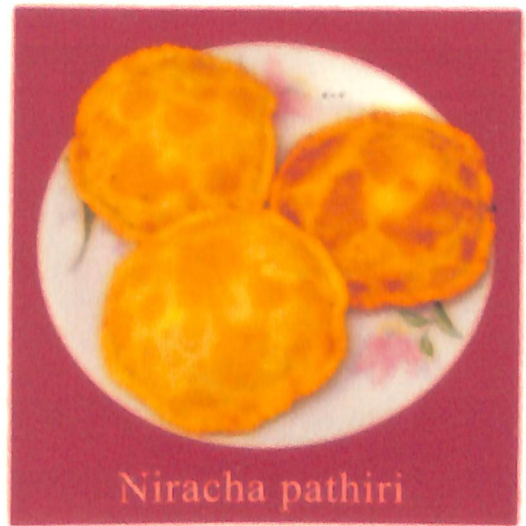


Manda

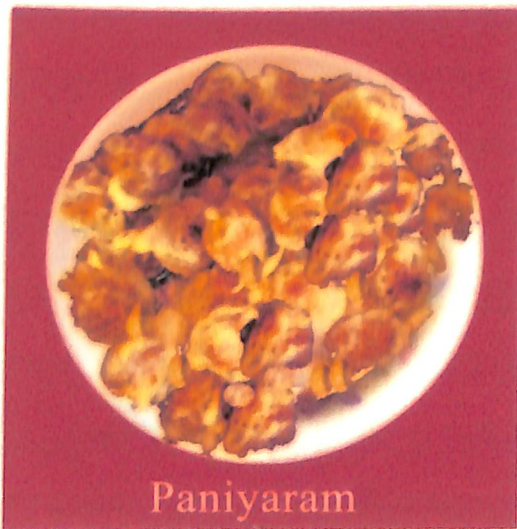
Plate I. Traditional foods selected for replication



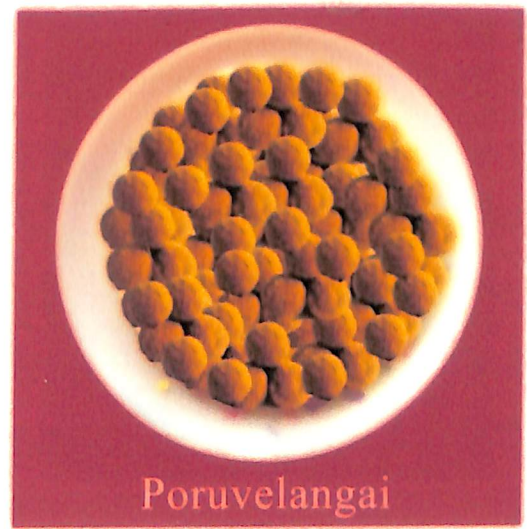
Muttayappam



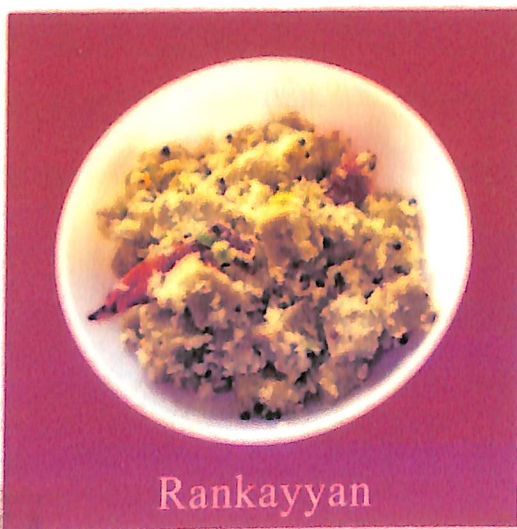
Niracha pathiri



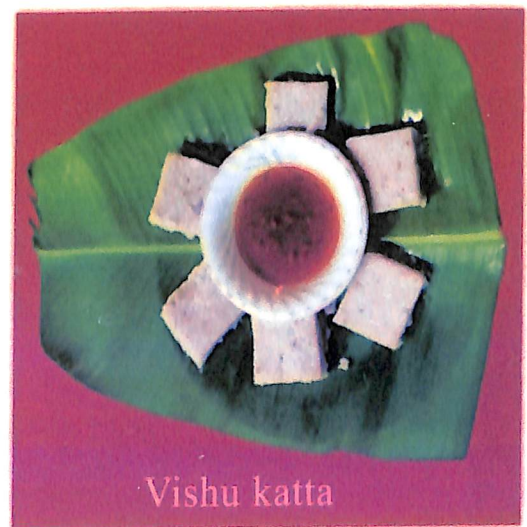
Paniyaram



Poruvelangai



Rankayyan



Vishu katta

Plate II. Traditional foods selected for replication

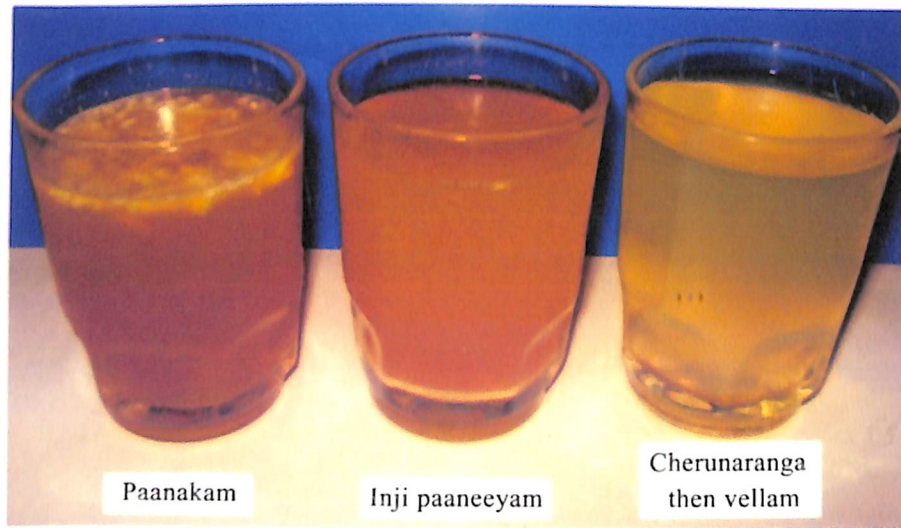


Plate III. Traditional beverages selected for replication

3.3.5.1 Moisture

The moisture content of the products was estimated by using the method of A.O.A.C (1980). To determine the moisture content, 10g of sample was taken in a petri dish and dried in a hot air oven at $110^{\circ}\text{C} \pm 5^{\circ}\text{C}$, cooled in a desiccator and weighed. The process of heating and cooling were repeated till constant weight was achieved. The moisture content of the sample was calculated from the loss in weight during drying and expressed in percentage.

3.3.5.2 Total carbohydrates

The total carbohydrate content was analysed colorimetrically using anthrone reagent (Sadasivam and Manickam, 1992). The powdered and dried sample was hydrolysed with 5 ml of 2.5 N hydrochloric acid and then cooled to room temperature. The residue was then neutralised with sodium carbonate until the effervescence ceases. Made up the volume to 100 ml and centrifuged. Pipetted 0.5 ml of supernatant and made up to 1 ml with distilled water and added 4 ml anthrone reagent and heated for eight minutes, cooled rapidly and the intensity of green to dark green colour were read at 630 nm. A standard graph was prepared using standard glucose at serial dilutions and glucose content was found out from the standard graph. Then, it was converted to the amount of total carbohydrates present in the sample and converted to fresh weight basis.

3.3.5.3 Protein

The estimation of protein content was done using the method of A.O.A.C (1980). The sample (0.3g) was digested with 6 ml Con H_2SO_4 after adding 0.4 g of CuSO_4 and 3.5 g K_2SO_4 in a digestion flask until the colour of sample was converted to green. After digestion it was diluted with water and 25 ml of 40 per cent NaOH was pumped. The distillate was collected in 2 per cent boric acid containing mixed indicators and then titrated with 0.2 N HCl.

3.3.5.4 Fat

The fat content of the sample was estimated using the method of A.O.A.C (1955). Five gram of sample was taken in a thimble and plugged with cotton. The material was extracted with petroleum ether for 6 hours without interruption by gentle heating in a soxhlet apparatus. Extraction flask was then cooled, and ether was removed by heating and weight was taken. The fat content was expressed in $\text{g } 100 \text{ g}^{-1}$ of the sample.

3.3.5.5 Fibre

The crude fibre content was estimated by acid-alkali digestion method as suggested by Chopra and Kanwar (1978).

Two gram of sample was boiled with 200 ml of 1.25 per cent sulphuric acid for 30 minutes. It was filtered through a muslin cloth and washed with boiling water and again boiled with 200 ml of 1.25 percent sodium hydroxide for 30 minutes. Repeated the filtration through muslin cloth and washed with sulphuric acid, water and alcohol in a sequential manner. The residue was transferred to a pre-weighed ashing dish and ignited for 30 minutes in a muffle furnace at 600°C , cooled in a desiccator and weighed. The fibre content of the sample was calculated from the loss in weight on ignition.

3.3.5.6 Calcium

The calcium content was estimated using titration method with EDTA as suggested by Page (1982).

One gram of dried and powdered sample of food stuff /one ml of beverage was predigested with 12 ml of 9:4 mixture of nitric acid and perchloric acid and volume was made up to 100 ml. Ten ml of diacid extract was taken, added 10 ml water, 10 drops of hydroxylamine, 10 drops of triethanol amine and 2.5 ml of NaOH and 10 drops of calcone. Then, it was titrated with 0.02N EDTA until the appearance of permanent

blue colour. The calcium content was expressed in mg per 100g of food or 100 ml of beverage.

3.3.5.7 Iron

The iron content was analysed colorimetrically using ferric iron as standard which gives a blood red colour with potassium thiocyanate as suggested by Raghuramulu *et al.* (2003).

To an aliquot of 6.5 ml diacid solution one ml of 30 per cent sulphuric acid, one ml of 7 per cent potassium persulphate solution and 1.5 ml of 40 per cent potassium thiocyanate solution were added. The intensity of the red colour was measured within twenty minutes at 540nm and expressed in mg per 100 g of food or 100 ml of beverage.

3.3.5.8 Sodium

The sodium content was estimated using flame photometer as suggested by Jackson (1973). The diacid solution was directly fed in the flame photometer and converted to fresh weight basis and expressed in mg per 100 g of food or 100 ml of beverage.

3.3.5.9 Potassium

The potassium content was estimated using flame photometer as suggested by Jackson (1973). One ml of the diacid solution was made up to 25 ml and read directly in flame photometer and potassium content was expressed in mg per 100 g of food or 100 ml of beverage.

3.3.5.10 Vitamin C

The vitamin C content of sample was estimated by the method of Sadasivam and Manickam (1992) using 2, 6 dichlorophenol indophenol dye. One gram of fresh sample and 5 ml of traditional beverages were extracted in four percent oxalic acid using a mortar and pestle and the filtrate was made up to 100 ml with four per cent oxalic acid. Five ml of extract was pipetted, added 10 ml of four percent of oxalic acid and titrated against the dye. Ascorbic acid content of fresh sample was calculated from the titer value.

3.3.5.11 Acidity

Titration acidity of the selected traditional beverages was estimated by titration method with 0.1N Sodium Hydroxide using phenolphthalein indicator (Ranganna, 1986) and expressed the acidity as gram of citric acid per 100 ml of beverage.

3.3.6 Organoleptic qualities of replicated traditional foods

Organoleptic qualities of the replicated traditional foods were conducted using nine point hedonic scale with a panel of 10 selected judges.

3.3.6.1 Selection of judges for acceptability studies

A series of acceptability trials were carried out using simple triangle test as suggested by Jellinek (1985) and a panel of ten untrained judges between the age group of 18-35 years were selected to conduct the organoleptic evaluation.

3.3.6.2 Preparation of score card

Score card based on nine point hedonic scale was prepared for organoleptic evaluation and the score card is given in Appendix VI.

3.3.7 Quality evaluation of replicated traditional foods during storage

The traditional food items were packed in polyethylene bags (250 gauges) (PE), polyethylene lined laminated aluminum pouches (PLM), glass bottles, PET jars (PT) and under vacuum (VP) depending upon the suitability of the package for each product and stored under ambient conditions or ambient as well as refrigerated conditions. The organoleptic evaluation and microbial enumeration of the replicated foods packed in suitable packaging materials were conducted at frequent intervals. The details of the packaging materials, storage conditions and the frequency at which observations on microbial count and organoleptic qualities were taken are given in Table 13.

3.3.7.1 Organoleptic evaluation of the replicated traditional foods during storage

The organoleptic evaluation of the replicated traditional foods packed in different packaging materials and stored under ambient and refrigerated conditions at specified intervals were conducted as explained in 3.3.6.

3.3.7.2 Microbial enumeration of the replicated traditional foods during storage

The total plate count of fungi, bacteria and yeast in the replicated traditional foods packed in different packaging materials and stored under ambient and refrigerated conditions at specified intervals were enumerated by routine procedure of serial dilution and plate count method as described by Agarwal and Hasija (1986). Nutrient agar medium, potato dextrose medium and YPS medium were used for estimating the count of bacteria, fungi and yeast respectively. The dilution used for bacteria was 10^{-5} and for fungi and yeast the dilution used was 10^{-3} .

pH of the food and beverages was determined using pH meter.

Table 13. Packaging materials, storage conditions and the intervals of observations taken during storage of traditional foods

Product	Type of packaging materials	Storage condition	Intervals of observation during storage
<i>Inderiyappam</i>	PE,PLM	Ambient & Refrigerated	Daily up to 3 rd day.
<i>Kala kala</i>	PE,PLM,VP	Ambient	Weekly up to 7 th week.
<i>Kaliyadakka</i>	PE,PLM,VP	Ambient	Monthly up to 5 th month.
<i>Karinellikka</i>	PE,PLM,PT	Ambient & Refrigerated	Monthly up to 6 th month.
<i>Madhura puttu</i>	PE,PLM	Ambient & Refrigerated	Alternate days up to 7 th day.
<i>Manda</i>	PE,PLM,VP	Ambient	Weekly up to 6 th week.
<i>Muttayappam</i>	PE,PLM	Ambient & Refrigerated	Daily up to 3 rd day.
<i>Niracha pathiri</i>	PE,PLM,VP	Ambient & Refrigerated	Daily up to 3 rd day.
<i>Paniyaram</i>	PE,PLM,VP	Ambient	Alternate days up to 5 th day.
<i>Poruvelangai</i>	PE,PLM,VP	Ambient	Monthly up to 6 th month.
<i>Rankayyan</i>	PE,PLM	Ambient & Refrigerated	Daily up to 3 rd day.
<i>Vishu katta</i>	PE,PLM	Ambient & Refrigerated	Daily up to 4 th day.
<i>Cherunaranga then vellam</i>	Glass bottle	Ambient & Refrigerated	Daily up to 3 rd day.
<i>Inji paaneeyam</i>	Glass bottle	Ambient & Refrigerated	Daily up to 3 th day.
<i>Paanakam</i>	Glass bottle	Ambient & Refrigerated	Daily up to 3 th day.

PE-polyethylene bags (250 gauge)

VP-vacuum packing

PLM- polyethylene lined laminated aluminium pouch PT-pet jar

3.3.8 Computation of cost of production of the replicated traditional foods

The total cost of production of traditional foods replicated at the laboratory level was computed by taking into account the cost of different ingredients, fuel and labour charges and the cost is expressed in Rs/1kg. The cost of beverages is expressed in Rs /200 ml.

3.4 Analysis of data

Statistical analysis was done using Kendall's Coefficient of Concordance (W) and Friedman's test which expresses the degree of association among the ten judges for each product under study.

Results

4. RESULTS

Results of the present study on “Documentation and quality evaluation of selected traditional foods of central zone of Kerala” are presented in this chapter under the following headings

- 4.1 Traditional food habits of different communities
- 4.2 Transition in the traditional food habits and traditional foods
- 4.3 Quality evaluation of selected replicated traditional foods
 - 4.3.1 Chemical composition of selected replicated traditional foods
 - 4.3.2 Organoleptic qualities of selected replicated traditional foods
 - 4.3.3 Microbial count and shelf life of selected replicated traditional foods
- 4.4 Cost of production of traditional foods

4.1 Traditional food habits of different communities

Traditional food habits of the respondents of different communities were ascertained with respect to the preference for traditional foods, reasons for the preference, frequency of preparation of traditional foods, traditional foods prepared during special occasions, religious festivals, rituals and physiological conditions, traditional preserved foods prepared at home, frequency of purchase of traditional foods, and details of traditional kitchen utensils and equipments used.

4.1.1 Details regarding preference for traditional foods

The details regarding the preference for traditional foods among different communities are given in Table 14.

Table 14. Preference for traditional foods

Communities (n)	Preference for traditional foods	
	Preferred	Not preferred
KB (30)	30 (100.00)	-
TB (35)	35 (100.00)	-
EZ (35)	33 (94.29)	2 (5.71)
HI(PKD) (40)	40 (100.00)	-
SC (36)	22 (61.11)	14 (38.89)
MU (36)	32 (88.89)	4 (11.11)
CH (35)	35 (100.00)	-
Total (247)	227 (91.90)	20 (8.10)

Numbers in parenthesis are percentage.

It was found that all respondents of Kerala Brahmin, Tamil Brahmin, Hindus of Palakkad and Christians preferred traditional foods. Majority of the respondents in Ezhava (94.29%), Scheduled Caste, (61.11%), and Muslim (88.89%) communities also gave preference to traditional foods.

The reasons indicated by the respondents for the preference given for traditional foods are presented in Table 15.

Table 15. Reasons for preference of traditional foods

Reasons	KB (n=30)	TB (n=35)	EZ (n=33)	HI(PKD) (n=40)	SC (n=22)	MU (n=32)	CH (n=35)	Total (n=227)
Healthy	23 (76.67)	23 (65.71)	27 (81.82)	40 (100.00)	14 (63.64)	-	14 (40.00)	141 (62.11)
Tasty	20 (66.67)	14 (40.00)	4 (12.12)	24 (60.00)	2 (9.09)	20 (62.50)	35 (100.00)	119 (52.42)
No adulteration	15 (50.00)	15 (42.86)	33 (100.00)	36 (90.00)	16 (72.73)	22 (68.75)	20 (57.14)	157 (69.16)
Less expensive	10 (33.33)	-	-	19 (47.50)	-	-	-	29 (12.78)
Ingredients are locally produced	-	-	-	28 (70.00)	-	-	18 (51.43)	46 (20.26)

Numbers in parenthesis are percentage.

All respondents belonging to the Hindus of Palakkad who gave preference to traditional foods indicated that they preferred traditional foods because of their health benefits and all the Christians preferred traditional foods since they are very tasty. Most of the respondents who preferred traditional foods indicated that they preferred traditional foods since they are not adulterated.

Among 227 respondents who preferred traditional foods 62.11 and 52.42 per cent of respondents considered that they are healthy and tasty and 69.16 and 12.78 per cent preferred traditional foods due to their purity without any adulteration and low cost.

4.1.2 Frequency of preparation of traditional foods

The frequency of preparation of different traditional foods by the different communities for breakfast, lunch and snacks are given in Table 16a, 16b and 16c respectively.

From Table 16a it is clear that all respondents of Kerala Brahmin and Scheduled Caste communities prepared traditional food items daily for breakfast. Majority of the respondents belonging to Tamil Brahmin (88.57%), Ezhava (65.72%), Hindus of Palakkad (82.50%) and Christian (91.43 %) communities also prepared traditional breakfast items daily. However, only 47.22 per cent of respondents belonging to Muslim community prepared traditional food items daily for breakfast. Altogether it was found that 81.78 per cent of respondents prepared traditional food items daily for breakfast.

It was found that all the respondents from the different communities prepared traditional food items daily for lunch (Table 16b).

Regarding the frequency of preparation of traditional snack items (Table 16c) it was found that only 11.43 per cent of respondents belonging to Tamil Brahmin

community prepared traditional snack items daily. Among Kerala Brahmins, 33.33 per cent prepared snack items thrice in a week and 36.67 per cent prepared once in a week. It was found that 50 per cent of Muslim respondents also prepared snack items once in a week. Most of the Christian (62.86%) and Scheduled Caste (55.56%) respondents prepared traditional snack items only occasionally. Altogether, it was found that 33.60 per cent and 30.37 per cent of respondents prepared traditional snack items once in a month and occasionally respectively and 23.48 per cent prepared once in a week.

Table 16a. Frequency of preparation of traditional items for breakfast

Frequency	KB (n=30)	TB (n=35)	EZ (n=35)	HI(PKD) (n=40)	SC (n=36)	MU (n=36)	CH (n=35)	Total (n=247)
Daily	30 (100.00)	31 (88.57)	23 (65.72)	33 (82.50)	36 (100.00)	17 (47.22)	32 (91.43)	202 (81.78)
Weekly thrice	-	4 (11.43)	9 (25.71)	7(17.50)	-	14 (38.89)	3 (8.57)	37 (14.98)
Weekly twice	-	-	3 (8.57)	-	-	5 (13.89)	-	8 (3.24)

Numbers in parenthesis are percentage.

Table 16b. Frequency of preparation of traditional items for lunch

Frequency	KB (n=30)	TB (n=35)	EZ (n=35)	HI(PKD) (n=40)	SC (n=36)	MU (n=36)	CH (n=35)	Total (247)
Daily	30 (100.00)	35 (100.00)	35 (100.00)	40 (100.00)	36 (100.00)	36 (100.00)	35 (100.00)	247 (100.00)

Numbers in parenthesis are percentage.

Table 16c. Frequency of preparation of traditional snack items

Frequency	KB (n=30)	TB (n=35)	EZ (n=35)	HI(PKD) (n=40)	SC (n=36)	MU (n=36)	CH (n=35)	Total (n=247)
Daily	-	4 (11.43)	-	-	-	-	-	4 (1.62)
Weekly thrice	10 (33.33)	-	-	-	-	-	-	10 (4.05)
Weekly twice	-	8 (22.86)	5 (14.28)	-	-	4 (11.11)	-	17 (6.88)
Weekly once	11 (36.67)	-	4 (11.43)	12 (30.00)	8 (22.22)	18 (50.00)	5 (14.28)	58 (23.48)
Monthly	9 (30.00)	10 (28.57)	18 (51.43)	16 (40.00)	8 (22.22)	14 (38.89)	8 (22.86)	83 (33.60)
Occasionally	-	13 (37.14)	8 (22.86)	12 (30.00)	20 (55.56)	-	22 (62.86)	75 (30.37)

Numbers in parenthesis are percentage.

Details regarding the frequency of preparation of traditional beverages and health foods are furnished in Table 16d and 16e respectively.

Table 16d. Frequency of preparation of traditional beverages

Frequency	KB (n=30)	TB (n=35)	EZ (n=35)	HI(PKD) (n=40)	SC (n=36)	MU (n=36)	CH (n=35)	Total (n=247)
Daily	20 (66.67)	35 (100.00)	35 (100.00)	35 (87.50)	6 (16.66)	36 (100.00)	35 (100.00)	202 (81.78)
Occasionally	10 (33.33)	-	-	5 (12.50)	15 (41.67)	-	-	30 (12.15)
Never	-	-	-	-	15 (41.67)	-	-	15 (6.07)

Numbers in parenthesis are percentage.

It was found that 81.78 per cent of respondents prepared traditional beverages daily (Table 16.d). All respondents of Tamil Brahmin, Ezhava, Muslim and Christian communities and majority of Kerala Brahmins (66.67%) and Hindus of Palakkad (87.5%) prepared traditional beverages daily. Only 16.66 per cent of Scheduled Caste respondents prepared traditional beverages daily, and 41.67 per cent prepared only occasionally. It was also seen that 41.67 per cent of Scheduled Caste respondents did not prepare traditional beverages at home.

Table 16e. Frequency of preparation of traditional health foods

Frequency	KB (n=30)	TB (n=35)	EZ (n=35)	HI(PKD) (n=40)	SC (n=36)	MU (n=36)	CH (n=35)	Total (n=247)
Occasionally	22 (73.33)	-	-	31 (77.50)	8 (22.22)	32 (88.89)	7 (20.00)	100 (40.49)
Never	8 (26.67)	35 (100.00)	35 (100.00)	9 (22.50)	28 (77.78)	4 (11.11)	28 (80.00)	147 (59.51)

Numbers in parenthesis are percentage.

Details of frequency of preparation of different health foods by different communities (Table 16e) indicated that none of the respondents of Tamil Brahmin and Ezhava communities prepared traditional health foods at home. Majority of Scheduled Caste (77.78%) and Christian (80%) respondents also did not prepare traditional health foods at home. About 73.33 per cent of Kerala Brahmin, 77.50 per cent of Hindus of Palakkad and 88.89 per cent of Muslim respondents indicated that they prepared traditional health foods at home occasionally.

Table 16f. Frequency of preparation of traditional preserved foods

Frequency	KB (n=30)	TB (n=35)	EZ (n=35)	HI(PKD) (n=40)	SC (n=36)	MU (n=36)	CH (n=35)	Total (n=247)
Monthly	18 (60.00)	13 (37.14)	5 (14.29)	14 (35.00)	-	-	-	50 (20.24)
Occasionally	12 (40.00)	15 (42.86)	5 (14.29)	26 (65.00)	20 (55.56)	22 (61.11)	35 (100.00)	135 (54.66)
Never	-	7 (20.00)	25 (71.42)	-	16 (44.44)	14 (38.89)	-	62 (25.10)

Numbers in parenthesis are percentage.

Details regarding the frequency of preparation of traditional preserved foods (Table 16f) by the respondents indicated that 60 per cent of Kerala Brahmins, 37.14 per cent of Tamil Brahmins and 35 per cent of Hindus of Palakkad prepared preserved food items once in a month. All respondents of Christian community, and majority of Hindus of Palakkad (65%), and Muslim (61.11%) communities prepared such food items less

frequently. It was found that 20 per cent of Tamil Brahmin, 71.42 per cent of Ezhava, 44.44 per cent of Scheduled Caste and 38.89 per cent of Muslim respondents did not preserve any food at home. Of the total respondents under study, 54.66 per cent prepared traditional preserved food items occasionally and 20.24 per cent prepared once in a month.

4.1.3 Traditional foods prepared during special occasions

Traditional foods prepared during special occasions by different communities are detailed in Table 17 to 22.

4.1.3.1 Kerala Brahmins

Traditional foods prepared in connection with special occasions of Kerala Brahmin community are presented in Table 17.

Table 17. Traditional food items prepared by Kerala Brahmins on special occasions

Occasion	Items
<i>Annaprasam</i>	<i>Ada, appam, aval and malar in jaggery syrup, sadya</i>
Birthday <i>Ayani oonu</i>	<i>Ada, appam, sadya</i>
Marriage <i>Namakaranam</i> <i>Upanayanam</i>	<i>Sadya</i>
Death	<i>Adiyanthira sadya</i>
<i>Shradham</i>	<i>Shradha sadya</i>

Traditional Kerala *sadya*, the legendary vegetarian feast was served during marriage, *namakarana* (naming ceremony), *upanayanam* (sacred thread ceremony), *annaprasam* (giving solid food to the infant for the first time) and for birthday. Among

Kerala Brahmin families, there exists a custom called *ayani oonu* on the previous day of marriage which was performed separately at bride's and bridegroom's houses. For this, special items like *ada*, *appam* and traditional *sadya* were prepared.

Ada, a traditional rice based snack was also served as the breakfast item for the person whose birthday is celebrated. For lunch, the traditional *sadya* was served along with *payasam*. The traditional naming ceremony *namakaranam* was celebrated in households by serving the traditional *sadya* for the guests. For the auspicious *annaprasa* ceremony conducted on the sixth month of the new born baby special dishes like *ada*, *appam*, *aval*, and *malar* in jaggery syrup, were prepared as *naivedyam* and offered to God. Later, these items were distributed to the guests. The special dishes served to the baby whose *annaprasa* ceremony was performed included cooked raw rice (not less than 3 *nazhi*), *pulissery* added with pepper, *erissery* using banana, yam or ash gourd, *olan*, fried yam, fried banana, *sharkkaravaratty*, *injithairu*, ginger pieces, *pazham nurukku*, and *ada pradhanam*. The specialty about the preparations of *annaprasa* ceremony was that all fried items and seasonings were done in pure ghee and all items were prepared in the traditional vessel - *uruli*. The *sadya* served to the guests was same as that of traditional Kerala *sadya*.

Specific restrictions were observed by family members during the death of a person in the family. Widows were restricted from taking rice based foods and salt. The days of mourning were called *pula* which was called as *uppu pula* during ancient times in which the use of salt was restricted among all family members. On the 12th day of demise, *adiyanthiram* was conducted and prepared *ada* and *appam* and traditional *sadya*. Kerala Brahmins avoided *sambar*, *papadam*, and *pal payasam* for *adiyanthira sadya* and included yam, colocasia and plantain as the major ingredients in curries. Use of onion, garlic, asafoetida and vegetables other than those commonly cultivated in Kerala like carrot, cabbage and beans were also avoided.

For the annual *shradha* ceremony of Kerala Brahmins, the special dishes like *pulissery*, *olan*, *kalan* and *erissery* were prepared for *shradha sadya* using fresh

vegetables like yam, colocasia, cowpea, ash gourd etc without adding turmeric powder, chilly powder, onion, garlic, asafoetida, and seasonings. However, pepper was added to all curries as an essential ingredient. For *shradha sadya*, Kerala Brahmins insisted on serving raw white rice called *kavyam. Injithairu* without adding chillies and *pazham nurukku*, banana chips, bread fruit chips and colocasia chips were also served. All items were prepared in brass or wooden vessels using ghee. *Ada pradhaman* with jaggery and coconut milk was a compulsory item for *shradha sadya*. It was found that *appam* and *ada* were served in almost all special occasions of Kerala Brahmins.

4.1.3.2 Tamil Brahmins

Details on the different traditional food items prepared by the Tamil Brahmin community on special occasions are detailed in Table 18.

Marriage celebrations of Tamil Brahmins lasted for four days and during all these days traditional food items like *murukku*, *laddu*, *thenkozhai*, *appam*, *manoharam*, *therattipal* and *kutty* were prepared. Odd number of traditional food items were brought from the bride's house to the marriage venue, the number and variety of which correlated with the economic status of the bride's family. There was a custom of preparing cone shaped structure with different food items like *laddu*, groundnut, *pottukadala*, *appam*, *muthusaram* etc. which were commonly called as *kutty*. These will be exhibited on the marriage venue on the wedding day. A traditional *sadya* was served to the invited guests. After marriage, the bride brought varieties of sweets and savouries, known as *cheeru* to the bridegroom's house.

Puliyoonu, *valakaapu* and *seemantham*, were the important functions conducted during pregnancy. For *puliyoonu*, Tamil Brahmins prepared five different types of rice commonly called *chitrannam* comprising of *manjal sadam*, *thengai sadam*, *pulinjadam*, *elimbicham sadam*, and *thairu sadam*. *Valakaappu* was performed on the fourth month and *seemantham* during the sixth month of pregnancy. For both, different sweets and savouries were prepared. *Poruvelangai* made up of roasted and powdered rice, wheat

and green gram was the focal food item for *seemantham* and *valakappu*. For *jatha karma* of a new born baby, which was conducted on the 7th day after delivery, Tamil Brahmins distributed different raw and cooked food grains to poor for the health and well being of the new born baby. During this occasion, special items like *kapparasi*, *neyyappam*, and other sweets and savouries were prepared.

Table 18. Traditional food items prepared by Tamil Brahmins on special occasions

Occasion	Items
Marriage	<i>Parippu thengai kutty, laddu, murukku, muthusaram, mysorepak, appam, therattipal, thengai therattipal, athirasam, and traditional sadya</i>
<i>Puliyoonu</i>	Different types of <i>sadam</i> like <i>thengai sadam, pulinjadam, elimbicham sadam, thairu sadam, manjal sadam</i>
<i>Valakappu</i>	<i>Pokavada, poruvelangai</i>
<i>Seemantham</i>	<i>Murrukku, muthusaram, laddu, mysorepak, poruvelangai, therattipal, thengai therattipal</i>
<i>Jatha karma</i>	<i>Kapparasi, neyyappam, laddu, murukku, muthusaram, mysorepak, manoharam, therattipaal, thengai therattipal</i>
Cradling ceremony	<i>Appam, cowpea in jaggery syrup, laddu, murukku, muthusaram, mysorepak, manoharam, therattipal, thengai therattipal</i>
<i>Namakarana</i>	<i>Laddu, murukku, muthusaram, mysorepak, manoharam, therattipal, thengai therattipal</i>
<i>Annaprasa</i> ceremony	<i>Ada and appam, laddu, murukku, muthusaram, mysorepak, manoharam, therattipal, thengai therattipal</i>
When child crosses the door step for the first time	<i>Ammini kozhukkattai</i>
Death (<i>shradham</i>)	<i>Sadya, ellunda, appam, modakam, vadai, ubbittu</i>

When the child was cradled for the first time, Tamil Brahmins celebrated the cradling ceremony with special items like *appam*, cowpea in jaggery syrup and sweets and savouries. For *annaprasa* ceremony, *ada* and *appam* were prepared. A special dish called *ammini kozhukkatai* was prepared by Tamil Brahmins on the day when the baby crossed the door step for the first time. Special sweets and savoury items like *laddu*, *murukku*, *muthusaram*, *mysorepak*, *therattipal*, *thengai therattipal*, *manoharam* were also prepared and distributed on the occasion of *jatha karma*, cradling ceremony, *namakaranam* and *annaprasam*.

For *upanayanam*, the boy was fed with *pongal sadam* called *manja pongal* in addition to the preparation of an elaborate *sadya*.

During the death of a family member, for *adiyanthira sadya*, Tamil Brahmins avoided red gram dhal, red chilly, coconut and coconut oil in dishes and included moong dhal, pepper and ghee. Locally available vegetables like yam, colocasia, coleus, jackfruit, raw plantain etc. were the ingredients used in curries. *Putharichunda thoran* was considered as an essential item for *shradha sadya*. The other major items included *morukootan*, *idiyanchakka thoran*, and *pachadi* along with cooked rice. Special items like *ellunda*, *neyyappam*, *sukhiyan*, *vadai*, *modakam*, *thenkuzhal*, and *ubbittu* were also prepared for *shradham*.

4.1.3.3 Ezhavas

The details of traditional food items prepared by Ezhava community on special occasions are presented in Table 19.

For marriage, *peridal*, *cheroonu*, and birthday, Ezhava community also prepared *sadya* in which major items included rice, *pulinkary*, *kutherissery*, *erupuli*, *olan*, *injipuli* and pickle. *Sadya* was given for the invited guests and relatives. *Chakkarachoru* was served as a dessert item instead of *payasam*. For marriage, different types of plantains

were also served to proclaim the agricultural background of the bride's family. The bride also carried *velichennappam*, banana *murukku* and *unda* to the bridegroom's house.

During death, fasting was observed until cremation, after which *kanji* or black tea prepared at a nearby house was served to the family members. On sixteenth day after the death of a family member, *adiyanthiram* was conducted with *sadya* almost similar to marriage *sadya* avoiding *papadam*, *plantain* and *payasam*.

Table 19. Traditional food items prepared by Ezhavas on special occasions

Occasion	Items
Marriage, <i>Peridal</i> , <i>Choroonu</i> , Birthday	<i>Sadya</i>
<i>Adiyanthiram</i>	<i>Adiyanthira sadya</i>
<i>Shradham</i>	<i>Shradha sadya</i>

4.1.3.4 Scheduled Castes

Details on the traditional food items prepared by the Scheduled Caste on special occasions are presented in Table 20.

Table 20. Traditional food items prepared by Scheduled Castes on special occasions

Occasion	Items
Marriage	<i>Sadya</i>
<i>Adiyanthiram</i>	<i>Adiyanthira sadya</i>
<i>Shradham</i>	<i>Shradha kanji</i> , <i>shradha puzhukku</i>

The marriage *sadya* of Scheduled Castes consisted of rice, *morucurry* or *pulinkary* and *puzhukku* made up of jack fruit, tubers like *kavath*, *kachil*, *cherukizhangu* and yam, *pulinji* and pickle. For *choroonu* ceremony, only cooked and mashed raw rice

was fed to the child and cooked rice with *pulinkary* and *puzhukku* were served to the guests. Toddy was served in coconut shells on special occasions.

During death of a family member, toddy and tapioca *puzhukku* were served for gents after cremation and black tea and tapioca *puzhukku* were served for women and children. There was a practice of bringing vegetables and grains by the relatives and on fifteenth day, Scheduled Caste community arranged a feast in which a *sadya* was prepared using the vegetables and grains brought by the relatives. The major items for *shradham* included *shradha kanji* and *puzhukku*.

4.1.3.5 Muslims

Traditional food items prepared during special occasions by the Muslim community are presented in Table 21.

Table 21. Traditional food items prepared by Muslims on special occasions

Occasion	Items
Marriage	<i>Pathiri</i> , <i>neichoru</i> , <i>biriyani</i> , meat preparations
5 th and 7 th day day of demise	<i>Kurru kurukkal</i>
40 th day of demise	Ghee rice and beef curry
Birthday	Meals with non vegetarian items

Muslim community gave importance to a variety of dishes on occasions related to marriage. Traditionally, the feast given for guests during marriage included items like *neichoru*, *pathiri*, beef curry or any other meat preparations and *biriyani*. During *puthiyapla salkkaram*, organized in bride's house after marriage, variety of dishes like *unnakkaya*, *pazham nirachathu*, *mutta mala*, *mutta surukka*, *mutta marichathu*, *kozhi nirachathu*, *valayappam*, *tharippola*, *pinjanathappam*, *kalathappam* and different types of *pathiri*, were prepared for treating *puthiyapla* (bride groom).

On the 40th day of the birth of a child, Muslim community removed baby's hair completely and on this day, raw meat was distributed to close relatives.

Birthdays were celebrated only in high income families during which time, meat preparations were included along with the major meals of the day.

During death of a family member, *kanji* or cooked rice along with one or two vegetarian curries were served. On the seventh or fifteenth day of demise, a special porridge was prepared out of raw rice flour and jaggery syrup, which was called *kurry kurukkuka*. On the 40th day, ghee rice and beef curry were prepared and distributed to close relatives and family members.

4.1.3.6 Christians

The details of traditional foods prepared by the Christian community during special occasions are presented in Table 22.

Table 22. Traditional food items prepared by Christians on special occasions

Occasion	Items
Betrothal, Marriage, Birth day, Baptism, Holy communion	Traditional Christian non vegetarian <i>sadya</i>
Death	<i>Kanji</i>
7 th day after demise	Vegetarian meals
40 th day after demise Annual remembrance day	Non Vegetarian meals

For betrothal function, *paachoru* was served first followed by *appam* and stew. Later, regular Christian *sadya* with all non vegetarian dishes was served.

On the previous day of marriage, a dinner with rice and *botti* (curry made up of intestine of cattle) *varutharacha curry*, *puzhukku* with plantain, yam and *kavath* was a usual practice. On marriage day, a traditional item called *paachoru* was served as breakfast item along with a meat curry. Families of low income groups served *kanji* and beef *ularthu*. Serving *avilosu podi*, *achappam* and *kuzhalappam* along with *paachoru* were also common among Christian community on marriage day.

After marriage, a *sadya* was served with non vegetarian items. Traditionally, the first item served was either *paachoru* or *venpaachoru* for marriage *sadya*. After that rice was served with chicken curry to which ash gourd pieces were added, along with pork *ularthiyathu*, fish *peerai*, beef fry and *morucurry*. Along with this, there was a custom of serving different types of plantains also. Christian community also served a dessert called *panambani* prepared from fermented jaggery syrup, plantain and sugar. *Kozhimbidi* was also prepared as a special non vegetarian item for functions related to betrothal and marriage. *Achappam*, *kuzhalappam*, *vattayappam*, *vellayappam*, *avilosu podi*, *avilosunda* were also prepared on different occasions like betrothal and marriage for treating guests.

During the death of a family member, *kanji* was prepared and served to the family members and relatives along with cowpea *thoran* and *uppilittathu* as the side dishes, after cremation. On the 7th day of demise, a mediocre vegetarian *sadya* was served for the close relatives. Christian communities prepared only vegetarian dishes until 40th day of demise and they avoided curd, ghee, milk, egg, butter milk and liquor till 40th day. On the 40th day, a typical traditional non vegetarian Christian *sadya* was given to the relatives. For the annual remembrance day also a traditional non vegetarian *sadya* was prepared.

4.1.4 Traditional foods of different communities in connection with religious festivals/rituals.

Details of the traditional food items prepared by different communities during religious festivals/rituals are furnished from Table 23 to Table 28.

4.1.4.1 Kerala Brahmins

To celebrate Kerala's prime festival *Onam*, Kerala Brahmins made *ada* as an offering to *thrikkakkarayappan* a God of Hindu mythology (Table 23). Rice flakes, *karolappam*, puffed rice, banana, *kadali pazham* etc. were also kept as *naivedyam* for the God and later all these items were distributed among family members. From *Atham* onwards, *sadya*, the traditional feast was prepared with the most elaborate *sadya* on the day of *thiruvonam*. On all these days *ada*, *karolappam*, *pazham puzhungiyathu*, *varuthupperi* and *sharkkaravaratty* were prepared till fourth *Onam* that is fourth day after *thiruvonam*.

Vishu was celebrated by preparing either *vishu kanji* or *vishu puzhukku* in which the major ingredient was jack fruit. *Sadya* was served for lunch on the day of *vishu*.

For *navarathri*, *neypayasam* was prepared daily for nine days. Rice flakes, puffed rice, *karolappam* and *ada* were also prepared during *navarathri* days. For *thiruvathira*, rice and rice based foods were avoided and only fruits and tender coconut water were consumed. Special preparations like *koova kurukku* made up of arrow root flour as the basic ingredient and *ettangadi puzhukku* also known as *thiruvathira puzhukku* using different types of tubers available in the backyard of ancient Kerala homesteads were also prepared for *thiruvathira*. For *ekadashi* also rice preparations were avoided and *ekadashi kanji* using wheat, *chama* or ragi and fruits like mango, guava, plantain and tender coconut water were consumed. *Vrathas* like *somavara vratham*, *shashti*, *sivarathri* and *pradosha vratham* were also observed and characterized by partial or complete restriction of rice based food preparations. Onion,

asafoetida, garlic and mustard were strictly avoided in the preparations during these days. To celebrate *karthika*, Kerala Brahmins used to prepare *ada* and *appam* as the special traditional items.

Table 23. Traditional food items prepared by Kerala Brahmins during festivals/ rituals

Festivals/rituals	Items
Onam	<i>Sadya, ada, karolappam, pazham puzhuniyathu, varuthupperi and sharkkaravaratty</i>
Vishu	<i>Vishu kanji, payasam, sadya</i>
Navarathri	<i>Aval, malar, neypayasam, karolappam, ada</i>
Ekadasi	<i>Gothambu kanji, chama kanji</i>
Thiruvathira	<i>Ettangadi puzhukku , koovakurukku</i>
Karthika	<i>Ada, appam</i>
Karkkidakam	<i>Pathilacurry, marunnu kanji, navadhanya kanji, njavara kanji, thavidappam, thavidu ada, cheeda</i>
<i>Karkkidaka vavu</i>	<i>Ada</i>

During the month of *Karkkidakam*, Kerala Brahmins prepared *pathilacurry* with 10 locally available edible medicinal leaves which varied from region to region. Kerala Brahmins used to take different medicated gruels like *marunnu kanji*, *navadhanya kanji*, and *njavara kanji*. The medicated rice, *njavara* was the basic ingredient for all these medicated gruels. They also consumed *kanaka podi* which is the fine bran of raw rice for medicinal purpose. This was also consumed as *thavidappam* in which jaggery and scrapped coconut were added along with fine bran. For *karkkidaka vavu*, *ada* was prepared. *Cheeda* was another special item prepared during the month of *Karkkidakam*.

4.1.4.2 Tamil Brahmins

The details on the traditional foods prepared by the Tamil Brahmin community during festivals/rituals are presented in Table 24.

Table 24. Traditional food items prepared by Tamil Brahmins during festivals/rituals

Festivals/rituals	Items
<i>Deepavali</i>	<i>Dosa, ukkarai, therattupal, maaladu, murukku, thenkuzhal, laddu, payasam.</i>
<i>Navarathri</i>	<i>Kosumalli, kozhukkattai, madura puttu, aval puttu, maaladu, pollavada</i>
<i>Thrikkarthika</i>	<i>Aval pori, malar pori, neyyappam, nolumbu ada</i>
<i>Aavani avittam</i>	<i>Sadya, vada, boli, palpayasam</i>
<i>Makarasamkranthi</i>	<i>Chakkarapongal, venpongal</i>
<i>Savithri pooja</i>	<i>Nolumbu adai</i>
<i>Thiruvathira</i>	<i>Thiruvathirakali, neyyappam, kizhangu puzhukku</i>
<i>Vinayaka chathurthi</i>	<i>Modakam, palpayasam</i>
<i>Ashtamirohini</i>	<i>Vellacheeda, uppucheeda, murukku, appam, rice flakes with jaggery</i>
<i>Shivarathri</i>	<i>Moong dhal kanji, wheat with jaggery, vella dosa</i>
<i>Karkkidaka vavu</i>	<i>Ubbittu, vada</i>
<i>Pournami</i>	<i>Palpayasam</i>

Deepavali, one of the important festivals of Tamil Brahmins was traditionally celebrated by preparing large sized *dosa, ukkarai, therattupaal, maaladu, murukku, thenkuzhal, laddu* and *payasam*.

For *Navarathri*, different traditional items like *kosumalli*, *kozhukattai*, *madhura puttu*, *pollavada*, *avalputtu*, *maaladu* were prepared. *Aval poru* and *malar poru* were prepared with rice flakes and popped rice respectively along with jaggery syrup and coconut scrapings for *thrikkarthika* ceremony. In addition to this, *neyyappam*, *nolumbu adai* were also prepared as additional items during this occasion.

For *avani avittam*, *vada*, *boli* and *palpayasam* were prepared and for lunch *sadya* was also prepared. For *pongal*, the Tamil New Year day, otherwise called as *makarasamkranthi*, *chakkarapongal* and *venpongal* were prepared. *Nolumbu adai* or *uppu adai* were the traditional items prepared for *savithri pooja*, an important function of ladies and girls. A conventional dish namely *thiruvathirakali*, was prepared in connection with *thiruvathira*. Other items prepared during this occasion included *neyyappam* and *kizhangu puzhukku* with seven different tubers. On *vinayaka chathurthi*, different types of *modakams* were prepared by Tamil Brahmins, which was believed to be the most favourite item of lord “Ganesha”. *Ashtamirohini* was celebrated by preparing *vellacheeda*, *uppucheeda*, *murukku*, *appam* and rice flakes with jaggery. *Moongdhal kanji* and *vella dosa* using wheat and jaggery were the items for *shivarathri*. For *pournami* day of *Kumbam*, Tamil Brahmin families prepared *palpayasam*. On 18th day of the month of *Karkkidakam*, Tamil Brahmins used to celebrate *adiperukku* for which they prepared *chithrannam* which included different types of cooked rice. For *karkkidaka vavu*, *ubbittu* and *vada* were customarily prepared.

4.1.4.3 Ezhavas

The Ezhava community also prepared traditional foods during festivals/rituals and the details are given in Table 25.

During Onam, on the *uthraadam* day, *ada* was prepared and offered to *thrikkakkarayappan*. Non vegetarian items were also prepared on this day. On the day of *thiruvonam*, a feast was arranged for lunch in which different curries were prepared

with locally cultivated vegetables. *Ada*, *varuthupperi* and *sharkkaravaratty* were the special items prepared for *Onam*. *Vishu* was celebrated by preparing *vishu katta*, a traditional item consumed along with jaggery syrup in the morning. A lunch with more than one curry was also prepared. For festivals related to temples called *uthsavam* or *pooram*, *unniyappam*, *kinnathappam*, *murukku*, *avilosu podi* etc. were prepared. Non vegetarian items and toddy were an indispensable component of almost all festivals. During the month of *Karkkidakam*, Ezhava community prepared tamarind seed *unda*, jack fruit seed *chuttathu*, mango kernel flour *ada*, *njavara kanji* and *marunnu kanji*.

Table 25. Traditional food items prepared by Ezhavas during festivals/rituals

Festivals/Rituals	Items
<i>Uthraadam</i>	<i>Ada</i> , non vegetarian meals
<i>Onam</i>	<i>Ada</i> , <i>varuthupperi</i> , <i>sharkkaravaratty</i> , and <i>sadya</i>
<i>Vishu</i>	<i>Vishu katta</i>
Temple festivals	<i>Unniyappam</i> , <i>kinnathappam</i> , <i>murukku</i> , <i>avilosu podi</i>
<i>Karkkidaka vavu</i>	<i>Ada</i>
<i>Karkkidakam</i>	Tamarind seed <i>unda</i> , jack fruit seed <i>chuttathu</i> , mango kernel flour <i>ada</i> , <i>njavara kanji</i> , <i>marunnu kanji</i>

4.1.4.4 Scheduled Castes

Traditional foods prepared by Scheduled Castes during festivals/rituals are given in Table 26.

Onam was celebrated with a major meal at noon which consisted of rice, one or two curries and *puzhukku* or *thoran*. This menu was considered as feast because during normal days the item for lunch was only *kanji*. For festivals related to God,

kanniyappam was the only traditional item prepared. This is nothing but a preparation of raw rice batter with salt having a spongy consistency and baked in earthen ware vessels. Along with this, meat and toddy were also offered to God as *naivedyam*. After offering, all these items were distributed among the family members. During the month of *Karkkidakam*, the items prepared included *chama choru* and mango kernel flour and tamarind seed flour based foods like *unda*, *ada* and *kumbilappam*. *Chama choru* was used as a major meal along with different cooked leafy vegetables.

Table 26. Traditional food items prepared by Scheduled Castes during festivals/rituals

Festivals/Rituals	Items
<i>Onam</i>	Vegetarian meals
<i>Vishu</i>	Vegetarian meals
Regional festivals	<i>Kanniyappam</i> , meat preparations and toddy
<i>Karkkidakam</i>	<i>Chama choru</i> , tamarind seed flour <i>unda</i> , mango kernel flour <i>appam</i>

4.1.4.5 Muslims

Details on the traditional foods prepared by Muslims during festivals/ rituals are given in Table 27.

For *noyambu thura* which is the breaking of religious fast observed in the evening during the month of Ramadan, variety of special dishes namely *jeeraka kanji*, *thari kanji*, *kuzhal pathiri*, *unnakkaya*, *niracha pathiri*, *aleesa* and *kalathappam* were some of the typical traditional items prepared and served. On the day of *Ramadan* (*perunnal*) a religious festival celebrated by Muslims, a grand feast was arranged in all households in which the major items prepared included *pathiri*, *neichoru*, and *biriyani*. Beef curry or mutton curry was also served as side dishes. Variety of fried snacks were prepared and exchanged between friends, relatives and neighbours during this occasion. *Muharam* was celebrated with *paalayikkappam* and wheat *verakiyathu*. In some families instead of this, a dish with cooked and mashed bengal gram dhal and dried

cowpea was prepared in coconut milk so as to get a semi solid consistency. *Navadhanya kanji*, *kakkum kaya kanji* and *thenga choru* were the important items prepared by Muslims during the month of *Karkkidakam*.

Table 27. Traditional food items prepared by Muslims during festivals/ rituals

Festivals/Rituals	Items
<i>Noyambu thura</i>	<i>Jeeraka kanji</i> , <i>thari kanji</i> , <i>kuzhal pathiri</i> , <i>unnakkaya</i> , <i>niracha pathiri</i> , <i>aleesa</i> , <i>kalathappam</i> , meals with non vegetarian items/ <i>biriyani</i> /ghee rice
<i>Ramadan</i>	<i>Pathiri</i> and non vegetarian curry Non vegetarian meals/ ghee rice / <i>biriyani</i> with non vegetarian side dishes.
<i>Muharam</i>	<i>Paalayikkappam</i> , wheat <i>verakiyathu</i>
<i>Karkkidakam</i>	<i>Navadhanya kanji</i> , <i>kakkum kaya kanji</i> and <i>thenga choru</i>

4.1.4.6 Christians

Details on the traditional food items prepared by the Christians during festivals/rituals are presented in Table 28.

The special items for Palm Sunday and *Osana perunnal* included *kozhukkatta* or *peechem pidi*. Porridge with rice flour, jaggery and sugar called *paalu kurukku* was prepared on Maundy Thursday. The same dish, but without sugar called as *pesaha kurukku* was a specialty of Good Friday. *Vattayappam* and *appam* were prepared on the day of Easter. For Christmas, *vattayappam*, *muttayappam*, *vettappam*, etc. were made at home and on Christmas day a non vegetarian feast was also arranged. Twenty fifth day of religious *vratha* namely *ambathu noyambu* was observed before Christmas and was especially distinguished with the preparation of *inderiyappam*. It was a special dish

based on rice flour to which coconut and seasonings were added. In some regions of Thrissur District, on the 40th day of this religious *vratha*, *chakkara paachoru* was prepared. Festivals related to churches were celebrated by preparing variety of dishes like *vattayappam*, *achappam*, *kuzhalappam*, *thamukku*, *velichenna appam*, *kaliyadakka* and *vettappam*.

Table 28. Traditional food items prepared by Christians during festivals/rituals

Festivals/ rituals	Items
Palm Sunday	<i>Kozhukkatta, peechampidi</i>
Maundy Thursday	<i>Pesaha kurukku/paalu kurukku/appam</i>
Good Friday	<i>Pesaha kurukku/paalu kurukku without sugar</i>
Easter	<i>Appam, vattayappam</i>
X'mas	<i>Appam, muttayappam, traditional feast with non vegetarian dishes.</i>
25 th day of religious "vratha"	<i>Inderiyappam, kalathappam</i>
40 th day of religious "vratha" (50 noyambu)	<i>Chakkara paachoru</i>
Festivals related to church (perunnal)	<i>Appam, achappam, kuzhalappam, thamukku, velichenna appam, kaliyadakka, vettappam (kaarayum koorayum)</i>

Avilosu podi, avilosunda, churuttu, cheppappam, payattunda, kuzhalappam, achappam, unniyappam, vettappam etc. were the snack items prepared and carried to the houses of relatives during different festivals as a token of love and joy.

4.1.5 Traditional foods consumed during different physiological conditions

Traditional foods consumed during different physiological conditions by different communities are presented in Table 29.

Among Kerala Brahmins, it was customary to give the bud of *peraal* ground in fresh milk for pregnant women. On the day of *pulikudi*, tamarind juice along with the extract of leaves of *kudampuli* was given to the pregnant women. Different types of medicated ghee were also given to pregnant women.

During lactation, a special preparation called *mukkidi* as well as sauted drumstick leaves and ayurvedic *kashayam* were given. Pepper was added as an essential item in all curries given to the lactating women. *Rasam* prepared with tamarind juice and highly flavoured with pepper was given on all days for lunch.

Tamil Brahmins prepared *poruvelangai* for the pregnant women. During lactation, cooked rice mixed with milk was given during the early months of lactation. Later, special preparations like *vattakootan* prepared out of *chundakka vattal*, stir fry of yam or green banana, *mulaku rasam* with tamarind juice were given along with cooked rice. All items were prepared in ghee and crushed pepper was also added. *Kalari marunnu* and *chukku lehyam* were the special ayurvedic preparations given to the lactating women by Tamil Brahmins.

Kanji with a medicinal plant *kurunthotti* was given to the pregnant Ezhava lady after seventh month. Special preparations of *Ezhavas* during lactation included *ulli lehyam*, *uluva verakiyathu*, *thenga kanji*, *puli lehyam*, *pookula lehyam* and *kozhimarunnu*.

Hindus of Palakkad district gave *oralappam* and *paniyaram*, made up of green gram and jaggery to the pregnant women. The special items given to the lactating women included *kurumulaku charu*, *chundakkai vattal*, bitter gourd *vattal*, stir fried yam with pepper powder and drumstick leaves curry.

Table 29. Traditional foods consumed by different communities during physiological conditions

Physiological condition	Items						
	KB	TB	EZ	HI PKD	SC	MU	CH
Pregnancy	Bud of <i>peraal</i> , tamarind juice/ <i>kudampuli</i> juice, pepper rasam	<i>poruvelangai</i>	<i>Kurunthotti kanji</i>	<i>Paniyaram</i> , <i>oralappam</i>	Gingelly oil	Beverages added with dates, nuts and milk , and <i>pazham chuttathu</i>	<i>Payattunda</i>
Lactation	<i>Mukkidi</i> , sauted drumstick leaves, ayurvedic <i>kashayam</i>	<i>Kalari marunnu</i> , <i>kanji</i> with <i>thippalli</i> added <i>mulaku rasam</i> without tamarind, <i>chukku lehyam</i>	<i>Ulli lehyam</i> , <i>uluva verakiyathu</i> , <i>thenga kanji</i> , <i>pulilehyam</i> , <i>pookula lehyam</i> , <i>kozhimarunnu</i>	<i>Kurumulaku charu</i> , <i>chundakkai vattal</i> , bitter gourd <i>vattal</i> , yam stir fried with pepper powder, drumstick leaves curry	<i>Pettu marunnu</i> , <i>ulli lehyam</i> , mutton soup, drumstick leaves <i>thoran</i> , <i>koova kurukku</i>	<i>pazham chuttathu</i> , <i>pookula lehyam</i> , garlic <i>lehyam</i> , broths, <i>uluva lehyam</i> , <i>ulli verakiyathu</i> , <i>kozhimarunnu</i> , goat liver fried in pepper, <i>thenga kanji</i> added with drumstick leaves	Liver fry added with pepper, brandy, banana fry, <i>chukku lehyam</i> , <i>pookula lehaym</i> , <i>kozhimarunnu</i> and mutton soup
Infancy	Juice of brahmi, added with <i>kalkandam</i> and turmeric. Banana /ragi flour porridge with curd or milk	Banana /ragi flour porridge with curd or milk	Porridges with banana flour, rice flour, ragi flour, wheat flour and arrow root flour along with milk.	Banana /ragi flour porridge with milk	Banana /ragi flour porridge with milk	Porridges with banana flour, rice flour, ragi flour, wheat flour and arrow root flour along with milk	Porridges with banana flour, ragi flour, arrow root flour along with milk
Puberty	<i>Pal kanji</i> , <i>neyyappam</i> , <i>murukku</i>	<i>Vellachoru</i> with curd, <i>therandukuli puttu</i> , <i>cheeli</i> .	Raw egg followed by gingelly oil, <i>manjal kanji</i> , <i>malarunda</i>	Green gram with rice <i>kanji</i> , <i>ragi verakiyathu</i>	<i>Manjal choru</i> , <i>ulli choru</i> , raw egg with gingelly oil	<i>Manjal kanji</i> , egg with gingelly oil	Half boiled egg, gingelly oil, <i>manjal kanji</i> with onion and garlic

Feeding gingelly oil to the pregnant women was a customary practice among Scheduled Caste communities. *Pettu marunnu*, *ulli lehyam*, mutton soup, *drumstick leaves thoran*, *koova kurukku* etc. were the special items given to lactating women.

For pregnant women, beverages added with dates, nuts and milk were given traditionally throughout the period by rich Muslim families. Ripe banana coated with jaggery syrup, tied in banana leaves and baked over coal was given to both pregnant and lactating women. During lactation, *pookula lehyam*, *garlic lehyam*, *uluva lehyam*, *ulli verakiyathu*, *kozhimarunnu* etc. were given. Fried goat liver added with pepper was also given as a special item. Drumstick leaves added to the *thenga kanji* was also given to the lactating women.

Christians prepared *payattunda* using green gram and jaggery for pregnant women. During lactation, liver fry, brandy, banana fried in ghee, *chukku lehyam*, *pookula lehyam*, *kozhi marunnu* and mutton soup were given to the lactating women.

There was a practice of giving the juice of *brahmi* to the new born baby in different communities. Porridges made with banana flour or ragi flour was found to be the common items included as a weaning food among all communities. Ezhavas and Muslim communities also included porridges made out of wheat flour or arrow root flour. In all these porridges jaggery was added as the sweetener. Kerala Brahmins gave *brahmi* juice to the new born baby after adding *kalkkandam* and turmeric. Muslim communities used to give ripe banana baked over coal after tying in banana leaf after 6th month.

Among Kerala Brahmins, when the girl attains puberty, *pal kanji* was prepared on the third day and fed to the girl. Different types of *naivedyam* were prepared and offered to the God, which included *ada*, *appam*, cooked raw rice and rice flakes in jaggery. These were distributed to the family members after offering to God. Different types of fried items like *neyyappam*, *murukku* etc. were prepared and fed to the girl.

Tamil Brahmins gave *vellachoru* with curd and *therandukuli puttu* and *cheeli* were the other traditional items prepared during this occasion.

Ezhava community arranged a *sadya* on this occasion for close relatives who will bring different food items like *velichenna appam*, *kinnathappam*, *murukku*, *pakavada*, *ariyunda*, *avilosu podi*, ripe banana etc. for the girl. Raw egg followed by gingelly oil, *manjal kanji*, *malarunda* etc. were given to the girl during puberty.

Hindus of Palakkad District prepared *kanji* added with green gram as well as *ragi verkiyathu* during puberty. Consumption of raw egg with gingelly oil was practiced among Scheduled Castes. *Manjal choru* and *ulli choru* were also given to the girl and a feast was arranged to celebrate the occasion. Muslim community gave *manjal kanji* and raw egg along with gingelly oil to the girl. Half boiled egg and gingelly oil, *manjal kanji* added with onion and garlic were the major items among Christian community on the occasion when the girl attains puberty.

4.1.6 Traditional preserved food item prepared by different communities

Details on traditional preserved food items prepared at home by different communities are presented in Table 30.

It was found that 94.33 per cent of respondents prepared different types of pickles. All respondents of Kerala Brahmin, Tamil Brahmin, Hindus of Palakkad and Scheduled Caste communities and majority of the respondents in Ezhava (91.43%), Muslim (86.11%) and Christian (82.86%) communities prepared pickles at home. Among the different types of pickles, *uppumanga* was prepared by 39.27 per cent of respondents. *Kondattam* and *thairumulaku* were prepared by 28.74 and 32.39 per cent of respondents respectively. *Chakka varattiyathu* and *veppilakkati* were prepared by 29.96 and 15.38 per cent of respondents respectively. Less than 5 per cent of respondents indicated that they prepared traditional preserved food items like *erimanga*,

Table 30. Details on traditional preserved foods prepared at home

Sl.No	Name of foods	Number of respondents							
		KB (n=30)	TB (n=35)	EZ (n=35)	HI PKD (n=40)	SC (n=36)	MU (n=36)	CH (n=35)	Total
1	<i>Ari papadam</i>	1 (3.33)	-	-	8 (20.00)	-	-	-	9 (3.64)
2	<i>Chakka unakkiyathu</i>	-	-	-	-	-	-	2 (5.71)	2 (0.81)
3	<i>Chakka varattiyathu</i>	8 (26.67)	-	17 (48.57)	23 (57.50)	9 (25.00)	11 (30.56)	6 (17.14)	74 (29.96)
4	<i>Erimanga</i>	6 (20.00)	-	-	-	-	-	-	6 (2.43)
5	<i>Kadumanga</i>	12 (40.00)	4 (11.43)	-	-	-	-	-	16 (6.48)
6	<i>Kappa papadam</i>	-	-	-	8 (20.00)	3 (8.33)	-	-	11 (4.45)
7	<i>Kondattam</i>	12 (40.00)	9 (25.71)	5 (14.29)	34 (85.00)	11 (30.56)	-	-	71 (28.74)
8	<i>Kudampuli smoked and dried</i>	-	-	6 (17.14)	-	-	-	-	6 (2.43)
9	<i>Manga thera</i>	2 (6.67)	-	-	4 (10.00)	-	-	-	6 (2.43)
10	<i>Pazham unakkiyathu</i>	-	-	1 (2.86)	4 (10.00)	1 (2.78)	-	-	6 (2.43)
11	Pickles	30 (100.00)	35 (100.00)	32 (91.43)	40 (100.00)	36 (100.00)	31 (86.11)	29 (82.86)	233 (94.33)
12	Tamarind dried	-	-	-	32 (80.00)	-	-	-	32 (12.96)
13	<i>Thairumulaku</i>	17 (56.67)	6 (17.14)	13 (37.14)	34 (85.00)	2 (5.56)	-	8 (22.86)	80 (32.39)
14	<i>Uppumanga</i>	22 (73.33)	7 (20.00)	13 (37.14)	12 (30.00)	19 (52.78)	20 (55.56)	4 (11.43)	97 (39.27)
15	<i>Vaata manga</i>	7 (23.33)	-	-	14 (35.00)	-	-	-	21 (8.50)
16	<i>Vaattu kappa</i>	-	-	-	-	-	-	2 (5.71)	2 (0.81)
17	<i>Vadakams</i>	3 (10.00)	5 (14.29)	-	9 (22.50)	2 (5.56)	-	-	19 (7.69)
18	<i>Veppilakkatti</i>	2 (6.67)	10 (28.57)	-	26 (65.00)	-	-	-	38 (15.38)
19	Wine	-	-	4 (11.43)	-	-	-	30 (85.71)	34 (13.77)

Numbers in parenthesis are percentage.

manga thera, ari papadam,, kappa papadam, vaattu kappa, chakka unakkiyathu, pazham unakkiyathu, and smoked and dried kudampuli.

4.1.7 Frequency of purchase of traditional foods

Details on the frequency of purchase of traditional foods by different communities are presented in Table 31.

It was seen that 60 per cent of Ezhavas and 45.71 per cent of Christians purchased traditional snack items on monthly basis. Majority (60%) of Tamil Brahmins rarely purchased traditional snacks. Hindus of Palakkad (42.5%) and Scheduled Caste communities (61.11%) also purchased traditional snack items only occasionally.

Savouries were purchased by 36.67 per cent of Kerala Brahmins, 62.86 per cent of Tamil Brahmins, 40 per cent of Ezhavas, 52.50 per cent of Hindus of Palakkad District, 33.33 per cent of Scheduled Castes, 44.45 per cent of Muslims and 31.43 per cent of Christians once in a month.

Preserved traditional food items were purchased by 40 per cent of Kerala Brahmins once in month and 30 per cent purchased these items only occasionally. Majority of Ezhavas (77.15%) and Scheduled Castes (63.89%) never purchased preserved foods. Among the Hindus of Palakkad District, 45 per cent purchased preserved foods occasionally and 12.50 per cent once in a month. The purchase of preserved items was on monthly basis among 51.43 per cent of respondents of Christian community and among Muslim community 69.45 per cent purchased occasionally.

Table 31. Frequency of purchase of traditional foods by different communities

Items Frequency	KB(n=30)				TB(n=35)					EZ(n=35)				HI(PKD)(n=40)			
	Snacks	Savouries	Preserved foods	Others	Snacks	Savouries	Preserved foods	Sweets	Others	Snacks	Savouries	Preserved foods	Others	Snacks	Savouries	Preserved foods	Others
Weekly once	-	-	-	-	-	-	-	7 (20.00)	-	7 (20)	-	-	-	2 (5.00)	3 (7.50)	-	-
Monthly	9 (30.00)	11 (36.67)	12 (40.00)	-	12 (34.29)	22 (62.86)	9 (25.71)	18 (51.43)	-	21 (60)	14 (40.00)	2 (5.71)	-	14 (35.00)	21 (52.50)	5 (12.50)	-
Occasionally	13 (43.33)	6 (20.00)	9 (30.00)	5 (16.67)	21 (60.00)	9 (25.71)	17 (48.58)	10 (28.57)	35 (100)	7 (20)	19 (54.29)	6 (17.14)	20 (57.14)	17 (42.50)	12 (30.00)	18 (45.00)	17 (42.50)
Never	8 (26.67)	13 (43.33)	9 (30.00)	25 (83.33)	2 (5.71)	4 (11.43)	9 (25.71)	-	-	-	2 (5.71)	27 (77.15)	15 (42.86)	7 (17.50)	4 (10.00)	17 (42.50)	23 (57.50)

Numbers in parenthesis are percentage.

Table 31 continued

Items Frequency	SC(n=36)				MU(n=36)				CH (n=35)			
	Snacks	Savouries	Preserved foods	Others	Snacks	Savouries	Preserved foods	Others	Snacks	Savouries	Preserved foods	Others
Weekly once	-	-	-	-	11 (30.56)	13 (36.11)	-	-	7 (20.00)	2 (5.71)	-	-
Monthly	14 (38.89)	12 (33.33)	-	-	9 (25.00)	16 (44.45)	7 (19.44)	-	16 (45.71)	11 (31.43)	18 (51.43)	-
Occasionally	22 (61.11)	24 (66.67)	13 (36.11)	19 (52.78)	16 (44.44)	7 (19.44)	25 (69.45)	18 (50.00)	10 (28.58)	22 (62.86)	8 (22.86)	20 (57.14)
Never	-	-	23 (63.89)	17 (47.22)	-	-	4 (11.11)	18 (50.00)	2 (5.71)	-	9 (25.71)	15 (42.86)

Numbers in parenthesis are percentage.

Summarised data of frequency of purchase of traditional foods indicated that (Table 32) 42.91 per cent of respondents purchased snack items occasionally and 38.46 per cent purchased once in a month. More than 40 per cent of respondents purchased savouries either on monthly basis or occasionally. Traditional food items other than snacks, savouries, preserved foods and sweets like breakfast foods and foods used for major meals, were purchased by 44.13 per cent of respondents occasionally.

Table 32. Summarised data of frequency of purchase of traditional foods (n=247)

Frequency \ Items	Snacks	Savouries	Preserved foods	Sweets	Others
Weekly once	27 (10.93)	18 (7.29)	-	7 (2.83)	7 (2.83)
Monthly	95 (38.46)	107 (43.32)	53 (21.46)	18 (7.29)	18 (7.29)
Occasionally	106 (42.91)	99 (40.08)	96 (38.87)	10 (4.05)	109 (44.13)
Never	19 (7.69)	23 (9.31)	98 (39.68)	-	113 (45.75)

4.1.8 Traditional kitchen utensils and equipments used by different communities

Information on traditional household utensils and equipments used were collected and the list is presented in Table 33 and in Plate IV and V. It was seen that different traditional kitchen utensils like *chottu kotta*, *ada palaka*, *arivetti*, *korika*, *neyyuruli*, *pancha paathram*, *mara pathi*, *marika*, *gomukhi* etc. were used by the families.

Majority of the respondents indicated that (Table 34) they are still using *kuzhi uruli* (66.4%), *manhatti* (64.37%) and *nazhi* (60.73%). Among the different communities also, all the respondents of Kerala Brahmin, Tamil Brahmin and Hindus of Palakkad are still using *kuzhi uruli* and all respondents of Hindus of Palakkad, Scheduled Caste and Muslims used *manhatti*. All respondents of Hindus of Palakkad used *nazhi*, and Kerala Brahmins used *para* also.

Summarised data of frequency of purchase of traditional foods indicated that (Table 32) 42.91 per cent of respondents purchased snack items occasionally and 38.46 per cent purchased once in a month. More than 40 per cent of respondents purchased savouries either on monthly basis or occasionally. Traditional food items other than snacks, savouries, preserved foods and sweets like breakfast foods and foods used for major meals, were purchased by 44.13 per cent of respondents occasionally.

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Items \ Frequency	Snacks	Savouries	Preserved foods	Sweets	Others
Weekly once	27 (10.93)	18 (7.29)	-	7 (2.83)	7 (2.83)
Monthly	95 (38.46)	107 (43.32)	53 (21.46)	18 (7.29)	18 (7.29)
Occasionally	106 (42.91)	99 (40.08)	96 (38.87)	10 (4.05)	109 (44.13)
Never	19 (7.69)	23 (9.31)	98 (39.68)	-	113 (45.75)

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Majority of the respondents indicated that (Table 34) they are still using *kuzhi uruli* (66.4%), *manhatti* (64.37%) and *nazhi* (60.73%). Among the different communities also, all the respondents of Kerala Brahmin, Tamil Brahmin and Hindus of Palakkad are still using *kuzhi uruli* and all respondents of Hindus of Palakkad, Scheduled Caste and Muslims used *manhatti*. All respondents of Hindus of Palakkad used *nazhi*, and Kerala Brahmins used *para* also.



Ada palaka



Gomukhi



Kal chatti



Korika



Marika



Wooden vessel



Metal vessels



Metal korika

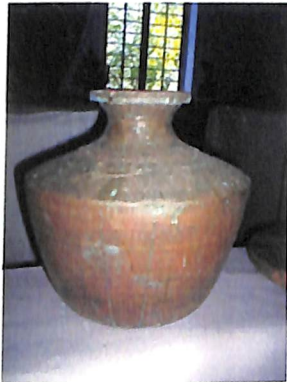
Plate IV. Traditional kitchen utensils and equipments



Thirikallu



Seva nazhi



Chembu kudam



Kazhinju kol



Bharani



Ola kudukka



Mulan kutty

Plate V. Traditional kitchen utensils and equipments

Table 33. List of traditional kitchen utensils and equipments

Sl no.	Utensils and Equipments	Purpose of Use
1	<i>Achappam achu</i>	Moulding <i>achappam</i>
2	<i>Ada palaka</i>	for straining water from cooked rice
3	<i>Appa chatti</i>	Making <i>vellayappam</i>
4	<i>Arivetti</i>	For washing rice and keeping cooked rice
5	<i>Cake Paathram</i>	Making cake
6	<i>Cheena chatti</i>	Cooking and frying
7	<i>Chottu kotta</i>	For washing rice and keeping cooked rice
8	<i>Edangazhi</i>	Measuring food items
9	<i>Gomukhi</i>	For serving butter milk, <i>rasam</i> etc.
10	<i>Kalchatti</i>	Preparing curries
11	<i>Kannan chiratta</i>	For making <i>puttu</i>
12	<i>Karolu/ kuzhi uruli</i>	Preparing <i>karolappam/ kuzhiyappam</i>
13	<i>Kazhinju kol</i>	Measuring medicinal items for ayurvedic preparations
14	<i>Korika</i>	For serving rice
15	<i>Kuzhalappam achu (Oda)</i>	Moulding <i>kuzhalappam</i>
16	<i>Manchatti</i>	Cooking
17	<i>Mara pathi</i>	For keeping curries before serving
18	<i>Marika</i>	For preparing foods for <i>shradham</i>
19	<i>Mulam kutti</i>	For making <i>kutty puttu</i>
20	<i>Nazhi</i>	Measuring food items
21	<i>Neyyuruli</i>	For boiling butter and keeping ghee
22	<i>Ottu kalam</i>	Cooking rice
23	<i>Otturuli</i>	Boiling, cooking, roasting, frying
24	<i>Pancha paathram</i>	For preparing foods for <i>shradham</i>
25	<i>Para</i>	Measuring food items
26	<i>Pattani cheppu</i>	Making <i>appam</i>
27	<i>Pichala chembu</i>	Preparing rice
28	<i>Venkala pana</i>	Storing foods
29	Wooden <i>seva nazhi</i>	For making <i>noolappam</i>
Equipments		
1	<i>Aattukallu</i>	Wet grinding
2	<i>Ammi</i>	Mashing and grinding
3	<i>Chirava</i>	For scraping coconut
4	<i>Earthen hearth</i>	Cooking
5	<i>Koondani</i>	Dehusking and crushing of grains
6	<i>Muram</i>	Grading, sorting and cleaning
7	<i>Thirikallu</i>	Dry grinding
8	<i>Ural and Ulakka</i>	Pounding

Table 34. Details of traditional household utensils used by the respondents

Sl no.	Name of Utensils	Number of respondents							Total (n=247)
		KB (n=30)	TB (n=35)	EZ (n=35)	HI(PKD) (n=40)	SC (n=36)	MU (n=36)	CH (n=35)	
1	<i>Achappam achu</i>	-	-	8 (22.86)	12 (30.00)	4 (11.11)	2 (5.56)	6 (17.14)	32 (12.96)
2	<i>Appa chatti</i>	-	-	-	-	-	-	1 (2.86)	1 (0.40)
3	<i>Biriyani chembu</i>	-	-	-	-	-	24 (66.67)	-	24 (9.72)
4	<i>Edangazhi</i>	4 (13.33)	-	-	-	-	-	-	4 (1.62)
5	<i>Kalchatti</i>	6 (20.00)	2 (5.71)	11 (31.43)	14 (35.00)	31 (86.11)	9 (25.00)	6 (17.14)	79 (31.98)
6	<i>Kannan chiratta</i>	-	-	2 (5.71)	2 (5.00)	9 (25.00)	-	-	13 (5.26)
7	<i>Karolu/ kuzhi uruli</i>	30 (100.00)	35 (100.00)	19 (54.29)	40 (100.00)	17 (47.22)	9 (25.00)	14 (40.00)	164 (66.40)
8	<i>Kuzhalappam achu (Oda)</i>	-	-	2 (5.71)	7 (17.50)	-	-	13 (37.14)	22 (8.91)
9	<i>Manchatti</i>	7 (23.33)	-	22 (62.86)	40 (100.00)	36 (100.00)	36 (100.00)	18 (51.43)	159 (64.37)
10	<i>Nazhi</i>	18 (60.00)	-	27 (77.14)	40 (100.00)	35 (97.22)	19 (52.78)	11 (31.43)	150 (60.73)
11	<i>Ottu kalam</i>	2 (6.67)	-	-	-	-	-	-	2 (0.81)
12	<i>Otturuli</i>	21 (70.00)	7 (20.00)	4 (11.43)	13 (32.50)	-	-	-	45 (18.22)
13	<i>Para</i>	30 (100.00)	-	27 (77.14)	33 (82.50)	21 (58.33)	-	-	111 (44.94)
14	<i>Pathiri chatti</i>	-	-	-	-	-	14 (38.89)	-	14 (5.67)
15	<i>Venkala pana</i>	6 (20.00)	2 (5.71)	-	-	-	-	-	8 (3.24)

Major kitchen equipments used by the families included *ammi*, *ural* and *ulakka*, *thirikallu*, *attukallu*, earthen hearth and *muram*. The usage of these equipments by the respondents indicated that only 14.98 per cent used *ammi*, 29.15 per cent used *muram* and 10.93 per cent used earthen hearth for cooking now a days also (Table 35). The other equipments were not at all used by any of the respondents.

Table 35. Details of traditional household equipments used by the respondents of different communities

Sl.No	Name of Equipment	KB (n=30)	TB (n=35)	EZ (n=35)	HI(PKD) (n=40)	SC (n=36)	MU (n=36)	CH (n=35)	Total (n=247)
1	<i>Ammi</i>	4 (13.33)	5 (14.29)	6 (17.14)	11 (27.50)	4 (11.11)	5 (13.89)	2 (5.71)	37 (14.98)
2	<i>Earthen hearth</i>	6 (20.00)	-	4 (11.43)	9 (22.50)	8 (22.22)	-	-	27 (10.93)
3	<i>Muram</i>	14 (46.67)	-	10 (28.57)	27 (67.50)	31 (86.11)	4 (11.11)	-	72 (29.15)

4.1.9 Alternatives used for traditional utensils and equipments

Details regarding the alternatives used for traditional utensils and equipments indicated that (Table 36) most of the utensils like *chottu kotta*, *ada palaka*, *arivetti*, *korika*, *neyyuruli*, *gomukhi*, *cheena chatti*, *pichala chembu*, *kal chatti*, *manchatti*, *ottu kalam*, *venkala pana*, *kannan chiratta*, *mulam kutty* and wooden *seva nazhi* were replaced with steel or metal utensils. No alternative utensils were suggested by the respondents for *pancha paathram*, *mara pathi*, *marika*, *edangazhi* and *para*.

Instead of *ammi* they used electric mixie and grinder for mashing and grinding (Table 36). *Ural* and *ulakka* which were used for pounding were replaced by mixie and *koondani* used for dehusking the grains was replaced by electric milling machines. Wet grinder and mixie were used for wet grinding instead of *aattu kallu* and earthen hearth was replaced by LPG stove. Instead of bamboo *muram* the respondents used plastic *muram*.

Table 36. Alternatives used for traditional kitchen utensils and equipments

Sl no.	Utensils	Alternatives currently used
1	<i>Ada palaka</i>	Steel /metallic perforated vessels
2	<i>Arivetti</i>	
3	<i>Chottu kotta</i>	
4	<i>Korika</i>	Steel spoon
5	<i>Neyyuruli</i>	Metal vessels
6	<i>Mara pathi</i>	No alternative
7	<i>Marika</i>	
8	<i>Pancha paathram</i>	
9	<i>Cheena chatti</i>	Metal vessels
10	<i>Gomukhi</i>	
11	<i>Pichala chembu</i>	
12	<i>Kalchatti</i>	Metal vessels and nonstick pans
13	<i>Karolu/ kuzhi uruli</i>	Utensils made up of alloy metals
14	<i>Otturuli</i>	
15	<i>Manchatti</i>	Metal vessels
16	<i>Ottu kalam</i>	
17	<i>Appa chatti</i>	Metal <i>appachatti</i> and nonstick <i>apachatti</i>
18	<i>Kazhinju kol</i>	No alternative
19	<i>Cake paathram</i>	Oven
20	<i>Pattani cheppu</i>	Nonstick <i>appachatti</i>
21	<i>Venkala pana</i>	Metal vessels
22	<i>Achappam achu</i>	No alternative
23	<i>Kuzhalappam achu (Oda)</i>	
24	<i>Kannan chiratta</i>	Metal <i>puttu</i> maker
25	<i>Mulam kutti</i>	
26	Wooden <i>seva nazhi</i>	Metal <i>seva nazhi</i>
27	<i>Nazhi</i>	Standard weight and measurement system in kilogram and Litres
28	<i>Edangazhi</i>	No alternative
29	<i>Para</i>	
30	<i>Ammi</i>	Electric mixer grinder
31	<i>Ural and ulakka</i>	Electric milling machines
32	<i>Koondani</i>	
33	<i>Aattukallu</i>	Wet grinder, mixie
34	<i>Thirikallu</i>	Mixie
35	<i>Earthen hearth</i>	LPG stove
36	<i>Muram</i>	<i>Muram</i> made up of plastic

4.2 Transition in the traditional food pattern

4.2.1 Transition of the breakfast pattern of different communities

4.2.1.1 Kerala Brahmins

The remarks of the respondents indicated that instead of taking breakfast items in the morning, the Brahmin community practiced *prathaloonu* at around 11 am. (Fig. 1). The items for *prathaloonu* were rice with curd and *mulaku kondattom/uppilittathu* or both. Nearly 66 per cent of respondents indicated that they had *prathaloonu* during 1950's and 34 per cent included *ada, pal kanji, noolappam, dosa, idli* etc. in their breakfast menu. During late 1960's, 53.33 per cent of respondents started preparing *chappathi, wheat dosa, ragi dosa* etc for breakfast and 46.67 per cent continued with the traditional *prathaloonu*. More than 60 per cent of respondents indicated that during 1970 *idli, dosa, ada, noolappam, uppuma, chappathi* and *puttu* became the common breakfast items of Kerala Brahmins. Majority (80%) had variety of these breakfast items during 1980's also. Presently 93.33 per cent of respondents indicated that they included *idli, different types of dosa, chappathi, uppuma, puttu, noolappam, ada, poori, ragi puttu* and wheat *puttu* as the common breakfast items and the rest (6.66%) resorted to *prathaloonu*.

4.2.1.2 Tamil Brahmins

Transition that occurred in the breakfast pattern of Tamil Brahmins over a period of years is presented in Fig. 2. About 57.14 per cent of respondents indicated that traditionally Tamil Brahmins did not have the habit of taking breakfast. *Vellachoru* and *uppilittathu* were given for children in the morning. It was found that 42.86 per cent of Tamil Brahmins had *vellachoru* and *uppilittathu* in the morning during this period. During 1960's 51.43 per cent of respondents indicated that they started including items like *idli, dosa, ada dosa, seva, uppuma, kozhukkattai* and *tharavadu kozhukkattai* for breakfast and 34.29 per cent of respondents continued with the traditional pattern of having *vellachoru* and *uppilittathu* in the morning. All respondents indicated that from

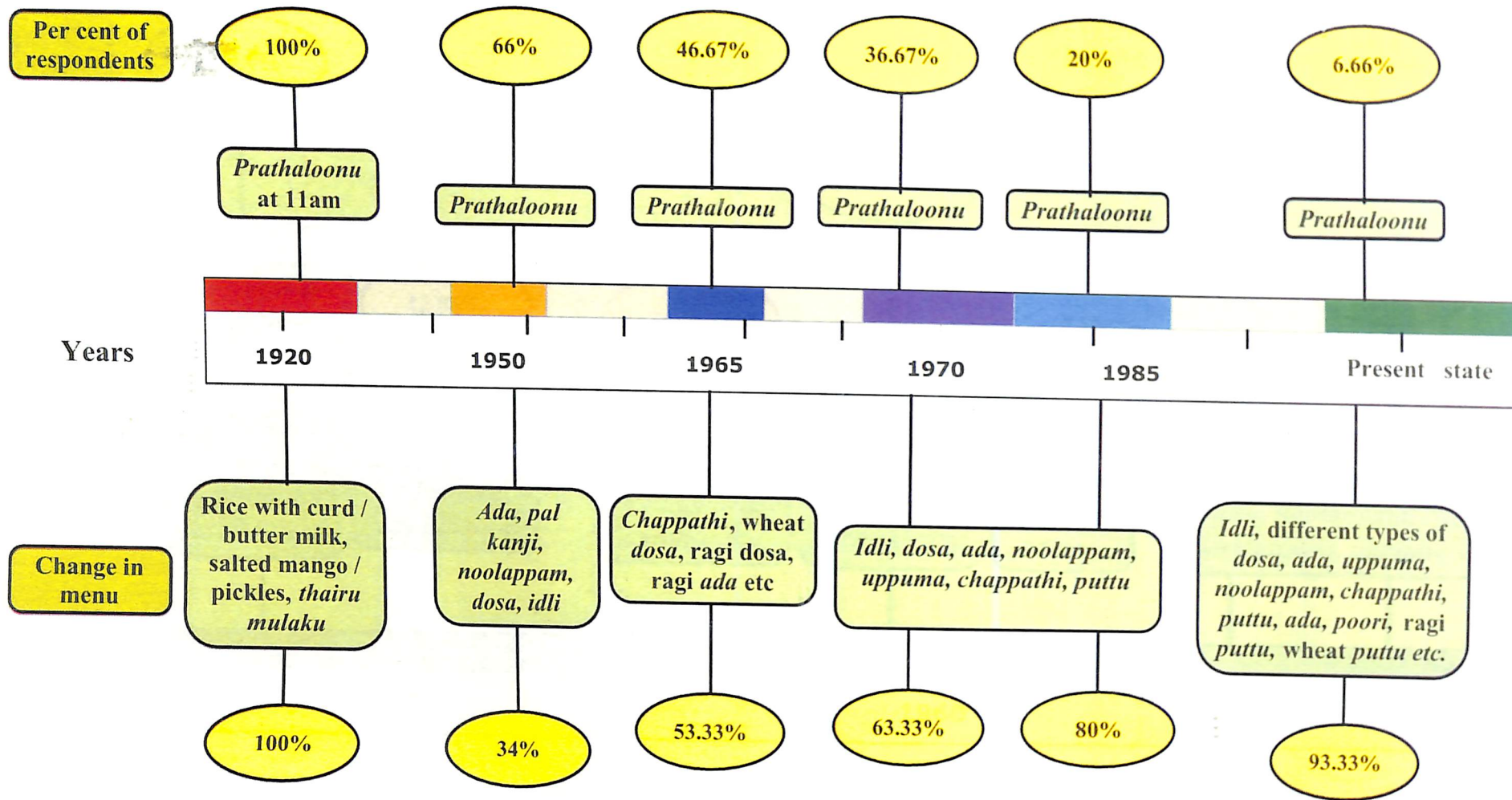


Fig. 1. Transition in the breakfast pattern of Kerala Brahmins

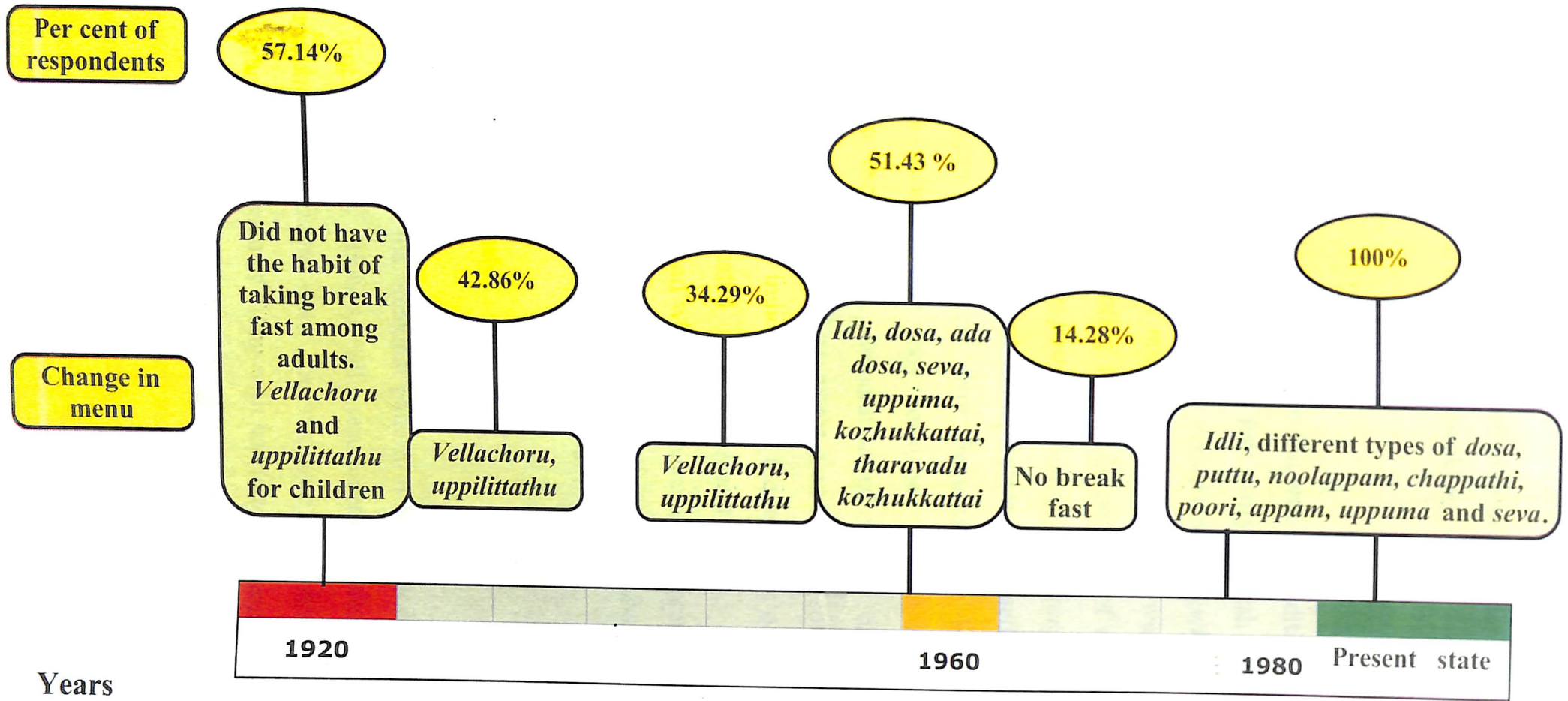


Fig. 2. Transition in the breakfast pattern of Tamil Brahmins

1980 onwards they prepared different types of *dosa*, *idli*, *puttu*, *noolappam*, *chappathi*, *appam*, *poori*, *uppuma* and *seva* for breakfast.

4.2.1.3 Ezhavas

Vella choru or *kanji* or *puzhukku* was the traditional breakfast item of Ezhava community during 1920's. Dried fish curry or fish fry, *chammanthi*, pickles or *uppilittathu* were the side dishes for *vella choru* or *kanji*. All the respondents indicated that *chiratta puttu*, *ottada*, *noolputtu* and *uppuma* were the special breakfast items prepared on occasions. During 1960's, 20 per cent of respondents indicated that they included wheat *kanji*, wheat *puttu*, *ragi puttu*, *chama kanji* as traditional breakfast items. During 1970's, 62.86 per cent of respondents indicated that they included *puttu*, *ada*, *noolputtu*, *uppuma*, *idli* and *dosa* frequently for breakfast and 37.14 per cent respondents indicated that they consumed cooked rice with *mezhukkupuratti* or *puzhukku* in the morning. Preparation of variety of breakfast items like *poori*, *chappathi*, *vellayappam*, *pathiri*, wheat *dosa* became common during 1980's and 82.86 per cent of respondents indicated about the inclusion of these items for breakfast. All the respondents indicated that at present *puttu*, *idli*, *dosa*, *chappathi*, *poori*, *vellayappam*, *uppuma* and wheat *dosa* became the common breakfast items of Ezhava households. The transition that occurred in the breakfast pattern of Ezhava community over a period of years is depicted in Fig. 3.

4.2.1.4 Scheduled Castes

Transition in the breakfast pattern of Scheduled Caste community is presented in Fig.4. During 1920's, all respondents indicated that *vella choru/tapioca puzhukku/tapioca puttu* were the common breakfast items of Scheduled Caste community and consumed along with *kondattam* or *uppilittathu* or *chammanthi* as side dishes. During 1960's, 66.67 per cent of respondents prepared *kanji* with rice, *ragi*, *chama*, bamboo rice and consumed along with different green leaves *thoran*, pickle or *chammanthi*. Rest of the respondents followed the practice of having *vella choru/puzhukku*. During 1970's different breakfast items like *puttu*, *ada*, *uppuma*,

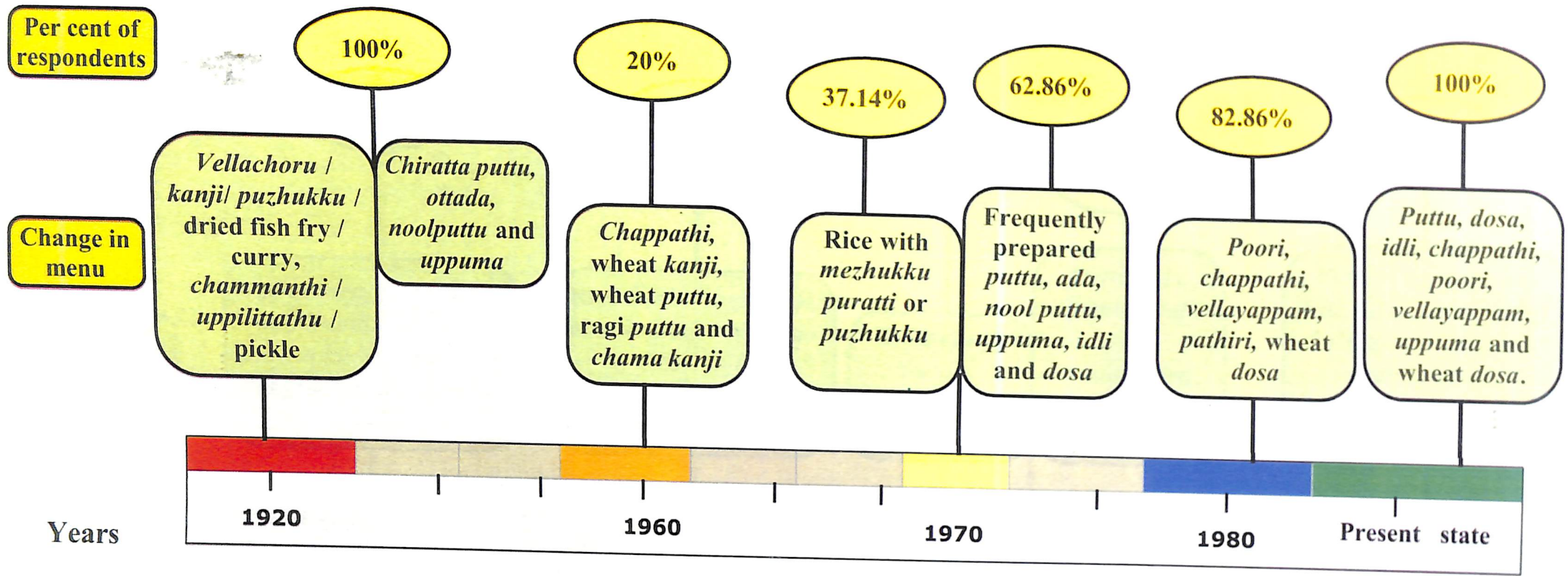


Fig. 3. Transition in the breakfast pattern of Ezhavas

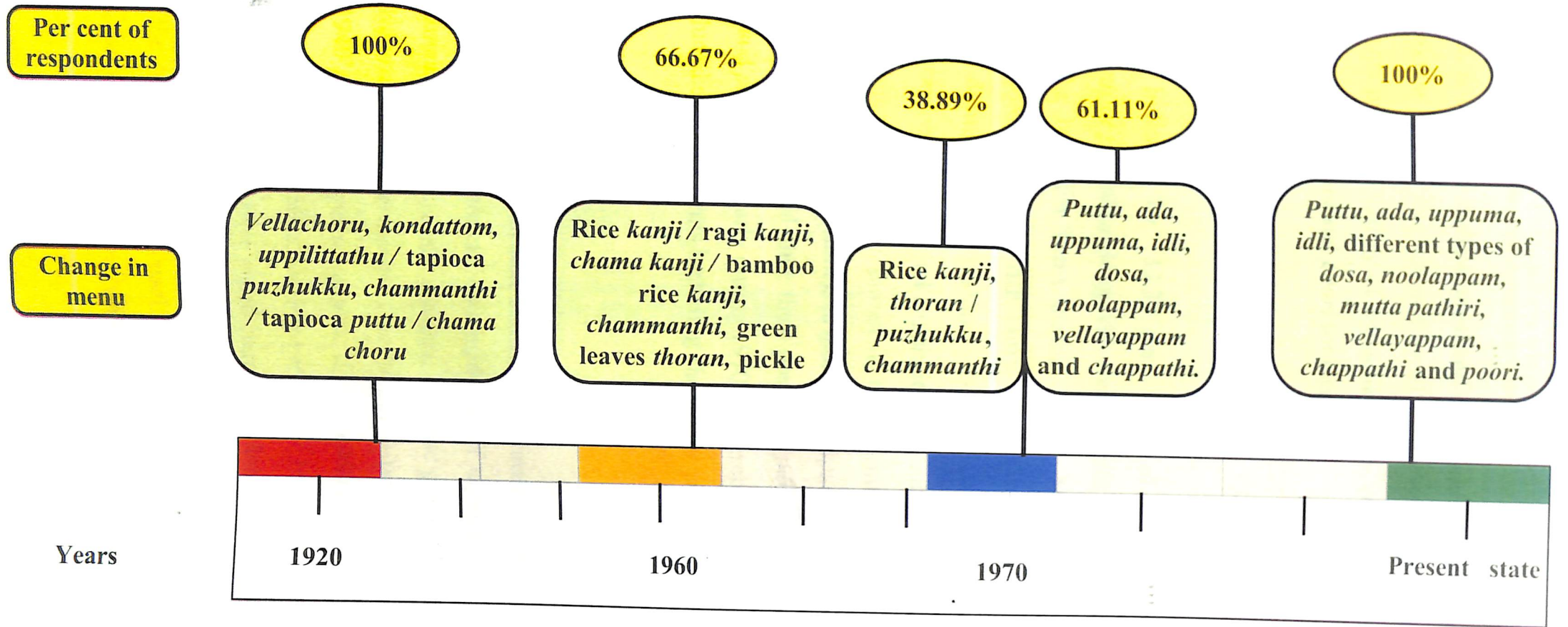


Fig. 4. Transition in the breakfast pattern of Scheduled Caste

idli, dosa, noolappam, velayappam and *chappathi* became common in households and this breakfast pattern was adopted by 61.11 per cent of respondents. Presently, all the respondents prepared variety of items like *puttu, ada, uppuma, idli, dosa, noolappam, velayappam, chappathi* and *poori* for breakfast.

4.2.1.5 Muslims

As indicated by 33.33 per cent of respondents, Muslim community included *kanji* or *puzhukku* along with *chammanthi, pickle* or dry fish *chuttathu* or curry (Fig. 5) as the breakfast items during 1920's. Majority (67.67%) indicated that they included rice with fish/dry fish curry /*puzhukku/thoran* as the common menu for breakfast during this period. During 1950's, 28.57 per cent had *kanji/puzhukku/chammanthi/pickle/fish/dry fish* curry and 45.72 per cent had rice with fish/dry fish curry/*puzhukku/ thoran* in the morning and the rest (25.71%) had *ada, puttu, wheat dosa, mutta pathiri, aripola, or uppuma* for breakfast during this period. All respondents indicated that they prepared *puttu, aripola, maidapola, idli, dosa, uppuma* and *pathiri* regularly during 1970's. Currently all the respondents indicated that they included different items including *chappathi, poori* and bread for breakfast.

4.2.1.6 Christians

All respondents indicated that the only breakfast item during 1920's was *kanji* or *puzhukku* (Fig.6). *Puzhukku* was made up of tapioca, tender jackfruit, bread fruit, green plantain, yam, colocassia, cowpea, or horse gram. The side dishes for *kanji* were *mezhukkupuratti* or *chammanthi*. Nearly 25.73 per cent of respondents opined that during 1940's *uppuma, puttu, appam, dosa, noolappam* and *ottada* were prepared in affluent families for breakfast. During 1960's, 37.14 per cent of respondents opined that they included different wheat based items like *kanji, dosa, chappathi*, as well as *ragi dosa* and *chama kanji* for breakfast along with rice based items. But majority (62.86%) adopted the traditional menu itself. During 1970's these breakfast items got more attention, but 60 per cent followed their traditional menu of *kanji* or *puzhukku*. Above

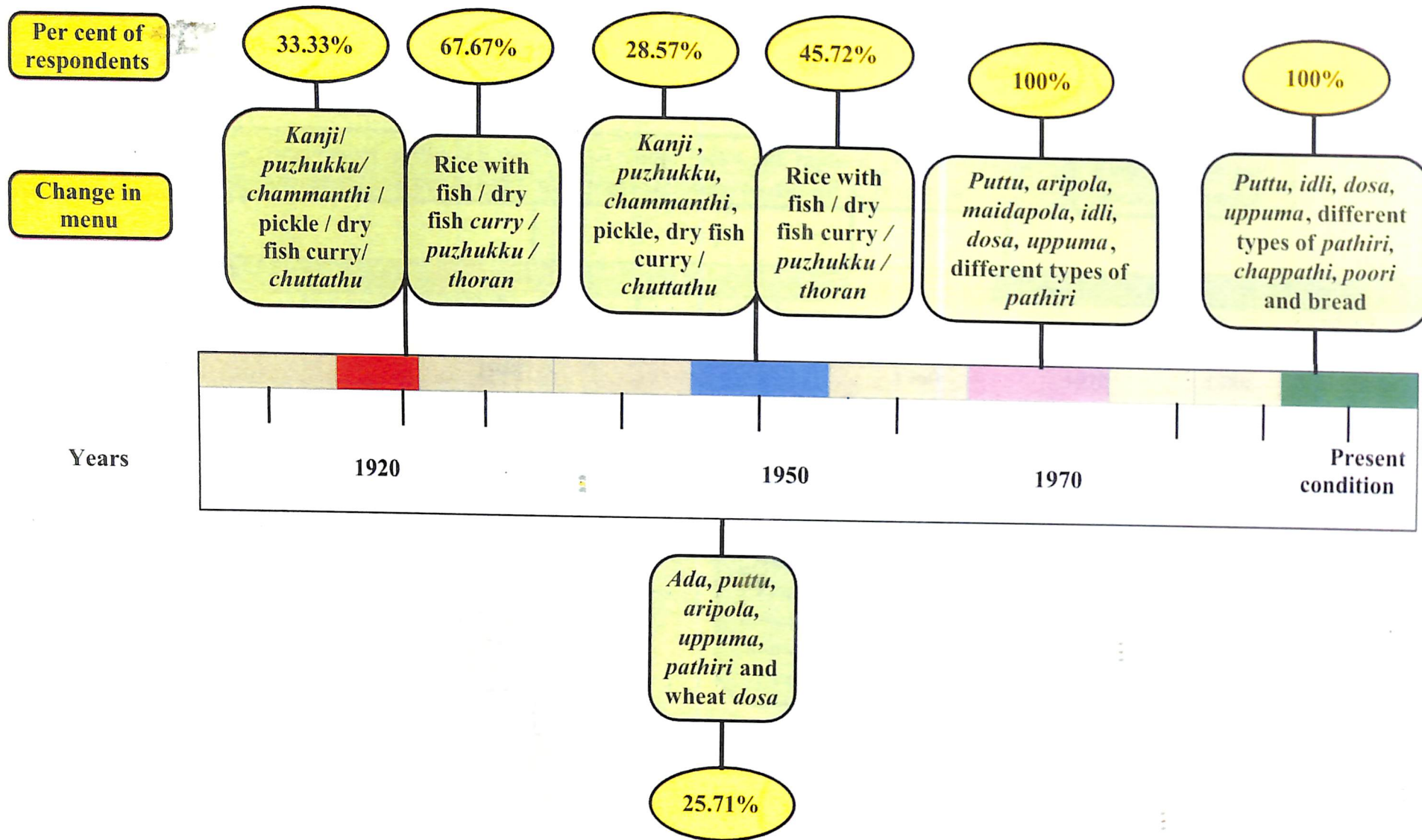


Fig. 5. Transition in the breakfast pattern of Muslims

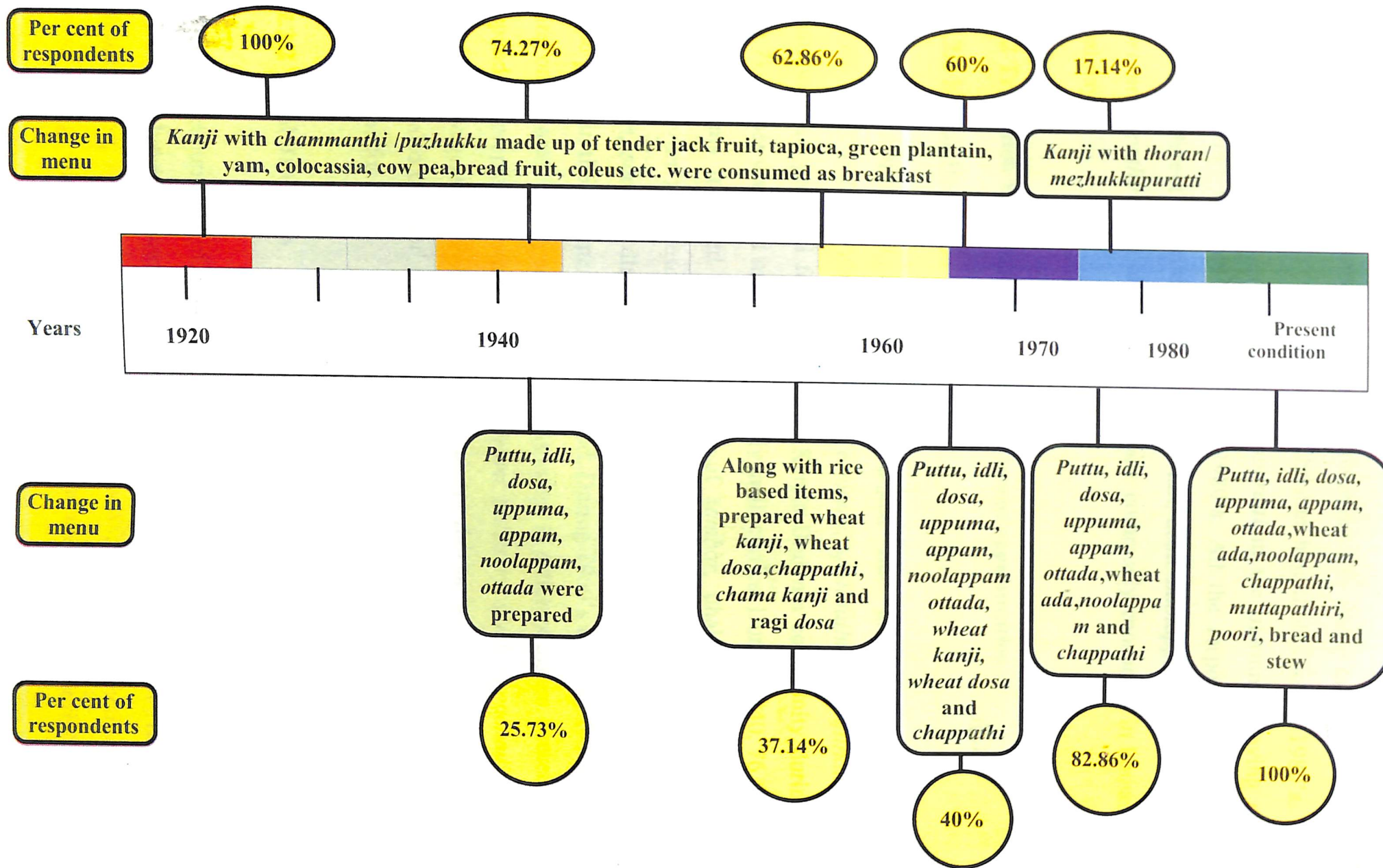


Fig. 6. Transition in the breakfast pattern of Christians

80 per cent of respondents opined that preparations like *puttu*, *idli*, *dosa*, *noolappam*, *appam*, *chappathi* etc became common in Christian households during 1980's. The rest had *kanji* along with *thoran* or *mezhukkupuratti* in the morning. Having *puzhukku* instead of *kanji* was not practiced after 1980's. All the respondents revealed that presently different breakfast items like *puttu*, *idli*, *dosa*, *noolappam*, *appam*, *chappathi*, *poori*, *muttapathiri*, and bread with stew were commonly consumed in households on usual days.

4.2.2 Transition in the lunch pattern of different communities

4.2.2.1 Kerala Brahmins

All respondents indicated that cooked rice along with *moru* curry/ *mulakushyam*/ *pulinkarry*/ *mezhukkupuratti* / *erissery*, *upplittathu* and *injithairu* were the common items prepared for lunch by the Kerala Brahmin community during 1920's (Fig.7). Pepper was used instead of red chilly in all curries. During 1940, 76.67 per cent of respondents indicated the introduction of *sambar*, dhal curry with vegetables, *pachadi*, *thoran* and *rasam* as the items for lunch along with rice, *moru* curry, *mulakushyam*, *sambar*, dhal curry, *erissery*, *injithairu* etc. Red chilies and coriander found place in their recipe during this period. During 1960's majority (63.33%) started using onion, asafoetida, garlic and other seasonings in different dishes. Presently, all the respondents prepared *moru* curry, *mulakushyam*, *pulissery*, *sambar*, *pachadi*, dhal curry added with vegetables, *erissery*, *mezhukkupuratti*, *thoran*, and *varutharacha* curry for lunch. They also used red chilly, coriander, asafoetida, garlic, onion and other spices to prepare dishes for lunch.

4.2.2.2 Tamil Brahmins

All respondents of Tamil Brahmin community indicated that they took rice or *sadam* for lunch during 1920's (Fig.8). The side dishes for lunch included *pulinkuzhambu*, *morukuzhambu*, *rasam*, *mulakootal*, *pachadi*, *kichadi*, *vatta kootan*, *sambar* along with *thoran*, *podithooval*, *kootu* and pickle. Majority (62.86%) of

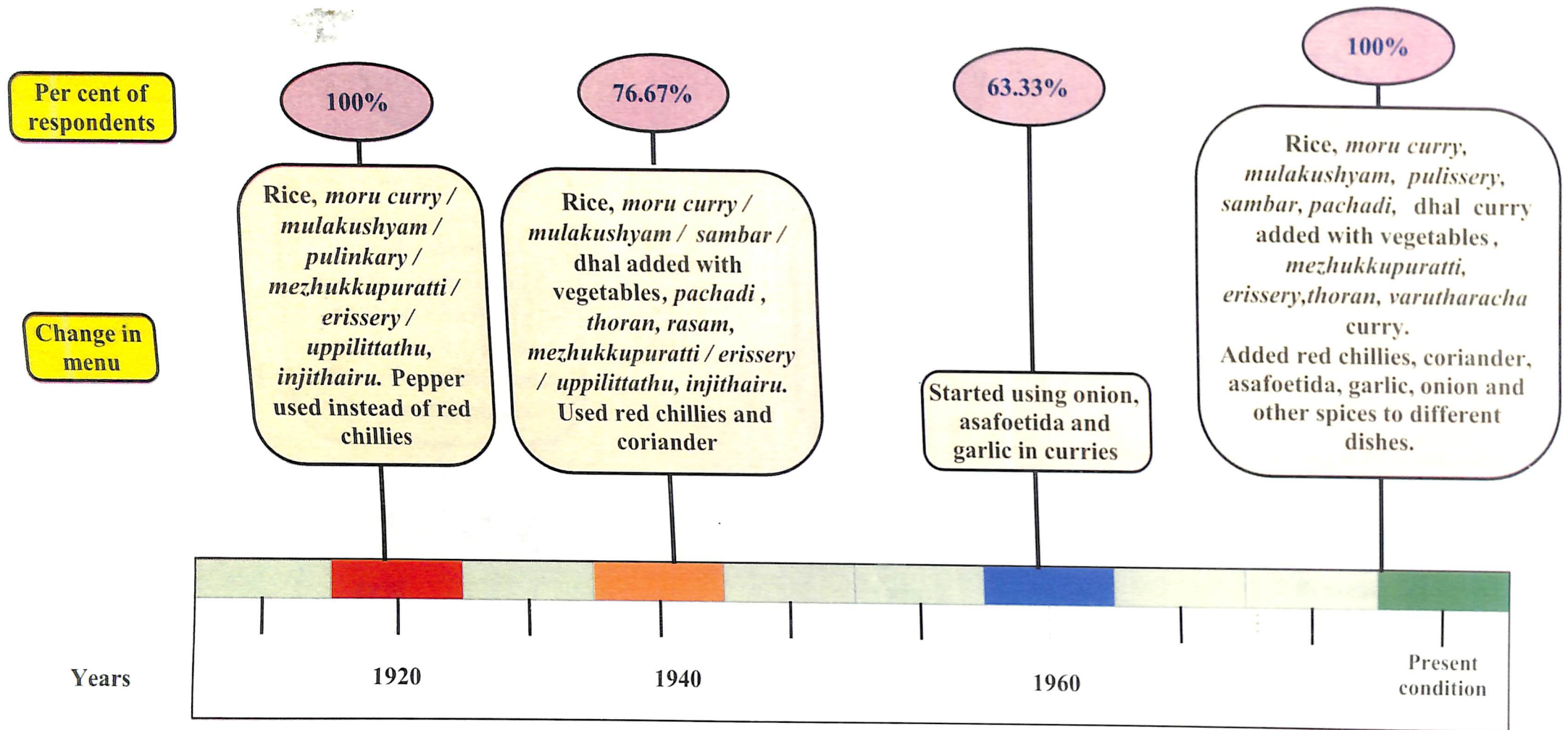


Fig. 7. Transition in the lunch pattern of Kerala Brahmins

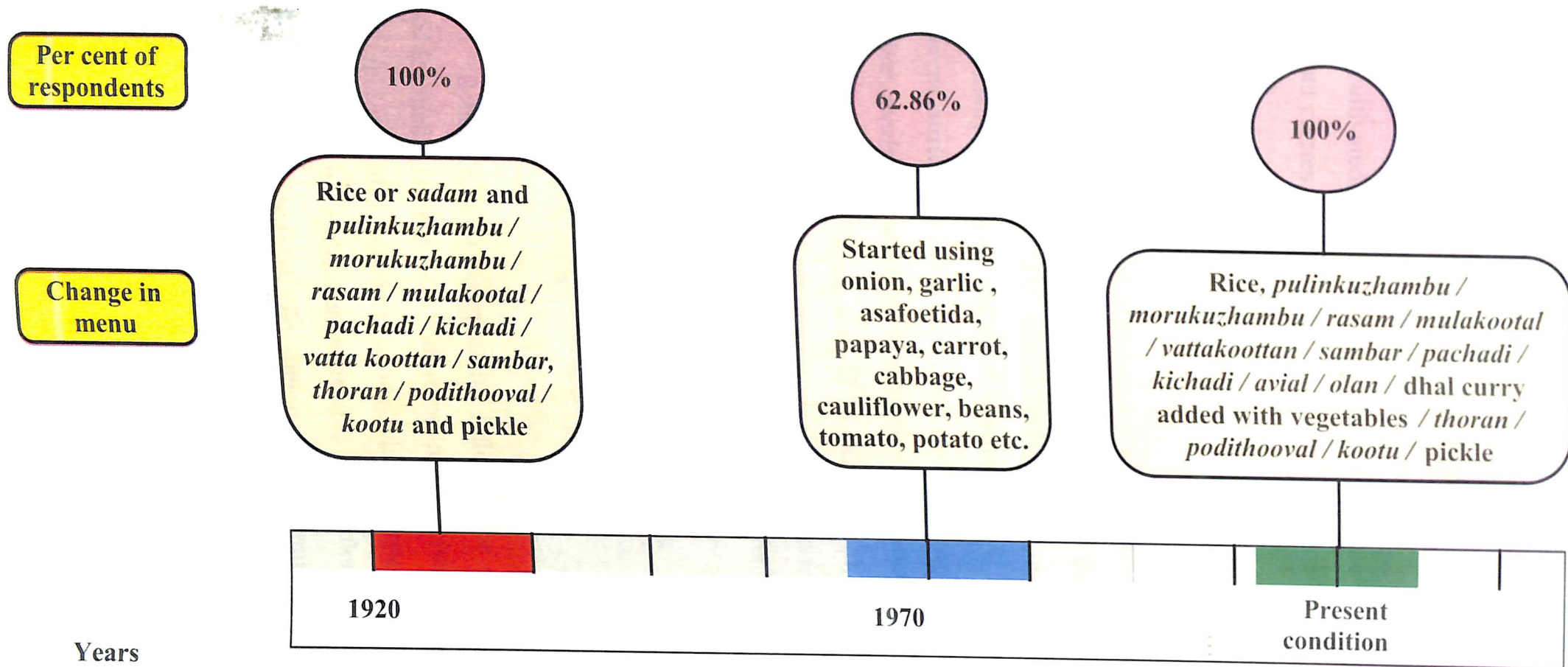


Fig. 8. Transition in the lunch pattern of Tamil Brahmins

respondents indicated that during 1970's they started using onion, garlic, asafoetida, *churakka*, papaya, carrot, cabbage, cauliflower, beans, tomato, and potato in curries. The only change in the present sadya being the use of different vegetables other than those cultivated in Kerala as well as the addition of coconut paste and coconut milk in different curries.

4.2.2.3 Ezhavas

The details of the transition occurred in the lunch pattern of Ezhava community is presented in Fig. 9. All respondents indicated that either *kanji* or cooked rice along with *puzhukku*/dry fish *chuttathu*/dry fish curry/*chammanthi* were the items traditionally prepared for lunch during 1920's. During 1950's, cooked rice with different curries like *moru* curry, fish curry, *erissery*, dhal curry added with vegetables, *sambar*, *mezhukkupuratti*, pickles, *vattals* and *chammanti* were found to be the common items included for lunch and 48.57 per cent of Ezhava respondents followed this pattern. Fish fry and meat preparations were used frequently after 1970's and 82.86 per cent of Ezhava respondents adopted these items for lunch. All the respondents indicated that presently they included cooked rice, different vegetable curries, fish fry and other non vegetarian preparations in the menu for lunch.

4.2.2.4 Scheduled Castes

Scheduled caste community followed the same pattern of Ezhavas in dishes used for lunch. During 1920's all respondents included *kanji*/cooked rice, *puzhukku*, dry fish *chuttathu* /dry fish curry along with *chammanthi*. During 1950, 25 per cent of respondents included different vegetable curries along with rice. During 1970, 80.50 per cent frequently used fish fry and meat preparations and presently all respondents included rice, vegetable curries, fish fry and non vegetarian preparations for lunch (Fig. 10).

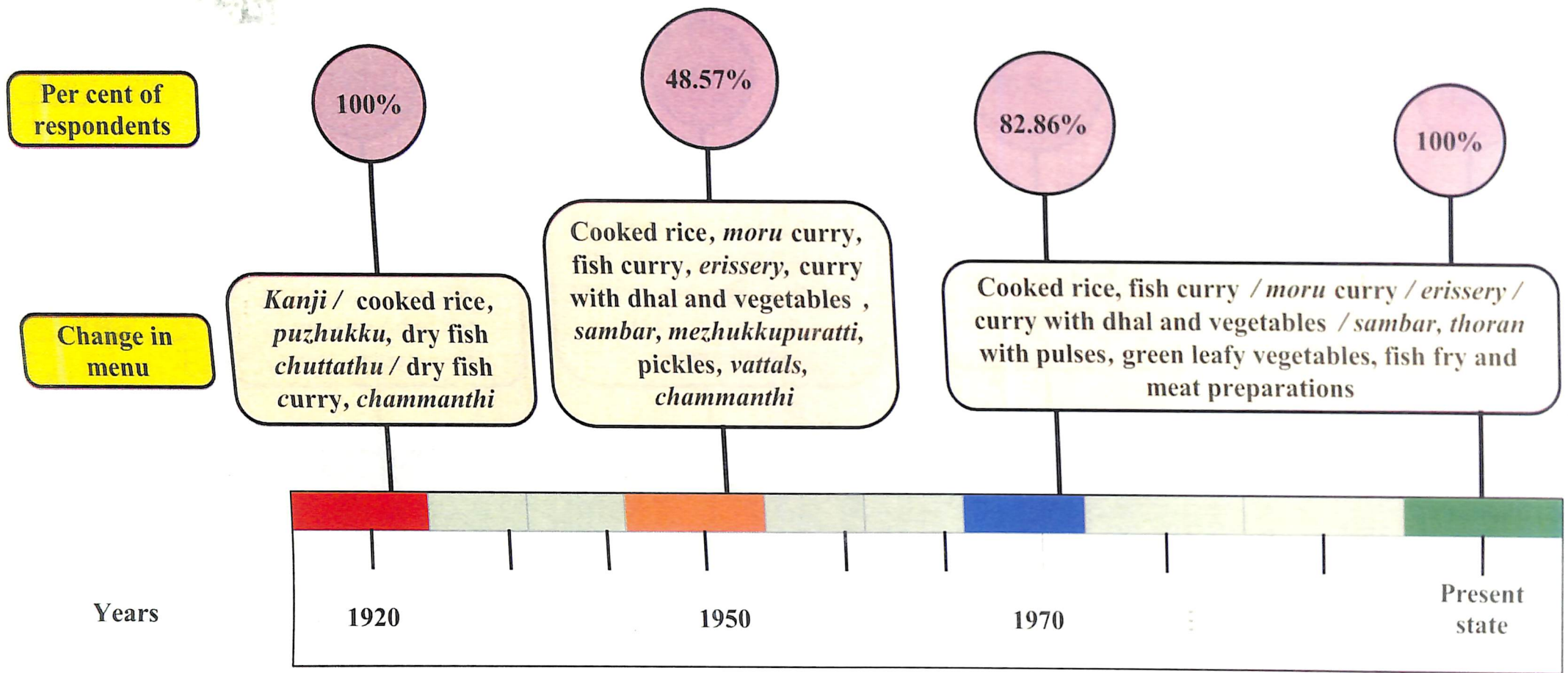


Fig. 9. Transition in the lunch pattern of Ezhavas

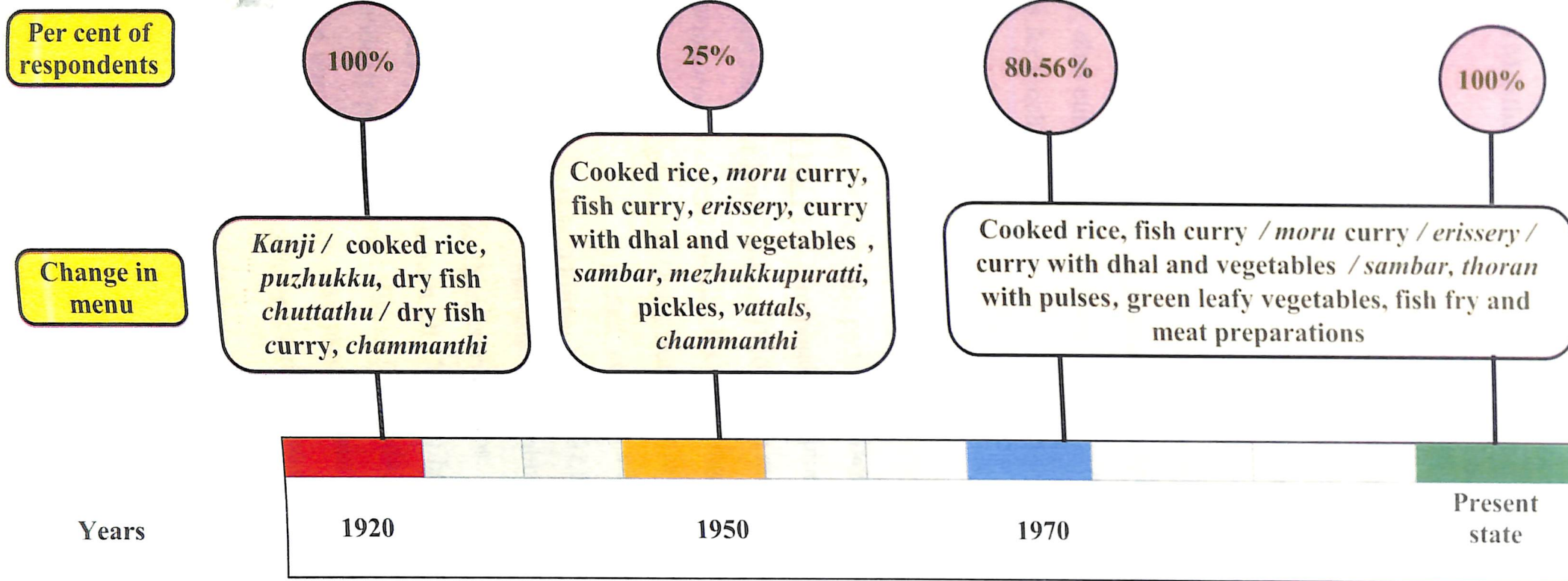


Fig. 10. Transition in the lunch pattern of Scheduled Castes

4.2.2.5 Muslims

Transition of lunch pattern of Muslim community is presented in Fig.11. Among Muslim community, the common lunch items prepared included rice along with fish/dry fish curry, dhal curry/*moru* curry/ *mezhukkupuratti* and pickle during 1920's and 72.22 per cent of the respondents adopted this pattern. More than 90 per cent of respondents indicated that during 1970's, different types of vegetable curries, meat preparation and fried non vegetarian items were used frequently by Muslim families for lunch. The recent trend showed that all respondents prepared vegetable curries like *sambar*, *moru* curry, dhal curry with vegetables, *varutharacha* curry and egg curry and non vegetarian items for lunch.

4.2.2.6 Christians

Transition of the lunch pattern of the Christian community was worked out and is represented in Fig.12. All respondents opined that either cooked rice or *kanji* was the common item for lunch during 1920's. The major side dishes were fish curry, *puzhukku* or *varutharacha* curry of which the major ingredients were locally available vegetables like yam, green plantain, bread fruit, tapioca etc. Different curries were prepared by adding coconut milk or pasted coconut with vegetables, tubers and green leaves available in homesteads. During 1970's, 82.85 per cent of respondents indicated that vegetables bought from markets like cabbage, carrot, tomato, big onion, potato, cauliflower etc replaced homestead crops. During 1980's meat items were more frequently prepared in almost all Christian households than before and 80 per cent of respondents prepared meat dishes frequently. Presently 71.42 per cent of respondents had the opinion that meat was used in their families only on Sundays and on special occasions and they included vegetarian items also for lunch.

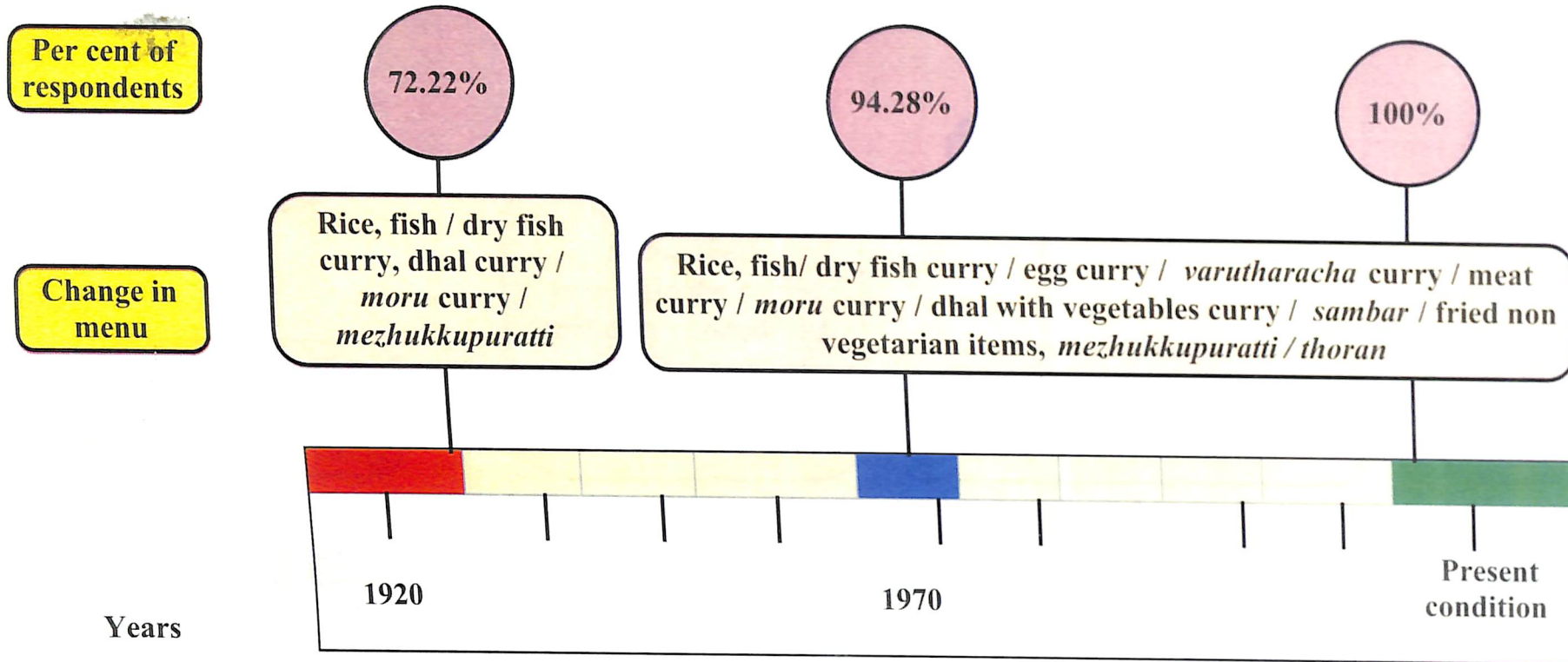


Fig. 11. Transition in the lunch pattern of Muslims

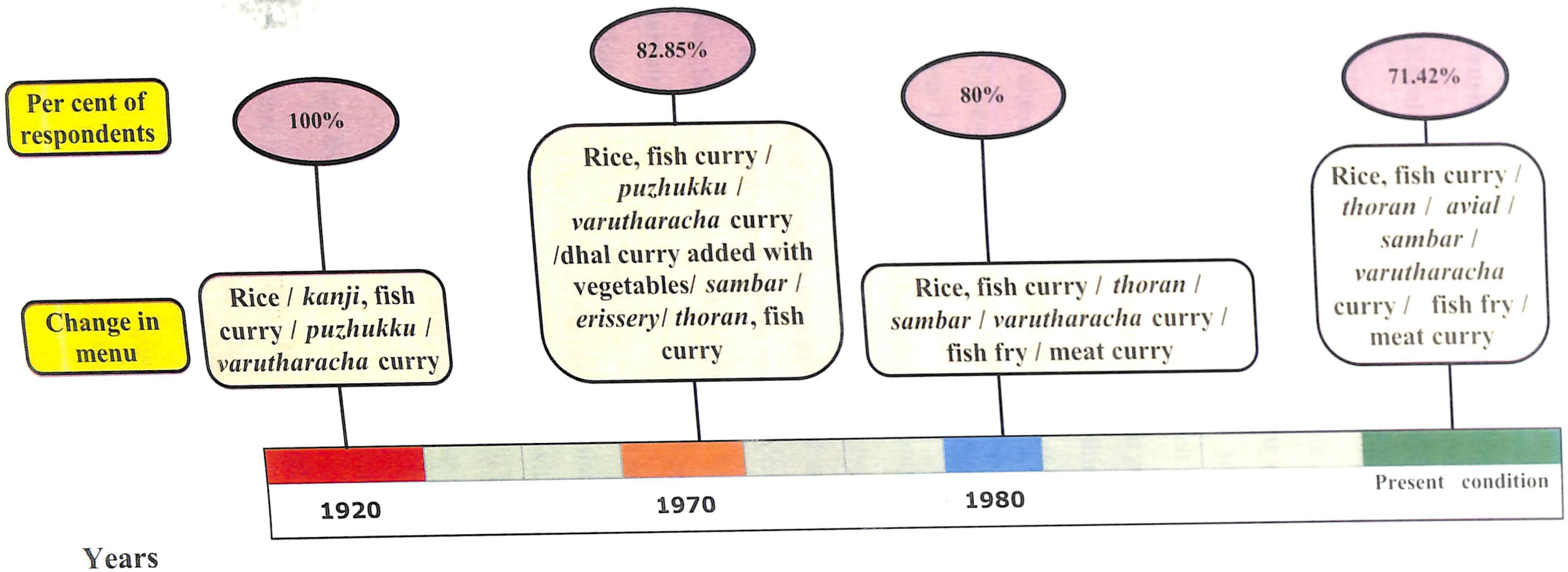


Fig. 12. Transition in lunch pattern of Christians

4.2.3 Transition in the marriage *sadya* of different communities

4.2.3.1 Kerala Brahmins

According to 23.33 per cent of respondents, the traditional *sadya* of the marriage feast of Kerala Brahmins was very simple and consisted of parboiled rice (*kuthari choru*) and four different curries, known as *nalu curry* (Fig.13). Along with this *nalu curry*, *injithairu*, *uppilittathu* were also served. *Erissery*, *olan*, *varuthupperi* and *madura curry* were the items of the so called *nalu curry*. *Madhura curry* was meant for the traditional dessert *payasam* mainly *ada pradhaman*. *Parippu pradhaman* and jack fruit *pradhaman* were ranked second and third in popularity. About 73.33 per cent of Kerala Brahmins considered jack fruit *pradhaman* as sub standard among high income groups. *Upperi* or fried chips were also considered as a curry. But 16.6 per cent respondents had the opinion that *upperi* is one among *nalu curry* but rest of the respondents were not sure about this. Seventy per cent of respondents had the opinion that *avial*, *sambar*, *pachadi*, *pulinji* and *papadam* were added to the *sadya* during 1940's. The same respondents opined that *sambar*, *pulinji* and *rasam* were of Tamil origin and the *pulinkary* which was reported to be more tasty was replaced with *sambar*. Serving dhal along with ghee was a common practice in *sadya* during 1960's, but not among the poor families. About 80 per cent of respondents indicated about the inclusion of *palada pradhaman* as a dessert item for marriage *sadya* during late 1970's. But it adorned to the place of the most popular item of *sadya* of Kerala Brahmins during 1980's. After 1980's *sadya* was modified with additions of more and more side dishes and 83.33 per cent of respondents indicated the inclusion of pineapple curry, cabbage *thoran*, bitter gourd - tomato curry and potato stew in *sadya*.

4.2.3.2 Tamil Brahmins

According to 88.57 per cent of Tamil Brahmins, the major dishes of traditional marriage feast included rice, dhal and ghee, sweet *pachadi*, sour *pachadi*, *kootu*, *morukuzhambu*, *sambar*, curry or *podithooval* with plantain, bread fruit, jack fruit, *kothavara* etc., *rasam*, butter milk, pickle, *appalam*, fried chips, *pal payasam* or *ada pradhaman*. During 1950, 68.58 per cent of respondents indicated that *kalan*, *olan*,

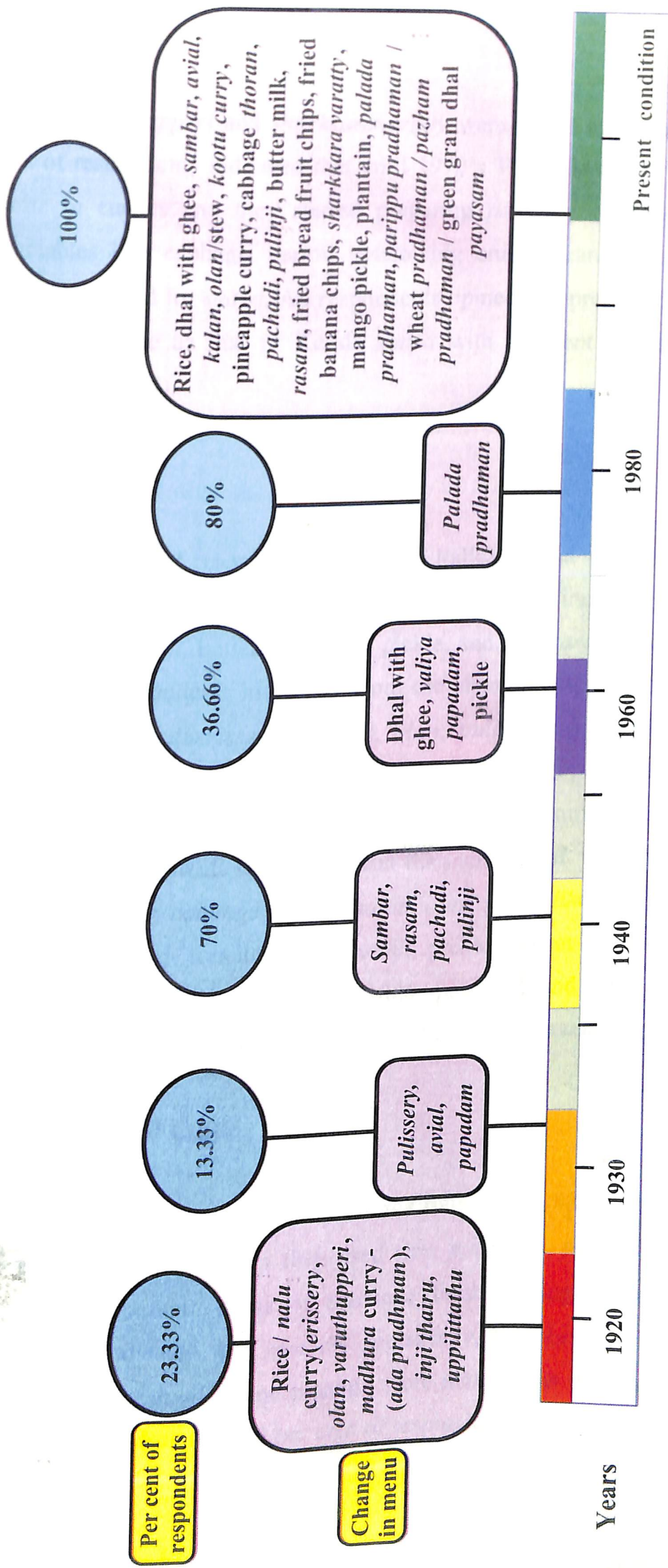


Fig. 13. Transition in the sadya of Kerala Brahmins

pulinji, *avial*, *upperi* and *sharkkaravaratty* were added to the menu. About 54.29 per cent of respondents indicated that until 1970's Tamil Brahmins did not use onion and garlic in curries and they started preparing *palada pradhaman* and used different vegetables like cabbage, carrot, potato, big onion, beans, peas and ladies finger in curries prepared for *sadya*. All respondents opined that presently the items for marriage *sadya* are same as that of Kerala *sadya* with different curries and more than one *payasam* (Fig.14).

4.2.3.3 Ezhavas

Majority of respondents (85.17%) indicated that traditional marriage *sadya* of Ezhava community had very few dishes (Fig.15) which included cooked rice, *pulinkary*, *kootu* curry, *pulinji*, butter milk, lime pickle, and *chakkarachoru*. During 1940's, 31.42 per cent of respondents indicated about the changes that occurred for *sadya* in which *sambar*, *avial*, *kutherissery*, *erupuli*, *olan*, *pulinji*, *aripayasam* and *papadam* were included along with the traditional menu. More than 60 per cent of respondents opined that *pachadi*, *thoran* and *palada pradhaman* were introduced to the *sadya* during 1970's. All respondents indicated about the inclusion of different curries like *sambar*, *avial*, *kootucurry*, *cabbage thoran*, *kalan*, *olan*, *pachadi/stew*, pineapple curry, *masala* curry, bitter gourd- tomato curry, *pulinji*, pickle, two or three types of *upperi*, butter milk, *rasam*, *papadam*, *plantain*, *palada payasam* and wheat/ moong dhal/ *pazha pradhaman* in the present day marriage *sadya* of Ezhava community.

4.2.3.4 Scheduled Castes

Regarding the items used for marriage feast, 88.89 per cent of respondents indicated that during 1920's they used rice, *pulinkary*, *puzhukku*, pickle and plantain (Fig.16) as the main items of marriage feast. During 1950's, 38.88 per cent of respondents indicated that *sambar*, *kootucurry*, *pulinkary*, *kalan*, *olan*, lime pickle, *chakkarachoru*, *papadam* and plantain were included as the major items of traditional marriage feast. More than 60 per cent of respondents indicated that during 1970's *sadya*

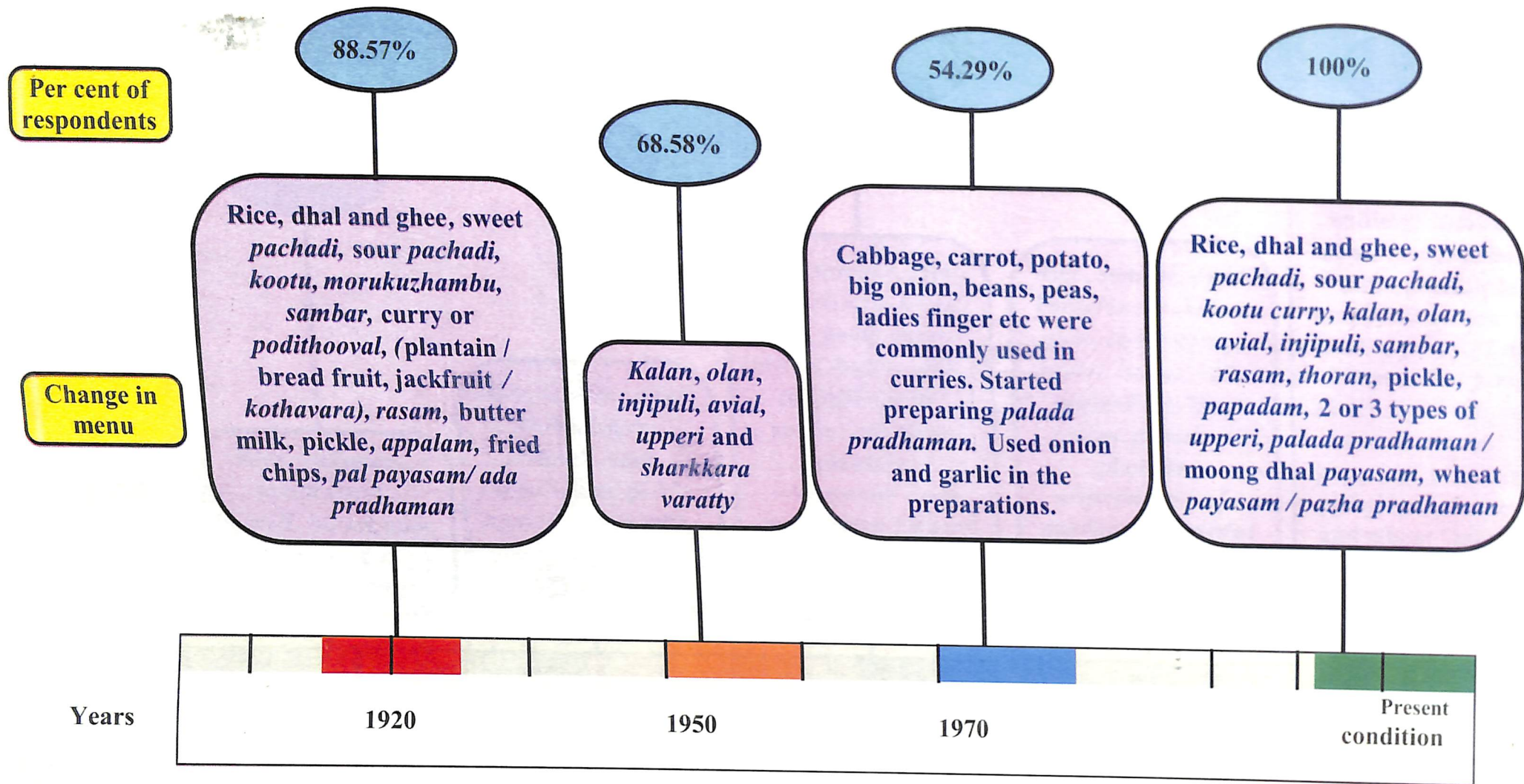


Fig. 14. Transition in the marriage *sadya* of Tamil Brahmins

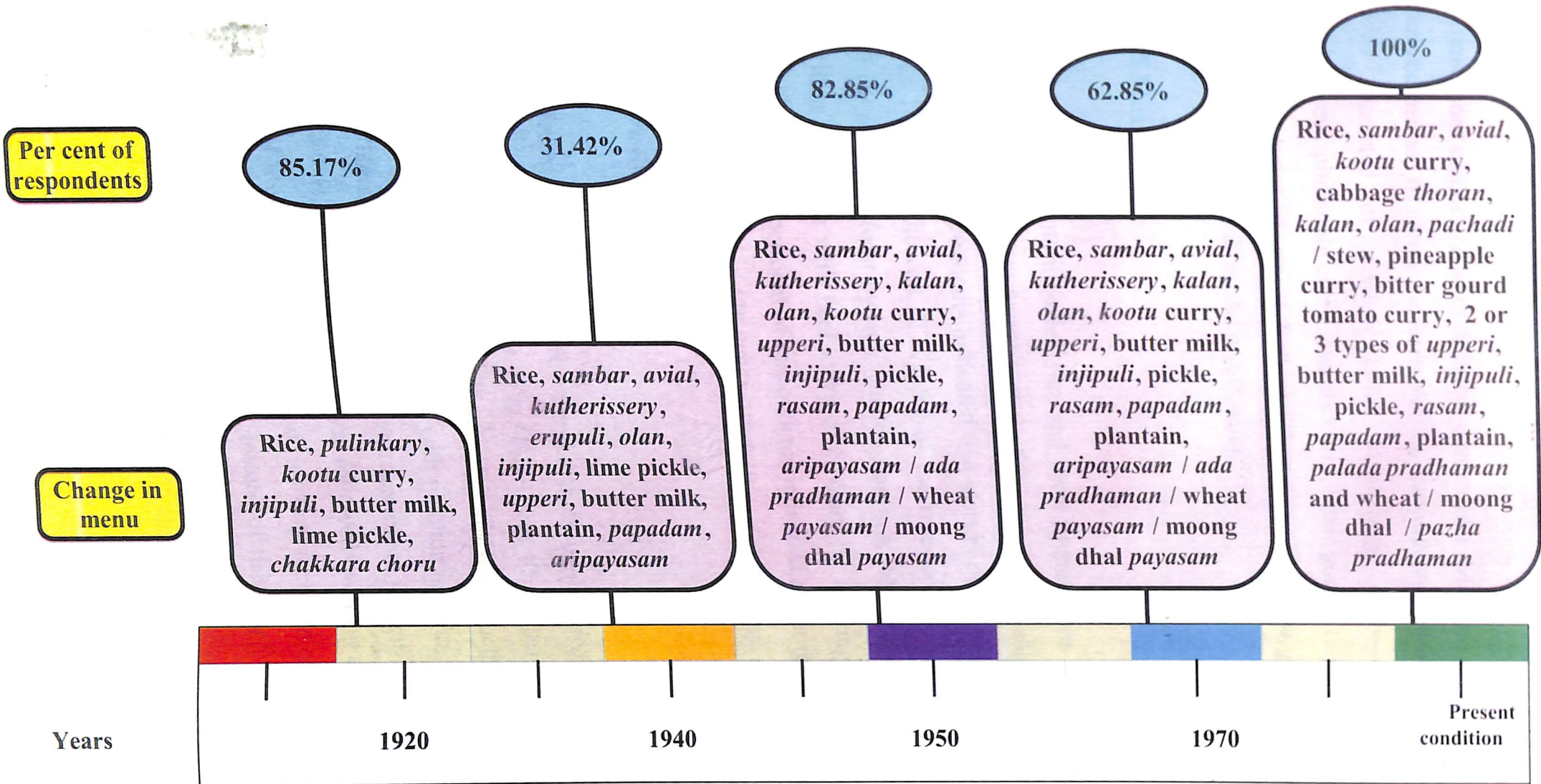


Fig. 15. Transition in the marriage *sadya* of Ezhavas

became more elaborated with different curries like *avial* and *erissery*. *Aripayasam* was prepared instead of *chakkarachoru*. All the respondents indicated that present pattern of *sadya* consisted of *sambar*, *avial*, *kootucurry*, cabbage *thoran*, *kalan*, *olan*, *pachadi/stew*, pineapple curry, *masala* curry, bitter gourd- tomato curry, *pulinji*, pickle, two or three types of *upperi*, butter milk, *rasam*, *papadam*, *plantain*, *palada payasam* and wheat/ moong dhal/ *pazha pradhaman*.

4.2.3.5 Muslims

All respondents included rice and meat preparations for marriage feast during 1920 (Fig. 17). In affluent families ghee rice was served instead of rice. During 1970's, 72.22 per cent of respondents indicated that instead of rice, they included ghee rice for marriage feast and the rest (27.78 %) of the respondents indicated that *biriyani* was served for marriage feast by rich Muslim families. All respondents indicated that they used either ghee rice with beef curry or *biriyani* for marriage feast during 1980's. At present about 11.11 per cent of respondents indicated about the course lunch served for marriage feast and the rest (88.89%) still followed the pattern of 1980's.

4.2.3.6 Christians

Different changes occurred for the traditional *sadya* served for the Christian marriage over a period of time (Fig.18). About 85.71 per cent of the respondents indicated that in the traditional marriage *sadya* of Christians they used to include rice as the main dish with chicken curry, beef with plantain *ularthu*, pork fry and fish curry as side dishes. Plantain and sugar added with fermented jaggery syrup, called *panambani*, was served as a dessert. This practice was followed by about 40 per cent of respondents and the rest of the respondents indicated that they included different types of plantains at the end of *sadya*. In certain regions, instead of fish curry, fish *peerai* was included. To prepare chicken curry, Christians used to add ash gourd pieces, and to prepare beef and pork they used to add coconut pieces and yam or green plantain pieces.

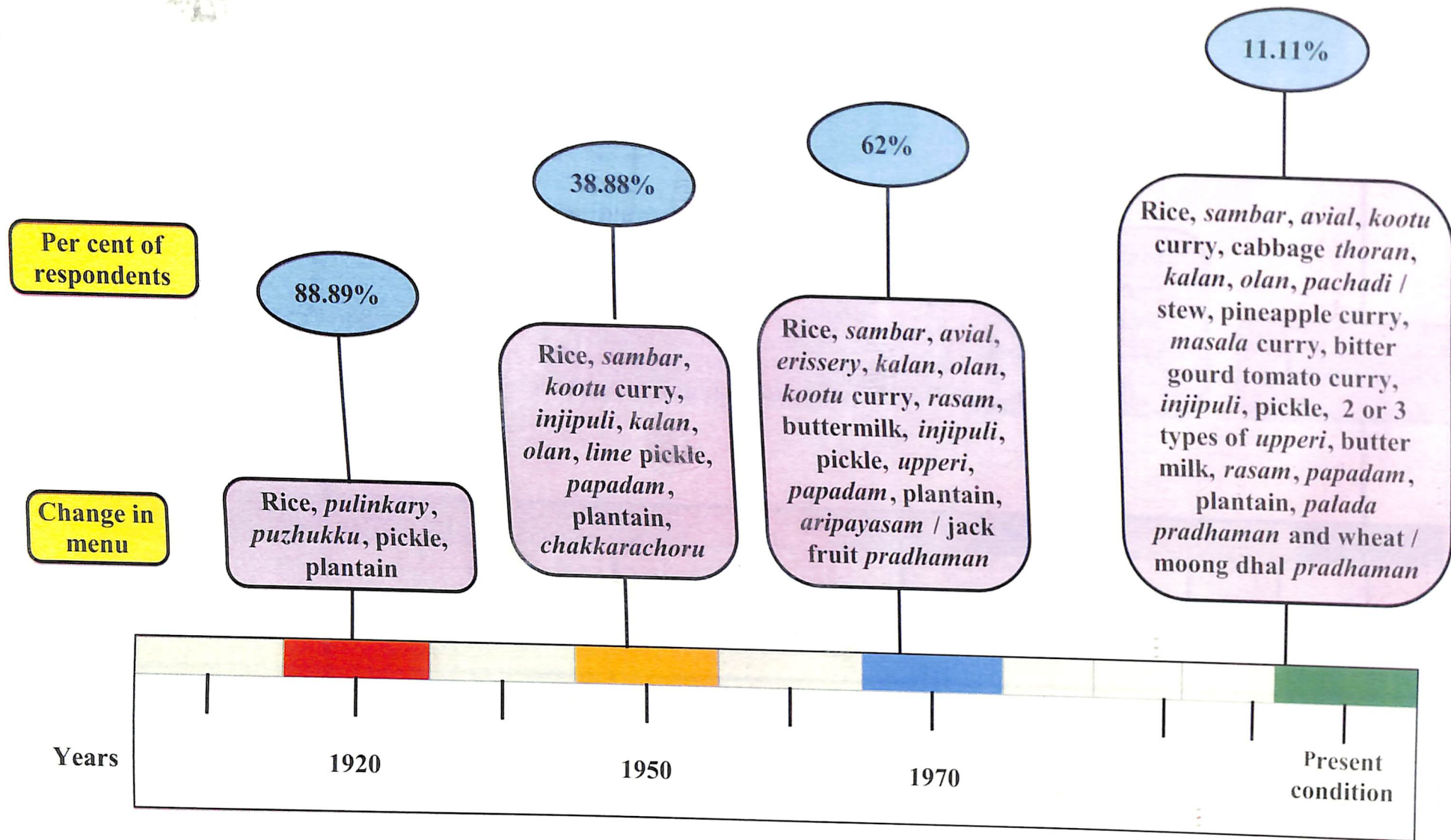


Fig. 16. Transition in the marriage *sadya* of Scheduled Castes

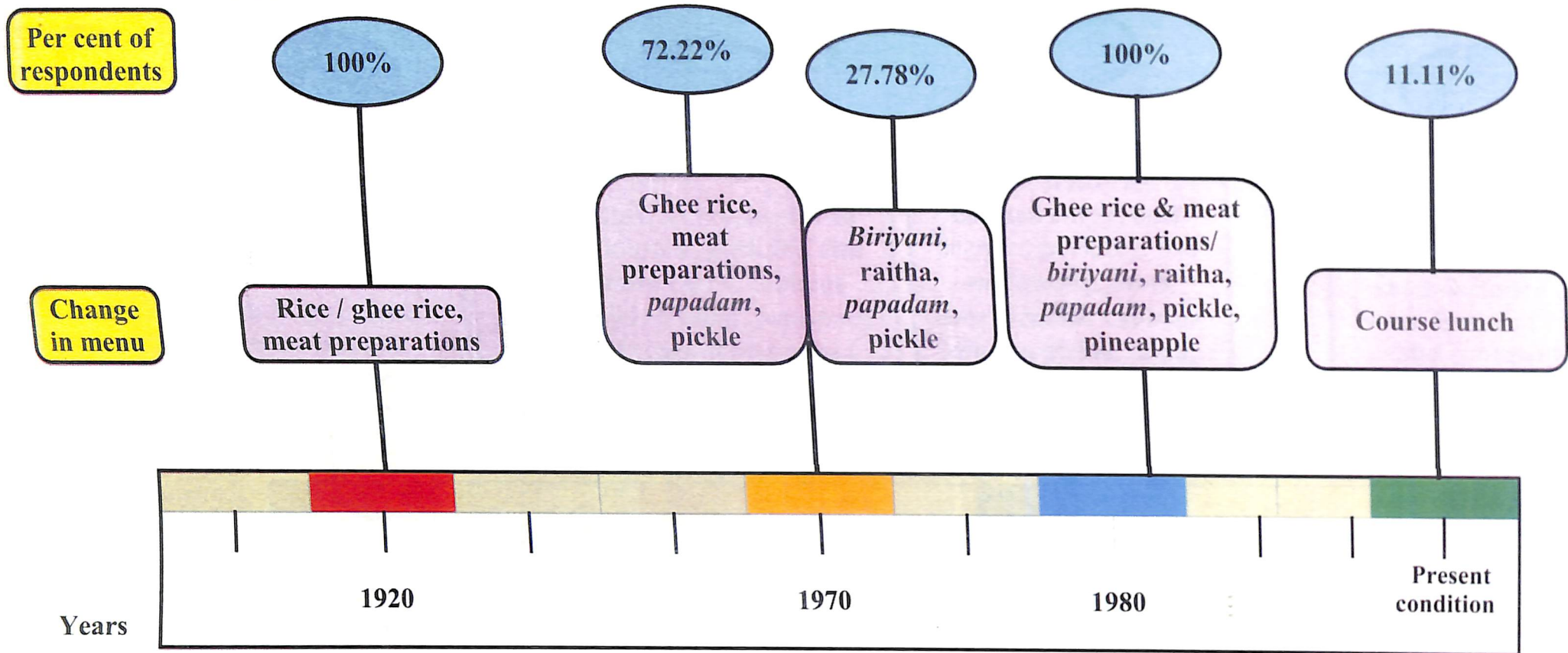


Fig. 17. Transition in the marriage feast of Muslims

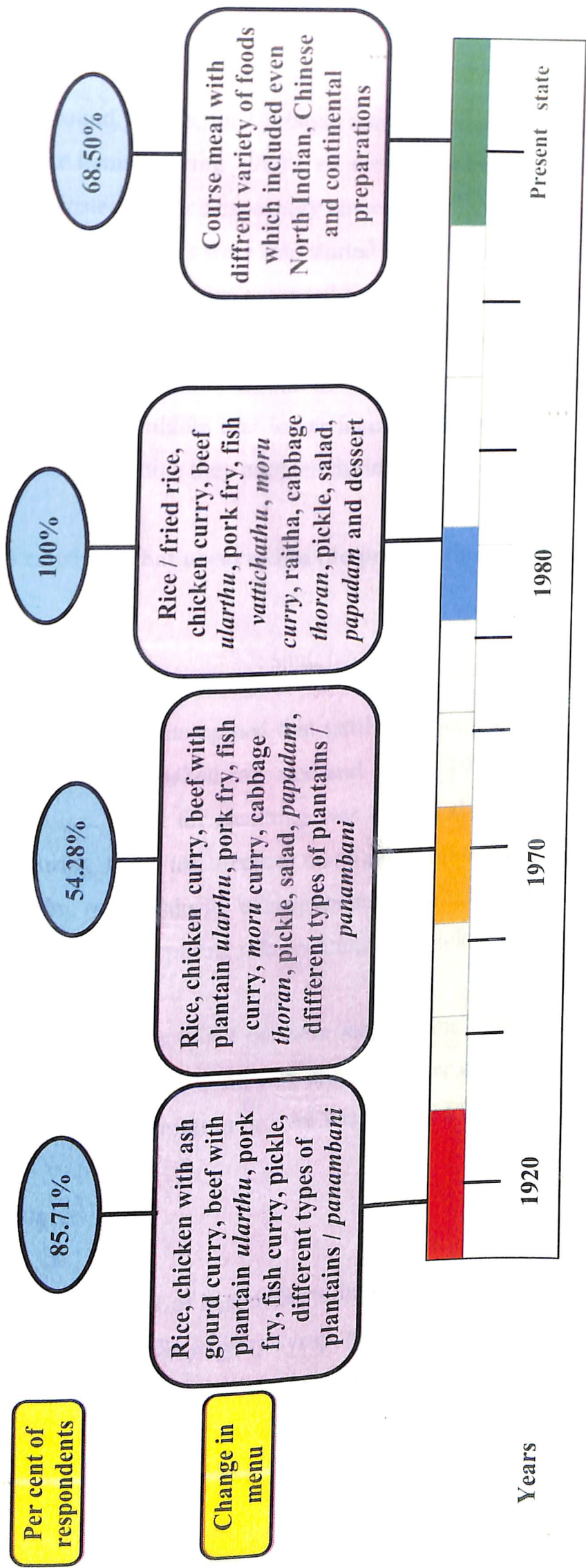


Fig. 18. Transition in the marriage feast of Christians

Around 1970's, for Christian marriage, vegetarian items were also served along with other items. During 1980's all the respondents indicated the practice of serving fried rice instead of rice especially among high income groups. Serving of desserts like ice creams or puddings were also started during this period and this was first adopted by the rich families and later extended to others. From 1990 onwards, 68.50 per cent of respondents indicated about the course lunch with different Kerala, North Indian, Chinese and continental dishes in the marriage *sadya* of Christians. Respondents belonging to the middle and lower income groups followed the traditional pattern of Christian *sadya* which they adopted during 1980's.

4.2.4 Transition that occurred in the preparation of traditional food items

4.2.4.1 *Ada*

All respondents opined that until 1940, *ada* was prepared either by grinding or by hand pounding soaked raw rice and during 1980, they used milled rice flour (Fig. 19). The vessel used for steaming was *uruli* and for cooking they used earthen ware hearth. During 1940, *idli* steamer made up of brass was commonly used in households for preparing *ada*. Majority of respondents (65.71%) indicated that roasted rice flour is presently used for preparing *ada* by making a thick dough with hot water.

During 1980's 66.67 per cent respondents indicated that they used aluminium or steel vessels for preparing *ada* and 53.33 per cent used LPG stove. At present, all respondents used aluminium or steel vessels and LPG stove for this purpose.

4.2.4.2 *Aluva*

Sixty per cent of respondents indicated that during 1950's hand pounded fine rice flour, coconut milk, jaggery syrup, ghee / coconut oil were used for preparing *aluva* (Fig. 20). Nearly 77.14 per cent of respondents indicated the use of both hand pounded raw rice flour as well as wheat flour to prepare *aluva* during 1970's and 8.57 per cent of

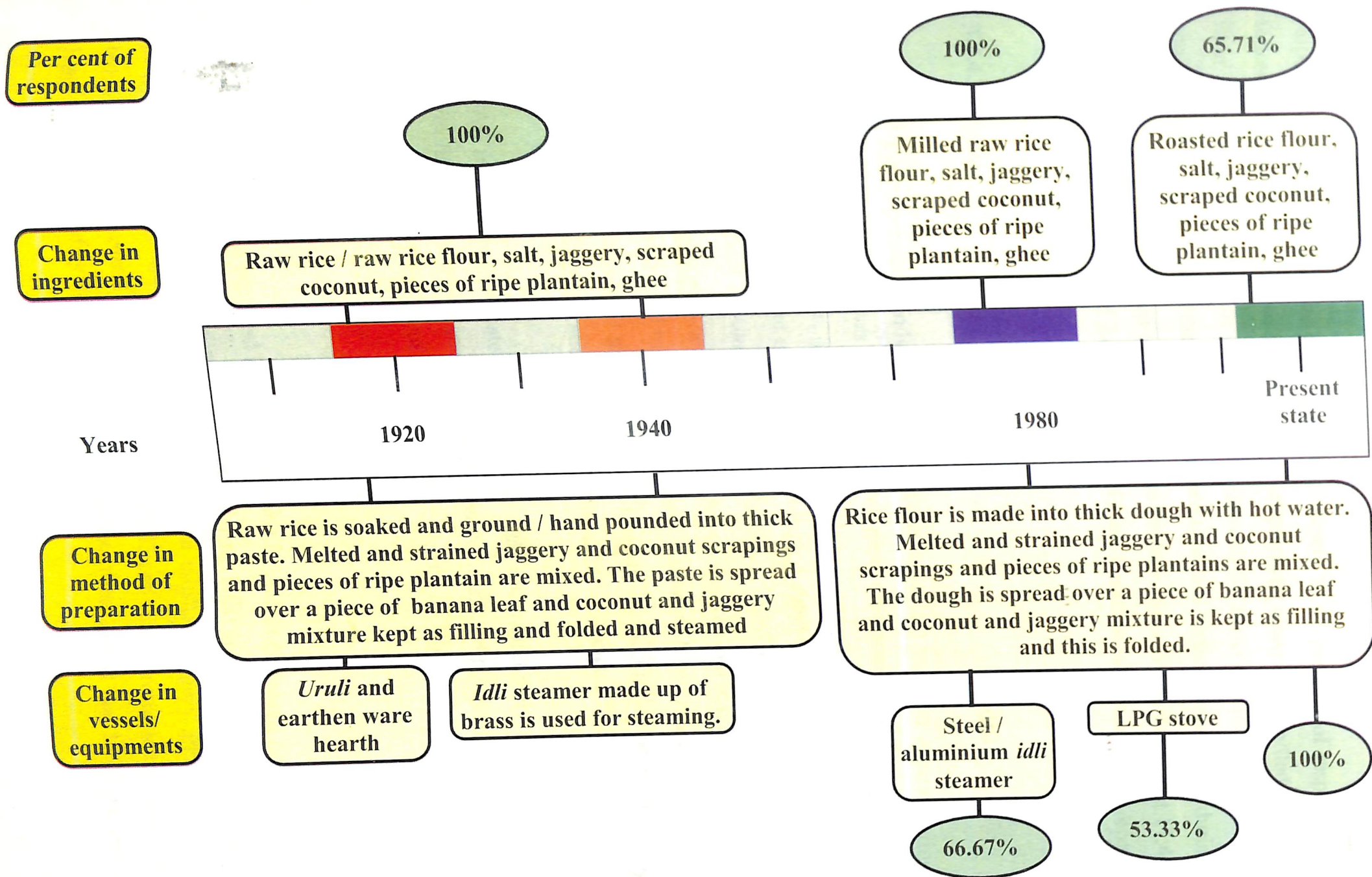


Fig. 19. Transition that occurred in the preparation of *Ada*

respondents used maida as the basic ingredient. Nearly 31.43 per cent of respondents followed this practice now also and 14.29 per cent prepared *aluva* using milled raw rice flour. Regarding the change in vessels and equipments for the preparation of *aluva*, it was found that 60 per cent of the respondents used *uruli* and earthen ware hearth during 1950's and 45.72 per cent used *uruli* even now to prepare *aluva*. It was found that 11.44 per cent used LPG stove and 34.28 per cent still used earthen ware hearth to prepare *aluva*.

4.2.4.3 *Appam*

All the respondents indicated that the main ingredient used for *appam* during 1920's was raw rice which was ground to a thick paste after soaking and mixing with jaggery syrup, coconut pieces, gingelly seeds, cardamom, cumin seeds and coconut oil or ghee. Nearly 63.33 per cent of respondents indicated about the use of hand pounded raw rice flour to prepare *appam* during 1960. Presently, 46.67 per cent of respondents indicated that they included a combination of roasted rice flour and maida and 63.33 per cent of respondents still used milled raw rice flour instead of hand pounded rice flour. None of the respondents used gingelly seeds at present. Transition that occurred in the ingredients, method of preparation and vessels for *appam* is depicted in Fig. 21.

All respondents indicated that to prepare *appam*, traditionally they used *kuzhi uruli /karolu/ appa kara* and cooked in earthen ware hearth. At present 6.67 per cent of respondents indicated the use of nonstick pans to prepare *appam*.

4.2.4.4 *Cheeli*

Transition that occurred in the preparation of *cheeli* is presented in Fig. 22. Only 42.85 per cent of respondents prepared *cheeli* during 1920's which was done by hand pounding roasted gingelly seeds and mixing with crushed jaggery and making into balls. At present, instead of crushed jaggery, 11.43 per cent of respondents used thick jaggery syrup and they used roasted gingelly seeds. It was found that 17.15 per cent of

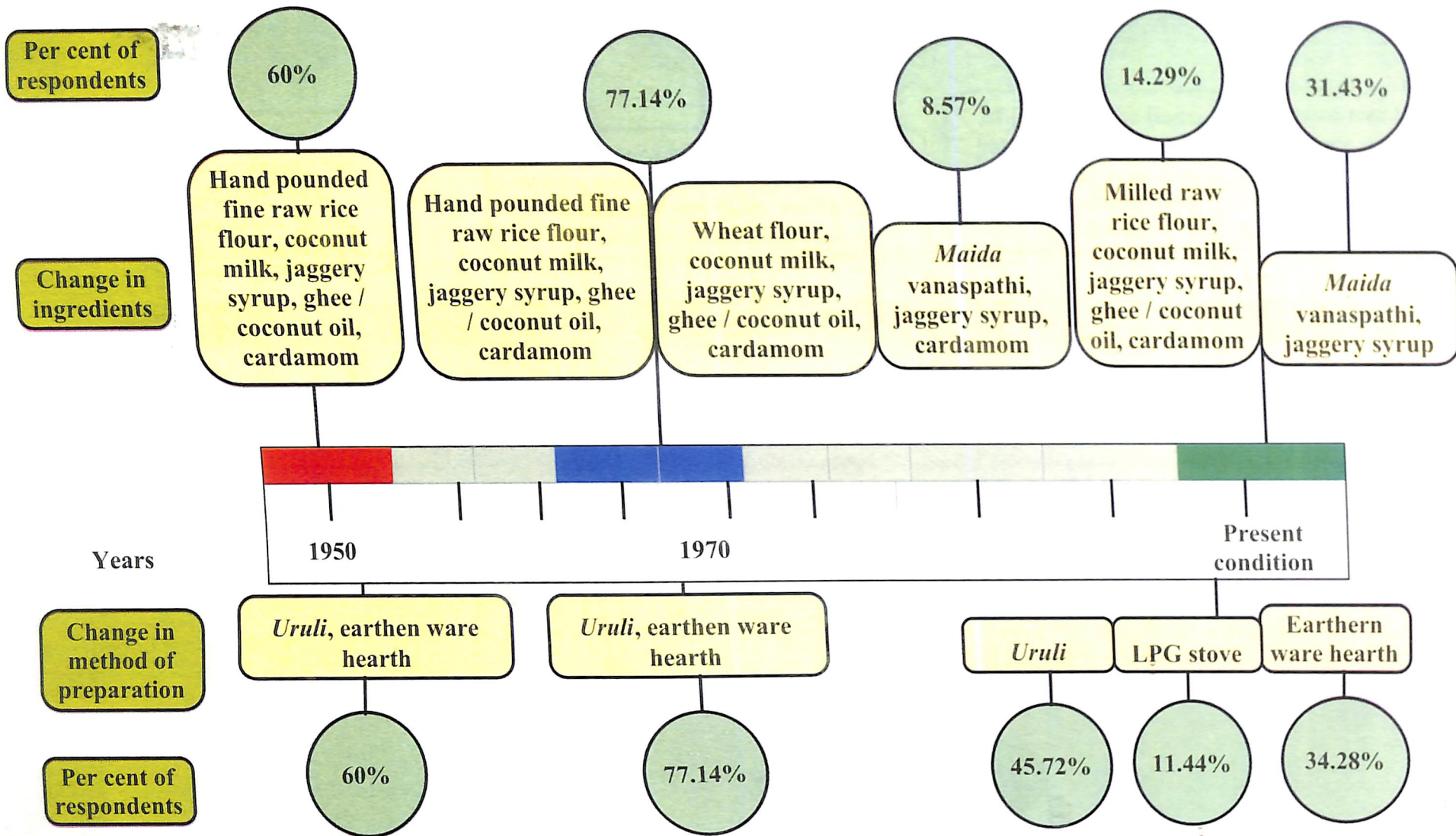


Fig. 20. Transition that occurred in the preparation of *Aluva*

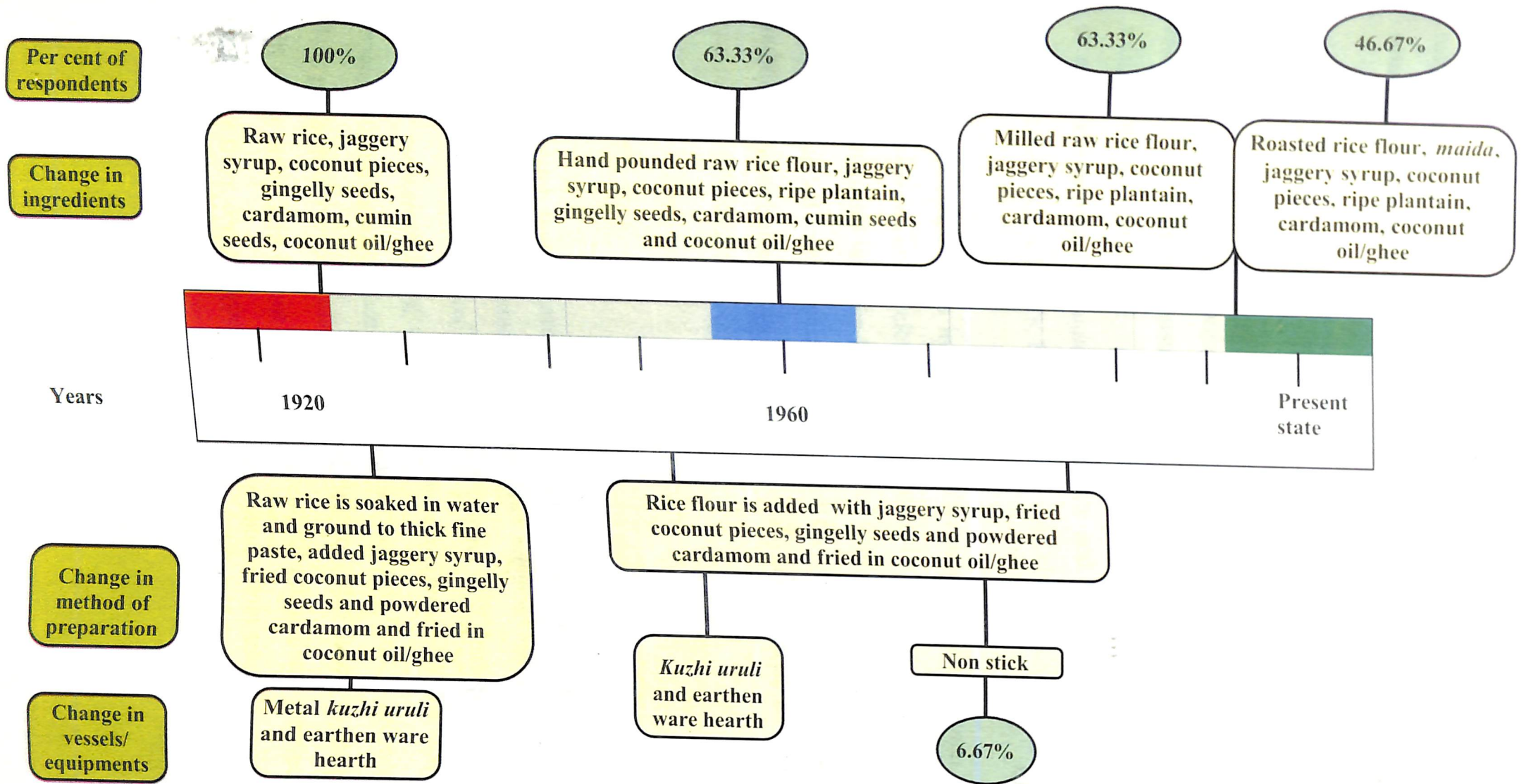


Fig. 21. Transition that occurred in the preparation of *Appam*

respondents prepared *cheeli* using the traditional method but they used mixie for pounding roasted gingelly seeds.

4.2.4.5 *Kadumanga*

To prepare *kadumanga*, 93.33 per cent of respondents used tender mango, whole red chilly, rock salt and mustard during 1920's (Fig. 23). During 1960's, they started using chilly powder, salt crystals and crushed mustard. At present, only 36.67 per cent of respondents prepared *kadumanga* at home and they followed the same pattern of preparation as that of 1960's. However, they used electric mixie for crushing spices.

All the respondents indicated that after preparing *kadumanga*, it was filled in traditional *bharani* and a cloth dipped in gingelly oil was wrapped over that. After closing the *bharani* with the lid it was sealed with jack fruit resin. This was kept in a dark room called *ara* especially constructed for storage of food and seeds in every traditional households. This practice got totally endangered now and none of the respondents followed these practices at present.

4.2.4.6 *Ottada*

Transition that occurred to *ottada* is presented in Fig. 24. During 1920's 40 per cent of respondents indicated that *ottada* was prepared using raw rice as the basic ingredient which was soaked in water and ground to a thick paste with coconut and cooked in *ottukalam* using earthen ware hearth. During 1950's, 25.72 per cent of respondents indicated the use of hand pounded raw rice flour to prepare *ottada*. About 74.28 per cent of respondents used roasted rice flour also during the same period along with small onion and cumin seeds. At present, all respondents prepared *ottada* using roasted rice flour, scraped coconut, small onion and cumin seeds.

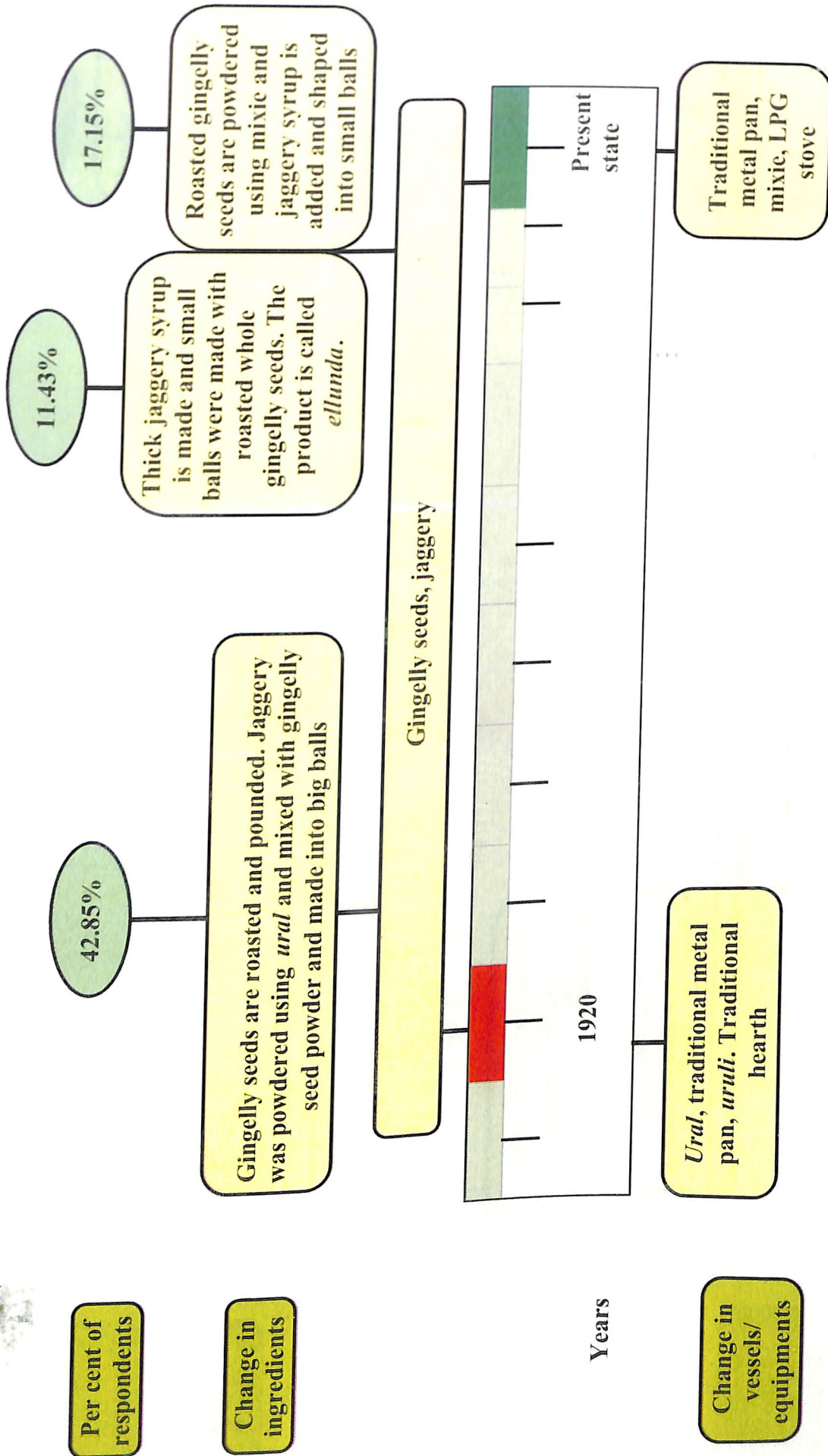


Fig. 22. Transition that occurred in the preparation of *Cheeli*

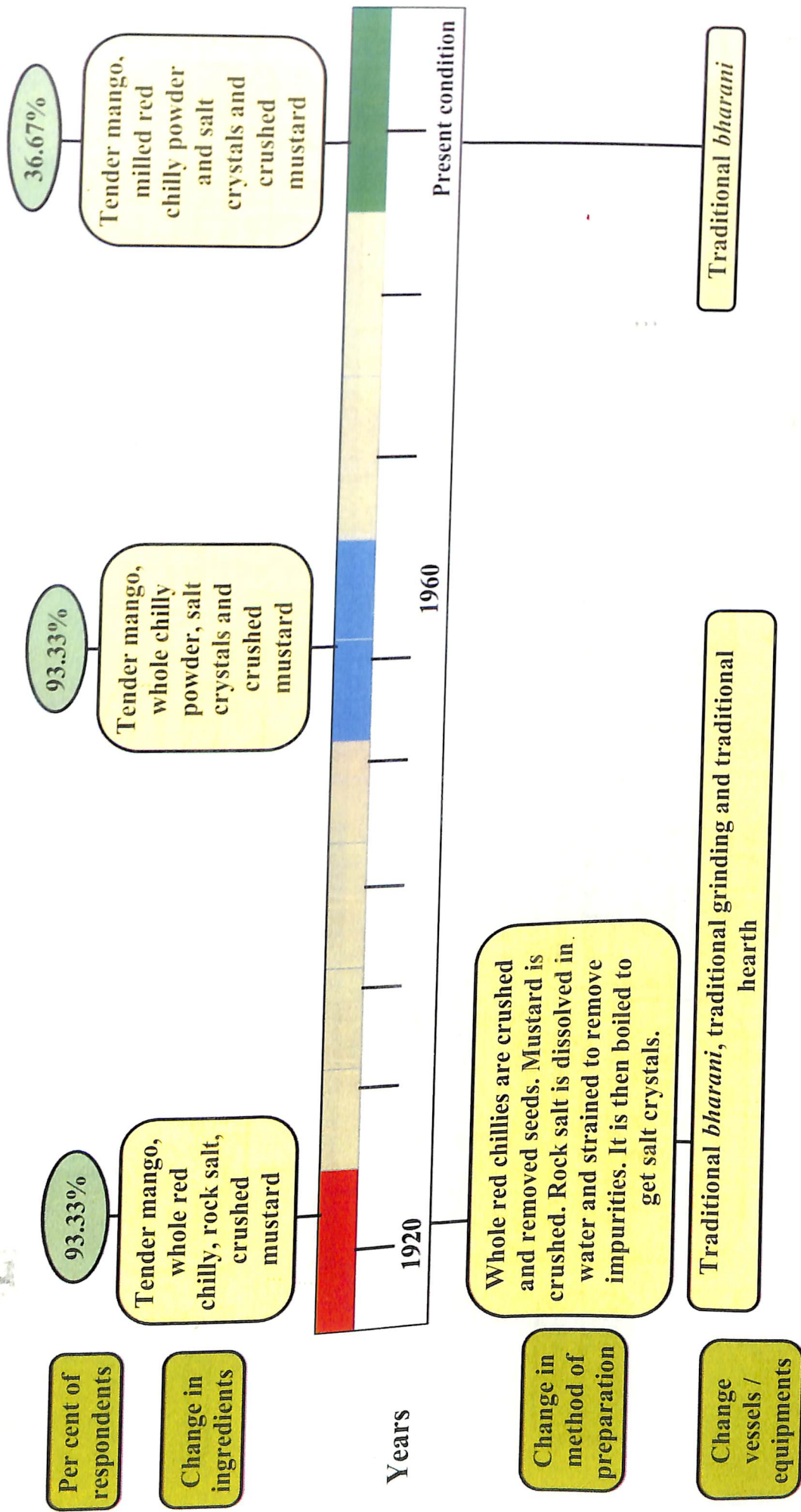


Fig. 23. Transition that occurred in the preparation of Kadumanga

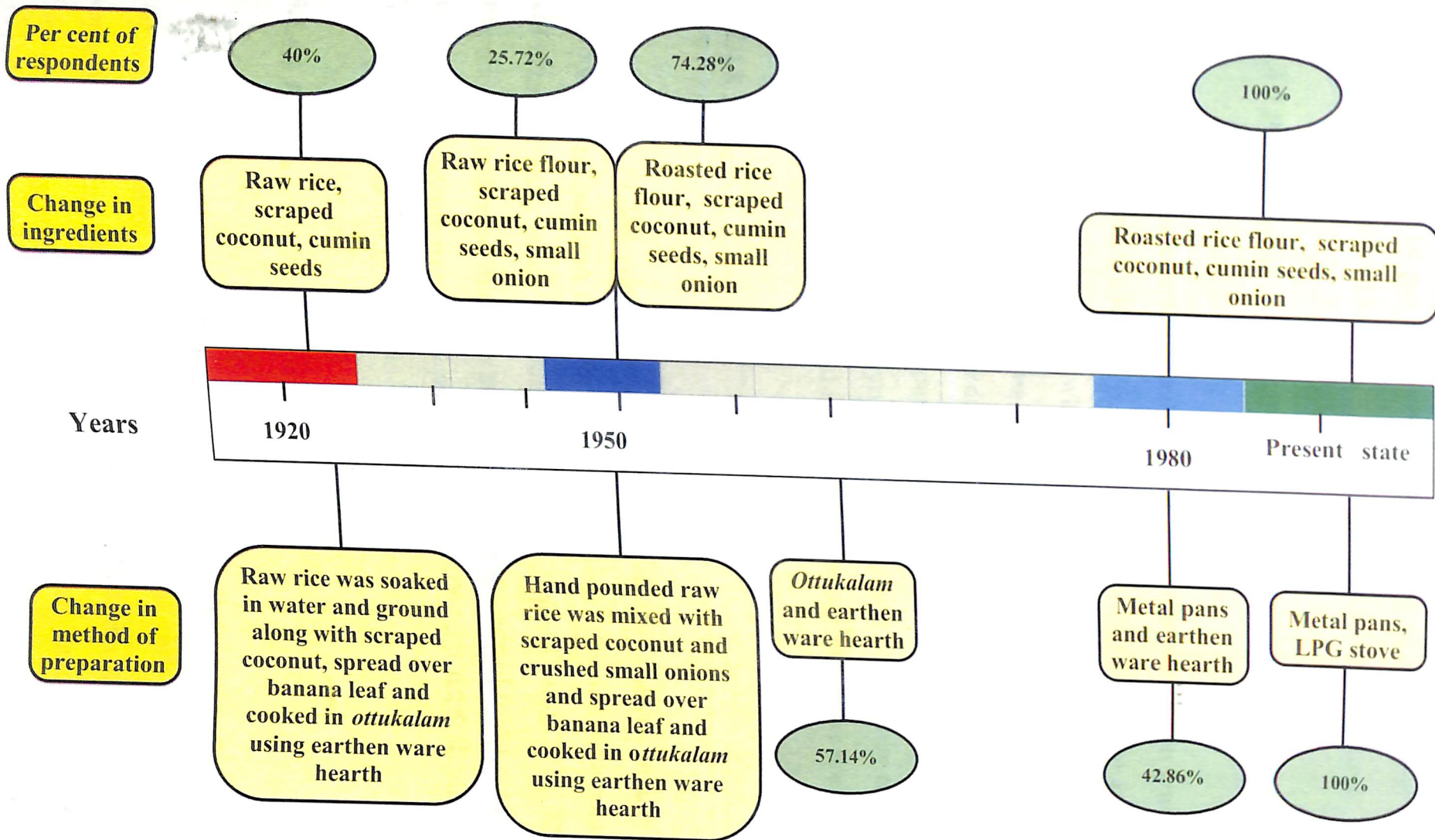


Fig. 24. Transition that occurred in the preparation of *Ottada*

All the respondents traditionally used *ottukalam* to prepare *ottada*. During 1980's about 57.14 per cent used *ottukalam* and 42.86 per cent used metal pans and earthen ware hearth which now got entirely replaced by LPG stove.

4.2.4.7 *Poruvelangai*

All respondents indicated that they used raw rice, green gram, jaggery, coconut pieces, cumin seeds and dry ginger powder as ingredients to prepare *poruvelangai* traditionally. During 1960's, wheat was also used along with other ingredients and 54.28 per cent of respondents used wheat, raw rice and green gram to prepare *poruvelangai* (Fig. 25). Presently, all the respondents followed this pattern. With respect to the method of preparation all respondents indicated that instead of thick jaggery syrup, they used thin syrup so as to get a soft consistency for *poruvelangai*. The respondents used both *uruli* and metal pans presently to prepare and used LPG stove.

4.2.4.8 *Puttu*

None of the respondents indicated about the changes in the ingredients and methods of preparation of *puttu*. However, during 1920 the respondents used *kannan chiratta* and *kana* made of bamboo to prepare *puttu*. During 1970, 88.57 per cent of respondents indicated that they started using *kana* made of metal. At present, 77.14 per cent of respondents used steel *puttu* maker and the rest used aluminium *puttu* maker. The details are given in Fig. 26.

4.2.4.9 *Ubbittu*

Ubbittu was prepared using green gram dhal, wheat flour, jaggery, scraped coconut, cardamom, turmeric powder, gingelly oil and ghee by 91.43 per cent of respondents during 1920's (Fig. 27). During 1940's, maida was used instead of wheat flour and green gram dhal was replaced with bengal gram dhal (62.85%). After 1940, *ubbittu* became less common and *ubbittu* prepared with bengal gram dhal and maida

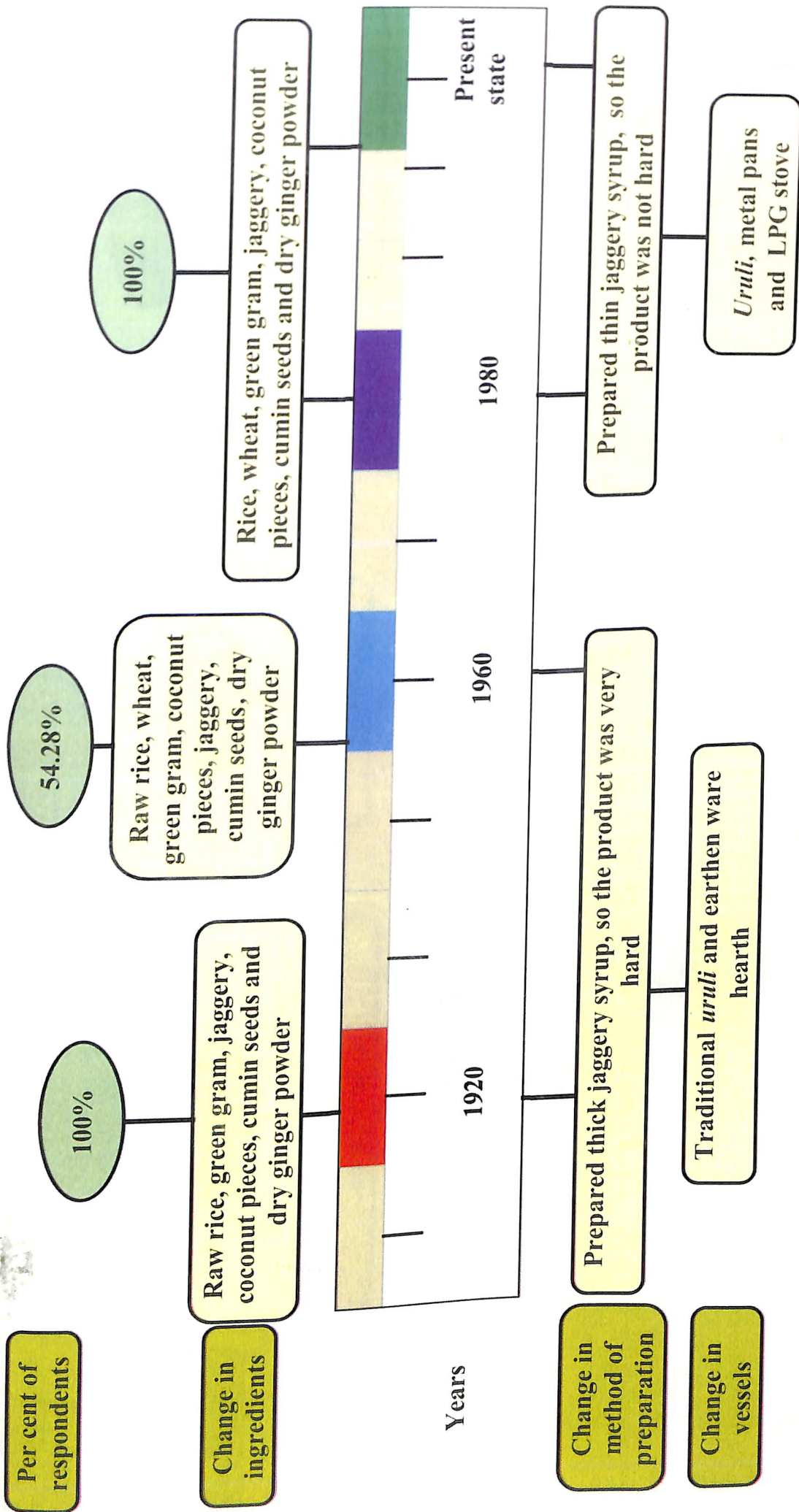


Fig. 25. Transition that occurred in the preparation of *Poruvelangai*

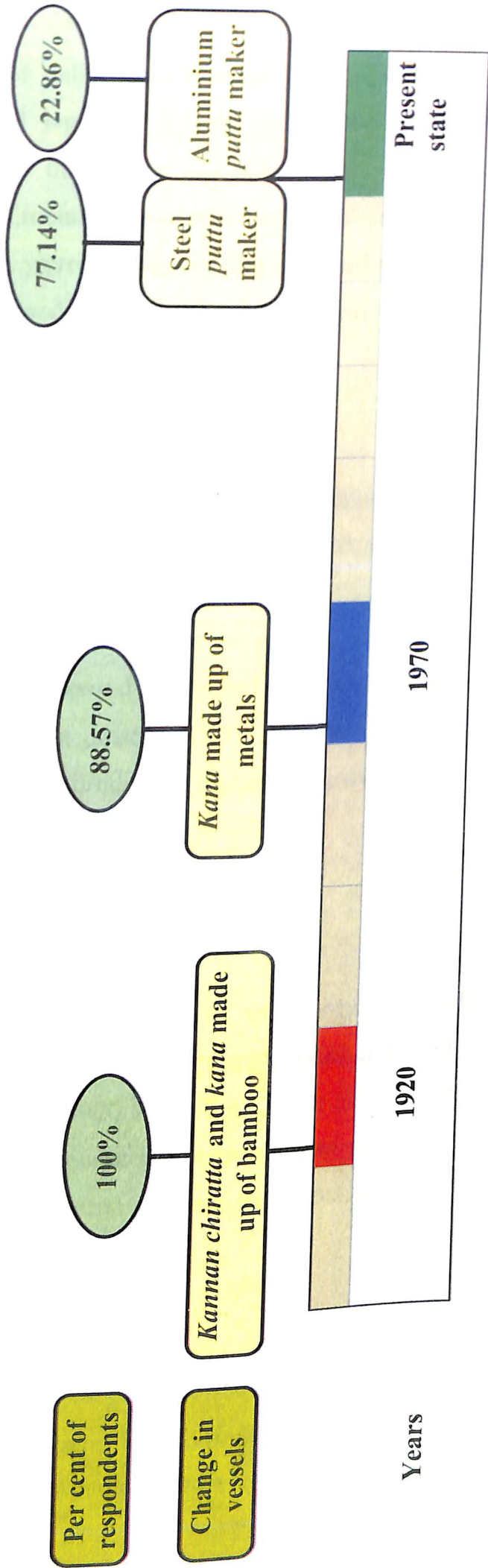


Fig. 26. Transition that occurred in the preparation of Puttu

which was called *boli* became popular. In the preparation of *boli*, sugar was used instead of jaggery. All the respondents indicated that the traditional pattern of preparation of *ubbittu* was strictly followed while preparing *ubbittu* for *shradham*. Instead of metal pan and *kalchatti* which were used to prepare *ubbittu* traditionally, non stick pans were used now a days and all the respondents who prepared *ubbittu* or *boli* (62.86%) used LPG stove for preparation.

4.2.4.10 *Ukkarai*

Ukkarai was traditionally prepared using moong dhal, jaggery, ghee and cardamom and 31.43 per cent prepared *ukkarai* using these ingredients (Fig. 28) and 68.57 per cent used bengal gram dhal instead of moong dhal. During 1950's, *mysorepak*, almost similar to *ukkarai* became more popular and 82.85 per cent of respondents prepared *mysorepak* instead of *ukkarai* using roasted bengal gram flour and sugar syrup. At present, 25.71 per cent of respondents prepared *mysorepak* and they opined that the product is highly commercialised. At present, none of the respondents prepared *ukkarai* at home.

4.2.4.11 *Uppuma*

Majority (82.86%) of respondents indicated that rice or wheat were hand pounded and the coarsely ground grains obtained called *nurukku* was used to prepare *uppuma* during 1920's. During 1970's all respondents indicated the use of readymade rava, scraped coconut and seasonings to prepare *uppuma*. At present, 88.57 per cent of respondents prepared *uppuma* with rava, scraped coconut, scraped vegetables, cooked green peas etc (Fig. 29).

4.2.4.12 *Vattayappam*

It was found that during 1930's raw rice flour, fresh toddy, jaggery, scraped coconut and cardamom were included as the ingredients to prepare *vattayappam*

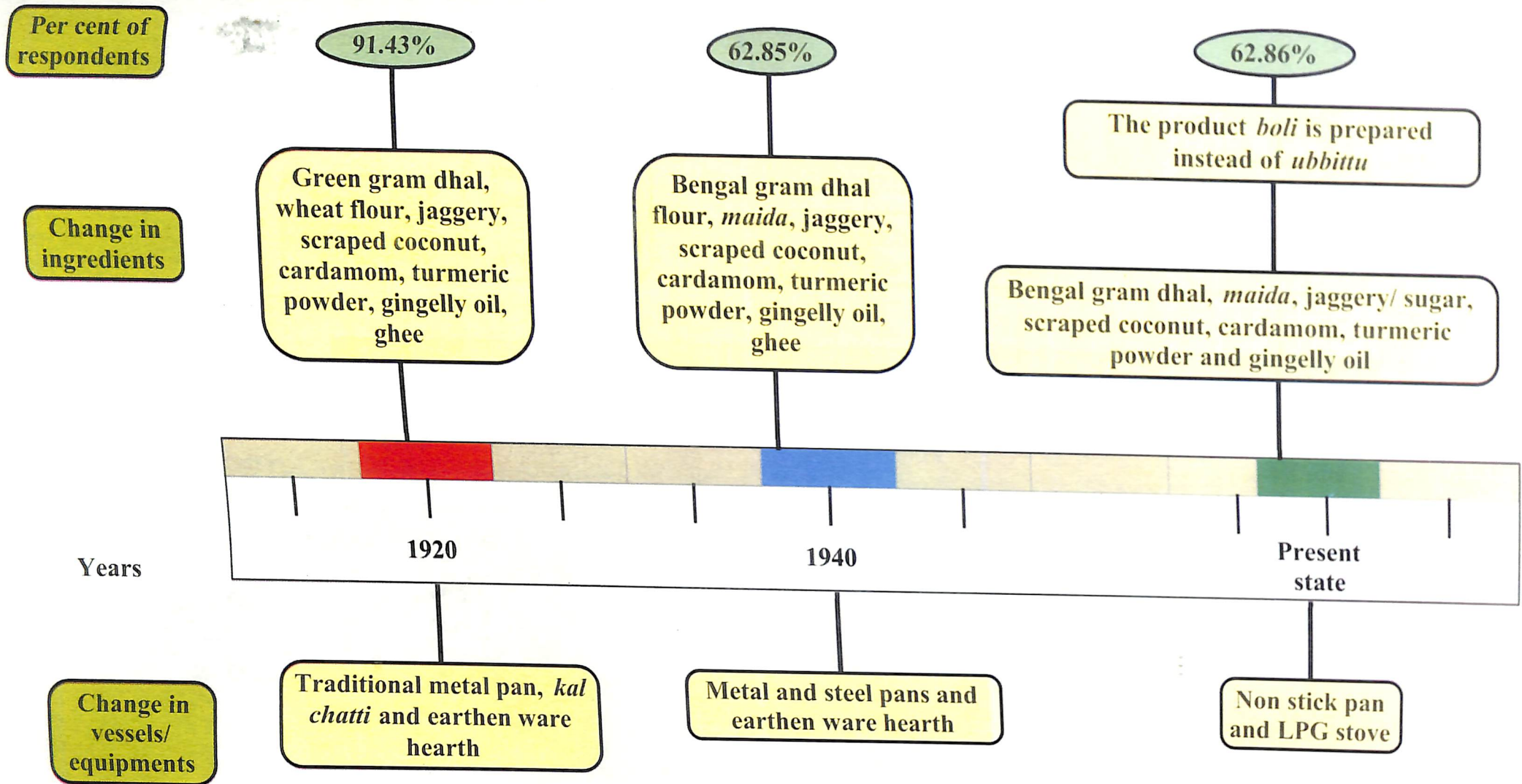


Fig. 27. Transition that occurred in the preparation of *Ubbittu*

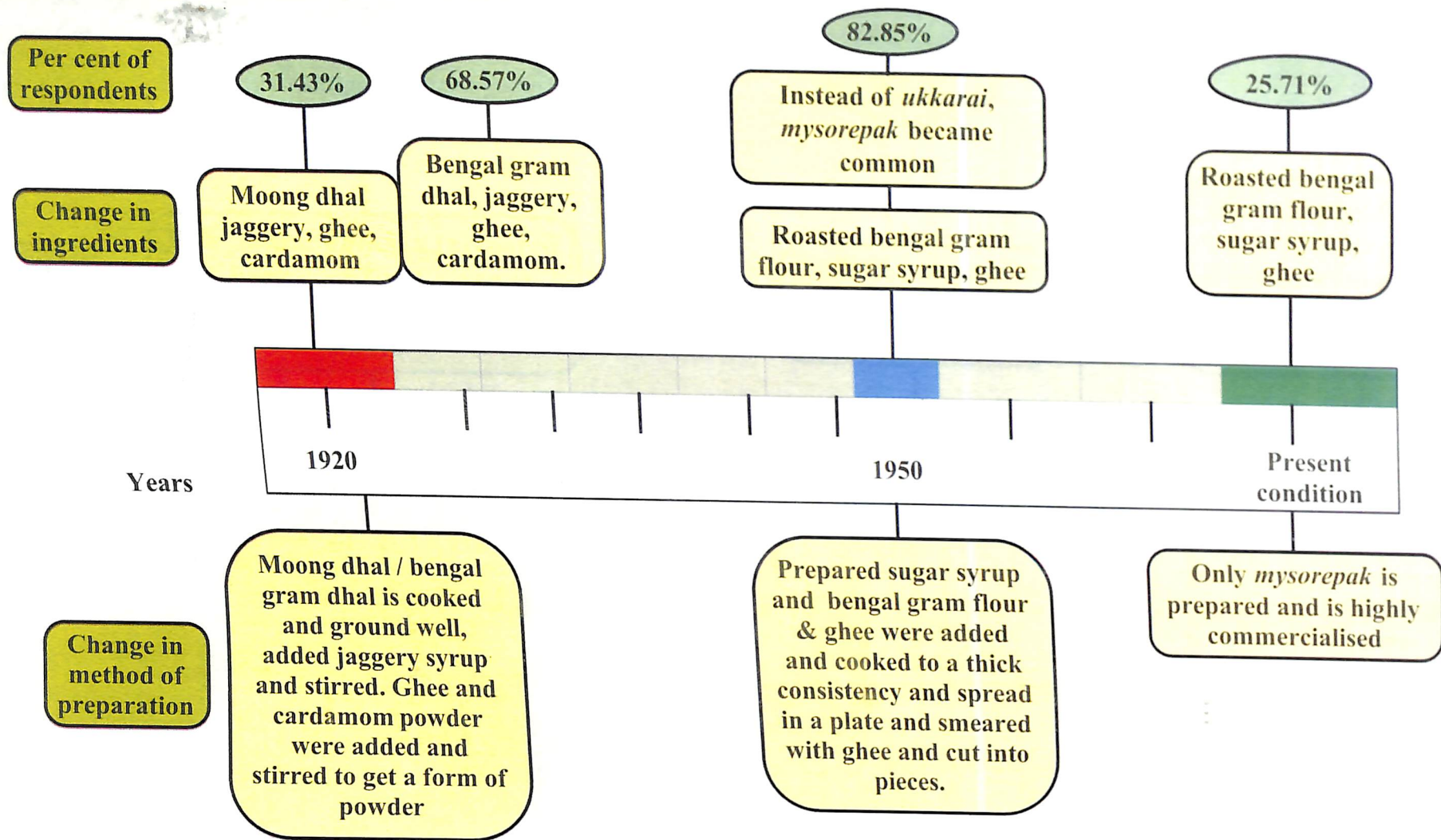


Fig. 28. Transition that occurred in the preparation of *Ukkarai*

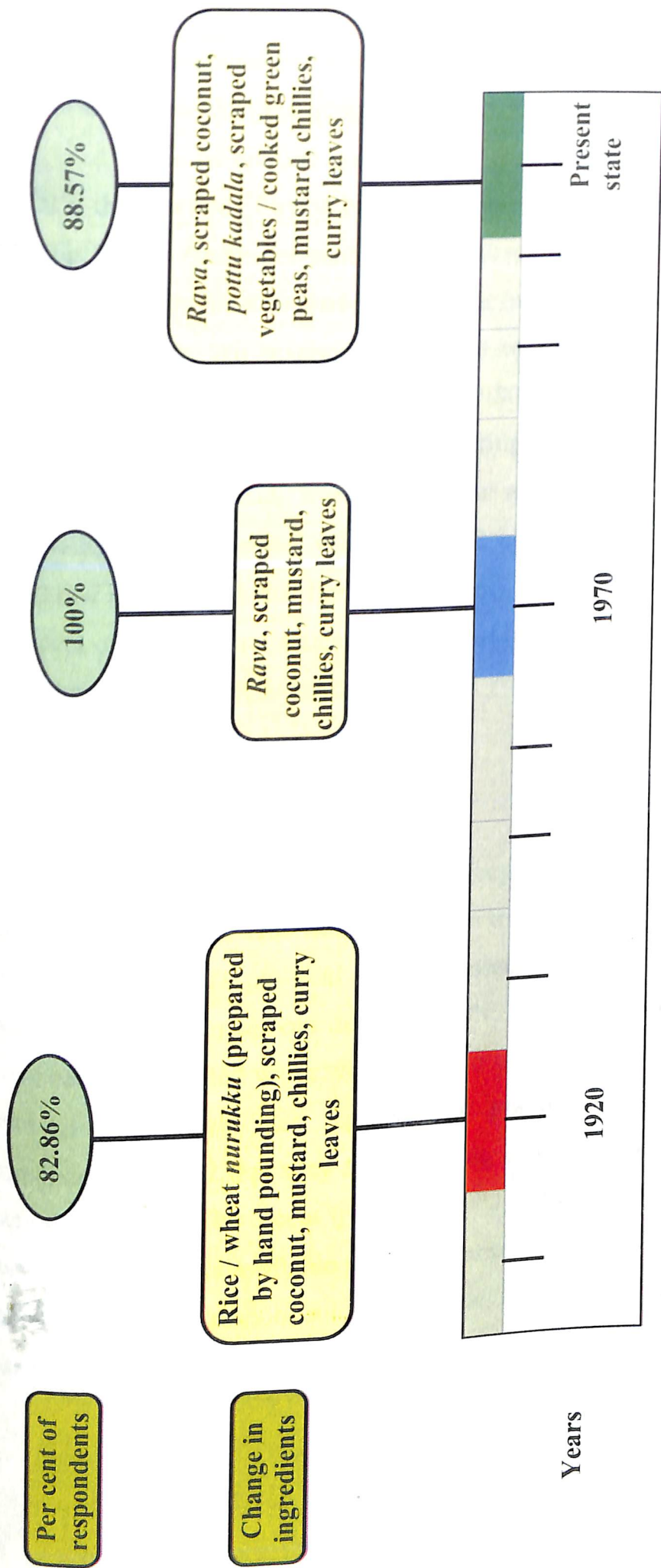


Fig. 29. Transition that occurred in the preparation of Uppuma

(Fig. 30). All respondents opined that *vattayappam* was prepared by pounding soaked and drained raw rice and scraped coconut together in the traditional *ural*. Fresh toddy was used as the fermenting agent and the steaming was done in wooden hearth. During 1970's, the practice of using jaggery became less popular and instead, sugar was added. During 1980's 62.85 per cent of respondents indicated the practice of using raw rice flour along with yeast as fermenting agent instead of toddy and coconut milk instead of scraped coconut. All respondents shifted to LPG stove as cooking media instead of traditional earthen ware hearth during 1980's. More than 50 per cent of respondents used aluminium vessels for steaming. During 1990's it was found that 48.57 per cent of respondents started using roasted rice flour and added baking soda as leavening agent. The latest trend observed was that 31.42 per cent and 63.33 per cent of respondents used raw and roasted rice flour respectively for making *vattayappam*. More than 57.14 per cent of respondents indicated the use of baking soda as a leavening agent and raisins and cherry to decorate *vattayappam*.

4.2.4.13 *Vellayappam*

During 1920's all respondents prepared *vellayappam* using raw rice, toddy, coconut and jaggery. This was prepared in traditional earthen ware pot and earthen ware hearth. About 25.71 per cent of respondents indicated the use of metal pots for the preparation of *vellayappam* during 1970's. Yeast instead of toddy, and slurry of rice *rava* cooked in boiled water were added to the batter. During the same period 31.42 per cent of respondents also reported the practice of using roasted rice flour. All respondents opined that they started using electric mixers and LPG stove during this period onwards. The recent trend observed in the preparation of *vellayappam* was the use of instant mixes available in local markets and nonstick pans instead of metal pans and 20 per cent of respondents prepared *vellayappam* using instant mix, 54.29 per cent used raw rice flour and 25.71 per cent used roasted rice flour (Fig.31).

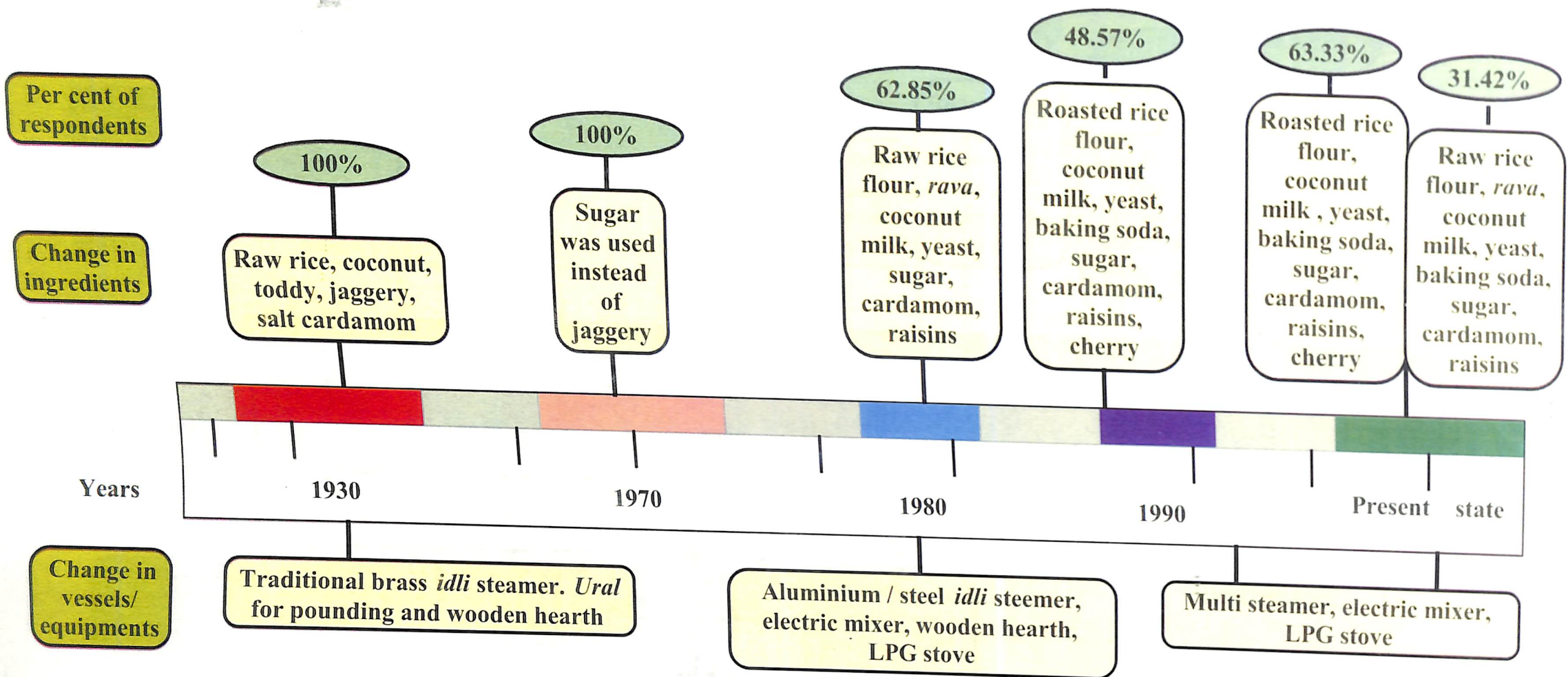


Fig. 30. Transition that occurred in the preparation of *Vattayappam*

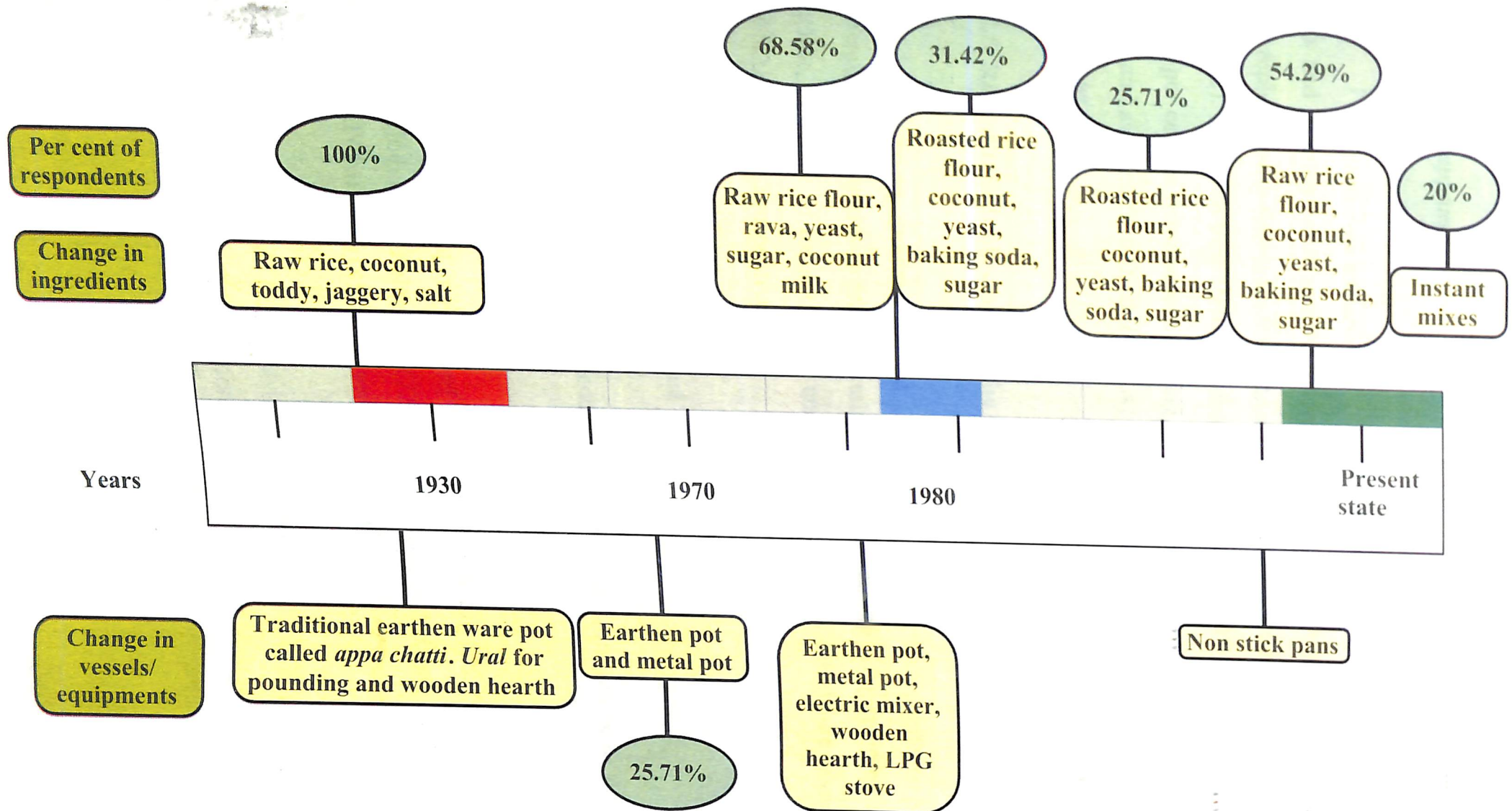


Fig. 31. Transition that occurred in the preparation of *Vellayappam*

4.2.4.14 *Vettappam*

Vettappam was traditionally prepared using roasted rice flour, egg, and coconut milk and gingelly seeds and finally fried in coconut oil. A portion of roasted rice flour was replaced with wheat flour during 1960's as opined by 22.86 per cent of respondents (Fig. 32). Later, during 1970's adding *maida* along with rice flour was practiced by 74.28 per cent of respondents. During 1980's majority prepared *vettappam* with *maida*, sugar and salt and then fried in oil. At present *vettappam* was prepared either as a sweet item or as a salty and spicy item.

4.2.5 Recent trends observed in the food habits of respondents

The recent trends observed in the food habits of respondents belonging to different communities were ascertained with respect to frequency of eating from outside, purchase of instant mixes and bakery items. The details are given in 4.2.5.1, 4.2.5.2, and 4.2.5.3 respectively.

4.2.5.1 The frequency of eating out

Details regarding the frequency of taking foods from hotels or restaurants are presented in Table 37.

It was found that majority of the Kerala Brahmins (76.67%), Tamil Brahmins (85.71%), Hindus of Palakkad (72.50 %), Scheduled Caste (66.67%), Muslims (66.67%) and Christians (85.71%) never took breakfast from outside.

Lunch was taken from outside occasionally by 27.78 to 61.11 per cent of respondents belonging to different communities. About 14 to 63 per cent of respondents indicated that they never had lunch from outside hotels or restaurants.

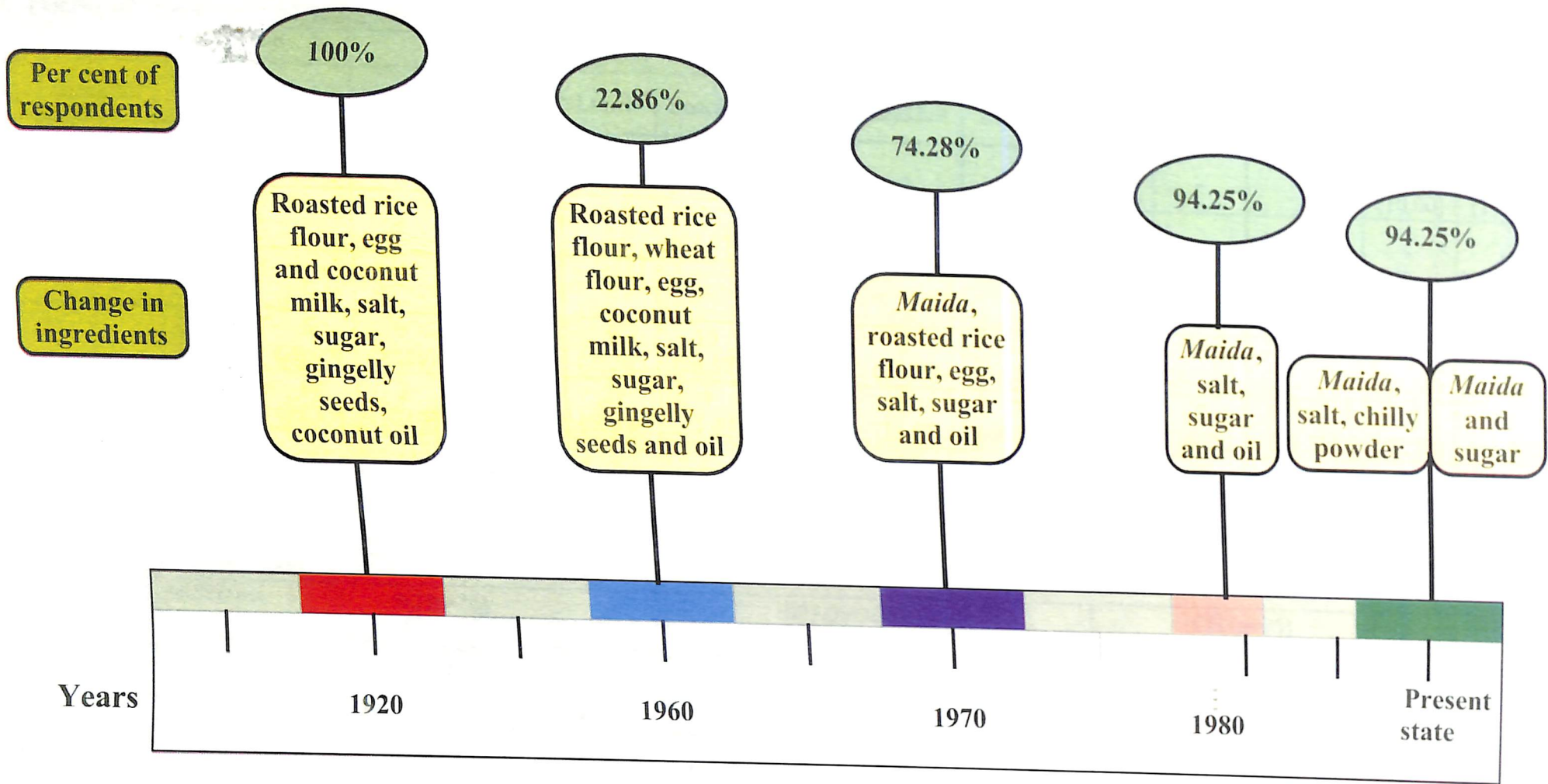


Fig. 32. Transition that occurred in the preparation of *Vettappam*

Table 37. Details of frequency of eating out

Type of meal Frequency	KB (n=30)				TB (n=35)				EZ (n=35)				HND PKD (n=40)			
	Breakfast	Lunch	Snacks	Dinner	Breakfast	Lunch	Snacks	Dinner	Breakfast	Lunch	Snacks	Dinner	Breakfast	Lunch	Snacks	Dinner
Weekly once	-	-	14 (46.67)	-	-	-	18 (51.43)	11 (31.43)	-	-	5 (14.29)	-	-	4 (10.00)	7 (17.50)	5 (12.50)
Weekly twice	-	-	-	-	-	-	3 (08.57)	9 (25.71)	-	-	-	-	-	-	-	-
Weekly thrice	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monthly	-	-	6 (20.00)	6 (20.00)	-	9 (25.71)	10 (28.57)	6 (17.15)	7 (20.00)	5 (14.29)	19 (54.28)	13 (37.14)	-	9 (22.50)	11 (27.50)	16 (40.00)
Occasionally	7 (23.33)	11 (36.67)	10 (33.33)	3 (10.00)	5 (14.29)	21 (60.00)	4 (11.43)	9 (25.71)	11 (31.43)	17 (48.57)	11 (31.43)	5 (14.29)	11 (27.50)	17 (42.50)	18 (45.00)	12 (30.00)
Never	23 (76.67)	19 (63.33)	-	21 (70.00)	30 (85.71)	5 (14.29)	-	-	17 (48.57)	13 (37.14)	-	17 (48.57)	29 (72.50)	10 (25.00)	4 (10.00)	7 (17.50)

Numbers in parenthesis are percentage.

Table 37 continued

Type of meal Frequency	SC (n=36)				MU (n=36)				CH (n=35)			
	Breakfast	Lunch	Snacks	Dinner	Breakfast	Lunch	Snacks	Dinner	Breakfast	Lunch	Snacks	Dinner
Weekly once	-	-	8 (22.22)	-	-	17 (47.22)	17 (47.22)	-	-	4 (11.43)	15 (42.86)	5 (14.29)
Weekly twice	-	-	-	-	-	-	-	-	-	-	-	-
Weekly thrice	-	-	-	-	-	-	-	-	-	-	-	-
Monthly	-	7 (19.44)	14 (38.89)	-	-	9 (25.00)	19 (52.78)	14 (38.89)	-	9 (25.71)	8 (22.85)	17 (48.57)
Occasionally	12 (33.33)	22 (61.11)	14 (38.89)	20 (55.56)	12 (33.33)	10 (27.78)	-	12 (33.33)	5 (14.29)	17 (48.57)	12 (34.29)	8 (22.85)
Never	24 (66.67)	7 (19.44)	-	16 (44.44)	24 (66.67)	-	-	10 (27.78)	30 (85.71)	5 (14.29)	-	5 (14.29)

Numbers in parenthesis are percentage.

Regarding the consumption of snacks from outside, it was seen that 14.29 to 51.43 per cent of the respondents took snack items from outside once in a week. Above 40 per cent of respondents belonging to Kerala Brahmin, Tamil Brahmin, Christian and Muslim communities took snack items from outside once in a week. Ten per cent of respondents belonging to Hindus of Palakkad indicated that they never took snack items from outside hotels or restaurants.

With respect to dinner, it was seen that 31.43 per cent of Tamil Brahmins, 12.50 per cent of Hindus of Palakkad and 14.29 per cent of Christians took dinner from outside once in a week. About 70 per cent of Kerala Brahmins, 48.57 per cent of Ezhavas, 17.50 per cent of Hindus of Palakkad, 44.44 per cent of Scheduled Caste, 14.29 per cent Christians and 27.78 per cent Muslims never had dinner from hotels or restaurants.

The summarised data on the frequency of taking foods from hotels or restaurants is given in Table 38.

Table 38. Summarised data of frequency of eating from outside

Type of meal	Breakfast	Lunch	Snacks	Dinner
Weekly once	-	25 (10.12)	84 (34.01)	21 (08.50)
Weekly twice	-	-	3 (01.21)	9 (03.64)
Weekly thrice	-	-	-	-
Monthly	7 (2.83)	48 (19.43)	87 (35.22)	72 (29.15)
Occasionally	63 (25.51)	115 (46.56)	69 (27.94)	69 (27.94)
Never	177 (71.66)	59 (23.89)	4 (01.62)	76 (30.77)

Numbers in parenthesis are percentage.

In general, it was found that majority (71.66%) of respondents never had breakfast from outside. Regarding taking lunch from outside, it was found that 10.12 per cent of respondents took lunch once in a week, 19.43 per cent once in a month, and 46.56 per cent occasionally. Details regarding taking snacks from restaurants and hotels, it was seen that 34.01 per cent of respondents had snacks from outside on weekly basis and 35.22 per cent on monthly basis. Frequency of having dinner from outside indicated that 29.15 per cent of respondents had dinner from hotels once in a month and 27.94 per cent occasionally.

4.2.5.2. Details of purchase of instant mixes

The details of purchase of instant mixes by the respondents from the market are given in Table 39.

Table 39. Details of purchase of instant mixes

Items	Number of respondents							
	KB (n=30)	TB (n=35)	EZ (n=35)	HI(PKD) (n=40)	SC (n=36)	MU (n=36)	CH (n=35)	Total (n=247)
Curry powders	17 (56.67)	26 (74.29)	31 (88.57)	28 (70.00)	22 (61.11)	36 (100.00)	30 (85.71)	190 (76.92)
Spice powders	22 (73.33)	29 (82.86)	33 (94.29)	33 (82.50)	6 (16.67)	32 (88.89)	12 (34.29)	167 (67.61)
Mixes for breakfast items	2 (6.67)	15 (42.86)	10 (28.57)	10 (25.00)	4 (11.11)	23 (63.89)	21 (60.00)	85 (34.41)
Prepared batter of idli/dosa	2 (6.67)	4 (11.43)	5 (14.29)	-	-	-	5 (14.29)	16 (6.48)
Payasam mix	-	-	-	-	-	17 (47.22)	4 (11.43)	21 (8.50)
Mixes for North Indian preparations	-	-	-	2 (5.00)	-	6 (16.67)	8 (22.86)	16 (6.48)
Tamarind paste	-	2 (5.71)	-	-	-	-	-	2 (0.81)

Numbers in parenthesis are percentage.

It was seen that most of the respondents purchased various instant mixes like curry powders (76.92%), spice powders (67.61%) and few of the respondents purchased mixes for breakfast items (34.41%), prepared *idli* or *dosa* batter (6.48%) *payasam* mix (8.5%) and mixes for North Indian preparations (6.48%). Among the different communities, all the Muslim respondents and majority of the Tamil Brahmin (74.29%), Ezhava (88.57%), Hindus of Palakkad (70%) and Schedule Caste (61.11%) and Christian (85.71%) respondents purchased curry powders from the market. Above seventy per cent of the respondents belonging to Kerala Brahmin (73.33%), Tamil Brahmin (82.86%), Ezhava (94.29%), Hindus of Palakkad (82.50%) and Muslim (88.89%) communities purchased spice powders from the market for household purpose.

4.2.5.3 Frequency of purchase of bakery items

The details with respect to the frequency of purchase of bakery items from the market are presented in Table 40.

The respondents belonging to the Kerala Brahmin community indicated that 53.33 per cent purchased chips and savouries and 33.33 per cent purchased bread once in a week. About 46.67 per cent and 66.67 per cent respondents purchased deep fried items and sweets occasionally. Majority of the respondents did not purchase soft drinks (93.33%) and other baked items (100%) and non vegetarian snacks (100%).

Frequency of purchase of bakery items by Tamil Brahmin community indicated that 57.14 per cent of the respondents purchased chips and savouries and 45.71 per cent purchased sweets once in a month. About 14.29 to 25.72 per cent purchased bread, biscuits, soft drinks and chips and savouries once in a week and majority (88.57%) of Tamil Brahmin respondents did not purchase deep fried snacks from outside.

Among the Ezhava community, 11.43 to 60 per cent of the respondents indicated that they purchased different bakery items from market once in a week.

Table 40. Frequency of purchase of bakery items

Items	KB (n=30)				TB (n=35)					EZ (n=35)				HI PKD (n=40)				
	Weekly once	Monthly	occasionally	Never	Weekly once	weekly twice	Monthly	occasionally	Never	Weekly once	Monthly	occasionally	Never	Weekly once	Weekly twice	Monthly	occasionally	Never
Chips and savouries	16 (53.33)	-	-	14 (46.67)	9 (25.72)	-	20 (57.14)	4 (11.43)	2 (5.71)	13 (37.14)	19 (54.29)	3 (8.57)	-	16 (40.00)	-	14 (35.00)	5 (12.50)	5 (12.50)
Biscuits	-	12 (40.00)	9 (30.00)	9 (30.00)	9 (25.72)	14 (40.00)	-	-	12 (34.28)	21 (60.00)	14 (40.00)	-	-	21 (52.50)	4 (10.00)	10 (25.00)	5 (12.50)	-
Bread	10 (33.33)	7 (23.33)	13 (43.34)	-	5 (14.29)	11 (31.42)	-	9 (25.72)	10 (28.57)	7 (20.00)	13 (37.14)	15 (42.86)	-	6 (15.00)	-	18 (45.00)	12 (30.00)	4 (10.00)
Other baked items	-	-	-	30 (100.00)	-	-	-	-	-	4 (11.43)	12 (34.28)	19 (54.29)	-	-	-	-	-	-
Non vegetarian Snacks	-	-	-	30 (100.00)	-	-	-	-	-	8 (22.86)	22 (62.86)	2 (5.71)	3 (8.57)	-	-	-	12 (30.00)	28 (70.00)
Deep fried snacks	-	-	14 (46.67)	16 (53.33)	-	-	-	4 (11.43)	31 (88.57)	7 (20.00)	28 (80.00)	-	-	12 (30.00)	-	20 (50.00)	6 (15.00)	2 (5.00)
Soft drinks	-	-	2 (6.67)	28 (93.33)	5 (14.29)	-	5 (14.29)	12 (34.28)	13 (37.14)	-	14 (40.00)	20 (57.14)	1 (2.86)	-	-	-	-	40 (100.00)
Sweets	-	-	20 (66.67)	10 (33.33)	19 (54.29)	-	16 (45.71)	-	-	6 (17.14)	19 (54.29)	10 (28.57)	-	7 (17.50)	-	15 (37.50)	12 (30.00)	6 (15.00)

Numbers in parenthesis are percentage.

Table 40. continued

Items	SC (n=36)						MU (n=36)					CH (n=35)				
	Weekly once	Weekly twice	weekly thrice	Monthly	occasionally	Never	Weekly once	Weekly twice	Monthly	occasionally	Never	Weekly once	Weekly twice	Monthly	occasionally	Never
Chips and savouries	6 (16.66)	11 (30.56)	7 (19.44)	10 (27.78)	2 (5.56)	-	11 (30.56)	-	14 (38.88)	11 (30.56)	-	13 (37.15)	2 (5.71)	18 (51.43)	2 (5.71)	-
Biscuits	9 (25.00)	2 (5.56)	-	18 (50.00)	7 (19.44)	-	14 (38.88)	5 (13.89)	-	12 (33.34)	5 (13.89)	13 (37.15)	-	16 (45.71)	6 (17.14)	-
Bread	12 (33.33)	8 (22.22)	-	10 (27.78)	4 (11.11)	2 (5.56)	7 (19.44)	5 (13.89)	19 (52.78)	5 (13.89)	-	16 (45.72)	9 (25.71)	4 (11.43)	6 (17.14)	-
Other baked items	-	-	-	-	8 (22.22)	28 (77.78)	-	-	16 (44.44)	9 (25.00)	11 (30.56)	-	-	23 (65.72)	10 (28.57)	2 (5.71)
Non vegetarian Snacks	-	-	-	14 (38.89)	18 (50.00)	4 (11.11)	9 (25.00)	-	20 (55.56)	7 (19.44)	-	19 (54.28)	-	8 (22.86)	8 (22.86)	-
Deep fried snacks	11 (30.56)	-	-	20 (55.56)	5 (13.89)	-	12 (33.33)	-	18 (50.00)	6 (16.67)	-	-	-	11 (31.43)	6 (17.14)	18 (51.43)
Soft drinks	-	-	-	-	-	36 (100.00)	-	-	7 (19.44)	21 (58.33)	8 (22.22)	-	-	12 (34.29)	4 (11.43)	19 (54.28)
Sweets	6 (16.66)	2 (5.56)	-	10 (27.78)	4 (11.11)	14 (38.89)	4 (11.11)	-	21 (58.33)	8 (22.22)	3 (8.33)	-	-	11 (31.43)	19 (54.28)	5 (14.29)

Numbers in parenthesis are percentage.

Fifteen to 52.5 per cent of the respondents belonging to the Hindus of Palakkad also purchased bakery items once in a week.

Details of frequency of purchase of bakery items by Scheduled Caste communities indicated that 50 per cent of respondents purchased biscuits monthly once. Non vegetarian snack items were purchased occasionally by 50 per cent of respondents and 55.56 per cent purchased deep fried snacks once in a month.

Regarding the frequency of purchase of bakery items by the respondents of Muslim and Christian communities it was seen that 11.11 to 38.88 per cent and 37.15 to 54.28 per cent of the respondents purchased different bakery items once in a week.

4.3 Quality evaluation of selected replicated traditional foods

Twelve selected endangered traditional foods and three beverages were replicated under laboratory conditions. The quality evaluation of these foods and beverages was carried out with respect to chemical constituents and acceptability. The replicated foods and beverages were packed in suitable packaging materials and stored under ambient or ambient and refrigerated conditions. The organoleptic evaluation and microbial enumeration of the products during storage were also carried out and the results are given in this section.

4.3.1 Chemical composition of selected replicated traditional foods

The chemical composition of replicated traditional foods and beverages were evaluated for different constituents initially and the results are presented in Table 41 and 42 respectively.

The moisture content of the traditional foods varied from 1.77 percent in *Poruvelangai* to 62.95 per cent in *vishu katta*. *Kaliyadakka*, *paniyaram* and *kala kala* had very low moisture content of 2.1, 2.28 and 3.55 per cent respectively.

Table 41 .Chemical composition of replicated traditional food products (per 100g FWB)

Sl .No	Name of foods	Moisture (%)	Total carbohydrates (g)	Protein (g)	Fat (g)	Fibre (g)	Calcium (mg)	Iron (mg)	Sodium (mg)	Potassium (mg)	Vitamin C (mg)
1	<i>Inderiyappam</i>	46.56	62.31	5.42	0.19	2.1	11	2.22	0.92	0.08	-
2	<i>Kala kala</i>	3.55	40.79	5.26	11.96	0	16.07	0.66	29.01	52.01	-
3	<i>Kaliyadakka</i>	2.1	34.27	1.94	2.45	0.6	22.43	1.22	0.016	0.182	-
4	<i>Karinellikka</i>	40.55	12.88	0.56	0	3.6	32.24	1.24	2.28	172.5	165.65
7	<i>Madhura puttu</i>	36.4	52.66	2.33	2.03	0.06	44.71	1.04	0.96	0	-
8	<i>Manda</i>	10.71	43.54	6.84	9.55	0.25	9.23	0.98	0.056	0.71	-
9	<i>Muttayappam</i>	55.17	48.92	11.62	9.88	0	44.01	0.36	22.25	32.71	-
10	<i>Niracha pathiri</i>	21.67	13.43	16.71	12.36	0.71	12.8	2.86	38.4	184.5	-
5	<i>Paniyaram</i>	2.28	74.22	13.71	9.07	0.86	57.03	2.01	9.49	386.4	-
6	<i>Poruvelangai</i>	1.77	68.06	7.29	2.1	1.2	38.9	2.26	33.06	566.71	-
11	<i>Rankayyan</i>	61.03	36.82	18.97	1.25	1.64	56.4	0.81	8.56	305.03	-
12	<i>Vishu katta</i>	62.95	70.19	7.42	1.38	0.01	11.11	1.58	0.94	0.02	-

Table 42. Chemical composition of replicated traditional beverages

Sl .No	Name of beverages	Acidity (%)	Vitamin C (mg)	Calcium (mg)	Iron (mg)	Sodium (mg)	Potassium (mg)
1	<i>Cherunaranga then vellam</i>	0.28	2.96	1.65	0.23	0.04	0
2	<i>Inji paaneeyam</i>	0.13	0	2.16	0.59	0	0
3	<i>Paanakam</i>	0.1	0	12.13	1.22	0.01	0

The highest total carbohydrate content was observed in *paniyaram* (74.22%) followed by *vishu katta* (70.19%) and *poruvelangai* (68.06%). *Karinellikka* had the lowest total carbohydrate content of 12.88 per cent.

Protein content of the replicated foods varied from 0.56 to 18.97 per cent with the highest protein content in *rankayyan* and the lowest in *karinellikka*. More than 10 per cent protein content was observed in *niracha pathiri* (16.71%), *paniyaram* (13.71%) and *muttayappam* (11.62%). Protein content of *poruvelangai*, *manda*, *inderiyappam*, *kala kala* and *vishu katta* varied from 5.26 to 7.42 per cent.

Among the traditional foods analysed for fat content *niracha pathiri* had the highest fat content of 12.36 per cent followed by *kala kala* (11.96 %), *muttayappam* (9.88%), *manda* (9.55%) and *paniyaram* (9.07%). Less than 3 per cent fat was observed in *inderiyappam* (0.19%), *kaliyadakka* (2.45%), *karinellikka* (0), *madhura puttu* (2.03%), *poruvelangai* (2.1%), *rankayyan* (1.25%) and *vishu katta* (1.38%).

The crude fibre content of traditional foods varied from 0 to 3.6 per cent with the highest fibre content in *karinellikka* followed by *inderiyappam* (2.1 %) and *poruvelangai* (1.2 %). The fibre content of *kala kala* and *muttayappam* was found to be 0 per cent.

The calcium content varied from 9.23 to 57.03 mg 100 g⁻¹ with the highest content in *paniyaram* and lowest in *manda*. Above 20 mg of calcium per 100 g was found in *karinellikka* (32.24 mg), *madhura puttu* (44.71 mg), *muttayappam* (44.01 mg) *poruvelangai* (38.9 mg), and *rankayyan* (56.4 mg).

Kala kala, *kaliyadakka*, *karinellikka*, *manda*, *madhura puttu*, *muttayappam*, *rankayyan*, and *vishu katta* had less than 2 mg of iron per 100 g of food. The iron content of 100 g of replicated foods varied from 0.36 mg to 2.86 mg with the highest and lowest contents in *niracha pathiri* and *muttayappam* respectively.

Highest sodium content was found in *niracha pathiri* (38.4 mg 100 g⁻¹) followed by *poruvelangai* (33.06 mg 100 g⁻¹), *kala kala* (29.01 mg 100 g⁻¹) and *muttayappam* (22.25 mg 100 g⁻¹). The sodium content of other traditional foods varied from 0.016 to 9.49 mg per 100 g.

The potassium content of traditional foods varied from 0 to 566.71 mg 100g⁻¹. Highest potassium content was found in *poruvelangai* followed by *paniyaram* (386.4 mg 100 g⁻¹), *rankayyan* (305.03 mg 100 g⁻¹), *niracha pathiri* (184.5 mg 100 g⁻¹), *karinellikka* (172.5 mg 100 g⁻¹) and *muttayappam* (32.71 mg 100 g⁻¹). All the other traditional foods had a potassium content of less than 1 mg 100 g⁻¹.

The Vitamin C content of *karinellikka* was found to be 166.65 mg 100 g⁻¹.

The acidity of traditional beverages was found to be 0.1 percent (*paanakam*), 0.13 percent (*inji paneeyam*), and 0.28 percent (*cherunaranga then vellam*). Vitamin C content of beverages varied from 0 to 2.96 mg per 100 ml. Highest calcium and iron contents were found in *paanakam*. Potassium content of beverages was found to be zero and the sodium content varied from 0 to 0.04 mg per 100 ml.

4.3.2 Organoleptic qualities of selected replicated traditional foods

The traditional foods prepared at the laboratory level were evaluated organoleptically for different quality attributes like appearance, colour, flavour, texture, taste and overall acceptability using a nine point hedonic scale initially and during storage.

4.3.2.1 Initial organoleptic qualities of replicated traditional foods

The mean scores for appearance of 12 traditional foods and 3 beverages varied from 6.93 in *poruvelangai* to 8.82 in *niracha pathiri* and 5.13 in *paanakam* to 7.75 in *cherunaranga then vellam*. Except *poruvelangai*, all the other traditional foods obtained

a mean score of above 7. Among the beverages *inji paneeyam* and *cherunanranga then vellam* had a mean score of 6.73 and 7.75 respectively (Table 43 and Table 44).

Table 43. Mean Scores for organoleptic evaluation of replicated traditional foods

Sl.No	Name of foods	Appearance	Colour	Flavour	Texture	Taste	Overall Acceptability
1	<i>Inderiyappam</i>	8.12	8.33	6.46	6.9	5.83	6
2	<i>Kala kala</i>	8.53	7.91	7.76	8.13	8.6	8.33
3	<i>Kaliyadakka</i>	7.42	7.13	5.94	4.97	7.22	7.41
4	<i>Karinellikka</i>	7.12	6.83	7.27	7.76	8	7.72
5	<i>Madhura puttu</i>	8.63	8.77	8.13	8.35	8.5	8.43
6	<i>Manda</i>	8.52	8.77	8.7	7.19	8.63	8.56
7	<i>Muttayappam</i>	8.32	8.33	8.44	8.35	8	8.23
8	<i>Niracha pathiri</i>	8.82	8.82	8.63	8.12	8.91	8.85
9	<i>Paniyaram</i>	8.12	7.95	7.44	6.85	7.96	7.95
10	<i>Poruvelangai</i>	6.93	7.15	6.97	6.53	6.63	6.87
11	<i>Rankayyan</i>	7.23	7.27	7.98	7.25	7.63	7.41
12	<i>Vishu katta</i>	7.28	7.14	7.33	8.67	7.81	7.63

Table 44. Mean Scores for organoleptic evaluation of replicated traditional beverages

Sl.No	Name of foods	Appearance	Colour	Flavour	Texture	Taste	Overall Acceptability
14	<i>Cherunaranga Then Vellam</i>	7.75	7.51	7.71	8.12	8.23	8.09
15	<i>Inji Paneeyam</i>	6.73	4.97	6.83	7.45	7.82	8.24
13	<i>Paanakam</i>	5.13	5.12	4.23	6.44	5.94	5.89

With respect to colour, the highest mean score of 8.82 was obtained for *niracha pathiri* followed by *madhura puttu* and *manda* (8.77), *muttayappam* and *inderiyappam* (8.33). Among beverages the lowest score for colour was noticed for *inji paneeyam* (4.97). Among the traditional foods and beverages except *inji paneeyam* all the other foods and beverages obtained a mean score of above 5.0.

Initially, the mean score for flavour of 12 traditional foods varied from 5.94 in *kaliyadakka* to 8.7 in *manda* and among beverages the scores varied from 4.23 to 6.83 with the highest in *cherunaranga then vellam* and lowest in *paanakam*. The mean score for flavour of traditional foods and beverages was found to be more than 6 except *kaliyadakka* and *paanakam*.

Vishu katta obtained the highest score (8.67) for texture followed by *madhura puttu* and *muttayappam* (8.35), *kala kala* (8.13) and *niracha pathiri* (8.12). Among the beverages, *cherunaranga then vellam* obtained the highest score of 8.12 followed by *inji paneeyam* (7.45) and *paanakam* (6.44).

The mean score for taste varied from 5.83 to 8.91 with the lowest and highest scores for *inderiyappam* and *niracha pathiri* respectively. All traditional foods except *inderiyappam* obtained a score of above 6.5.

Among the beverages *cherunaranga then vellam* had the highest mean score of 8.23 followed by *inji paneeyam* (7.82) and *paanakam* (5.94).

The overall acceptability of traditional foods indicated that the highest score of 8.85 was obtained for *niracha pathiri* followed by *manda* (8.56), *madhura puttu* (8.43), *kala kala* (8.33), and *muttayappam* (8.23). All the other foods obtained an overall acceptability score in the range of 6 to 8. Among the beverages *inji paneeyam* had the highest mean score (8.24) followed by *cherunaranga then vellam* (8.09) and *paanakam* (5.89).

4.3.2.2 Organoleptic qualities of replicated traditional foods during storage

The organoleptic qualities of replicated traditional foods and beverages during storage are detailed below.

4.3.2.2.1 *Inderiyappam*

Inderiyappam packed in polyethylene (PE) and polyethylene lined laminated pouches (PLM) were stored under ambient and refrigerated storage conditions and evaluated for organoleptic qualities daily for three days during storage for different quality attributes (Table 45).

Table 45. Mean score for organoleptic evaluation of *inderiyappam* during storage

PS	TP	Appearance		Colour		Flavour		Texture		Taste		Overall acceptability	
		PE	PLM	PE	PLM	PE	PLM	PE	PLM	PE	PLM	PE	PLM
Ambient condition													
1 st	DAS	6.23	6.56	6.27	6.73	3.83	2.92	2.93	3.63	2.52	2.8	4.15	4.5
2 nd	DAS	2.81	3.33	4.81	4.13	2.82	2.79	1.81	2.25	1.91	1.72	2.72	3.52
3 rd	DAS	2	2.21	3.06	3.31	2.62	2.27	2.34	2.23	1.82	2.74	2.31	2.53
Refrigerated condition													
1 st	DAS	5.41	5.63	5.11	5.14	4.15	4.66	3.53	3.23	5.01	5.32	5.17	5.59
2 nd	DAS	4.2	4.72	4.37	4.4	2.32	2.46	1.82	2	1.2	1.31	3.23	4.24
3 rd	DAS	3	3.51	4	4.23	2.3	2.21	1.53	1.58	2.33	2.38	2.34	2.34

TP : Type of packing PS : Period of storage DAS : Day after storage

During the first day after storage, the product packed in PLM obtained the highest score for appearance (6.56), colour (6.73), texture (3.63) and taste (2.8). For flavour the product packed in PE obtained a score of 3.8. The scores decreased drastically after the first day of storage in both packaging materials.

Under refrigerated conditions the product packed in PLM obtained the highest score for all quality attributes except texture up to first day after storage and there after a drastic decrease in the mean scores was noticed for all the quality characteristics for *inderiyappam* packed both in PE and PLM.

The overall acceptability of *inderiyappam* packed in PE and PLM under ambient and refrigerated conditions also decreased considerably after first day of storage (Fig 33). *Inderiyappam* packed in both PE and PLM and kept under refrigerated conditions was acceptable only up to the first day of storage with a mean score of 5.59 and the mean rank scores obtained on the basis of Kendall's coefficient of concordance showed no significant variation between the packaging.

4.3.2.2.2 *Kala kala*

Kala kala was packed in PE, PLM and under vacuum (VP) and stored for seven weeks at ambient conditions and evaluated at weekly intervals for different quality attributes (Table 46). At the end of storage highest mean scores were obtained for *kala kala* packed in PLM for appearance (7.13), colour (7.1), flavour (6.43), texture (4.53) and taste (4.33). From the initial mean scores of 8.53, 7.91 and 7.76 for appearance, colour and flavour the scores decreased and were in the range of 6.20 to 7.13, 6.63 to 7.1, and 4.5 to 6.43 respectively at the end of storage. For texture and taste, the score decreased to 3.57 to 4.53 and 2.65 to 4.33 from the initial mean score of 8.13 and 8.6 respectively.

The mean scores for overall acceptability along with their mean rank scores obtained on the basis of Kendall's coefficient of concordance are presented in Table 47. The overall acceptability scores of *kala kala* showed a decreasing trend throughout the storage period which were packed in PE and PLM and VP (Fig. 34).

During the first three weeks of storage agreement on the preference of one packaging material over the other among the judges was not noticed. The product in all the three types of packing did not have much difference in all aspects of organoleptic observation up to three weeks. The mean rank scores obtained by PLM were high and so it can be inferred that PLM is the best suited packing throughout the period of storage for *kala kala*.

Table 46. Mean score for organoleptic evaluation of *kala kala* during storage (Ambient condition)

TP \ PS	Appearance			Colour			Flavour			Texture			Taste		
	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP
1 st WAS	8.53	8.53	8.53	7.86	7.87	7.83	7.97	8.53	7.14	7.43	8.64	7.38	7.83	8.35	7.79
2 nd WAS	8	8.21	7.84	7.81	7.84	7.91	7.31	8.63	6.83	7.67	8.46	7.24	7.82	8.41	7.11
3 rd WAS	7.71	8.08	7.61	7.82	7.83	7.6	6.7	8.1	6.5	6.6	8.3	6.8	7.8	8.1	6.8
4 th WAS	7.5	7.9	7.2	7.75	7.83	7.47	5.89	7.84	6.51	6.63	8.31	6.93	7.28	8.09	6.51
5 th WAS	7.44	7.82	7	7.6	7.77	7.6	5.23	7.4	5.94	5.31	8.3	6.36	6.61	7.45	5.91
6 th WAS	7.11	7.62	6.72	6.73	7.45	7	5.33	6.73	4.9	4.33	6.9	5.46	5.7	5.86	3.81
7 th WAS	6.21	7.13	6.2	6.63	7.1	6.85	4.5	6.43	5	4.03	4.53	3.57	2.65	4.33	4.33

TP : Type of packing

PS : Period of storage

WAS : Week after storage

Table 47. Overall acceptability score of *kala kala* during storage

TP \ PS	1 st WAS	2 nd WAS	3 rd WAS	4 th WAS	5 th WAS	6 th WAS	7 th WAS
PE	8.11 (1.65)	7.51 (1.60)	7.12 (1.85)	6.63 (1.55)	6.1 (1.50)	4.8 (1.60)	3.87 (1.70)
PLM	7.95 (2.35)	8 (2.30)	7.8 (2.15)	7.92 (2.80)	7.51 (2.75)	5.46 (2.35)	4.59 (2.60)
VP	8.11 (2)	7.94 (2.10)	6.91 (2)	6.74 (1.65)	6.2 (1.75)	5.1 (2.05)	3.73 (1.75)
Kendall's W ^a	0.148	0.179	0.043	0.551*	0.53*	0.219*	0.372*
Percentage of significance	45.3	26.6	65.1	0.4	0.5	11.2	2.4

TP: Type of packing, PS: Period of storage, *indicate significance, Figures in parenthesis are mean rank scores

4.3.2.2.3 *Kaliyadakka*

The organoleptic evaluation of *kaliyadakka* packed in PE, PLM, and VP and stored under ambient conditions was conducted at monthly intervals for a period of 5 months for different quality attributes (Table 48).

From the initial score of 7.42 (appearance), 7.13 (colour), 5.94 (flavour), 4.97 (texture), and 7.22 (taste), the mean scores for all the quality attributes decreased gradually during storage. The mean score for appearance was found to be high for *kaliyadakka* packed under vacuum (6.51) at the end of storage. Highest score was obtained for *kaliyadakka* packed in PLM for colour (6.84), flavour (4.6) and taste (3.63) at the end of storage and for texture the mean score was found to be high for *kaliyadakka* packed in VP (4.1). For taste, an acceptable score in the range of 5.21 to 5.73 was obtained for the product at the end of third month of storage with the highest score for the product packed in PE. At fifth month of storage the mean score for taste of *kaliyadakka* varied from 3.25 to 3.63.

The overall acceptability of *kaliyadakka* decreased throughout the storage period in all the three packages (Table 49 and Fig 35). During the last two months there was agreement among judges and the rank scores denote the order of priority for overall

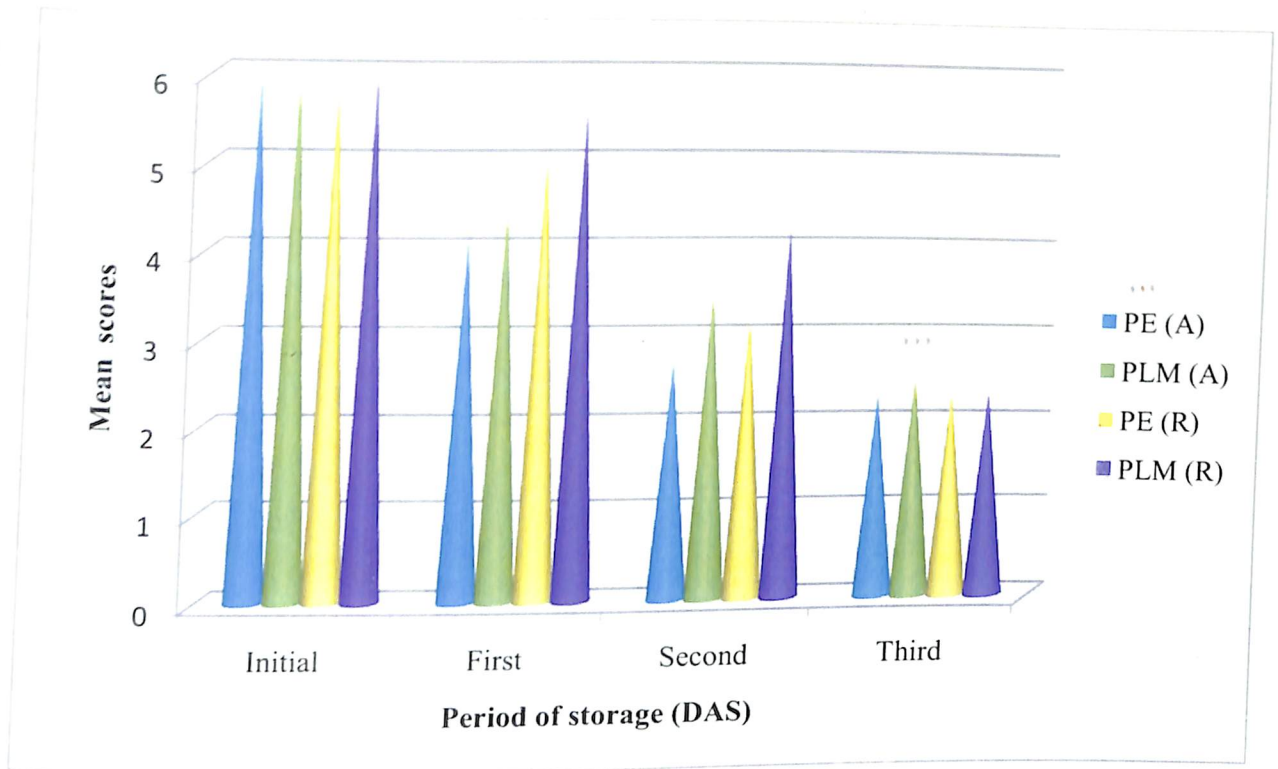


Fig. 33. Overall acceptability scores of *inderiyappam* during storage

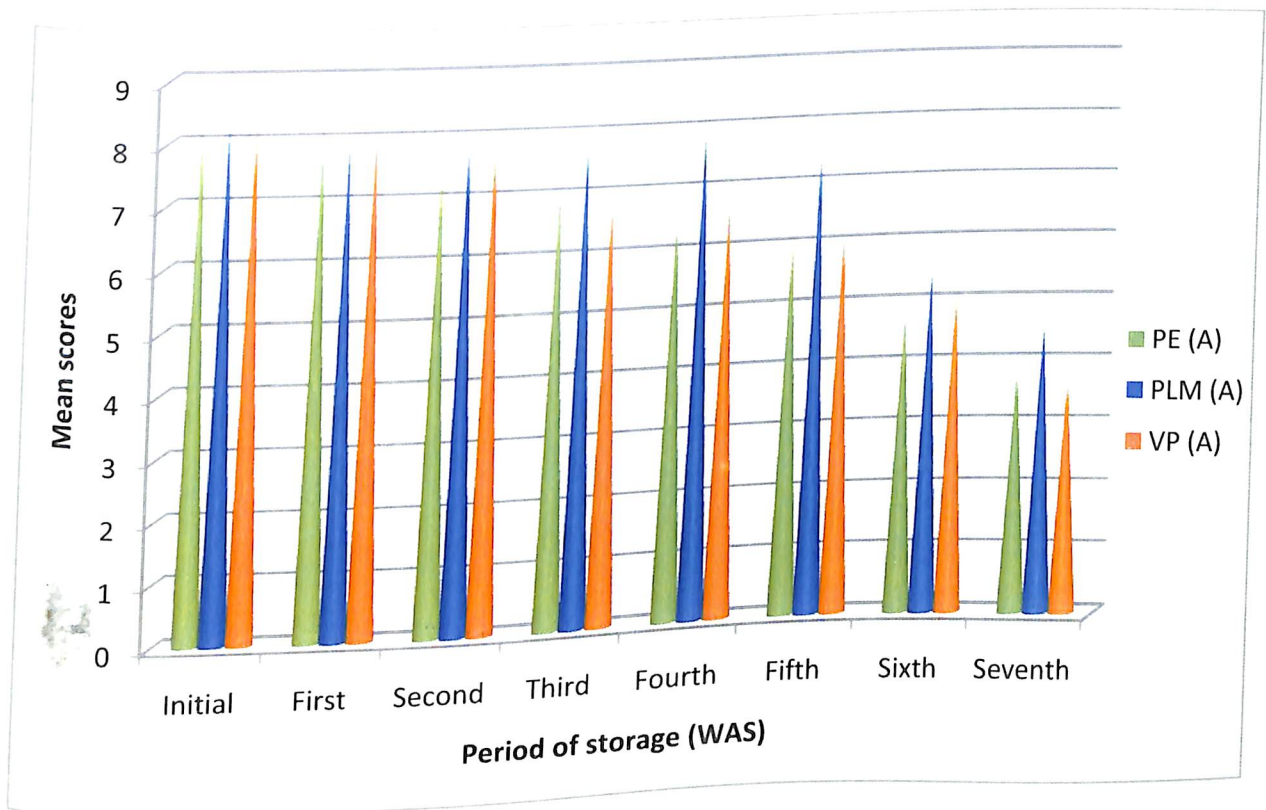


Fig. 34. Overall acceptability scores of *kala kala* during storage

DAS: Day after storage (A): Ambient condition
 WAS: Week after storage (R): Refrigerated condition

Table 48. Mean score for organoleptic evaluation of *kaliyadakka* during storage (Ambient condition)

TP PS	Appearance			Colour			Flavour			Texture			Taste		
	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP
1 st MAS	7.21	6.95	6.73	6.5	7.13	7.11	5.52	5.81	5.52	4.31	4.63	4.93	6.36	5.91	7.22
2 nd MAS	7.32	6.22	6.42	7.22	7.12	6.77	5.41	5.42	5.42	6.11	4.65	4.65	6.12	5.44	6.91
3 rd MAS	7.32	6.54	6.4	6.93	7.1	7	5.12	5.5	5.21	4.5	4.31	4.91	5.73	5.64	5.21
4 th MAS	6.38	6.51	6.5	6.59	7	6.8	5.6	6.23	6.2	4.22	4.41	4.45	4.3	4.8	4.44
5 th MAS	6.36	6.31	6.51	6.5	6.84	6.7	4.23	4.6	4.2	4.22	4.38	4.1	3.25	3.63	3.62

TP : Type of packing PS : Period of storage MAS : Month after storage

acceptability. Even though, significant variation among the packaging used during the initial months were not observed, vacuum packing was found to be the best during last two months of storage.

Table 49. Overall acceptability scores of *kaliyadakka* during storage

(Ambient condition)

TP \ PS	1 st MAS	2 nd MAS	3 rd MAS	4 th MAS	5 th MAS
PE	7.41 (2.25)	6.75 (1.75)	5.23 (1.80)	3.85 (1.55)	3.9 (1.75)
PLM	7.23 (2)	7.12 (2.20)	5.41 (2.05)	5.22 (2.10)	5.1 (2.25)
VP	7.16 (1.75)	6.93 (2.05)	5.63 (2.15)	5.1 (2.35)	5.01 (2.35)
Kendall's W ^a	0.078	0.194	0.039	0.29*	0.287*
Percentage of significance	45.8	36.4	67.4	9.4	11.3

TP: Type of packing
*indicate significance

PS: Period of storage
Figures in parenthesis are mean rank scores

4.3.2.2.4 *Karinellikka*

Karinellikka was packed in PE, PLM and PT and stored under ambient and refrigerated conditions for a period of six months and evaluated organoleptically at monthly intervals upto six months. The mean scores for appearance, colour, flavour, texture and taste of *karinellikka* stored under ambient conditions (Table 50) decreased gradually during storage. Among the different packaging materials used to pack *karinellikka*, the highest score for appearance (6.12), colour (5.5) flavour (6) texture (6.2) and taste (5.31) was obtained for *karinellikka* packed in PLM under ambient storage conditions at the end of storage.

Under refrigerated conditions (Table 51) maximum score for appearance (5.94), flavour (5.43), texture (5.34) and taste (5.5) was obtained for *karinellikka* packed in PLM. For colour, the product stored both in PE and PLM obtained the maximum score of 5.17.

Table 50. Mean score for organoleptic evaluation of *karinellikka* during storage (Ambient condition)

TP \ PS	Appearance			Colour			Flavour			Texture			Taste		
	PE	PLM	PT	PE	PLM	PT	PE	PLM	PT	PE	PLM	PT	PE	PLM	PT
1 st MAS	7.2	7.11	6.93	6.41	7.43	6.76	7.84	7.93	7.12	7.64	8.15	8.26	8.2	8.21	8.21
2 nd MAS	6.55	6.83	6.63	6.42	6.68	6.56	7.27	6.92	6.91	7.93	7.39	7.22	7.88	7.56	7.74
3 rd MAS	6.84	6.92	6.55	6.17	6.44	6.19	6.2	6.81	6.56	7.75	7.24	6.64	7.83	7.24	6.64
4 th MAS	5.21	6.41	5.33	5.34	5.88	5.52	5.7	6.4	5.74	5.54	6.7	5.96	6.21	5.67	5.11
5 th MAS	5.2	6.4	5.1	5.38	5.72	5.28	5.4	6.4	5.28	4.91	6.7	5.96	6.23	5.43	4.86
6 th MAS	5	6.12	5.1	5.31	5.5	5.19	5.2	6	5.22	4.46	6.2	5.41	5.21	5.31	4.83

TP: Type of packing PS: Period of storage MAS : Months after storage

Table 51. Mean score for organoleptic evaluation of *karinellikka* during storage (Refrigerated condition)

TP \ PS	Appearance			Colour			Flavour			Texture			Taste		
	PE	PLM	PT	PE	PLM	PT	PE	PLM	PT	PE	PLM	PT	PE	PLM	PT
1 st MAS	6.81	7.11	6.81	6.61	6.64	7.08	6.76	7.13	7.17	7.72	7.55	7.73	7.99	8.23	8.17
2 nd MAS	6.8	7.07	6.42	6.86	6.65	5.65	6.15	6.34	6.62	7.32	7.5	7.72	8.02	7.42	7.3
3 rd MAS	6.49	6.91	5.99	6.82	6.63	5.82	5.68	6.35	6.06	6.46	7.02	7.29	7.51	7.41	7.3
4 th MAS	6.59	6.54	5.24	5.51	5.68	5.3	3.4	5.92	5.16	5.73	6	5.56	6.33	6.51	6.62
5 th MAS	5.9	5.99	5.11	5.21	5.19	4.81	4.21	5.64	4.94	5.34	5.42	5.18	5.5	6.04	5.1
6 th MAS	5.02	5.94	5.12	5.17	5.17	4.81	4.11	5.43	4.67	5.31	5.34	5.17	5.09	5.5	5

TP: Type of packing PS: Period of storage MAS : Month after storage

Karinellikka packed and kept under ambient and refrigerated conditions had an overall acceptability in the range of 5.14 to 6.33 and 4.11 to 5.3 respectively at the end of the storage with the maximum in *karinellikka* packed in PLM in both storage conditions (Table 52. Fig 36).

Table 52. Overall acceptability score of *karinellikka* during storage

Storage conditions	TP \ PS	1 st	2 nd	3 rd	4 th	5 th	6 th
		MAS	MAS	MAS	MAS	MAS	MAS
Ambient	PE	7.75 (1.95)	7.65 (2.75)	7.33 (2.17)	5.33 (1.45)	5.33 (1.45)	5.14 (1.55)
	PLM	7.79 (2.5)	7.22 (1.70)	7.2 (2)	6.41 (2.70)	6.33 (1.85)	6 (2.1)
	PT	7.72 (2)	7.26 (2.15)	6.81 (1.8)	6.3 (1.83)	6.3 (1.91)	5.26 (1.75)
	Kendall's W ^a	0.005	0.112	0.448*	0.494*	0.512*	0.489*
	Percentage of Significance	94.9	32.5	1.1	0.7	0.03	0.01
Refrigerated	PE	7.51 (1.85)	7.66 (2.10)	7.46 (2.10)	5.33 (1.50)	5.11 (1.95)	4.11 (1.55)
	PLM	7.67 (2)	7.75 (2.10)	7.69 (2.30)	6.37 (2.35)	5.53 (2.35)	5.3 (2.35)
	PT	7.73 (2.15)	6.93 (1.80)	6.91 (1.60)	6.25 (2.15)	5.11 (1.72)	4.64 (2.10)
	Kendall's W ^a	0.06	0.044	0.371*	0.321*	0.172*	0.197*
	Percentage of Significance	54.9	63	2.4	8.5	17.9	13.9

TP: Type of packing PS: Period of storage
*indicate significance Figures in parenthesis are mean rank scores

Karinellikka packed in PE, PLM and PT and kept under ambient conditions obtained the mean rank scores of 1.55, 2.1 and 1.75 respectively at the end of the storage period. This indicates the order of priority among the judges on the overall acceptability of the product. Under refrigerated conditions, also *karinellikka* packed in PLM showed maximum mean ranks scores (2.35) at the end of the storage period. During the initial months of storage much agreement among judges was not observed and so it is inferred that the product in different types of packaging did not have much difference in all aspects of organoleptic observation.

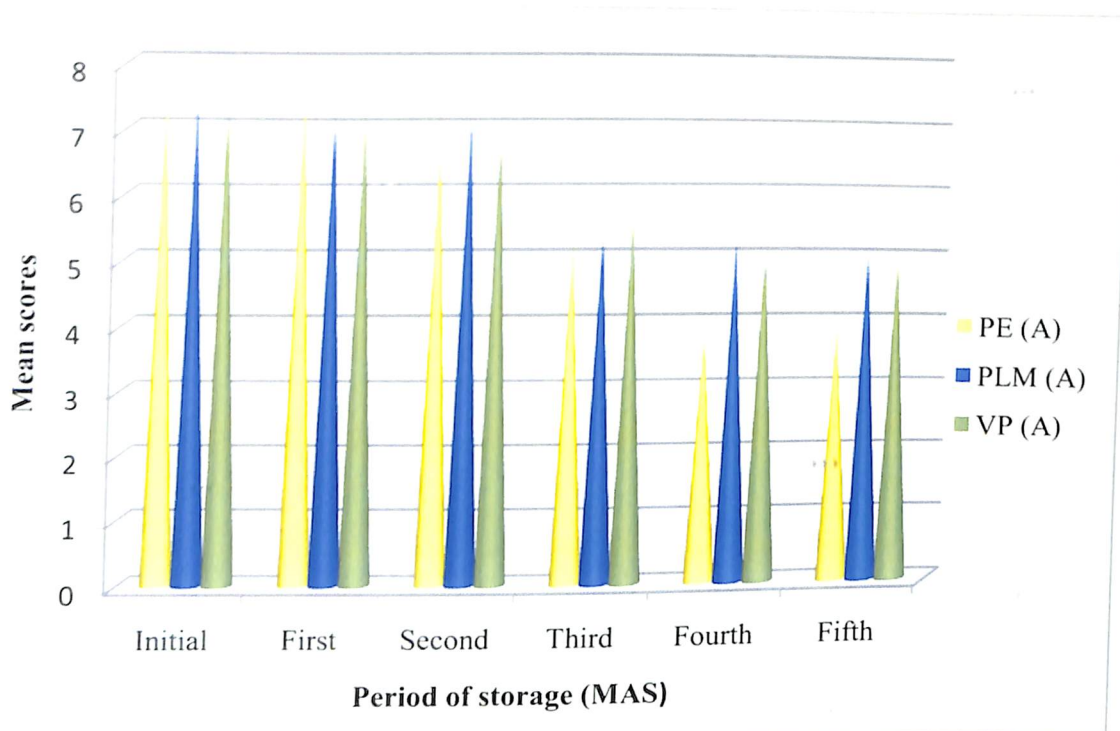


Fig. 35. Overall acceptability scores of *kaliyadakka* during storage

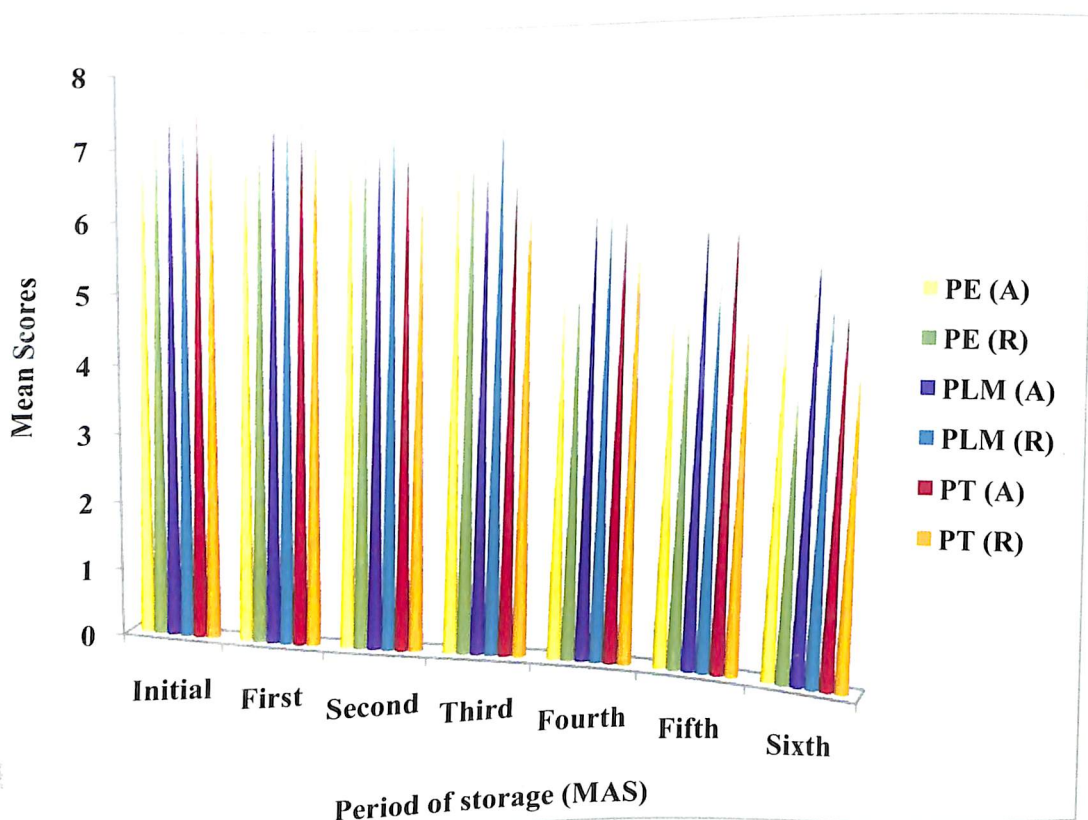


Fig. 36. Overall acceptability scores of *karinellikka* during storage

MAS: Month after storage (A): Ambient condition (R): Refrigerated condition

4.3.2.2.5 *Madhura puttu*

Madhura puttu was packed in PE and PLM and stored both under ambient and refrigerated conditions till seven days and evaluated for organoleptic qualities during alternate days. Under ambient conditions, for appearance and colour highest score was obtained for *madhura puttu* packed in PE through out the storage period (Table 53). After the third day of storage, highest score of 6.66 and 7.5 respectively were obtained for flavour and texture for *madhura puttu* packed in PLM. For taste, PE and PLM obtained a score of 7.81 and 7.84 respectively after the third day of storage. After the fifth day of storage the mean scores for flavour, texture and taste, decreased to less than 5.22 for *madhura puttu* packed both in PE and PLM.

Under refrigerated conditions, a gradual decrease in the mean scores was obtained for all the quality attributes. For colour and taste the highest score was obtained for *madhura puttu* packed in PLM at the end of storage. For appearance, flavour and texture, the highest scores of 5.97, 5.66 and 5.06 respectively were obtained for the product packed in PE.

The mean score for overall acceptability was maximum in *madhura puttu* packed in PE (5.23) and kept under ambient conditions at the end of the storage period. Under refrigerated conditions, *madhura puttu* packed in PE had high mean score on first (7.13), third (7.22) and seventh (5.83) day of storage (Fig 37).

Table 53. Mean score for organoleptic evaluation of *madhura putt* during storage
(Ambient and refrigerated conditions)

PS \ TP	Appearance		Colour		Flavour		Texture		Taste		Overall acceptability	
	PE	PLM	PE	PLM	PE	PLM	PE	PLM	PE	PLM	PE	PLM
Ambient condition												
1 st DAS	7.82	7.71	8.43	8.33	7.9	8.13	7.6	7.55	8.24	7.63	7.82	8.21
3 rd DAS	7.13	6.97	8.33	7.54	6	6.66	6.85	7.5	7.81	7.84	7.23	7.66
5 th DAS	6.71	5.33	7	6.81	3.5	2.8	5.21	4.41	3.5	4.86	4.67	5.32
7 th DAS	5.43	4.65	6.83	6.55	3.21	2.52	5.2	4.09	3.5	4.66	5.23	4.67
Refrigerated condition												
1 st DAS	8.33	8.54	8.06	7.23	6.68	7	6.6	6.53	6.5	7.7	7.13	6.66
3 rd DAS	6.43	7.62	6.9	7.3	6	7.55	6.71	6.24	7.22	7.51	7.22	6.53
5 th DAS	6.7	6.82	6.9	7.5	5.8	5.7	5.63	5.33	6.5	6.32	6.09	6.27
7 th DAS	5.97	5.33	6.5	6.67	5.66	5.34	5.06	5.01	5.23	5.33	5.83	5.33

TP: Type of packing PS: Period of storage DAS : Day after storage

The mean rank scores obtained on the basis of Kendall's coefficient of concordance indicated that there was no agreement among judges on the differential degradability of the product under different packagings and hence it may be inferred that there was no much difference in overall acceptability of the product in different packagings.

4.3.2.2.6 Manda

The organoleptic evaluation of *manda* packed in PE, PLM and VP was conducted at weekly intervals for a period of six weeks under ambient storage conditions. For all the five quality attributes the mean scores of *manda* packed in all the three packaging materials decreased gradually (Table 54).

From the initial value of 8.52 for appearance, at the end of sixth week of storage, the mean scores decreased to 6.6, 6.07 and 6.3 for *manda* stored in PE, PLM and VP respectively. For colour, from the initial value of 8.77 at the end of storage, the scores decreased to 6.61, 6.73 and 6.65 for PE, PLM and VP respectively. For flavour the scores decreased to 4.2 for *manda* stored in PE and 4.92 for PLM and in VP from

Table 54. Mean score for organoleptic evaluation of *manda* during storage (Ambient condition)

TP \ PS	Appearance			Colour			Flavour			Texture			Taste		
	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP
1 st WAS	8.31	8.22	8.12	8.69	8.26	8.33	7.54	8.67	6.45	7.13	7	6.33	8.61	8.6	8.39
2 nd WAS	8.39	8.23	7.91	8.44	7.65	8	7.56	7.77	6.33	7	6.52	5.83	7.61	8.51	8.22
3 rd WAS	7.33	8.42	7.91	7.23	7.57	7.72	6.46	7	5.89	6.24	6.62	5.61	7.43	7.13	7.13
4 th WAS	7.33	7.92	7.97	7	7.33	7.7	6.54	6.72	5.65	5.73	5.53	5.81	5.8	6.83	6
5 th WAS	6.8	7	7.1	6.6	7.2	7.1	5.2	6.3	5.1	5.1	5.2	5.1	5	5.8	6.1
6 th WAS	6.6	6.07	6.3	6.61	6.73	6.65	4.2	4.92	4.92	3.61	5.24	4.82	3.8	4.12	3.57

TP: Type of packing

PS: Period of storage

WAS: Week after storage

the initial score of 8.7. With respect to texture and taste, the scores were found to be 3.61 and 3.8 in PE, 5.24 and 4.12 in PLM and 4.82 and 3.57 in VP respectively at the end of storage.

The mean scores obtained for overall acceptability of *manda* is presented in Table 55 and Fig 38. The mean overall acceptability scores of *manda* packed in PE, PLM and VP were found to be 4.33, 4.58, and 4.41 at the end of sixth week of storage.

Table 55. Overall acceptability score of *manda* during storage (Ambient condition)

TP \ PS	1 st WAS	2 nd WAS	3 rd WAS	4 th WAS	5 th WAS	6 th WAS
PE	8.23 (1.90)	7.69 (1.95)	6.91 (2.10)	6.17 (1.55)	5.32 (1.35)	4.33 (1.40)
PLM	8.56 (2.05)	7.8 (2.15)	7.91 (2.25)	6.33 (1.80)	5.59 (2.70)	4.58 (2.05)
VP	8.53 (1.75)	7.53 (1.90)	6.63 (1.65)	6.54 (2.65)	5.5 (1.95)	4.41 (1.75)
Kendall's W ^a	0.017	0.044	0.0217*	0.416*	0.61*	0.023*
Percentage of significance	84.6	64.6	11.5	1.6	0.2	19.8

TP: Type of packing
*indicate significance

PS: Period of storage
Figures in parenthesis are mean rank scores

The mean rank scores obtained on the basis of Kendall's coefficient of concordance indicated the order of priority for overall acceptability of product. During the first two weeks there was not much agreement among the judges and it should be inferred that the product in all the three types of packaging did not differ much and when considering the mean rank scores the most suited package for *manda* is PLM.

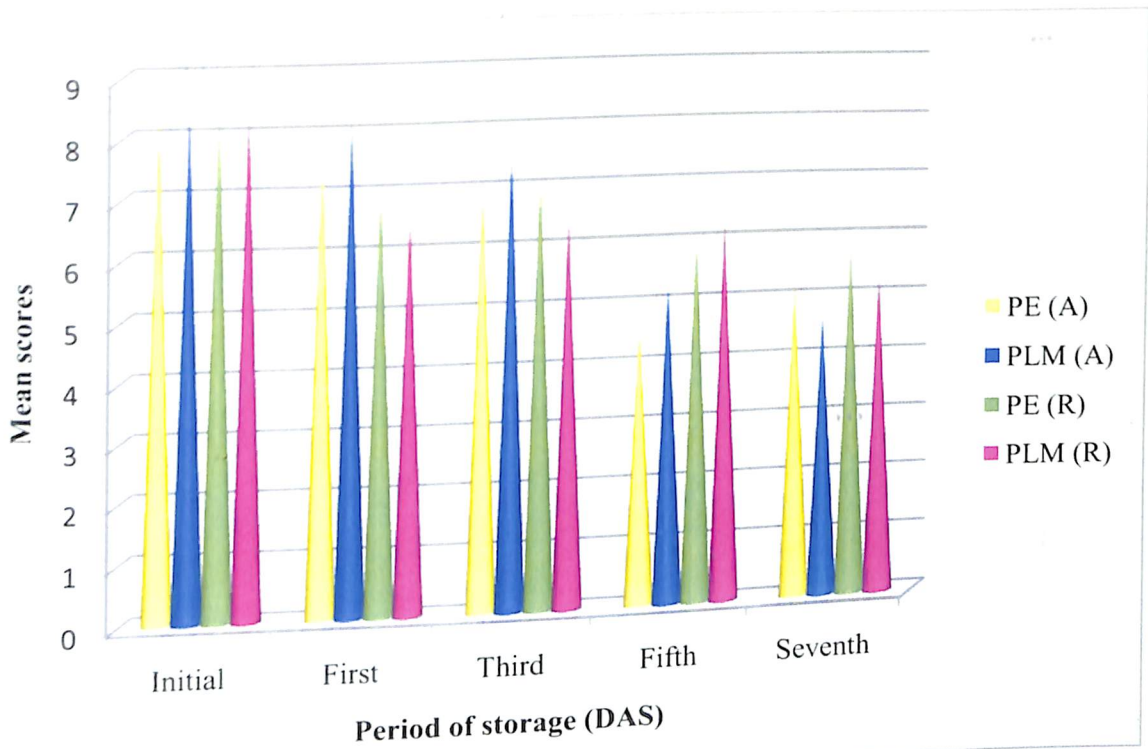


Fig. 37. Overall acceptability scores of *madhura puttu* during storage

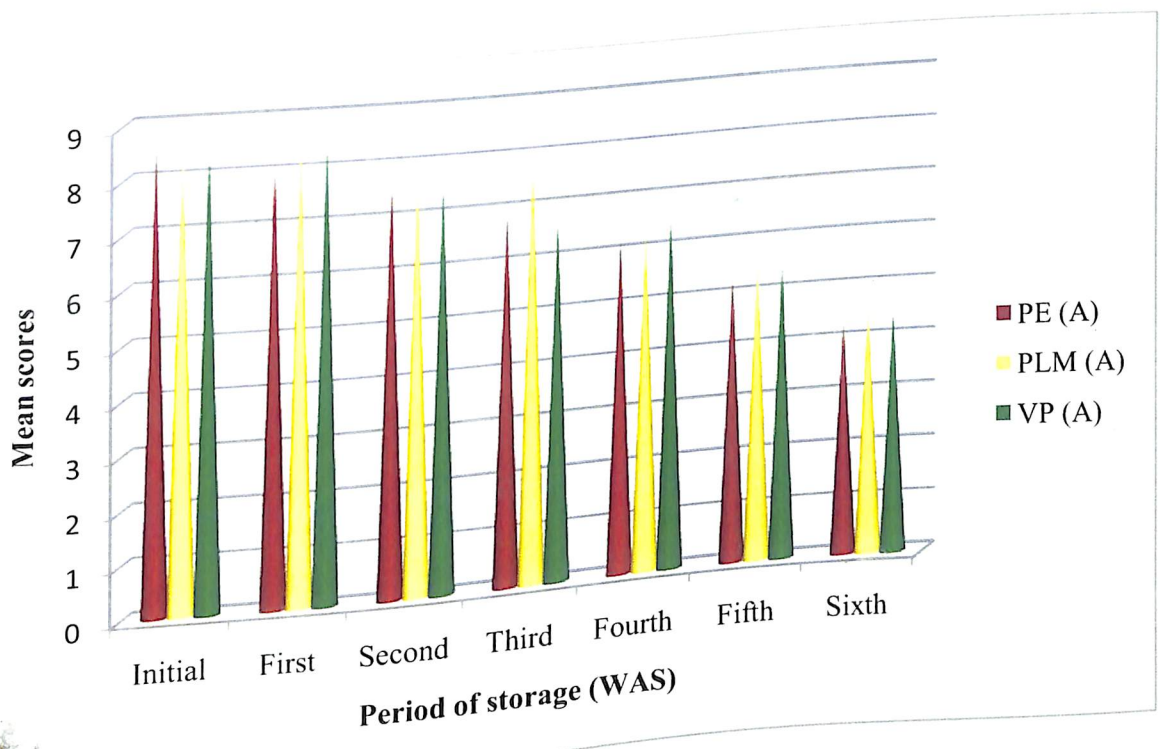


Fig. 38. Overall acceptability scores of *manda* during storage

WAS: Week after storage
 DAS: day after storage
 (A): Ambient condition
 (R): Refrigerated condition

4.3.2.2.7. *Muttayappam*

Muttayappam packed in PE and PLM and stored under ambient and refrigerated conditions were evaluated daily for three days (Table 56).

Table 56. Mean score for organoleptic evaluation of *muttayappam* during storage (Ambient and refrigerated conditions)

TP \ PS	Appearance		Colour		Flavour		Texture		Taste		Overall acceptability	
	PE	PLM	PE	PLM	PE	PLM	PE	PLM	PE	PLM	PE	PLM
Ambient condition												
1 st DAS	6.33	5.61	5.21	4.81	3.33	2.3	3.4	3.31	4.2	3.8	5.08	4.93
2 nd DAS	4.37	3.93	5.37	5.45	3.06	3.3	3.27	2.5	2.39	2.61	4.6	3.77
3 rd DAS	3.36	3.65	5.65	5.45	2.75	2.58	2.44	2.41	2.08	2.06	3.64	3.23
Refrigerated condition												
1 st DAS	5.19	5.87	5.29	5	3.23	1.89	5	4.7	4.3	5.13	5.96	5.08
2 nd DAS	5.1	5.55	5.25	4.23	3.44	3.93	3.1	3.23	2.38	3.7	4.93	3.83
3 rd DAS	4.92	4.53	5.22	4.06	3.56	3.61	2.87	2.66	2.43	2.22	3.55	3.09

TP: Type of packing

PS: Period of storage

DAS- Day after storage

Muttayappam packed in PE obtained the highest score for all quality characteristics after first day of storage under ambient conditions. After the second day of storage the product packed in PE obtained the highest score for appearance and texture. For colour, flavour and taste the product packed in PLM obtained the maximum score. After the third day of storage under ambient conditions the scores were found to be 3.36 and 3.65 for appearance, 5.65 and 5.45 for colour, 2.75 and 2.58 for flavour, 2.44 and 2.41 for texture, 2.08 and 2.06 for taste for *muttayappam* packed in PE and PLM respectively.

Under refrigerated conditions the scores were found to be 4.92 and 4.53 (appearance), 5.22 and 4.06 (colour), 3.56 and 3.61 (flavour), 2.87 and 2.66 (texture), 2.43 and 2.22 (taste) for the product packed in PE and PLM. The mean scores for overall acceptability showed low scores in all the packages after the first day of packing under both ambient and refrigerated conditions.

The mean scores for overall acceptability of muttayappam during storage are represented in Fig. 39.

Mean rank scores for overall acceptability obtained on the basis of Kendall's coefficient of concordance did not differ much and there was no agreement among judges at any stage of storage in both packaging materials.

4.3.2.2.8 *Niracha pathiri*

Niracha pathiri was packed in PE, PLM and VP and stored both under ambient and refrigerated conditions for three days and evaluated daily for different quality attributes. Under ambient conditions, *niracha pathiri* packed in PLM obtained the highest score for appearance (4.79), colour (5.7), flavour (4.83), and texture (5.31) after first day of storage (Table 57). For taste, the highest score of (4.27) was obtained for the product packed in PLM and in VP. At the end of third day of storage the organoleptic scores varied from 3.16 to 3.28 (appearance) 4.22 to 5.6 (colour), 2 to 2.16 (flavour), 1.42 to 3.6 (texture) and 1 to 1.3 (taste) for different quality attributes.

Under refrigerated conditions, the *niracha pathiri* packed in PLM, showed the maximum score for colour (5.71), flavour (2.99) and texture (3.53). For appearance and taste the product packed in PE obtained the highest score of 6.62 and 4.43 respectively. After the third day of storage, the mean scores varied from 2.69 to 4.63 for appearance, 4.78 to 5 for colour, 1.3 to 1.77 for flavour, 2 to 2.41 for texture and 1.21 for taste.

The mean scores obtained for overall acceptability of *niracha pathiri* on the first day after storage indicated that those packed in PE obtained the highest mean score of 4.78 and 5.83 under ambient and refrigerated conditions respectively. After this considerable decrease in the overall acceptability was observed (Fig 40). The mean rank scores obtained on the basis of Kendall's coefficient of concordance indicated that there was no agreement among judges at any stage of observation for overall acceptability

Table 57. Mean score for organoleptic evaluation of *niracha pathiri* (Ambient and refrigerated conditions)

TP PS	Appearance			Colour			Flavour			Texture			Taste			Overall acceptability		
	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP
	Ambient condition																	
1 st DAS	4.69	4.79	4.59	5.3	5.7	4.3	3.6	4.83	4.33	5.07	5.31	3.44	3.71	4.27	4.27	4.78	4.33	4.49
2 nd DAS	3.55	3.82	4.45	5.23	5.69	4.09	3.2	3.33	3.31	4.33	4.8	3.26	3.52	3.26	3.15	3.82	4.41	3.91
3 rd DAS	3.16	3.25	3.18	4.7	5.6	4.22	2	2.01	2.16	3.6	3.17	1.42	1.3	1.11	1	3.13	3.1	3.21
	Refrigerated condition																	
1 st DAS	6.62	6.35	5.82	4.82	5.71	4.84	2.57	2.99	2.67	2.88	3.53	2.45	4.43	3.25	2.85	5.83	5.35	5.71
2 nd DAS	5.63	6.02	5.6	4.74	5.71	4.33	2	2.44	2	2.1	3.33	2.09	4.02	2.11	1.9	5.09	4.91	5.1
3 rd DAS	2.69	4.63	3.5	4.78	5	4.8	1.5	1.3	1.77	1.8	2.41	2	1.21	1.21	1.21	3.55	3.78	3.51

P: Type of packing

PS: Period of storage

DAS : Day after storage

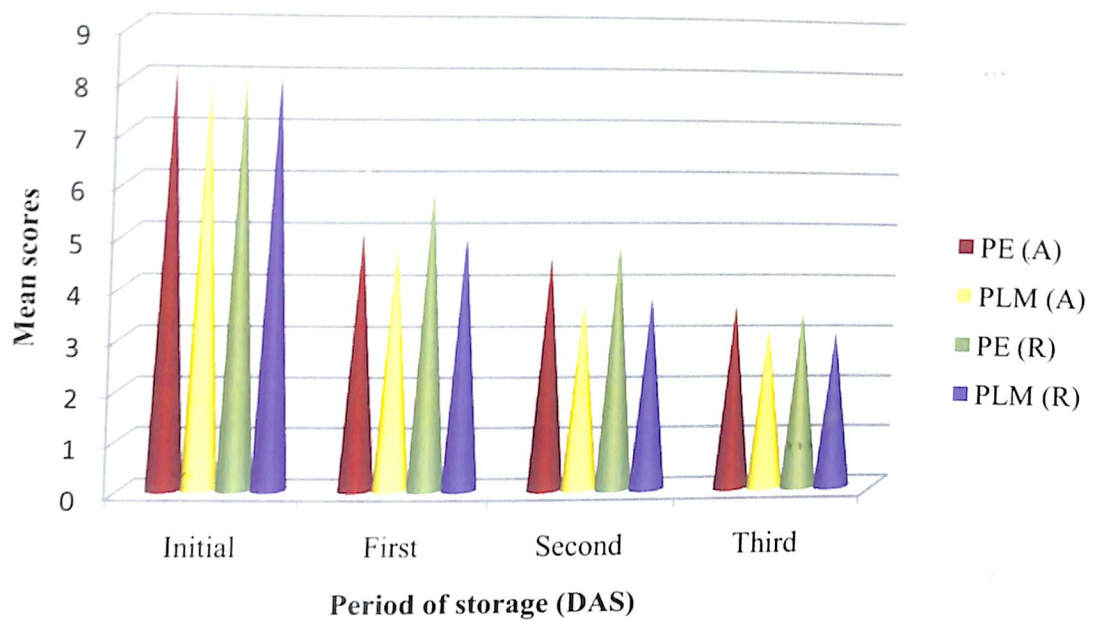


Fig. 39. Overall acceptability scores of *muttayappam* during storage

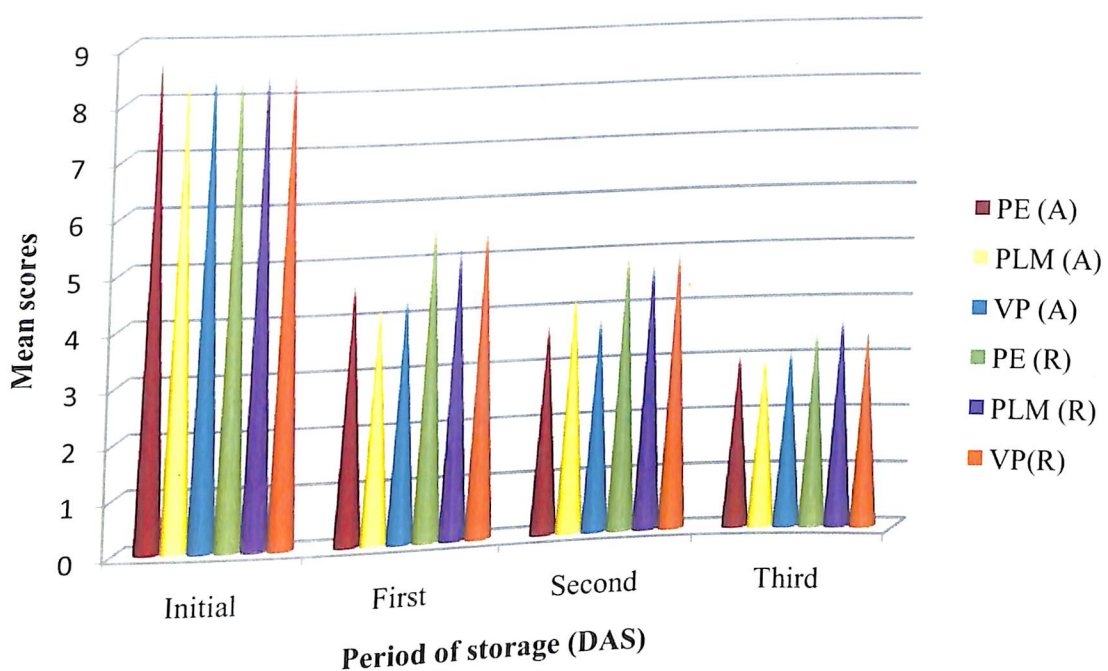


Fig. 40. Overall acceptability scores of *niracha pathiri* during storage

DAS: Day after storage (A): Ambient condition (R): Refrigerated condition

based on the packaging materials. So it can be inferred that there was no variation among packaging materials with respect to overall acceptability.

4.3.2.2.9 *Paniyaram*

Paniyaram was packed in PE, PLM and under vacuum and stored under ambient conditions for five days and evaluated on alternate days. Highest mean score for appearance was obtained for *paniyaram* packed in PE throughout the storage period (Table 58).

For flavour, *paniyaram* packed in PLM showed the maximum score during first (6.94) third (6.23) and fifth (5.14) day of storage. The mean score for texture and taste decreased during storage and at the end of storage period highest score of 6.41 was obtained for *paniyaram* packed in PE and VP for texture and for taste highest score of 3.13 was obtained for the product packed in VP.

The mean scores for overall acceptability obtained for *paniyaram* packed in PLM was found to be high after first day of storage and those packed in PE obtained the highest score of 6.82 after third day of storage. After this considerable decrease in overall acceptability was noticed (Fig. 41).

Mean rank scores based on Kendall's coefficient of concordance indicated that there was not much difference in the overall acceptability of *paniyaram* packed in PE, PLM and VP under ambient conditions.

4.3.2.2.10. *Poruvelangai*

Poruvelangai was packed in PE, PLM and VP and stored under ambient conditions for a period of 6 months and organoleptic evaluation was conducted at monthly intervals. The results (Table 59) indicated that from the initial mean score of 6.93 (appearance), 7.15 (colour), 6.97 (flavour), 6.53 (texture) and 6.63 (taste) at the

Table 58. Mean score for organoleptic evaluation of *paniyaram* during storage (Ambient condition)

PS \ TP	Appearance			Colour			Flavour			Texture			Taste			Overall acceptability		
	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP
1 st DAS	6.95	6.85	6.55	7.66	7.91	7.63	6.62	6.94	6.67	6.83	6.79	6.85	6.33	6.82	6.53	7.13	7.23	7.1
3 rd DAS	6.66	6.66	6.73	7.34	7.83	7.66	5.43	6.23	3.98	6	6.23	6.34	5.55	6.91	5.11	6.82	6.43	6.39
5 th DAS	6.85	6.43	6.77	6.25	7.28	7.17	2.55	5.14	2.79	6.41	6.36	6.41	3.11	2.81	3.13	4.33	3.66	3.23

TP : Type of packing

PS : Period of storage

DAS : Day after storage

Table 59. Mean score for organoleptic evaluation of *poruvelangai* during storage (Ambient condition)

PS \ TP	Appearance			Colour			Flavour			Texture			Taste		
	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP	PE	PLM	VP
1 st MAS	6.83	6.88	6.77	5.97	6.7	7	7.3	8.17	8.25	6.01	5.68	4.73	6.5	5.91	5.41
2 nd MAS	6.81	6.68	6.53	5.95	6.9	7	7	7.27	6.45	5.19	5	4.49	6.26	6.71	6
3 rd MAS	6.76	6.57	6.65	5.84	6.6	6.82	6	6.93	7	4	5.46	5.66	6.13	6.02	6.6
4 th MAS	5.88	6.43	6.65	5.82	6.52	6.77	6.22	6.25	6	5.36	4.87	5.27	6	6.83	5.82
5 th MAS	5.83	5.94	6.11	5.9	6.51	5.8	6.33	6.23	5.33	3.44	4.67	5.33	5.34	5.71	5.7
6 th MAS	5.54	5.95	5.4	5.55	6.5	5.8	3.87	5.56	5.33	3.67	3.23	4.26	3.84	4.73	4.73

TP: Type of packing

PS: Period of storage

MAS : Month after storage

end of storage period the mean scores varied from 5.4 to 5.95 (appearance), 5.55 to 6.5 (colour), 3.87 to 5.56 (flavour), 3.23 to 4.26 (texture) and 3.84 to 4.73 (taste). Highest score for appearance, colour and flavour was obtained for *poruvelangai* packed in PLM. For texture, maximum score of 4.26 was obtained for *poruvelangai* packed in VP and for taste the product packed both in PLM and VP scored the maximum.

The mean scores for overall acceptability of *poruvelangai* stored in different packaging materials are presented in Table 60 and also in Fig 42.

Table 60. Overall acceptability score of *poruvelangai* during storage

(Ambient condition)

TP \ PS	1 st MAS	2 nd MAS	3 rd MAS	4 th MAS	5 th MAS	6 th MAS
PE	6.81 (1.80)	6.11 (1.55)	6.1 (1.70)	5.93 (1.50)	5.82 (1.70)	4.35 (1.45)
PLM	6.83 (2.20)	6.42 (2.15)	6.4 (1.75)	6.38 (2.35)	6.21 (1.95)	5.21 (2.10)
VP	6.8 (2)	6.45 (2.30)	6.37 (2.55)	6.34 (2.15)	6.33 (2.35)	5.54 (2.45)
Kendall's W ^a	0.053	0.067	0.126	0.239*	0.294*	0.332*
Percentage of significance	58.7	45.6	28.2	9.1	5.3	3.6

TP: Type of packing
*indicate significance

PS: Period of storage
Figures in parenthesis are mean rank scores

The mean scores indicated a decrease in overall acceptability towards the end of the storage period in all the packages. *Poruvelangai* packed in PE showed a decrease from 6.81 to 4.35 and for *poruvelanagi* packed in PLM the score decreased to 5.21. Vacuum packed *poruvelangai* showed the maximum score of 5.54 at the end of storage period.

The mean rank scores obtained on the basis of Kendall's coefficient of concordance indicated that there was agreement among the judges on the acceptability of *poruvelangai* packed in different packages during the fourth, fifth and sixth months of storage. There was no much variation in the ranks obtained for *poruvelangai* packed in PLM and VP.

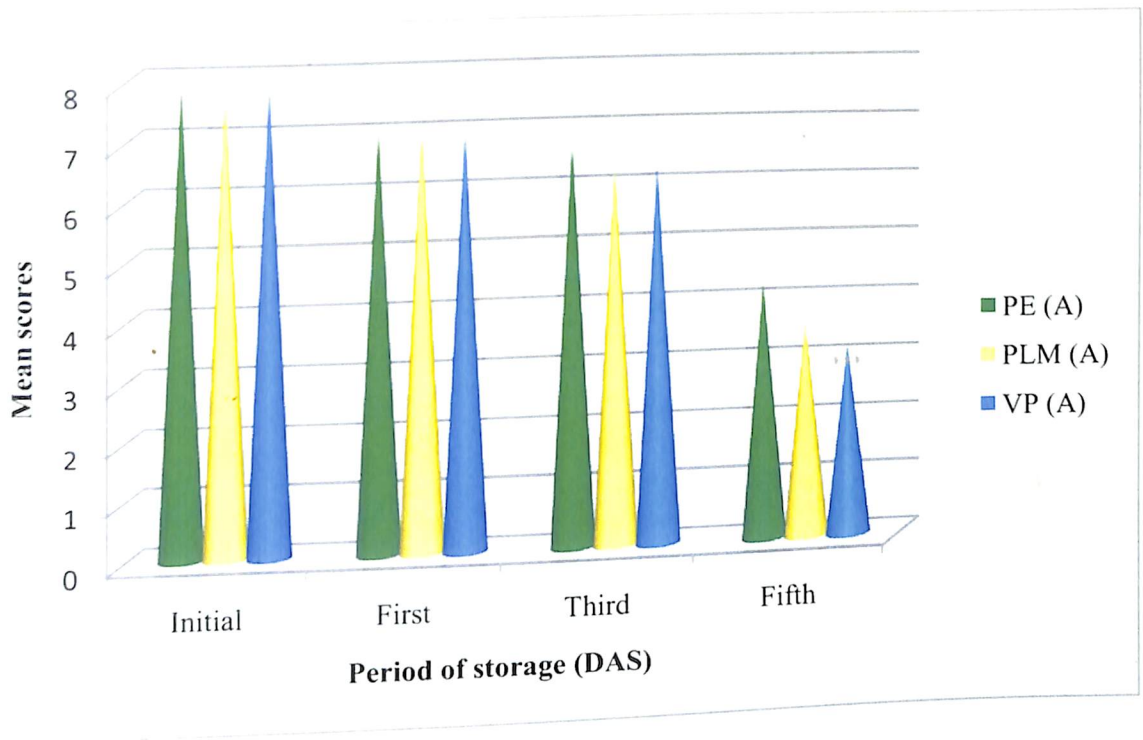


Fig. 41. Overall acceptability scores of *paniyaram* during storage

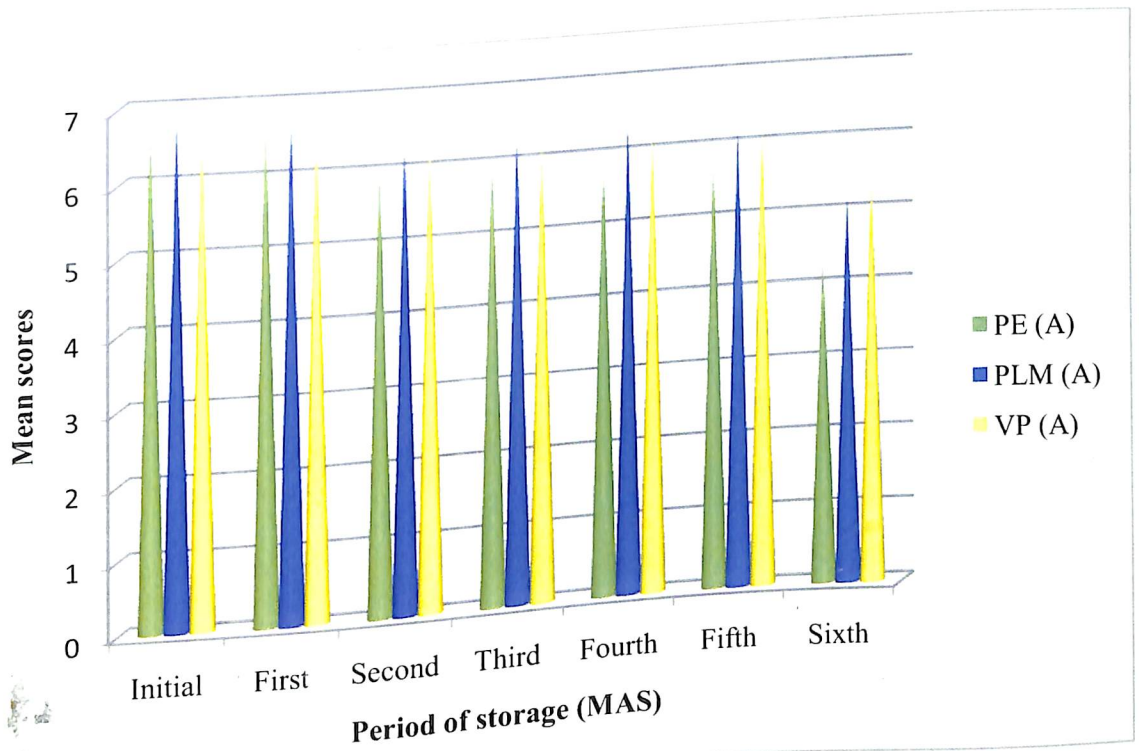


Fig. 42. Overall acceptability scores of *poruvelangai* during storage

DAS: Day after storage (A): Ambient condition
 MAS: Month after storage (R): Refrigerated condition

4.3.2.2.11 Rankayyan

Rankayyan was packed in PE and PLM and stored both under ambient and refrigerated conditions and evaluated daily for 3 days. From the initial score of 7.23, 7.27, 7.98, 7.25 and 7.63 for appearance, colour, flavour, texture and taste, under ambient conditions, the scores decreased to 3.71 and 3.22 (appearance), 4.09 and 2.91 (colour), 1.62 and 1.6 (flavour), 2.6 and 2.87 (texture) and 2.22 and 2.7 (taste) at the end of storage period in PE and PLM respectively. The product packed in PE obtained the highest score for appearance, colour and flavour. For texture and taste highest score was obtained for the product packed in PLM (Table 61). After the second day of storage, the mean scores were found to be less than 4.16 for all the quality attributes in both packaging materials.

Table 61. Mean score for organoleptic evaluation of *rankayyan* during storage
(Ambient and refrigerated conditions)

PS	TP	Appearance		Colour		Flavour		Texture		Taste		Overall acceptability	
		PE	PLM	PE	PLM	PE	PLM	PE	PLM	PE	PLM	PE	PLM
Ambient condition													
	1 st DAS	5.44	4.65	4.53	4.33	4.09	3.51	4.43	4.51	4.63	4.93	4.92	4.87
	2 nd DAS	3.63	3.67	4.15	3	2.82	3.13	2.63	2.53	2.27	2.71	3.61	3.57
	3 rd DAS	3.71	3.22	4.09	2.91	1.62	1.6	2.6	2.87	2.2	2.7	3.61	3.64
Refrigerated condition													
	1 st DAS	5.13	5	4.41	4.72	3.53	4.25	5.11	4.13	5.21	4.61	4.71	4.63
	2 nd DAS	5.01	4.82	3.16	3.13	2.55	3.64	2.91	3.23	2.94	3.33	3.85	3.67
	3 rd DAS	4.05	4	3.09	3.03	2.08	3.44	2.61	2.33	2.79	2.6	3.01	3.07

TP: Type of packing

PS: Period of storage

DAS: Day after storage

Under refrigerated conditions the mean scores were found to be 5.13 and 5 (appearance), 4.41 and 4.72 (colour), 3.53 and 4.25 (flavour), 5.11 and 4.13 (texture) and 5.21 and 4.61 (taste) for *rankayyan* packed in PE and PLM respectively. After the third day of storage the mean scores varied from 2.08 to 4.05 for different quality attributes.

There was no much variation in overall acceptability of *rankayyan* packed in PE and PLM under both ambient and refrigerated conditions during the second day of storage and the mean scores obtained for *rankayyan* packed in PE and PLM were below five (Fig43).

Mean rank scores obtained based on Kendall's coefficient of concordance indicated that there was not much difference between the overall acceptability of *rankayyan* packed in PE and PLM under ambient and refrigerated conditions.

4.3.2.2.12 *Vishu katta*

Organoleptic evaluation of *vishu katta* packed in PE and PLM and stored both under ambient and refrigerated conditions was conducted daily for four days (Table 62).

Table 62. Mean score for organoleptic evaluation of *vishu katta* during storage (Ambient and refrigerated conditions)

PS	TP	Appearance		Colour		Flavour		Texture		Taste		Overall acceptability	
		PE	PLM	PE	PLM	PE	PLM	PE	PLM	PE	PLM	PE	PLM
Ambient condition													
	1 st DAS	7.09	7.11	7.07	7	7.2	6.8	7	7	5.11	5.11	5.3	5.5
	2 nd DAS	3.69	3.87	7.06	6.67	6.58	6.75	7.39	7.69	4.79	5.08	3	3.3
	3 rd DAS	2.75	3.73	6.14	5.92	1.54	1.86	1.33	2.1	1	1	1.2	1.45
	4 th DAS	2.5	2.5	4.3	4.5	2.09	20.9	1	1	1	1	2	2
Refrigerated condition													
	1 st DAS	6.92	7.83	7.11	7.06	6.56	6.23	6.64	7.41	6	6.74	6.61	6.84
	2 nd DAS	6.76	6.65	6.92	7	3.83	4	3.41	3.63	2	2.55	3.78	3.67
	3 rd DAS	5.64	5.72	6.82	6.91	2.94	3.01	3.01	3.23	2	2	3.33	3.56
	4 th DAS	2.94	3.07	3.06	3.45	2.14	2.22	2.31	2.46	2	2	2.5	2.79

TP: Type of packing

PS: Period of storage

DAS -Day after storage

Under ambient conditions after the first day of storage the mean scores of appearance and colour were found to be 7.09, 7.11 and 7.07, 7 respectively for *vishu katta* packed both in PE and PLM. For flavour, highest score was found to be for the product packed in PE (7.2) and for texture and taste both PE and PLM obtained the

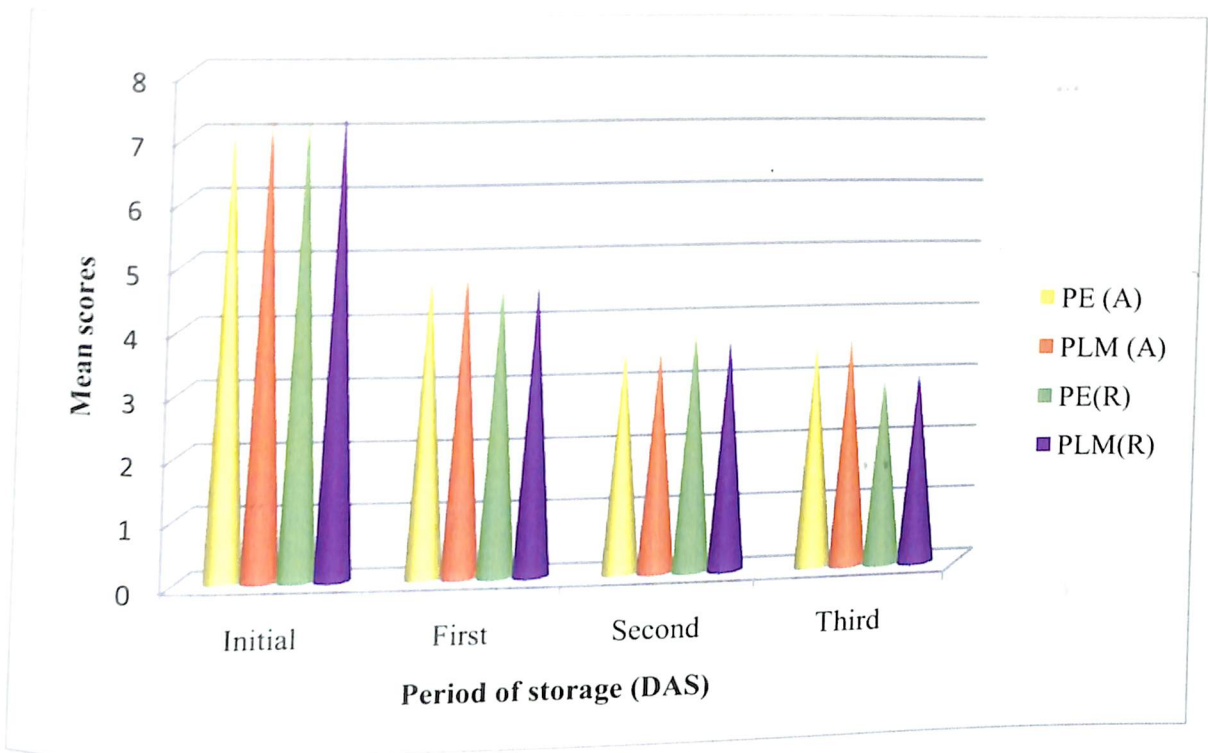


Fig. 43. Overall acceptability scores of *rankayyan* during storage

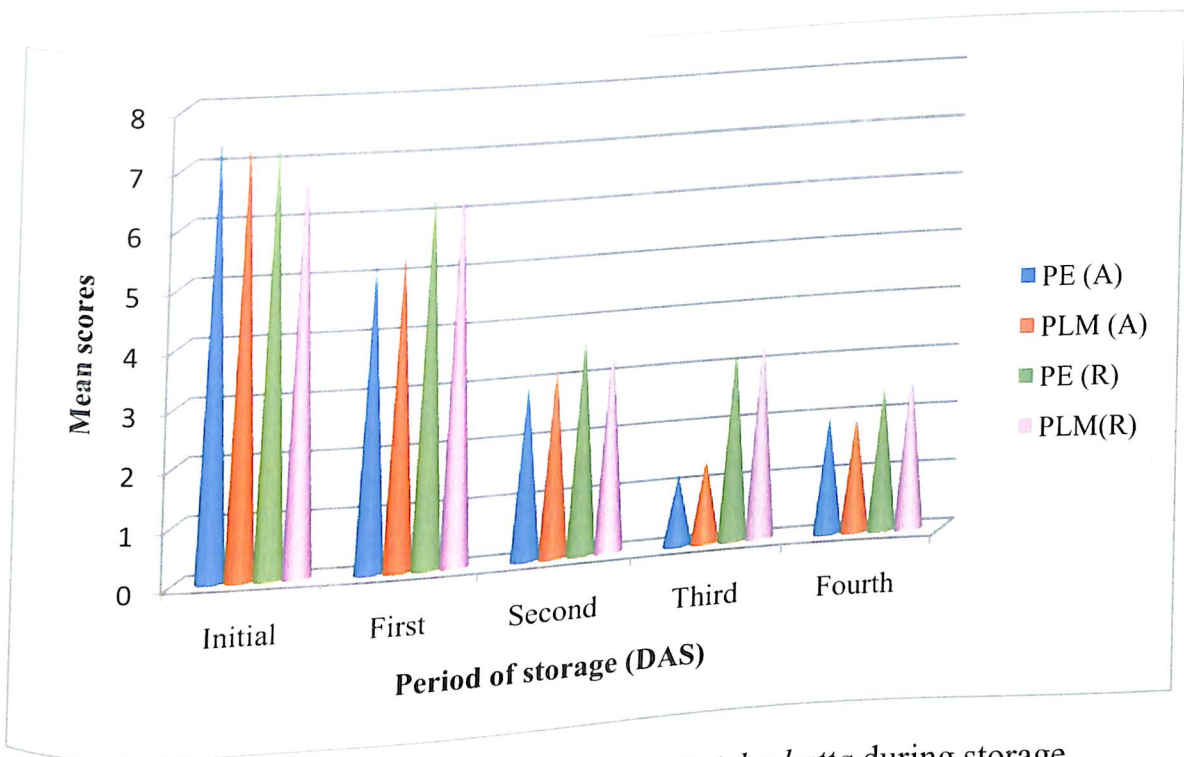


Fig. 44. Overall acceptability scores of *vishu katta* during storage

DAS: Day after storage (A): Ambient condition (R): Refrigerated condition

highest score of 7 and 5.11 respectively. After the third day of storage, the scores decreased drastically for all the quality attributes except colour.

Under refrigerated conditions, at the end of first day of storage, highest score was obtained for *vishu katta* packed in PLM for appearance (7.83) texture (7.41) and taste (6.74). For colour and flavour *vishu katta* packed in PE obtained the highest score of 7.11 and 6.56 respectively. After the third day of storage the scores decreased drastically for flavour, texture and taste.

Mean score for overall acceptability for *vishu katta* stored under ambient conditions after first day of storage was considerably less than the initial scores (Fig 44). The mean scores for the overall acceptability of *vishu katta* kept under refrigerated conditions showed mean score of 6.61 and 6.84 respectively in PE and PLM.

At any stage of observation no agreement was noticed among judges. As this is a highly perishable item, the mean rank scores obtained did not differ much and from that it should be inferred that *vishu katta* packed in two types of packaging did not have much difference in all aspects of organoleptic observation.

4.3.2.2.13 Beverages

The three replicated beverages namely *paanakam*, *injipaneeyam* and *cherunaranga then vellam* were packed in glass bottles and stored under ambient and refrigerated conditions for a period of 3 days. The mean scores obtained for different quality attributes were presented in Table 63.

After the first day of storage the mean scores varied from 4.63 to 7.31 (appearance), 3.77 to 7.25 (colour), 4.25 to 7.46 (flavour), 4.31 to 5.93 (texture) and 5.54 to 5.86 (taste). Under ambient conditions during the second day of storage, the maximum score for appearance (5.62), colour (6.82), flavour (3.23), texture (5.15), and taste (3.47) was obtained for *cherunaranga then vellam*. Over all acceptability scores of

the beverages varied from 2.77 in *injipaneeyam* to 4.27 in *paanakam* under ambient storage conditions after 2nd day of storage.

Under refrigerated conditions highest mean score for appearance (7.62), colour (7.19), flavour (6.15) and texture (6) was obtained for *cherunaranga then vellam* and for taste *injipaneeyam* obtained the highest score of 7.19 after first day of storage. The mean scores of all three beverages decreased gradually for different quality attributes. The overall acceptability scores varied from 6.15 to 7.27 after the first day of storage with the highest score for *cherunaranga then vellam* and the lowest for *paanakam*(Fig 45).

Table 63. Mean score for organoleptic evaluation of beverages during storage (Ambient and refrigerated conditions)

NB PS		Appearance			Colour			Flavour			Texture			Taste			Overall Acceptability		
		PN	IP	CTV	PN	IP	CTV	PN	IP	CTV	PN	IP	CTV	PN	IP	CTV	PN	IP	CTV
Ambient condition	1 st DAS	4.63	4.91	7.31	4.12	3.77	7.25	4.25	5.27	7.46	4.36	4.31	5.93	5.62	5.54	5.86	5.82	6.13	6.12
	2 nd DAS	3.85	3.61	5.62	3.56	2.96	6.82	2.33	2.91	3.23	2.27	3.53	5.15	3.11	3.11	3.47	3.83	2.77	4.27
	3 rd DAS	3.62	3.25	4.97	3.52	2.94	6.72	2.22	2.42	3.1	2.11	3.21	5.09	2.89	2.92	3.41	3.61	2.52	3.77
Refrigerated condition	1 st DAS	4.11	5.97	7.62	3.97	5.14	7.19	5	5.12	6.15	5.83	6	6	5.93	7.13	7.09	6.15	7.19	7.27
	2 nd DAS	4.09	2.95	5.37	3.52	4.95	6.63	4.43	4	5.45	4.53	4.13	7.11	5.12	3.77	7	4.31	3.16	6.54
	3 rd DAS	3.93	2.88	5.32	3.51	4.91	6.57	4.32	3.74	5.32	4.23	4.01	6.94	4.72	3.71	6.92	3.92	3.15	6.51

NB: Name of Beverages CTV:Cherunaranga then vellam

PS : Period of storage IP : Injipaaneeyam

DAS: Day after storage PN: Paanakam

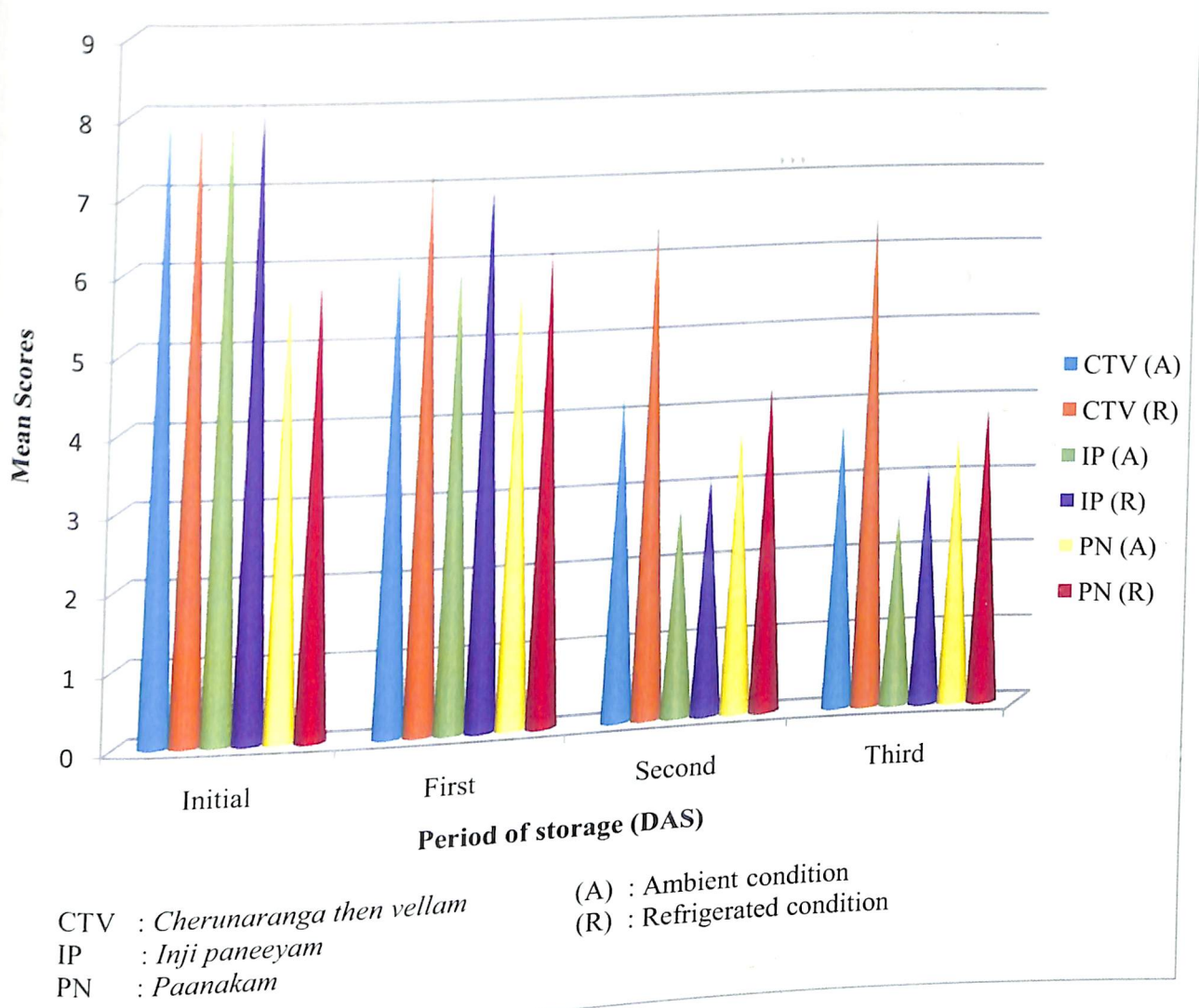


Fig. 45. Overall acceptability scores of traditional beverages during storage

4.3.3 Microbial count and shelf life of selected replicated traditional foods

Microbial enumeration of twelve replicated traditional foods and three beverages packed in suitable packaging materials and stored under ambient or ambient and refrigerated conditions for bacteria, fungi, and yeast, initially and at frequent intervals were conducted and the results are furnished in this section. The pH of the products during storage was also observed.

4.3.3.1 *Inderiyappam*

Inderiyappam was packed in PE and PLM and stored under ambient and refrigerated conditions for three days and microbial count were enumerated daily and the results are presented in Table 64.

Table 64. Total microbial count of *inderiyappam* during storage
(Ambient and refrigerated conditions)

Period of storage	Type of packing	Microbial population (cfu g ⁻¹)							
		pH		Bacteria (x10 ⁵)		Fungi (x10 ³)		Yeast (x10 ³)	
		A	R	A	R	A	R	A	R
Initial		5.94	5.94	2.5	2.5	-	-	-	-
1 st DAS	PE	5.56	5.84	54	21.5	-	-	-	-
	PLM	5.74	5.88	36.5	14.5	-	-	-	-
2 nd DAS	PE	5.22	5.62	129	40	9	6.5	14.5	4
	PLM	5.37	5.67	58.5	26.5	3	2	5.5	1.5
3 rd DAS	PE	5.01	5.51	THTC	68.5	23.5	10	18	16
	PLM	5.21	5.62	134	52.5	21	7.5	32	9

A - Ambient

R - Refrigerated DAS: Day after storage

From the initial pH of 5.94, the pH decreased to 5.01 and 5.21 in *inderiyappam* packed in PE and PLM and stored under ambient conditions. Under refrigerated conditions at the end of storage the pH was found to be 5.51 (PE) and 5.62 (PLM). The bacterial count increased to a very high level in the product packed in PE and stored under ambient conditions at the end of storage. The initial bacterial count was found to

be 2.5×10^5 cfu g⁻¹. Under refrigerated conditions the bacterial count increased to 68.5×10^5 cfu g⁻¹ and 52.5×10^5 cfu g⁻¹ in the product packed in PE and PLM respectively (Fig 46).

Fungi and yeast growth were not observed initially and during the first day of storage in both packaging materials. At the end of storage, fungal growth observed were 23.5×10^3 cfu g⁻¹ and 21×10^3 cfu g⁻¹ under ambient conditions and 10×10^3 cfu g⁻¹ and 7.5×10^3 cfu g⁻¹ under refrigerated conditions in *inderiyappam* packed in PE and PLM respectively.

The mean rank scores obtained on the basis of Friedman's test for bacteria, fungi and yeast were statistically significant and mean rank scores varied among different packaging materials denoted the high perishability of the product.

4.3.3.2 *Kala kala*

Initially, the pH of *kala kala* was found to be 6.2 with the bacterial count of 2.5×10^5 cfu g⁻¹ (Table 65). At the end of seventh week of storage the pH varied from 6.11 to 6.13 in *kala kala* packed in PE, PLM and VP.

After the first week of storage in *kala kala* the bacterial count increased to 7.5×10^5 cfu g⁻¹ in PE and 3×10^5 cfu g⁻¹ in VP under ambient storage conditions. At the end of storage, the bacterial count was found to be 58×10^5 cfu g⁻¹ in PE, 51.5×10^5 cfu g⁻¹ in PLM and 22.5×10^5 in VP. The bacterial count of *kala kala* during storage is presented in Fig 47.

Upto fourth week of storage, no fungal count was observed in *kala kala* packed in PE, PLM and VP. During 5th week of storage a fungal count of 4.5×10^3 cfu g⁻¹ was observed in *kala kala* packed in PE. At the end of seventh week of storage the fungal count increased to 8×10^3 cfu g⁻¹ in PE and 3.5×10^3 cfu g⁻¹ in LM.

Yeast growth was not observed in *kala kala* packed in PE, PLM and VP till second week of storage. During the third week of storage, yeast count was found to be 2.5×10^3 cfu g⁻¹, 1×10^3 cfu g⁻¹ and 1×10^3 cfu g⁻¹ respectively in *kala kala* packed in PE, PLM and VP respectively. At the end of storage, a high yeast growth was observed in *kala kala* packed in PE and PLM and a count of 12.5×10^3 cfu g⁻¹ was observed in the product packed in VP.

Table 65. Total microbial count of *kala kala* during storage (Ambient condition)

Period of storage	Type of packing	Microbial population (cfu g ⁻¹)			
		pH	Bacteria (x10 ⁵)	Fungi (x10 ³)	Yeast (x10 ³)
Initial		6.2	2.5		
1 st WAS	PE	6.18	7.5	-	-
	PLM	6.23	2.5	-	-
	VP	6.2	3	-	-
2 nd WAS	PE	6.19	8	-	-
	PLM	6.22	4.5	-	-
	VP	6.21	3	-	-
3 rd WAS	PE	6.19	11.5	-	2.5
	PLM	6.21	9	-	1
	VP	6.19	3.5	-	1
4 th WAS	PE	6.17	18.5	-	6.5
	PLM	6.21	16	-	7
	VP	6.19	6.5	-	2
5 th WAS	PE	6.12	32.5	4.5	7
	PLM	6.17	42	-	8.5
	VP	6.15	12.5	-	5
6 th WAS	PE	6.12	54.5	6	15.5
	PLM	6.15	46.5	2.5	7
	VP	6.14	14	-	7.5
7 th WAS	PE	6.11	58	8	THTC
	PLM	6.13	51.5	3.5	THTC
	VP	6.13	22.5	-	12.5

THTC: Too high to count

WAS: Week after storage

The mean rank scores obtained on the basis of Friedman's test for bacteria (Table 66) were found to be significant during the last weeks of storage. The mean ranks indicated the order of perishability and were low for the product packed under vacuum.

Table 66. Mean rank scores of *kala kala* during storage for bacteria

PS \ TP	1 st WAS	2 nd WAS	3 rd WAS	4 th WAS	5 th WAS	6 th WAS	7 th WAS
PE	4.35	3.27	3	3	2.75	2.75	2.75
PLM	2.15	2.19	3.25	1.25	2.25	2.25	2.25
VP	2.75	1.25	1.75	1.75	1	1	1
Friedman's statistics	0.0367	0.457	3.714*	3.714*	3.714*	3.714*	3.714*
Percentage of significance	64.37	35.79	15.6	15.6	15.6	15.6	15.6

*indicate significance WAS: Week after storage

Table 67. Mean rank scores of *kala kala* during storage for yeast and fungi

PS \ TP	3 rd WAS		4 th WAS		5 th WAS		6 th WAS	
	Yeast	Fungi	Yeast	Fungi	Yeast	Fungi	Yeast	Fungi
PE	3	-	2.25	-	2.15	-	3	-
PLM	1.5	-	2.75	-	2.50	-	1.25	-
VP	1.5	-	1	-	1	-	1.75	-
Friedman	4*	-	3.75*	-	3	-	3.75*	-
Percentage of significance	13.5	-	15.6	-	22.5	-	15.6	-

*indicate significance WAS: Week after storage

The mean ranks obtained for yeast (Table 67) on the basis of Friedman's test was statistically significant except for fifth month of storage and found low perishability in vacuum packed product.

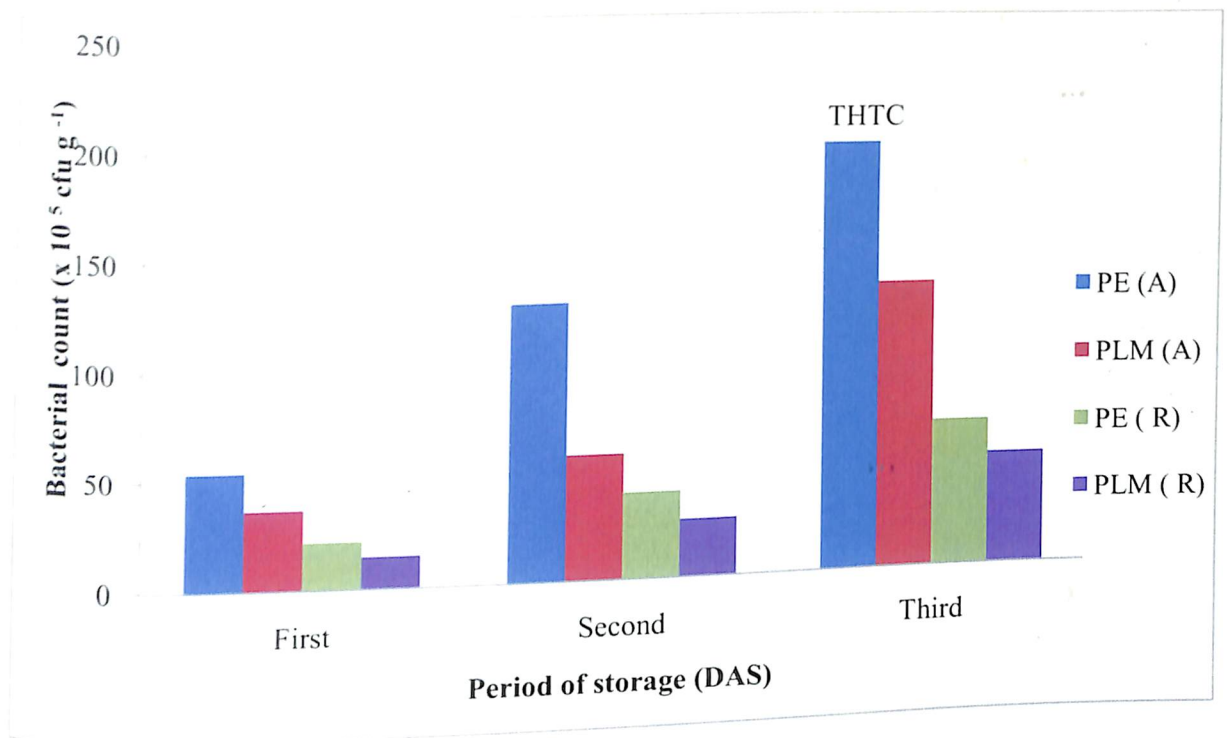


Fig. 46. Total bacterial count of *inderiyappam* during storage

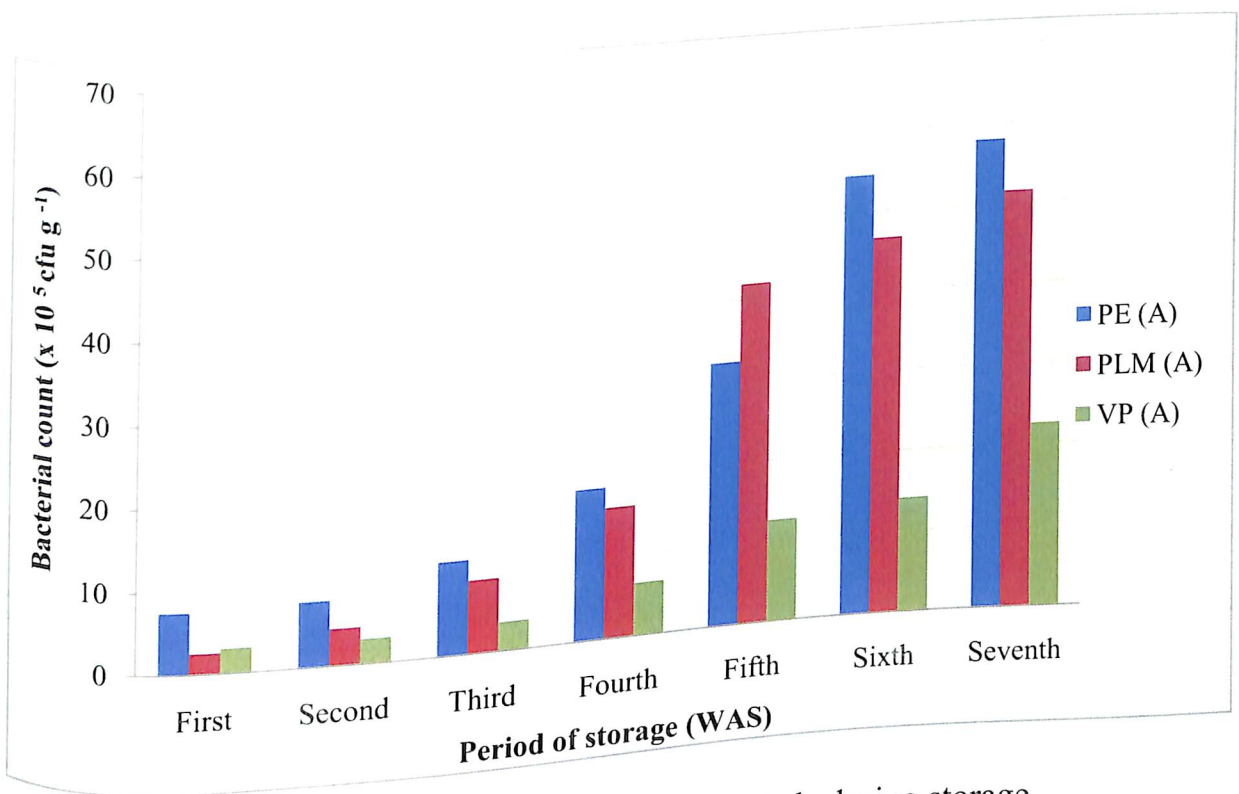


Fig. 47. Total bacterial count of *kala kala* during storage

DAS: Day after storage (A): Ambient condition
 WAS: Weeks after storage (R): Refrigerated condition THTC: Too high to count

4.3.3.3 Kaliyadakka

Kaliyadakka was packed in PE, PLM and also under vacuum and stored under ambient condition. Microbial observations were taken until fifth month and the results are presented in Table 68.

Table 68. Total microbial count of *kaliyadakka* during storage
(Ambient condition)

Period of storage	Type of packing	Microbial population (cfu g ⁻¹)			
		pH	Bacteria (x10 ⁵)	Fungi (x10 ³)	Yeast (x10 ³)
Initial		6.71	4.5	-	-
1 st MAS	PE	6.71	6.5	-	-
	PLM	6.69	5	-	-
	VP	6.7	4.5	-	-
2 nd MAS	PE	6.67	7.5	4.5	2.5
	PLM	6.69	6	-	1
	VP	6.69	6	-	1.5
3 rd MAS	PE	6.63	12	6	4
	PLM	6.69	7.5	2.5	2
	VP	6.69	6.5	-	1
4 th MAS	PE	6.57	21.5	11.5	6.5
	PLM	6.6	16.5	4.5	6
	VP	6.7	7	2	2
5 th MAS	PE	6.52	42.5	18	20
	PLM	6.65	29	9.5	8.5
	VP	6.66	13	4	6.5

MAS: Month after storage

Initially, the pH of *kaliyadakka* was found to be 6.71 and it decreased to 6.52, 6.65 and 6.66 in PE, PLM and VP respectively at the end of fifth month of storage. From an initial bacterial count of 4.5×10^5 cfu g⁻¹, the count increased to 42.5×10^5 cfu g⁻¹, 29×10^5 cfu g⁻¹ and 13×10^5 cfu g⁻¹ in *kaliyadakka* packed in PE, PLM and

VP at the end of fifth month of storage. The bacterial count of *kaliyadakka* during storage is presented in Fig. 48.

Yeast and fungal growth were not observed at the end of first month of storage. The growth of fungi was observed only in *kaliyadakka* packed in PE during the second month of storage and in PE and PLM during the third month of storage. At the end of fifth month of storage, the fungal growth varied from 4×10^3 cfu g⁻¹ to 18×10^3 cfu g⁻¹ in *kaliyadakka* packed in VP and PE respectively. At the end of the storage period the yeast count observed varied from 6.5×10^3 cfu g⁻¹ to 20×10^3 cfu g⁻¹ with the lowest and highest counts in *kaliyadakka* packed in VP and PE respectively.

The mean rank scores obtained on the basis of Friedman's test for bacteria are presented in Table 69 and for fungi and yeast the details are given in Table 70.

Table 69. Mean rank scores of *kaliyadakka* during storage for bacteria

PS \ TP	1 st MAS	2 nd MAS	3 rd MAS	4 th MAS	5 th MAS
PE	2.50	2.33	3	3	3
PLM	1.50	1.83	1.83	2	2
VP	2	21.83	1.17	1	1
Friedman's statistics	1	0.667	5.63*	6*	6*
Percentage of significance	60.7	71.7	6	5	5

*indicate significance MAS: Month after storage

TP: Type of packing PS: Period of storage

It was found that the mean rank scores obtained for bacteria were significant during the last three months of storage. The mean ranks for bacteria indicated the order of perishability and were low for the product packed under vacuum. The mean rank scores obtained for fungal growth during fourth and fifth months after storage was statistically significant and the rank scores varied among different packages.

Table 70. Mean rank scores of *kaliydakka* during storage for yeast and fungi

PS \ TP	2 nd MAS		3 rd MAS		4 th MAS		5 th MAS	
	Yeast	Fungi	Yeast	Fungi	Yeast	Fungi	Yeast	Fungi
PE	2.50	-	3	-	2.67	3.25	3	3.25
PLM	1.5	-	1.75	-	2.33	2.25	2	2.25
VP	2	-	1.25	-	1	1.5	1	1.5
Friedman's statistics	2	-	3.714*	-	4.66*	4*	6*	4*
Percentage of significance	36.8	-	15.6	-	9.7	13.5	5	13.5

*indicate significance MAS: Month after storage

TP: Type of packing PS: Period of storage

The mean rank scores obtained for yeast (Table 70) were also found to be significant during third, fourth and fifth months of storage and the low scores obtained for *kaliyadakka* packed under vacuum denoted low yeast count and hence comparatively low perishability.

4.3.3.4 *Karinellikka*

Karinellikka was stored under ambient and refrigerated conditions for a period of six months and microbial enumeration was conducted at monthly intervals for a period of six months. The pH of *karinellikka* was also noted during storage. The results are given in Table 71.

Initially, the pH of *karinellikka* was found to be 2.66 which retained till first month of storage under refrigerated condition in *karinellikka* packed in PLM and PT. Under ambient storage conditions the pH decreased to 2.64 in PLM and PT. During the second, third, fourth, fifth and sixth months of storage, the pH gradually decreased in *karinellikka* stored both under ambient and refrigerated conditions in all the three packaging materials. At the end of storage, the pH decreased to 2.02 and 2.38 (PE), 2.32 and 2.41(PLM) and 2.12 and 2.35 (PT) under ambient and refrigerated conditions respectively.

Table 71. Total microbial count of *karinellikka* during storage

(Ambient and refrigerated conditions)

Period of storage	Type of packing	pH		Microbial population (cfu g ⁻¹)					
		pH		Bacteria (x10 ⁵)		Fungi (x10 ³)		Yeast (x10 ³)	
		A	R	A	R	A	R	A	R
Initial		2.66	2.66	-	-	-	-	-	-
1 st MAS	PE	2.66	2.64	2	1.5	-	-	-	-
	PLM	2.64	2.66	1.5	-	-	-	-	-
	PT	2.64	2.66	1	1	-	-	-	-
2 nd MAS	PE	2.63	2.63	2	2	-	-	-	-
	PLM	2.64	2.65	2	1	-	-	-	-
	PT	2.61	2.65	2.5	1	-	-	-	-
3 rd MAS	PE	2.51	2.61	4	2.5	-	-	-	-
	PLM	2.52	2.63	3.5	2	-	-	-	-
	PT	2.57	2.64	4.5	2.5	-	-	-	-
4 th MAS	PE	2.38	2.58	7.5	2.5	4.5	-	-	-
	PLM	2.41	2.61	5.5	3	3	-	-	-
	PT	2.42	2.6	5	2.5	2	-	-	-
5 th MAS	PE	2.33	2.48	18.5	10.5	55	1.5	3	2
	PLM	2.41	2.54	8.5	15.5	21.5	1	1.5	1
	PT	2.38	2.51	14.5	13	37	2	1.5	2
6 th MAS	PE	2.02	2.38	33	21	70	3.5	6.5	3.5
	PLM	2.32	2.41	15.5	16.5	54	2.5	2	2
	PT	2.12	2.35	19	19.5	72.5	2	3.5	3

A- Ambient R- Refrigerated MAS: Month after storage

Initially, the bacterial count of *karinellikka* was found to be zero and after first month of storage bacterial count increased to 2×10^5 cfu g⁻¹ (PE), 1.5×10^5 cfu g⁻¹ (PLM) and 1×10^5 cfu g⁻¹ (PT) under ambient condition and 1.5×10^5 cfu g⁻¹ (PE), 0 (PLM) and 1×10^5 cfu g⁻¹ (PT) under refrigerated condition. The bacterial count gradually increased during the storage period and after second and third months of storage the count varied from 5 to 7.5×10^5 cfu g⁻¹ and 2.5 to 3×10^5 cfu g⁻¹ under ambient and refrigerated conditions respectively. At the end of storage period the bacterial count further increased to 19 to 33×10^5 cfu g⁻¹ and 16.5 to 21×10^5 cfu g⁻¹ under ambient and refrigerated conditions (Fig. 49).

The fungal count was found to be zero initially and upto third month of storage. During the fourth month *karinellikka* stored under ambient condition had a fungal count of 4.5×10^3 cfu g⁻¹ (PE), 3×10^3 cfu g⁻¹ (PLM) and 2×10^3 cfu g⁻¹ (PT). Fungal count was not observed during the fourth month of storage also in *karinellikka* packed in PE, PLM and PT and stored under refrigerated conditions. During the fifth month, the fungal count varied from 21.5 to 55×10^3 cfu g⁻¹ with the highest and lowest counts in *karinellikka* packed in PE and PLM respectively and stored under ambient conditions. Under refrigerated condition the fungal count was found to be 1.5×10^3 cfu g⁻¹, 1×10^3 cfu g⁻¹ and 2×10^3 cfu g⁻¹ respectively in *karinellikka* packed in PE, PLM and PT. At the end of storage the fungal count further increased under ambient and refrigerated conditions and it varied from 54 to 72.5 and 2 to 3.5×10^3 cfu g⁻¹ respectively.

The yeast count was found to be zero in *karinellikka* packed in three packaging materials and stored under ambient and refrigerated conditions till fourth month of storage. During the fifth and sixth months of storage, the yeast count varied from 1.5 to 3 and 2 to 6.5×10^3 cfu g⁻¹ under ambient conditions and 1 to 2 and 2 to 3.5×10^3 cfu g⁻¹ under refrigerated conditions. The mean rank scores obtained for *karinellikka* for bacteria, fungi and yeast on the basis of Friedman's test are presented in Table 72 to Table 74.

Table 72. Mean rank scores of *karinellikka* during storage for bacteria

TP \ PS	1 st MAS		2 nd MAS		3 rd MAS		4 th MAS		5 th MAS		6 th MAS	
	A	R	A	R	A	R	A	R	A	R	A	R
TP												
PE	2.25	2.75	1.75	3	2	2.25	3	1.75	3	1	2.75	2.5
PLM	2.25	1	1.75	1.5	1.25	1.5	1.75	2.5	1.5	3.5	1.5	1.5
PT	1.5	2.25	2.5	1.5	2.75	2.25	1.25	1.75	1.5	2	2.25	2
Friedman's statistics	100	3.7*	2	4*	3*	1.5	3.71	2.74	4.24*	4.25*	4.65*	100
Percentage of significance	60.7	15.6	36.8	13.5	22.3	60.7	35.6	36.8	11.5	13.5	13.74	60

A: Ambient R: Refrigerated

*indicate significance MAS: Month after storage

TP: Type of packing PS: Period of storage

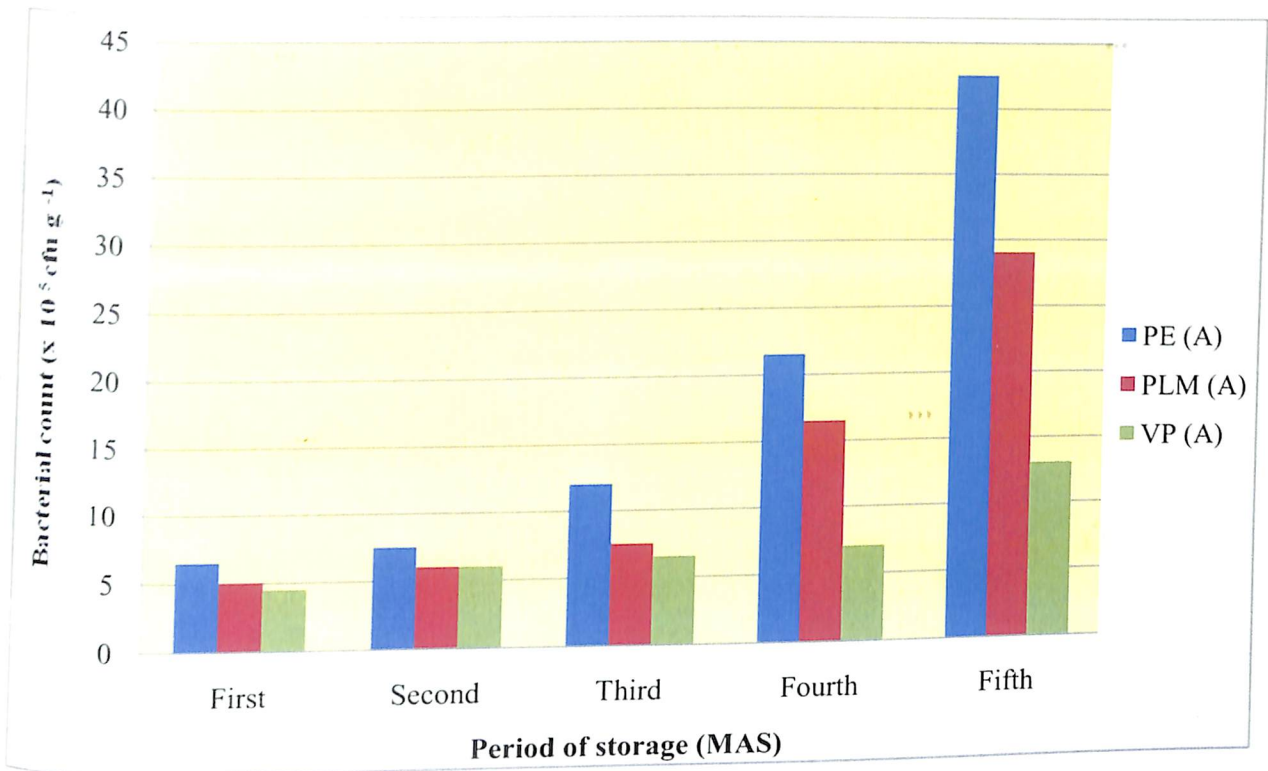


Fig. 48. Total bacterial count of *kaliyadakka* during storage

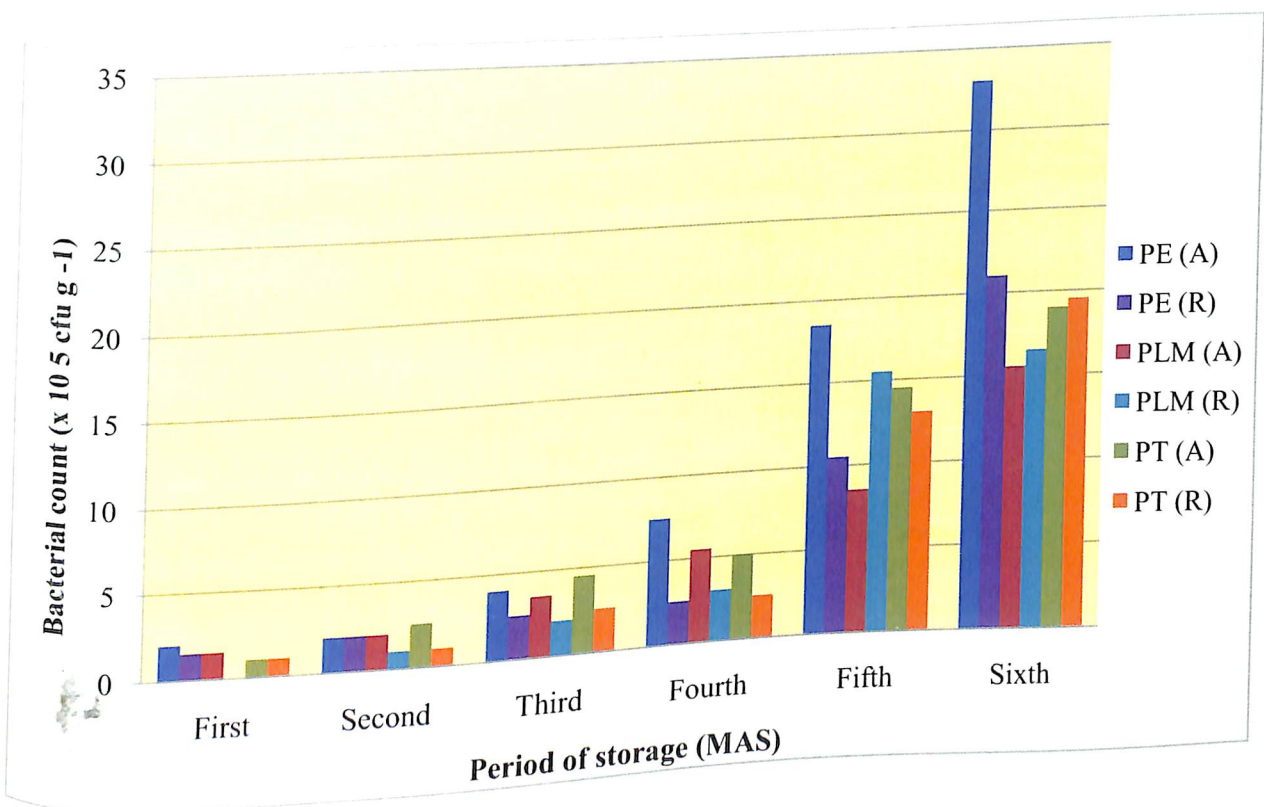


Fig. 49. Total bacterial count of *karinellikka* during storage

MAS: Month after storage

(A): Ambient condition

(R) : Refrigerated condition

The mean rank scores obtained for bacterial count was significant during fifth month of storage both in ambient and refrigerated storage conditions and the order of perishability varied in different packages during different stages of observation.

Table 73. Mean rank scores of *karinellikka* during storage for fungi

TP \ PS	4 th MAS		5 th MAS		6 th MAS	
	A	R	A	R	A	R
PE	3	1.75	3.75	2.25	2.25	2.50
PLM	1.75	2.5	1.5	1.25	1	2.25
PT	1.25	1.75	2.50	2.25	3.25	1.50
Friedman's statistics	3.7	100	3.50*	3	4*	100
Percentage of significance	15.6	60.7	18.5	22.3	13.5	60.7

*indicate significance MAS: Month after storage

A: Ambient R: Refrigerated TP: Type of packing PS: Period of storage

Table 74. Mean rank scores of *karinellikka* during storage for yeast

TP \ PS	5 th MAS		6 th MAS	
	A	R	A	R
PE	3	2.50	3	2.5
PLM	1.5	1.25	1.5	1.50
PT	1.5	2.25	1.5	2
Friedman's statistics	3*	2	3*	100
Percentage of significance	22.3	36.8	22.3	60.7

*indicate significance MAS: Month after storage

A: Ambient R: Refrigerated TP: Type of packing PS: Period of storage

At the end of the storage period the mean rank scores obtained for fungi and yeast count (Table 73 and Table 74) in *karinellikka* under ambient condition was found to be significant and the order of perishability in terms of fungi and yeast growth varied in different packages.

4.3.3.5 *Madhura puttu*

Madhura puttu was packed in PE and PLM and stored for seven days under ambient and refrigerated conditions. The results on microbial enumeration are presented in Table 75.

Table 75. Total microbial count of *madhura puttu* during storage

Period of storage	Type of packing	Microbial population (cfu g ⁻¹)							
		pH		Bacteria (x10 ⁵)		Fungi (x10 ³)		Yeast (x10 ³)	
		A	R	A	R	A	R	A	R
Initial		6.28	6.28	6	6	-	-	-	-
1 st DAS	PE	6.01	6.2	7.5	5.5	-	-	-	-
	PLM	6.28	6.28	4.5	3.5	-	-	-	-
3 rd DAS	PE	5.97	5.98	14	12.5	-	-	6.5	5
	PLM	6.01	6	7.5	4.5	-	-	3.5	4.5
5 th DAS	PE	5.81	5.85	29	42.5	3.5	2	16.5	7
	PLM	5.97	5.93	13.5	9.5	3	-	13.5	7.5
7 th DAS	PE	5.8	5.83	73	65	9.5	4.5	39.5	28
	PLM	5.92	5.91	26.5	18	6.5	2	11	8.5

DAS- Day after storage

A: Ambient R: Refrigerated

The initial pH of the product was found to be 6.28 and it decreased to 5.8 and 5.92 under ambient conditions and 5.83 and 5.91 under refrigerated conditions in *madhura puttu* packed in PE and PLM respectively. From the initial bacterial count of 6×10^5 cfu g⁻¹ at the end of storage, the count increased to 73 and 26.5×10^5 cfu g⁻¹ in *madhura puttu* packed in PE and PLM respectively and stored under ambient conditions. Under refrigerated conditions the bacterial count observed were 65×10^5 cfu g⁻¹ and 18×10^5 cfu g⁻¹ in *madhura puttu* packed in PE and PLM respectively (Fig. 50).

The growth of fungi was not observed till third day after storage in both packaging materials and storage conditions. At the end of storage, the fungal counts observed were 9.5×10^3 cfu g⁻¹ (PE) and 6.5×10^3 cfu g⁻¹ (PLM) under ambient conditions and 4.5×10^3 cfu g⁻¹ (PE) and 2×10^3 cfu g⁻¹ (PLM) under refrigerated conditions.

Yeast growth was not observed initially and during the first day of storage in both packaging materials and storage conditions. At the end of storage, the yeast counts were found to be 39.5×10^3 cfu g⁻¹ (PE) and 11×10^3 cfu g⁻¹ (PLM) under ambient conditions and 28×10^3 cfu g⁻¹ (PE) and 8.5×10^3 cfu g⁻¹ (PLM) under refrigerated conditions.

The mean rank scores obtained on the basis of Friedman's test for bacteria, fungi and yeast were statistically significant and mean rank scores which varied among different packaging materials and storage conditions denoted the high perishability of the product.

4.3.3.6 Manda

Manda was packed in PE, PLM and VP under ambient conditions and stored for a period of six weeks and microbial growth was enumerated at weekly intervals. The results are presented in Table 76.

From the initial PH of 6.62, the pH decreased to 6.37 (PE), 6.46 (PLM) and 6.47 (VP) at the end of storage. The bacterial count increased to 110×10^5 cfu g⁻¹, 42×10^5 cfu g⁻¹ and 11.5×10^5 cfu g⁻¹ in *manda* packed in PE, PLM and VP respectively from an initial value of 4×10^5 cfu g⁻¹. The bacterial count of *manda* during storage is presented in Fig. 51.

The growth of fungi was not at all observed till third week of storage. At the end of sixth week, the count increased to 7×10^3 cfu g⁻¹, 6.5×10^3 cfu g⁻¹ and 4.5×10^3 cfu g⁻¹ respectively in *manda* packed in PE, PLM and VP respectively. Yeast growth was not observed at the end of the first week in PE, PLM and VP as well as in PLM and VP at the end of second week. At the end of sixth week of storage the yeast count varied from 5.5×10^3 cfu g⁻¹ in VP to 26.5×10^3 cfu g⁻¹ in PE.

Table 76. Total microbial count of *manda* during storage (Ambient condition)

Period of storage	Type of packing	Microbial population(cfu g ⁻¹)			
		pH	Bacteria (x10 ⁵)	Fungi (x10 ³)	Yeast (x10 ³)
Initial		6.62	4	-	-
1 st WAS	PE	6.62	6	-	-
	PLM	6.61	5.5	-	-
	VP	6.62	2.5	-	-
2 nd WAS	PE	6.6	7.5	-	4.5
	PLM	6.61	6	-	-
	VP	6.61	2.5	-	-
3 rd WAS	PE	6.54	13	-	7
	PLM	6.54	8.5	-	3.5
	VP	6.58	6.5	-	2
4 th WAS	PE	6.41	36.5	2.5	11.5
	PLM	6.52	16	3	6.5
	VP	6.54	9	1	4.5
5 th WAS	PE	6.41	72.5	6.5	20
	PLM	6.5	33.5	4.5	7.5
	VP	6.53	10	1	5
6 th WAS	PE	6.37	110	7	26.5
	PLM	6.46	42	6.5	8
	VP	6.47	11.5	4.5	5.5

WAS : Week after storage

The mean rank scores obtained for *manda* on the basis of Friedman's test for bacteria, fungi and yeast are presented in Table 77 and 78.

Table 77. Mean rank scores of *manda* during storage for bacteria

TP \ PS	1 st WAS	2 nd WAS	3 rd WAS	4 th WAS	5 th WAS	6 th WAS
PE	2.5	2.75	2.5	3.75	3.75	3.75
PLM	2.5	2.25	2.5	2.25	2.25	2.25
VP	1	1	1	1	1	1
Friedman's statistics	3	3.7*	4*	6*	6*	6*
Percentage of significance	22.3	15.6	13.5	5	5	5

*indicate significance WAS: week after storage

PS : Period of storage

TP : Type of packing

Table 78. Mean rank scores of *manda* during storage for yeast and fungi

TP \ PS	3 rd WAS		4 th WAS		5 th WAS		6 th WAS	
	Yeast	Fungi	Yeast	Fungi	Yeast	Fungi	Yeast	Fungi
PE	3.25	-	3.75	2.25	3.25	3.25	3.25	2.75
PLM	2.50	-	2.25	2.25	2.25	2.50	2.25	2.25
VP	1.75	-	1	1.50	1	1.75	1	1
Friedman's statistics	4*	-	6*	1	6*	4*	6*	3.714*
Percentage of significance	13.5	-	5.0	60.7	5.0	13.5	5.0	15.6

*indicate significance WAS: week after storage

PS : Period of storage

TP : Type of packing

The mean rank scores for bacteria during second, third, fourth, fifth and sixth months were found to be significant (Table 77) with the minimum rank score in vacuum packed product. The mean rank scores for total count for fungi were statistically significant during the last two weeks and for yeast, during all stages of storage (Table 78). The minimum rank scores in terms of microbial count which denote low perishability was observed in *manda* packed under vacuum.

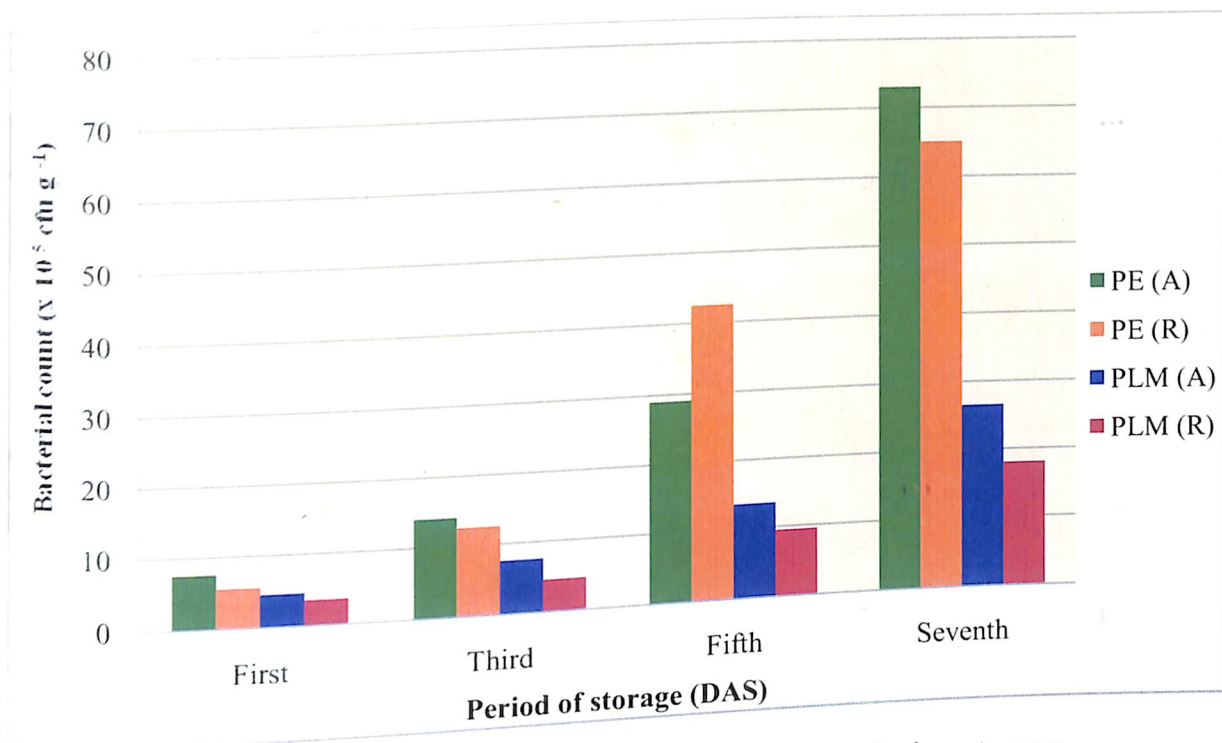


Fig. 50. Total bacterial count of *madhura puttu* during storage

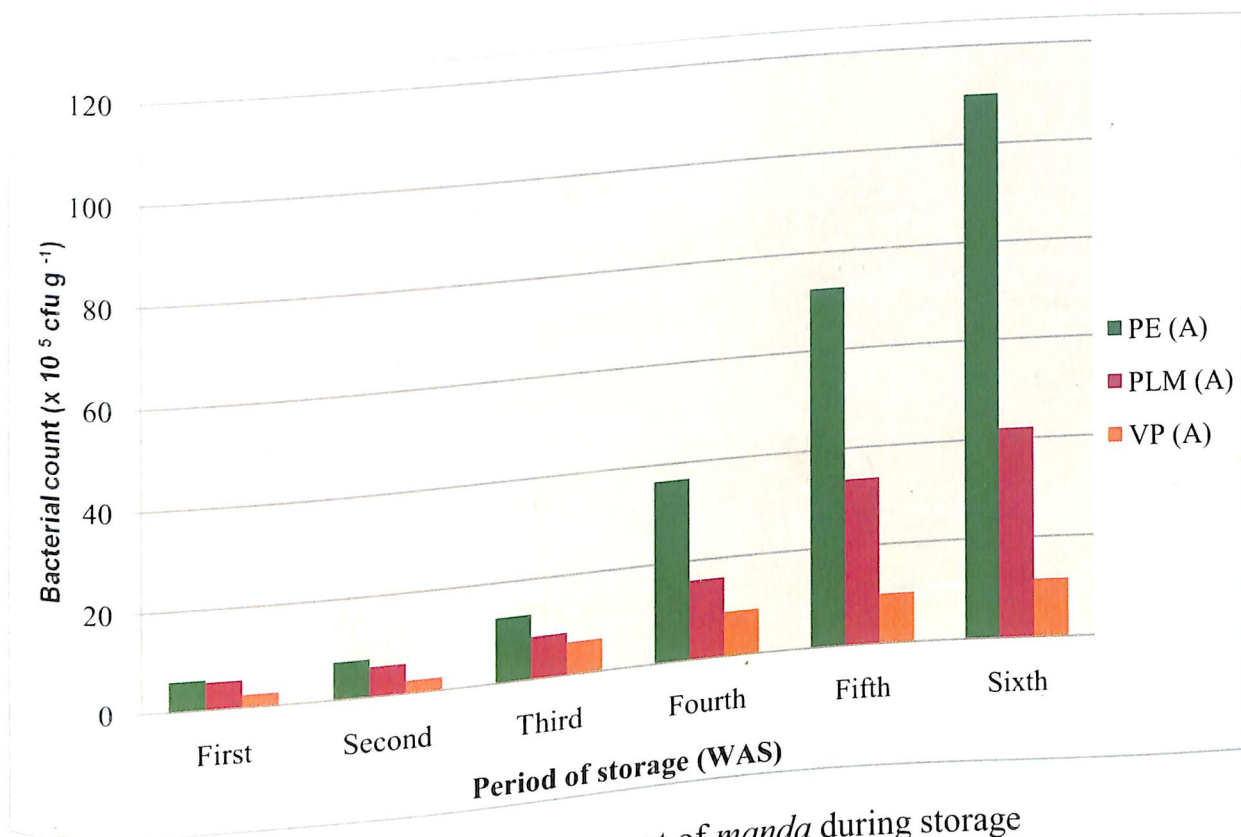


Fig. 51. Total bacterial count of *manda* during storage

WAS: Week after storage

DAS: Day after storage

(A): Ambient condition

(R): Refrigerated condition

4.3.3.7 *Muttayappam*

Muttayappam was packed in PE and PLM and kept under ambient and refrigerated conditions for a period of three days and the results of microbial enumeration are presented in Table 79.

Table 79. Total microbial count of *muttayappam* during storage
(Ambient and refrigerated conditions)

Period of storage	Type of packing	Microbial population(cfu g ⁻¹)							
		pH		Bacteria (x10 ⁵)		Fungi (x10 ³)		Yeast (x10 ³)	
		A	R	A	R	A	R	A	R
Initial		6.38	6.38	26.5	26.5	-	-	12.5	-
1 st DAS	PE	6.34	6.38	89.5	45	-	-	20.5	5
	PLM	6.33	6.37	74.5	37.5	-	-	17.5	9
2 nd DAS	PE	6.25	6.32	159.5	73.5	6.5	5	24	7.5
	PLM	6.22	6.31	167.5	62	4.5	3	19	11.5
3 rd DAS	PE	6.01	6.26	THTC	117	23	11.5	58.5	16.5
	PLM	6.2	6.28	THTC	87.5	42	25.5	42.5	14

DAS: Day after storage THTC : Too high to count A: Ambient R: Refrigerated

The pH of *muttayappam* was found to be 6.38 initially which decreased to 6.01 and 6.2 under ambient conditions and 6.26 and 6.28 under refrigerated conditions at the end of three days of storage.

From an initial bacterial count of 26.5×10^5 cfu g⁻¹ at the end of storage, a very high count was observed in *muttayappam* stored under ambient conditions packed both in PE and PLM. Under refrigerated condition the count increased to 117×10^5 cfu g⁻¹ in PE and 87.5×10^5 cfu g⁻¹ in PLM (Fig. 52).

Fungal growth was not observed initially and after the first day of storage in both packaging materials. At the end of storage, the fungal count observed were 23×10^3 cfu g⁻¹ and 42×10^3 cfu g⁻¹ under ambient conditions and 11.5×10^3 cfu g⁻¹ and

25.5×10^3 cfu g⁻¹ under refrigerated conditions in *muttayappam* packed in PE and PLM respectively.

The mean rank scores obtained on the basis of Friedman's test for bacteria, fungi and yeast were statistically significant and mean rank scores which varied among different packaging materials under ambient and refrigerated conditions denoted the high perishability of the product.

4.3.3.8 *Niracha pathiri*

Niracha pathiri was packed in PE, PLM and Vacuum and stored for 3 days in ambient and refrigerated conditions. From the initial pH of 6.3, the pH decreased to 5.58, 5.6 and 5.59 under ambient conditions and 5.67, 5.69 and 5.62 under refrigerated condition in PE, PLM and VP respectively (Table 80).

Table 80. Total microbial count of *niracha pathiri* during storage
(Ambient and refrigerated conditions)

Period of storage	Type of packing	Microbial population (cfu g ⁻¹)							
		pH		Bacteria (x10 ⁵)		Fungi (x10 ³)		Yeast (x10 ³)	
		A	R	A	R	A	R	A	R
Initial		6.3	6.3	7.5	7.5	-	-	-	-
1 st DAS	PE	6.21	6.16	20.5	23.5	5.5	-	23.5	16
	PLM	6.14	6.16	12.5	25.5	1.5	-	19.5	6
	VP	6.16	6.18	20	11.5	-	-	7.5	2.5
2 nd DAS	PE	5.91	5.93	89.5	47.5	20.5	7.5	96	21.5
	PLM	5.74	5.84	52.5	28.5	14.5	4	32.5	7.5
	VP	5.66	5.81	35.5	23	10.5	4.5	8	6.5
3 rd DAS	PE	5.58	5.67	THTC	217	THTC	79	THTC	42.5
	PLM	5.6	5.69	THTC	148.5	THTC	24.5	116.5	28.5
	VP	5.59	5.62	121.5	109.5	37.5	14.5	98	20.5

DAS: Day after storage THTC: Too High to Count A: Ambient R: Refrigerated

With respect to the bacterial count, from the initial count of 7.5×10^5 cfu g⁻¹ it increased to a very high count in *niracha pathiri* packed in PE and PLM under ambient

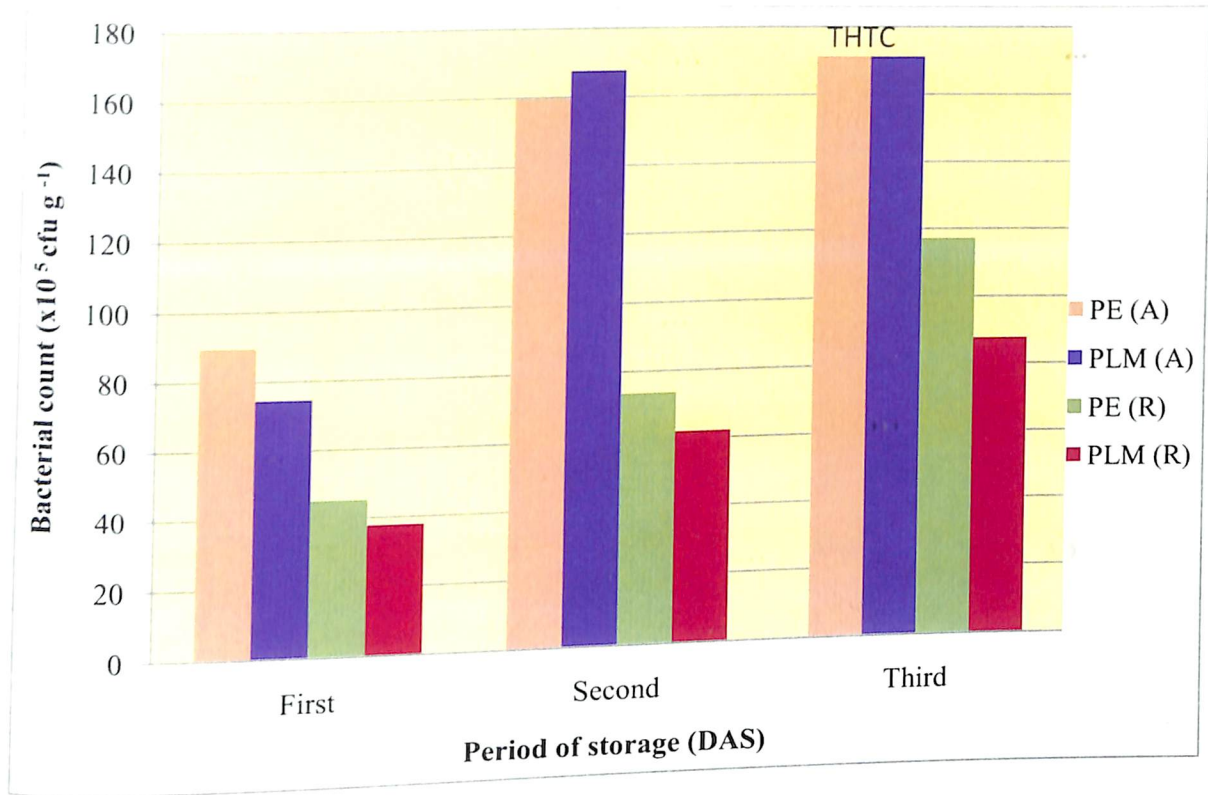


Fig. 52. Total bacterial count of *muttayappam* during storage

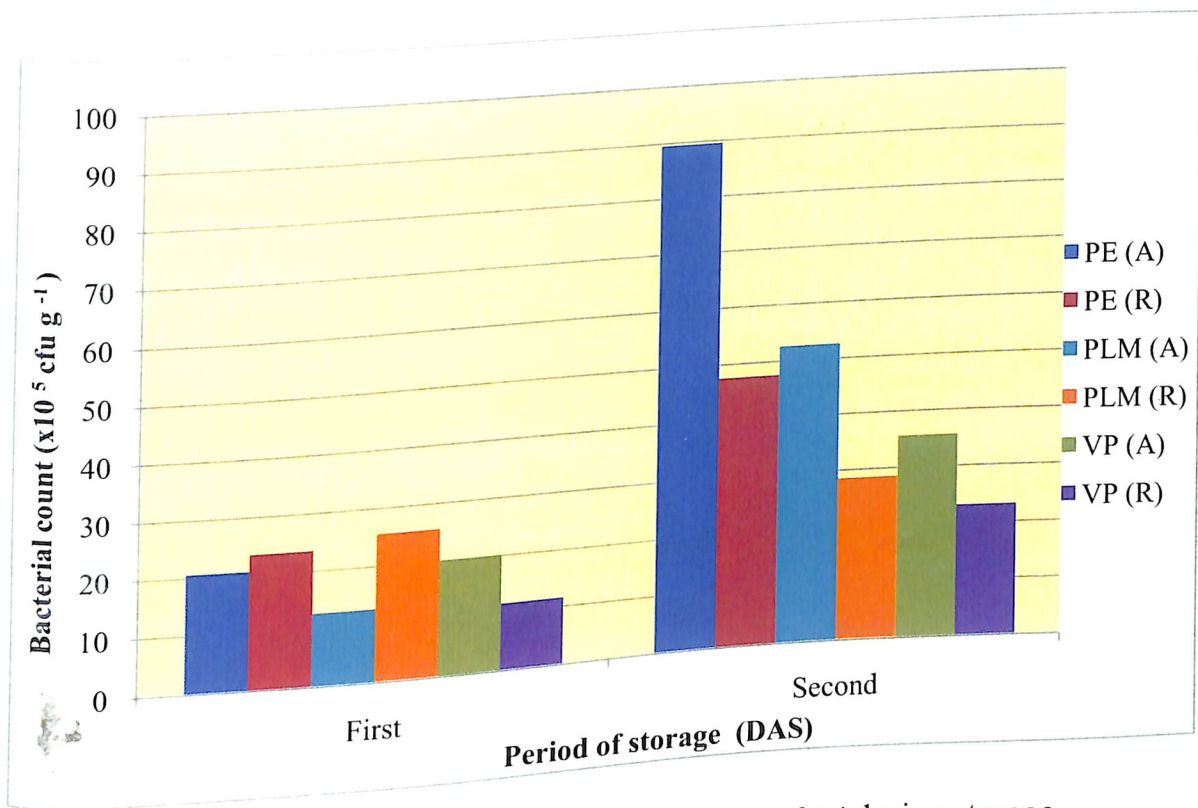


Fig. 53. Total bacterial count of *niracha pathiri* during storage

DAS: Day after storage (A): Ambient condition (R): Refrigerated condition THTC: Too high to count

storage conditions. Under refrigerated conditions the bacterial count observed varied from $109.5 \times 10^5 \text{ cfu g}^{-1}$ (VP) to $217 \times 10^5 \text{ cfu g}^{-1}$ (PE) (Fig. 53).

The fungi and yeast counts were found to be zero initially. No fungal growth was observed in *niracha pathiri* stored under refrigerated conditions in PE, PLM and VP as well as those packed in VP and stored under ambient conditions. At the end of storage a very high count of fungi was observed in *niracha pathiri* packed in PE and PLM and stored under ambient conditions. Under refrigerated conditions at the end of storage the fungal count varied from $14.5 \times 10^3 \text{ cfu g}^{-1}$ (VP) to $79 \times 10^3 \text{ cfu g}^{-1}$ (PE) and $37.5 \times 10^3 \text{ cfu g}^{-1}$ in *niracha pathiri* packed in VP and kept under ambient conditions.

The mean rank scores obtained on the basis of Friedman's test for bacteria, fungi and yeast were statistically significant and mean rank scores which varied among different packaging materials under ambient and refrigerated conditions denoted the high perishability of *niracha pathiri*.

4.3.3.9 Paniyaram

Paniyaram was packed in PE, PLM and VP and stored for 5 days under ambient conditions. The changes occurred to pH, and to the total microbial count were observed and the results are presented in Table 81.

From the initial pH of 6.57 the pH of *paniyaram* decreased to 6.22 in PE, 6.36 in PLM and 6.4 in VP. The initial bacterial count was found to be $6.5 \times 10^5 \text{ cfu g}^{-1}$ and it increased to a very high amount in *paniyaram* packed in PE and a bacterial count of $97.5 \times 10^5 \text{ cfu g}^{-1}$ and $94 \times 10^5 \text{ cfu g}^{-1}$ were observed in the product packed in PLM and VP respectively (Fig. 54).

Table 81. Total microbial count of *paniyaram* during storage (Ambient condition)

Period of storage	Type of packing	Microbial population (cfu g ⁻¹)			
		pH	Bacteria (x10 ⁵)	Fungi (x10 ³)	Yeast (x10 ³)
Initial		6.57	6.5	-	-
1 st DAS	PE	6.56	32	-	14.5
	PLM	6.57	14.5	-	8
	VP	6.57	9.5	-	2.5
3 rd DAS	PE	6.3	122.5	-	42
	PLM	6.43	57	-	8.5
	VP	6.54	19.5	-	5
5 th DAS	PE	6.22	THTC	14.5	106.5
	PLM	6.36	97.5	5.5	16.7
	VP	6.4	94	2.5	12

DAS: Day after storage

Till third day of storage no fungal growth was noticed and on the fifth day, the fungal growth varied from 2.5×10^3 cfu g⁻¹ (VP) to 14.5×10^3 cfu g⁻¹ (PE). Initially, yeast growth was not noticed and at the end of the fifth day of storage, yeast growth was found to be 106.5×10^3 cfu g⁻¹, 16.7×10^3 cfu g⁻¹ and 12×10^3 cfu g⁻¹ in *paniyaram* packed in PE, PLM and VP respectively.

The mean rank scores obtained on the basis of Friedman's test for bacteria, fungi and yeast were statistically significant and mean rank scores which varied among different packaging materials under ambient and refrigerated conditions denoted the high perishability of the product.

4.3.3.10 *Poruvelangai*

Poruvelangai was packed in PE, PLM and also under vacuum and was evaluated for its total microbial count and pH up to six months and the results are presented in Table 82.

Table 82. Total microbial count of *poruvelangai* during storage (Ambient condition)

Period of storage	Type of packing	Microbial population (cfu g ⁻¹)			
		pH	Bacteria (x10 ⁵)	Fungi (x10 ³)	Yeast (x10 ³)
Initial		6.34	2.5	-	-
1 st MAS	PE	6.34	5	-	-
	PLM	6.33	2.5	-	-
	VP	6.34	2	-	-
2 nd MAS	PE	6.31	6	-	-
	PLM	6.33	2.5	-	-
	VP	6.33	2.5	-	-
3 rd MAS	PE	6.3	7.5	5.5	-
	PLM	6.31	3.5	3	-
	VP	6.32	3	-	-
4 th MAS	PE	6.3	7	5	2
	PLM	6.31	4.5	4	1.5
	VP	6.32	4.5	1.5	-
5 th MAS	PE	6.29	11.5	6	3
	PLM	6.3	6.5	4.5	2
	VP	6.3	5	1.5	-
6 th MAS	PE	6.27	14.5	6.5	4
	PLM	6.3	8	5.5	2.5
	VP	6.3	5.5	2	-

MAS: Month after storage

Initially, the pH of *poruvelangai* was found to be 6.34 and at the end of storage of six months the pH was found to be 6.27 in PE and 6.3 in PLM and VP. From an initial bacterial count of 2.5×10^5 cfu g⁻¹, at the end of storage the count of *poruvelangai* stored under ambient conditions increased to 14.5×10^5 cfu g⁻¹ in PE, 8×10^5 cfu g⁻¹ in PLM and 5.5×10^5 cfu g⁻¹ in VP. The bacterial count of *poruvelangai* during storage is presented in Fig. 55.

Fungal growth was not observed in *poruvelangai* till second month of storage in any of the packaging materials and also for the *poruvelangai* packed in VP at the end of

third month. At the end of storage, the fungal growth observed varied from 2×10^3 cfu g^{-1} (VP) to 6.5×10^3 cfu g^{-1} (PE).

The mean rank scores obtained on the basis of Friedman's test for bacteria, yeast and fungi are presented in Table 83 and 84.

Table 83. Mean rank scores of *poruvelangai* during storage for bacteria

PS \ TP	1 st MAS	2 nd MAS	3 rd MAS	4 th MAS	5 th MAS	6 th MAS
PE	3	3	3.25	3.25	3	3
PLM	1.83	1.83	1.75	1.50	2	2
VP	1.17	1.83	1.50	1.50	1	1
Friedman's statistics	0.563	3.64	3.64	4.51*	4*	4*
Percentage of significance	67.6	22.3	22.3	18.75	13.5	13.5

*indicate significance MAS: Month after storage

Table 84. Mean rank scores of *poruvelangai* during storage for total yeast and fungi

PS \ TP	4 th WAS		5 th WAS		6 th WAS	
	Yeast	Fungi	Yeast	Fungi	Yeast	Fungi
PE	2.50	2.66	2.75	2.83	3.27	2.83
PLM	2.50	2.33	2.25	2.17	2.21	2.17
VP	1	1	1	1	1.72	1
Friedman's statistics	3*	4.66*	3.7*	5.63*	4*	5.63*
Percentage of significance	22.3	9.7	15.6	6	13.5	6

MAS: Month after storage *indicate significance

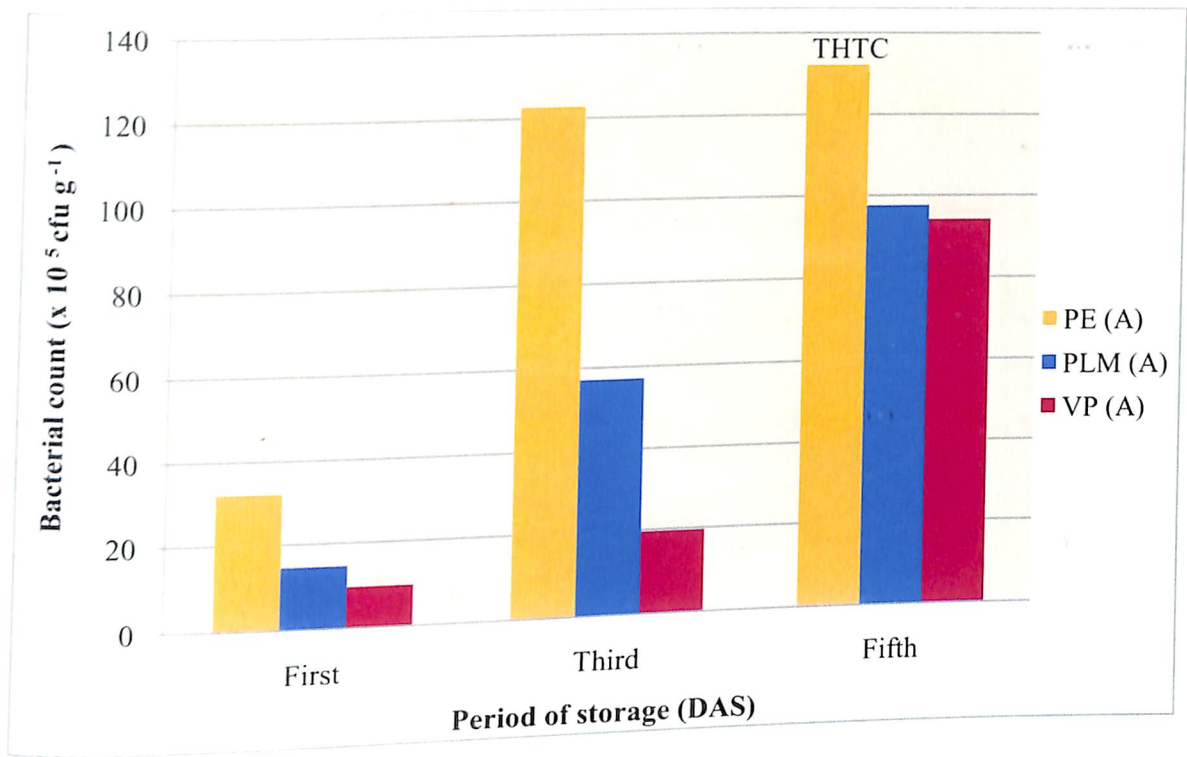


Fig. 54. Total bacterial count of *paniyaram* during storage

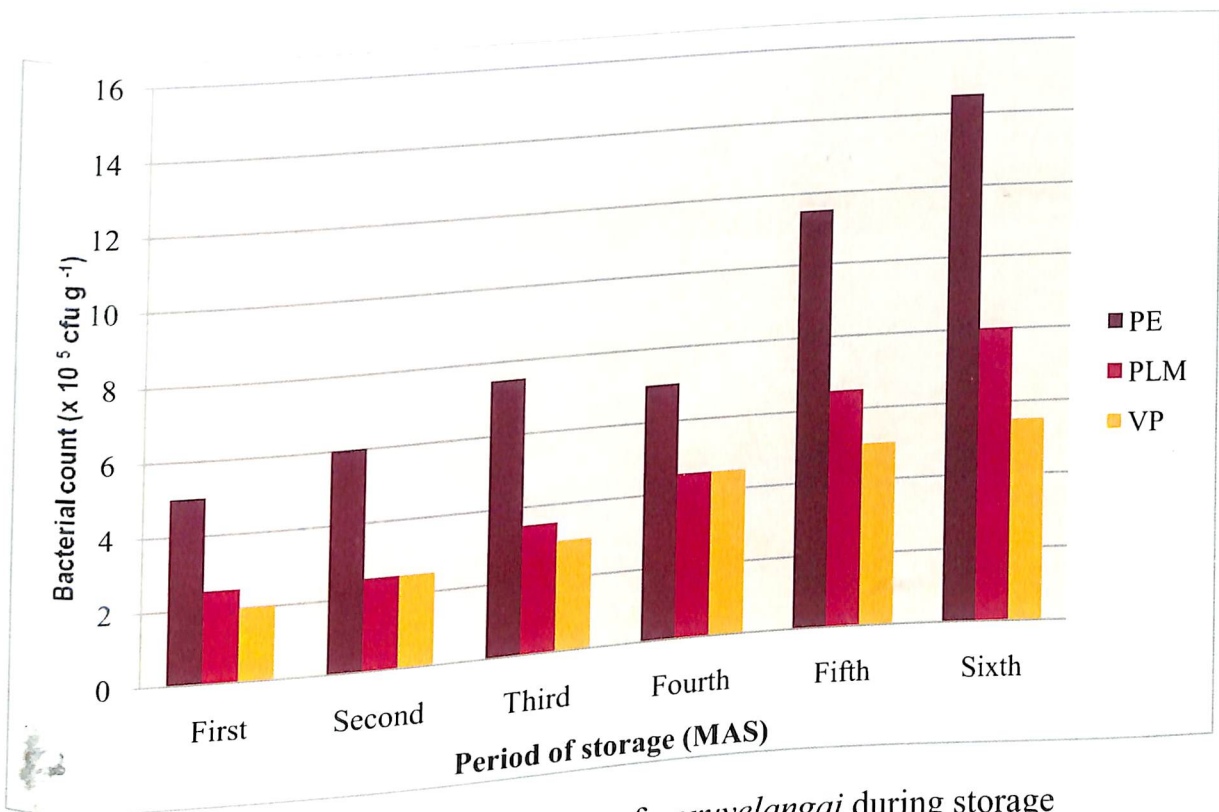


Fig. 55. Total bacterial count of *poruvelangai* during storage

DAS: Day after storage (A): Ambient condition
 MAS: Month after storage (R): Refrigerated condition THTC: Too high to count

The mean rank scores obtained for total count of bacteria and fungi and yeast were statistically significant after third month of storage. The minimum mean rank scores for microbial count were obtained for *poruvelangai* packed under vacuum.

4.3.3.11 Rankayyan

Rankayyan was packed in PE and PLM and stored for three days both under ambient and refrigerated storage conditions and the microbial enumeration was conducted daily. The results are presented in Table 85.

Table 85. Total microbial count of *rankayyan* during storage
(Ambient and refrigerated conditions)

Period of storage	Type of packing	Microbial population (cfu g ⁻¹)							
		pH		Bacteria (x10 ⁵)		Fungi (x10 ³)		Yeast (x10 ³)	
		A	R	A	R	A	R	A	R
Initial		6.01	6.01	4.5	4.5	-	-	-	-
1 st DAS	PE	5.91	5.97	76.5	7	2.5	-	-	-
	PLM	5.92	5.95	28.5	5.5	-	-	-	-
2 nd DAS	PE	5.54	5.84	106.5	16	7.5	2	2.5	-
	PLM	5.61	5.88	74	6.5	5.5	1.5	3	-
3 rd DAS	PE	5.37	5.62	THTC	176	THTC	78	10	5
	PLM	5.42	5.76	218	94.5	THTC	46	12.5	2.5

DAS: Day after storage THTC: Too High to Count A: Ambient R: Refrigerated

The pH of *rankayyan* decreased to 5.37, (PE) and 5.42 (PLM) under ambient conditions and to 5.62 (PE) and 5.76 (PLM) under refrigerated conditions from an initial pH of 6.01. Initially, the bacterial count was found to be 4.5×10^5 cfu g⁻¹ and the count increased to a very high level in *rankayyan* packed in PE at the end of storage under ambient conditions. In *rankayyan* packed in PLM the count was found to be 218×10^5 cfu g⁻¹. Under refrigerated conditions, the bacterial count observed was 176×10^5 cfu g⁻¹ in PE and 94.5×10^5 cfu g⁻¹ in PLM (Fig.56).

The growth of fungi was not observed initially and for the product packed both in PE and PLM and kept under refrigerated conditions. At the end of second day of storage the fungal count of 7.5×10^3 cfu g⁻¹ and 5.5×10^3 cfu g⁻¹ was observed in *rankayyan* stored under ambient conditions and packed both in PE and PLM respectively. At the end of storage, the yeast count observed was 10×10^3 cfu g⁻¹ (PE) and 12.5×10^3 cfu g⁻¹ (PLM) under ambient conditions.

The mean rank scores obtained on the basis of Friedman's test for bacteria, fungi and yeast were statistically significant and mean rank scores which varied among different packaging materials under ambient and refrigerated conditions denoted the high perishability of the product.

4.3.3.12 *Vishu katta*

Vishu katta was packed in PE and PLM and stored for a period of four days under ambient and refrigerated conditions. At the end of storage, the pH of the product was found to be 5.02 (PE) and 5.44 (PLM) and 5.47 (PE), and 5.59 (PLM) under ambient and refrigerated storage conditions. The initial pH was found to be 6.01. From an initial bacterial count of 2×10^5 cfu g⁻¹ at the end of storage, the count increased to a high level in *vishu katta* packed in PE under ambient conditions (Table 86). Under refrigerated conditions the count was observed to be 167×10^5 cfu g⁻¹ in PE and 103.5×10^5 cfu g⁻¹ in PLM (Fig. 57).

The growth of fungi and yeast was not observed after the first day of storage in *vishu katta* packed both in PE and PLM. After second day of storage also under refrigerated condition no fungal growth was observed in *vishu katta* packed in PLM. At the end of storage, the fungal growth increased to 7.5×10^3 cfu g⁻¹ and 6.5×10^3 cfu g⁻¹ under ambient conditions and 7×10^3 cfu g⁻¹ and 6×10^3 cfu g⁻¹ under refrigerated conditions in PE and PLM respectively. Yeast growth was not observed in *vishu katta* packed in PLM and stored under ambient and refrigerated conditions at the end of second day of storage. After the fourth day of storage the yeast growth increased to

12.5×10^3 cfu g⁻¹(PE) and 7×10^3 cfu g⁻¹ (PLM) under ambient conditions and 6.5×10^3 cfu g⁻¹ (PE) and 4.5×10^3 cfu g⁻¹(PLM) under refrigerated condition.

Table 86. Total microbial count of *vishu katta* during storage

(Ambient and refrigerated conditions)

Period of storage	Type of packing	Microbial population (cfu g ⁻¹)							
		pH		Bacteria (x10 ⁵)		Fungi (x10 ³)		Yeast (x10 ³)	
		A	R	A	R	A	R	A	R
Initial		6.01	6.01	2	2	-	-	-	-
1 st DAS	PE	5.91	6	80.5	38.5	-	-	-	-
	PLM	5.97	6.01	43	27.5	-	-	-	-
2 nd DAS	PE	5.7	5.84	133.5	79	2	3.5	6.5	2.5
	PLM	5.7	5.92	96	54.5	1.5	-	-	-
3 rd DAS	PE	5.33	5.54	191.5	88	4	4.5	9.5	3
	PLM	5.49	5.68	109.5	72	3	4.5	1.5	1
4 th DAS	PE	5.02	5.47	THTC	167	7.5	7	12.5	6.5
	PLM	5.44	5.59	242.5	103.5	6.5	6	7	4.5

DAS: Day after storage THTC: Too High to Count A: Ambient R: Refrigerated

The mean rank scores obtained on the basis of Friedman's test for bacteria, fungi and yeast were statistically significant and mean rank scores which varied among different packaging materials under ambient and refrigerated conditions denoted the high perishability of the product.

4.3.3.13 Beverages

The beverages were stored for three days under ambient and refrigerated conditions and microbial enumeration of beverages was conducted initially and daily for three days. Initial pH of *cherunaranga then vellam* was found to be 4.32. At the end of storage, the pH decreased to 2.88 and 3.22 under ambient and refrigerated storage conditions respectively (Table 87). The bacterial count increased to 56.5×10^5 cfu g⁻¹ and 32×10^5 cfu g⁻¹ under ambient and refrigerated storage conditions from an initial value of 2.5×10^5 cfu g⁻¹. Fungal growth was not observed in *cherunaranga then*

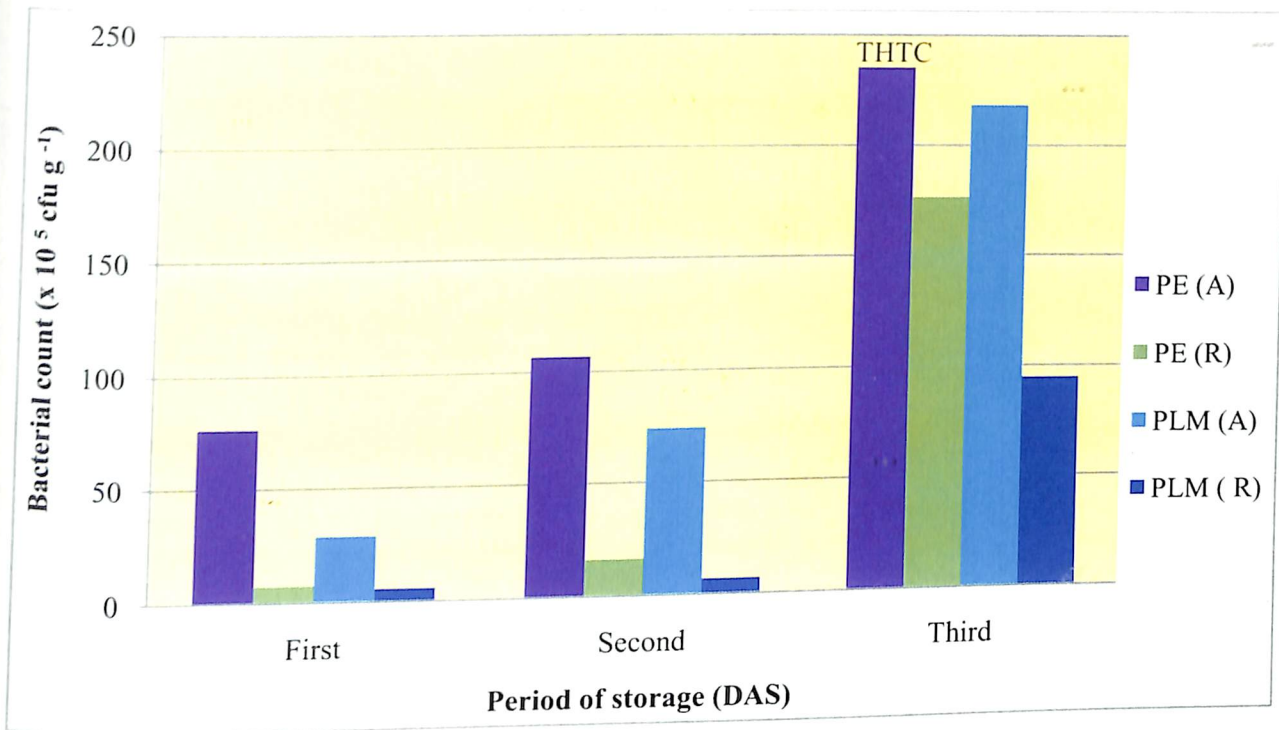


Fig. 56. Total bacterial count of *rankayyan* during storage

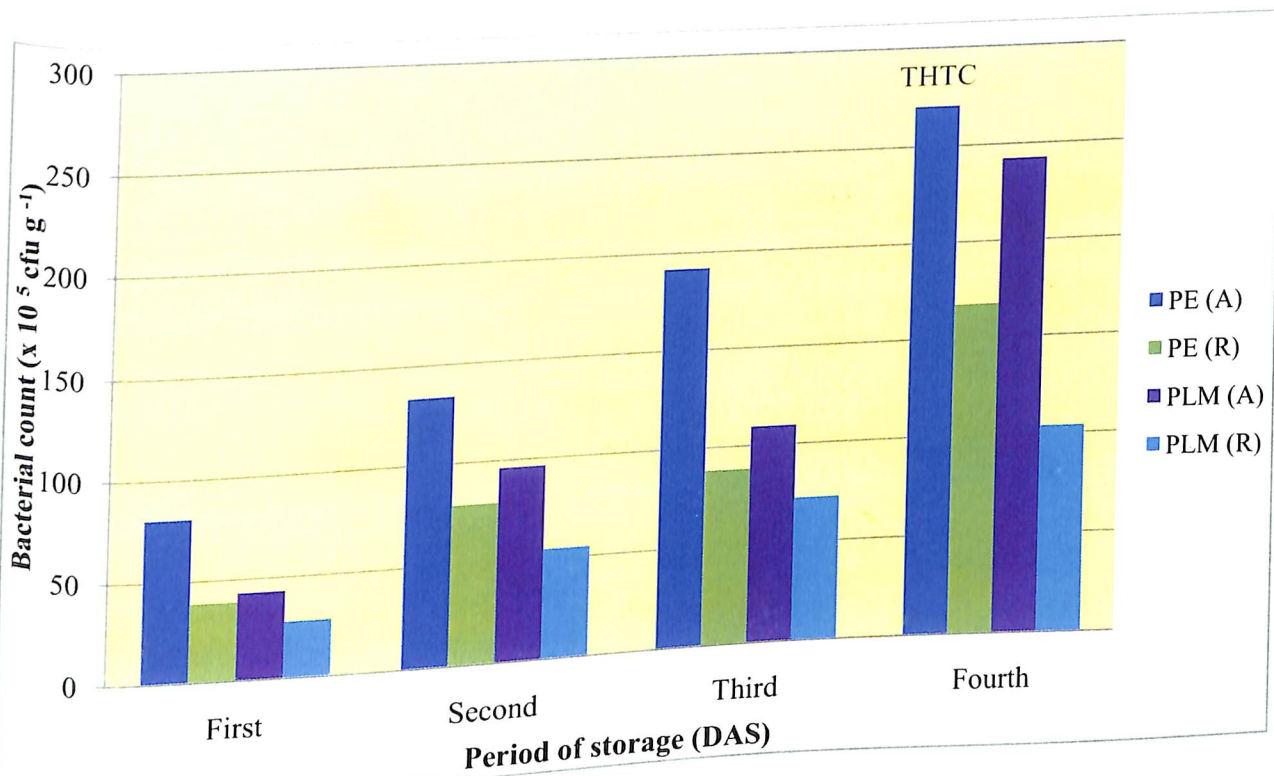


Fig. 57. Total bacterial count of *vishu katta* during storage

DAS: Day after storage (A): Ambient condition (R): Refrigerated condition THTC: Too high to count

vellam initially and during storage both under ambient and refrigerated conditions. Initially the yeast count was found to be 2.5×10^3 cfu g⁻¹. Under ambient conditions the yeast count increased to a very high level at the end of storage and under refrigerated condition the count was found to be 51×10^3 cfu g⁻¹.

The pH of *injipaneeyam* was found to be 6.41 and it decreased to 5.04 under ambient conditions and 5.41 under refrigerated conditions (Table 88). From an initial bacterial count of 21.5×10^5 cfu g⁻¹ under ambient conditions the bacterial count increased to a very high level at the end of storage and under refrigerated conditions the count increased to 103×10^5 cfu g⁻¹. Fungal growth was not observed in *injipaneeyam* till the end of storage under both storage conditions. From the initial yeast count of 4×10^3 cfu g⁻¹ at the end of storage the count increased to a very high level under ambient conditions and to 30.5×10^3 cfu g⁻¹ under refrigerated conditions.

The pH of the *paanakam* decreased to 5.72 (ambient) and 6.09 (refrigerated) from an initial pH of 6.68 during storage. The bacterial count at the end of storage was found to be very high under ambient storage conditions and under refrigerated conditions the count was found to be 78×10^5 cfu g⁻¹. The initial bacterial count was found to be 9×10^5 cfu g⁻¹. Fungal growth was not observed in *paanakam* till third day under both storage conditions. From an initial yeast count of 2×10^3 cfu g⁻¹ at the end of storage, the count increased to a very high level under ambient conditions and to 32×10^3 cfu g⁻¹ under refrigerated conditions (Table 89). The bacterial count of beverages during storage is illustrated in Fig 58.

Table 87. Total microbial count of *cherunaranga then vellam* during storage

(Ambient and refrigerated conditions)

Period of storage	pH		Microbial population (cfu g ⁻¹)					
			Bacteria (x10 ⁵)		Fungi (x10 ³)		Yeast (x10 ³)	
	A	R	A	R	A	R	A	R
Initial	4.32	4.32	2.5	2.5	-	-	2.5	2.5
1 st DAS	4.22	4.01	9	5.5	-	-	10.5	1.5
2 nd DAS	3.56	3.98	27.5	14	-	-	192	32.5
3 rd DAS	2.88	3.22	56.5	32	-	-	THTC	51

DAS: Day after storage THTC: Too High to Count A: Ambient R: Refrigerated

Table 88. Total microbial count of *injipaneeyam* during storage

(Ambient and refrigerated conditions)

Period of storage	pH		Microbial population (cfu g ⁻¹)					
			Bacteria (x10 ⁵)		Fungi (x10 ³)		Yeast (x10 ³)	
	A	R	A	R	A	R	A	R
Initial	6.41	6.41	21.5	21.5	-	-	4	4
1 st DAS	6.23	6.37	54.5	25	-	-	10	11.5
2 nd DAS	5.47	6.01	128.5	72	-	-	32.5	14.5
3 rd DAS	5.04	5.41	THTC	103	-	-	THTC	30.5

DAS : Day after storage THTC: Too High to Count A: Ambient R: Refrigerated

Table 89. Total microbial count of *paanakam* during storage

(Ambient and refrigerated conditions)

Period of storage	pH		Microbial population (cfu g ⁻¹)					
			Bacteria(x10 ⁵)		Fungi (x10 ³)		Yeast (x10 ³)	
	A	R	A	R	A	R	A	R
Initial	6.68	6.68	9	9	-	-	2	2
1 st DAS	6.43	6.61	16	9.5	-	-	18	5.5
2 nd DAS	6.02	6.54	56.5	29	-	-	45	8.5
3 rd DAS	5.72	6.09	THTC	78	-	-	THTC	32

DAS : Day after storage THTC: Too High to Count A: Ambient R: Refrigerated

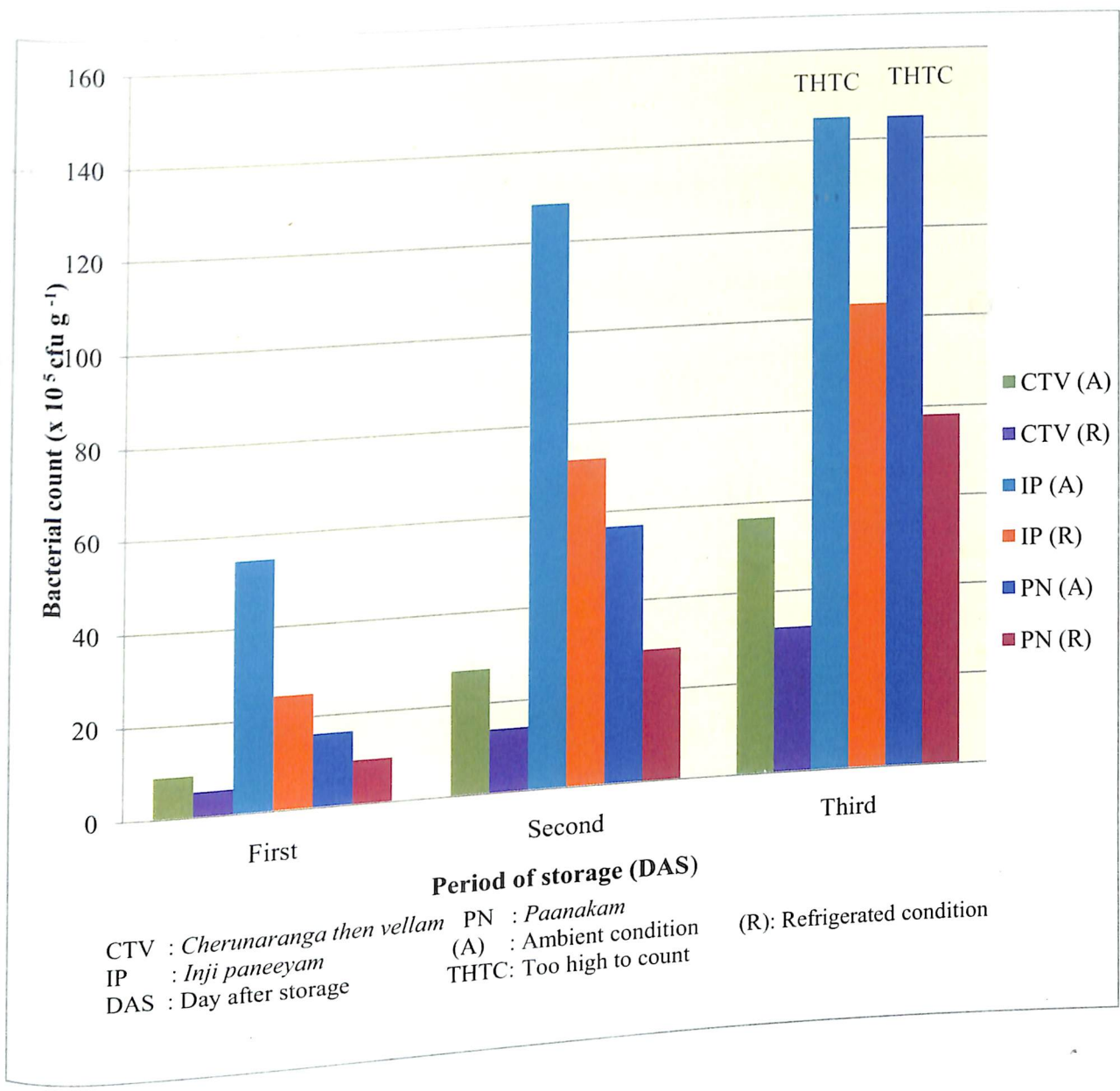


Fig. 58. Total bacterial count of traditional beverages during storage

4.3.4. Major changes observed in the preparation of replicated foods

Important changes observed in the ingredients, method of preparation, vessels/equipments, used for the preparation and source of fuel are given in Table 89.

Major changes adopted to prepare the traditional foods were use of electric mixie for grinding and powdering instead of *ammi*, *attukallu*, *ural* and *ulakka*, LPG stove instead of earthen ware hearth, non stick pans, *idli* steamer and stainless steel vessels instead of metal vessels.

Table 90. Major changes observed in the preparation of replicated foods

Sl.No	Items	Traditional method	Method adopted for replication
1	<i>Inderiyappam</i>	Used <i>aattukallu</i> for grinding Steamed in metal vessel Used earthen ware hearth for cooking	Used mixie for grinding Steamed in <i>Idli</i> steamer Used LPG stove for cooking
2	<i>Kala kala</i>	Used <i>cheena chatti</i> or <i>uruli</i> for frying Used earthen ware hearth	Used Non stick pan for frying Used LPG stove
3	<i>Kaliyadakka</i>	Used <i>cheena chatti</i> or <i>uruli</i> for frying Used earthen ware hearth	Used <i>cheena chatti</i> for frying Used LPG stove
4	<i>Karinellikka</i>	Used <i>mankalam</i> for preparation Used earthen ware hearth	Used <i>mankalam</i> for preparation Used earthen ware hearth
5	<i>Madhura puttu</i>	Used hand pounded rice flour Used aluminium vessels for steaming Used earthen ware hearth	Used milled raw rice flour Used <i>idli</i> steamer Used LPG stove
6	<i>Manda</i>	Folded <i>manda</i> was held in hand and kept in heated oil until the ends get sealed Used earthen ware hearth	Sealed the ends with thick maida paste and deep fried in oil Used LPG stove
7	<i>Muttayappam</i>	Baking was done with coal kept over and under the vessel Used earthen ware hearth	Cooked in <i>appachatti</i> Used LPG stove

8	<i>Niracha pathiri</i>	Cooked beef in metal vessels until it gets cooked Crushed beef using <i>ammi</i> Used earthen ware hearth	Cooked beef in pressure cooker Minced beef in mixie Used LPG stove
9	<i>Paniyaram</i>	Used <i>ural</i> and <i>ulakka</i> for pounding roasted green gram Used earthen ware hearth	Used mixie for preparing green gram flour Used LPG stove
10	<i>Poruvelangai</i>	Used <i>ural</i> and <i>ulakka</i> for pounding ingredients Used thick jaggery syrup Shaped into big balls Used earthen ware hearth	Used mixie for preparing flour Used thin jaggery syrup Shaped into small balls Used LPG stove
11	<i>Rankayyan</i>	Used <i>aattukallu</i> for grinding green gram Used aluminium vessels for steaming Used earthen ware hearth	Used mixie for grinding Used <i>idli</i> maker for steaming Used LPG stove
12	<i>Vishu katta</i>	Used <i>attukallu</i> for grinding green gram Used aluminium vessels for steaming Used earthen ware hearth	Used mixie for grinding Used <i>idli</i> maker for steaming Used LPG stove
13	<i>Cherunaranga then vellam</i>	Prepared manually	Used lime juice extractor to extract lime juice
14	<i>Inji paneeyam</i>	Crushed ginger manually	Used mixie to crush ginger
15	<i>Paanakam</i>	Used big brass vessels to keep <i>paanakam</i>	Used stainless steel vessels for preparation

4.4 Cost of production of replicated traditional foods

The cost of production of replicated traditional foods and beverages was calculated and the cost of one kilo gram of traditional foods is presented in Table 91.

Table 91. Cost of production of replicated traditional foods

Sl.No	Name of foods	Cost (Rs)/kg.
1	<i>Inderiyappam</i>	49.75
2	<i>Kala kala</i>	86.20
3	<i>Kaliyadakka</i>	98.20
4	<i>Karinellikka</i>	33
5	<i>Madhura puttu</i>	84
6	<i>Manda</i>	53.60
7	<i>Muttayappam</i>	84.50
8	<i>Niracha pathiri</i>	231.20
9	<i>Paniyaram</i>	93.45
10	<i>Poruvelangai</i>	48
11	<i>Rankayyan</i>	75
12	<i>Vishu katta</i>	35.50

Among the replicated traditional foods, *niracha pathiri* had the maximum cost of production (Rs.231.20/kg). For majority of the replicated traditional food items, the total cost for production was found to be below Rs. 100 per kg. *Karinellikka* had the minimum cost of Rs. 33 per kg. For all the three replicated traditional beverages, the cost of production was Rs. 5 per 200 ml.

Discussion

5. DISCUSSION

The critical discussion pertaining to the study entitled "Documentation and quality evaluation of traditional foods of central zone of Kerala" is presented under the following headings

- 5.1 Traditional food pattern of different communities
- 5.2 Transition in the traditional food pattern and trends occurred in food habits
- 5.3 Quality evaluation of selected traditional foods

5.1 Traditional food pattern of different communities

Traditional foods evolved through hundreds of years, is still an inevitable segment of our culture. In every part of the society, people had diverse food habits which are strongly bound to the region, religion, economic status and cultural beliefs. Kerala, the Emerald of south, besides its natural wealth is proud of its exquisite cuisines. In this section, traditional food pattern prevailing in the central zone of Kerala with particular reference to traditional foods and traditional food pattern of various communities are discussed

All respondents of Kerala Brahmin, Tamil Brahmin, Hindus of Palakkad and Christians and majority of Ezhava, Scheduled Caste and Muslim respondents preferred traditional foods mainly due to their health benefits, low cost and palatability. This is a strong evidence of the solid acquaintance towards the nostalgic tastes of their homeland.

In a study conducted by Shyna (2001), it was seen that more than 70 per cent of respondents preferred traditional foods due to their variety, purity and palatability. It was also reported that overwhelming majority of Indian consumers preferred to take traditional Indian meals rather than western foods (Indian Food Industry, 2001). Invasion of tin food culture which caused many hazardous health implications have brought up a preference towards traditional eating habits (Leena 2007). Chaudhry (2006) also indicated the popularity and preference of traditional Indian foods

especially among those who took food from outside. In contradiction to this, Rajashekhar (2005) reported that the traditional dishes take lot of time to prepare and the modern foods like bread, butter/jam and eggs, porridges, cornflakes, sandwiches, noodles etc are replacing them.

Only 5 to 39 per cent respondents did not give preference to traditional foods. This could be due to the tendency to enjoy a variety of modern foods including ready to eat and ready to cook items and their easy accessibility and availability in the market.

Traditional food items which have been time tested and regularly prepared for centuries were still prepared and consumed by all respondents. More than 80 per cent of respondents of different communities except Ezhavas and Muslims prepared traditional foods frequently for breakfast. Shyna (2001) also indicated that traditional breakfast items were prepared upto four times in a week by majority of respondents in different communities of Thrissur district. All the respondents prepared traditional food items daily for lunch which indicated that the respondents insisted upon an indigenous lunch.

Among the different communities studied, it was seen that Tamil Brahmin respondents prepared traditional snack items frequently when compared to other communities. This might be due to the practice of 'four meal a day pattern' followed by Tamil Brahmins which included tiffin in the mid afternoon for which they prepared different traditional snack items. Nearly 82 per cent of the respondents prepared traditional beverages like *chukku vellam*, *jeeraka vellam*, *karingaly vellam*, *pathimugham vellam* and *naranga vellam* regularly. Among the different communities also it was seen that majority of the respondents prepared traditional beverages daily.

Traditional health foods were prepared only by 41 per cent of respondents occasionally and the rest did not prepare any health foods at home. Commercialisation of health foods and their availability in the open market might be the reasons for not preparing health foods at home.

Preserved foods which are historic in origin were not regularly prepared by majority. About 25 per cent never prepared preserved foods at home. Here also

availability of different preserved foods including pickles, *vattals* and other dehydrated products in the market could be the reason for not preparing these foods at home.

Kerala is famous for its diversified culinary culture. The moods of different occasions reflected significantly upon the food styles in different communities. Brahmin community gave prime importance for different festivals and rituals and prepared different traditional food items like *ada*, *appam* and *malar* or *aval* in jaggery syrup and *sadya* for almost all occasions. For *annaprasam*, when the baby was fed with solid foods for the first time at the age of six months, Kerala Brahmins traditionally prepared *ada*, *appam*, *aval* and *malar* in jaggery syrup. Shyna (2001) also indicated similar observations. Andarjanam (2003) indicated about the *sadya* given for *annaprasam* by Kerala Brahmins in which they served cooked raw rice along with *pulissery*, *erissery*, *sharkaravaratty*, *injithairu*, *pazhamnurukku* and *pradhaman* to the invited guests. Rajashekhar (2005) indicated that *sadya* is a common style of food service for festivals and celebrations.

Kerala Brahmins observed *uppu pula* after the death of close relatives in which they avoided salt in all preparations. Namboothiripad (1963) and Andarjanam (2003) also indicated about *uppu pula* observed by Kerala Brahmins for 12 days after the death of close relatives. For the *adiyanthira sadya* conducted on the twelfth day of demise of relatives, it was customary that all dishes should be prepared hygienically with extreme care and in traditional way and considered *adiyanthira sadya* as an offering to the soul of the expired person. Almost all respondents adopted these restrictions, and to prepare curries they used the vegetables which were available in their homesteads and prepared in traditional style and avoided red chillies, onion, garlic, asafoetida and vegetables like beans, carrot, beetroot, cauliflower, cabbage etc. Shyna (2001) also noticed the same trend in the *adiyanthira sadya* of Kerala Brahmins. Andarjanam (2003) reported about the *nalucurry* prepared for *adiyanthiram* which consisted *erissery*, *pulissery*, *olan* and *purattupperi* and *madhura curry* (*ada pradhaman*). Along with other items, *injithairu* which is considered as equal to thousand curries, *sharkaravaratty*, *pazham nurukku* were also served for *adiyanthiram*. All the restrictions adopted for *adiyanthiram* were followed for *shradham* also. Sharma (2000) and Andarjanam (2003) reported that red

chillies, tamarind and mustard were avoided for *shradha sadya* and included *erissery*, *pulissery*, *olan*, *mezukkupuratti*, *inchithairu*, *inchi nurukku*, plantain, jaggery, *ada pradhanam* and *ada*.

The first wave of migration from Tamil Nadu began during the 14th century AD following the invasion of Muslim kingdoms. Large numbers of Tamil Brahmins migrated and settled down on the western side of Palakkad gap which provided them security and safety from the invaders. Occasionally, Brahmins also migrated from Tamil Nadu at the invitation from the Rajas of Kerala. Over the years these migrants built up their own individual culture and established an identity of their own. In Kerala, they are commonly referred to as *Pattars*.

Tamil Brahmins prepared wide variety of traditional sweets and savouries to celebrate different occasions like marriage, *namakaranam*, *seemantham*, *valakappu*, cradle ceremony etc. Traditional sweets and savouries prepared for marriage were exhibited on the venue. It is a customary practice to prepare *kutty* with different food items and to exhibit them on the marriage *pandal* so as to welcome the bride and bridegroom. Shyna (2001) also indicated about five or seven pairs of *kutty* prepared with foods like *laddu*, *mysorepak*, ground nut, *pottu kadala*, *muthusaram*, *neyyappam*, *thenkozhai* added with jaggery syrup by Tamil Brahmins. Rajagopalan and Ananthalakshmy (2007) also reported about different types of traditional sweets and savouries exhibited on the marriage venue and indicated that bride will carry five different types of sweets and savouries to bridegroom's house after marriage which they called as *cheeru* or *pancha bhakshanam*. Shyna (2001) also observed the practice of carrying odd number of sweets and savouries to the bride grooms house and indicated that the number will vary on the economic status of bride's family.

For annual *shradha* ceremony along with traditional *sadya*, Tamil Brahmins prepared *ellunda*, *appam*, *modakam*, *vadai* and *ubbittu*. The *sadya* served for *shradham* was called *charasadya* for which *rasam* added with pepper was considered as a must. Rajagopalan and Ananthalakshmy (2007) reported that Tamil Brahmins served *rasam* traditionally for *shradham* and also *balitharpanam* in which they offered food to

the departed soul. The authors also reported that *vada* added with pepper was one of the special preparations for *shradha sadya*.

In general, the two Brahmin communities studied insisted that the traditional practice of food preparation should be strictly followed during special occasions, rituals and customs performed after or in connection with the demise of a person. The use of pepper in all preparations was typical for *shradham* and *adiyanthiram* of these two Brahmin communities. Red chilies were called as "*kappal mulaku*" by elders which means that it is an imported commodity. Rajagopalan and Ananthalakshmy (2007) indicated that in ancient India, only pepper was used and the entrance of red chilies to our kitchen is because of the influence of Portuguese invasion. Vishnunambodiri (2007) reported that urug dhal, *papadam*, asafoetida, papaya, *muringa* and onion were avoided by Brahmins as these were restricted by the strong stipulations and regulations of Brahmanya.

Traditionally, Ezhavas, the toddy tappers by profession were one of the under privileged and marginalised communities. They adopted toddy tapping as their main source of income for their livelihood. Kadaloor (2007) mentioned about the distinct food culture of Thiyyas /Ezhavas. Pushkaran (2008) mentioned about the pathetic situation of poverty and indebtedness of Ezhavas, prior to the constitution of Kerala State. This might be the reason for the less variety of foods among Ezhavas for various celebrations, special occasions and rituals.

Traditionally, the *sadya* prepared for marriage of Ezhavas was different from that of Brahmins. The major items included were *pulinkary*, *kutherissery*, *erupuli*, *olan*, *inchipuli*, pickle or *uppilittathu*. Venugopalapanicker (1999) observed that *pulinkary* was used in Kerala during ancient times. Shyna (2001) observed that *sadya* of Ezhava community is similar to Nair and Namboodiris and did not contain *inchithairu* and fried items like yam and brinjal and the *payasam* prepared were either *pradhaman* with green gram or wheat. But, in the present study it was observed that traditionally, instead of *pradhaman*, *chakkarachoru* was prepared and served for *sadya*. Special occasions like

peridal, *cheroonu* and birthday were found to be celebrated by only high income families.

After marriage, Ezhavas also carried different food items to bride grooms house. Kadaloor (2007) observed the practice of preparing “*unda*” with rice, coconut and jaggery during this occasion.

In connection with death, *pula* was observed for twelve days by Ezhavas and on fifth day, *sanjayanam* was conducted. For the *adiyanthira sadya* conducted on sixteenth day of demise, Ezhavas avoided *papadam*, plantain and *payasam* and non vegetarian items. Surprisingly toddy was served to the family members. This concurs with the findings of Shyna (2001) with the exception of *payasam* served for *adiyanthira sadya*. As per the present study, it was found that *ada pradhaman* was prepared presently for *adiyanthira sadya* which was not practiced during olden days. Lekha (2003) observed that Ezhavas of Kannur district conducted *adiyanthiram* on twelfth day.

Scheduled Caste community also prepared *sadya* for marriage. The items were limited with rice, *morucurry* or *pulinkary*, *puzhukku*, *pulinchi* and pickles. As Scheduled Castes were marginalized due to illiteracy, low education, poor economic status and castism, their food habits had less variety. As these communities did not have the right to own land due to the caste discrimination existed in ancient Kerala, they were thrown to extreme poverty which reflected in their culinary practices.

Muslim community gave prime importance for hospitality and prepared numerous delicious food items on all occasions and distributed to friends and relatives. Rajashekhar (2005) reported that Muslim food habits have been influenced very much by Islam and Arab traders and they used milk, nuts, dry fruits and juices abundantly in their preparations. On the occasion of marriage, *neichoru* along with meat preparations were the major items served. Shyna (2001) also observed that Muslims prepared *neichoru* for their marriage feast.

The ceremony of *puthiyapla salkaram* is most renowned for numerous dishes prepared by the bride's family for the bridegroom day by day. Ahamed (2003) listed various items like *kozhikanji*, *elanchi*, *kozhi nirachathu*, *balayappam*, *mutta marichathu*, *musara*, *kalathappam*, *muchilappam*, *mutta surukka*, *panchara patta*, *seerappam*, *irachi pathiri*, *neyyappam*, *palooda* and *mutta mala* as the special items prepared for *puthiyapla salkaram* by Muslims of Malabar. The dishes on this occasion were reported to be different by the Muslim respondents of the present study which strongly suggest significant regional differences in the food pattern during special occasions within the community. Hussain (2007) also mentioned about different types of dishes prepared during *puthiyapla salkaram*.

Christian food habits are influenced by the Portuguese, Dutch and British food habits (Rajashekhar, 2005). During ancient times, in Christian families, betrothal, marriage, baptism and holy communion were celebrated by preparing typical Christian non vegetarian feast. The peculiarity of non vegetarian dishes was that chicken curry was always prepared by adding ash gourd or papaya pieces. While cooking pork meat, they used to add equal quantity of raw banana pieces / *kavath* / tapioca / coleus. Beef *ularth* was prepared by adding sufficient quantity of small onion, garlic, pepper and coconut pieces. All these practices were totally ignored now and at present it is considered undignified to add vegetables in meat preparations. Abraham (2007) reported similar pattern of *sadya* in Syrian Christians of Kerala. Jacob (2004) reported that chicken curry added with fried grated coconut paste, beef *ularthu* added with coconut pieces, fish curry added with *kudampuli* preserved by smoking and garlic, ginger and curry leaves were the major items of Christian marriage *sadya*.

Traditionally, Christians served *panambani* as a dessert item in *sadya*. In this study, majority of the respondents opined that it was prepared from fermented jaggery syrup with mashed plantain. Jacob (2004) reported different constituents like curd, plantain and sugar in *panambani*. Abraham (2007) mentioned about the serving of curd, jaggery syrup and *pazham* at the end of *sadya* of Syrian Christians of Kerala. Instead of

payasam served in the *sadya* of Hindus, *panambani* was found to be the dessert item of Christian *sadya*.

Kerala is the home for many renowned legendary and religious festivals. Food feasts that portray the joy of sharing are an inexorable element of any festivals. Traditional food items prepared by each community during religious festivals/rituals and the changes occurred due to the time span were collected from elderly persons in the present study.

Rich cultural heritage of Kerala comes out in its best form and spirit during the ten day long state festival, *Onam*. *Onam* is celebrated with joy and enthusiasm all over the state by people of all communities and make elaborate preparations to celebrate it in the best possible manner. Kerala Brahmins made *ada* as an offering to *thrikkakkarayappan*, a God of Hindu Mythology. Shyna (2001) reported that Nair and Namboodiri families used to prepare *ada* on the day of *thiruvonam*. Mamballi (2007) also reported that Hindus prepared *ada* as an offering to *thrikkakkarayappan* in connection with *onam*. Rice flakes, *appam*, puffed rice, banana and *kadalipazham*, were also kept as *naivedyam* for the God. *Varuthupperi* and *shakkaravaratty* the salty and sweet chips made up of banana are typical traditional foods prepared in connection with *onam* in almost all families. Many of the respondents were found to be purchasing *varuthupperi* and *shakkaravaratty* during *onam* which were remarked as the most commercialized traditional items of Kerala. Shyna (2001) indicated that traditionally the different communities, especially Hindus prepared *varuthupperi* and *shakkaravaratty* with *nendran* banana. But, now a days most of the families in Kerala used to purchase these items from market due to lack of time and the preparation seems to be laborious especially for the young and working women. Kerala Brahmins prepared *sadya* on the day of *thiruvonam*. *Sadya* means banquet or big feast associated with a special occasion, like marriage, birthday, childbirth etc. *Onasadya* is traditionally a vegetarian meal served on a plantain or banana leaf, people eat sitting cross-legged on the floor. Shyna (2001) reported that non vegetarian foods were avoided during *Onam* irrespective of community in Central and South Kerala and *sadya* with 10 to 15 items were also prepared.

Vishu is the festival which marks the first day of Malayalam year and falls in the month of *Medam* (April). *Vishu* was celebrated by Kerala Brahmins by preparing *vishu kanji* and *vishu puzhukku* in which the major ingredient was jack fruit. *Sadya* was served as lunch on the day of *vishu*.

Navaratri is a Hindu festival celebrated all over India and the word *Navaratri* literally means nine nights in Sanskrit. The special item prepared was the rich ghee flavoured *neypayasam*. *Thiruvathira vratham* is observed by ladies during the Malayalam month *Dhanu*. Rice and rice based foods were avoided and fruits and tender coconut water were taken during the day. The special preparations included *koova verakiyathu* made up of arrow root flour as the basic ingredient and *ettangadi puzhukku* otherwise known as *thiruvathira puzhukku*. This was prepared by different types of tubers available in the backyard of ancient Kerala homesteads. Shyna (2001) also mentioned about the preparation of *thiruvathira puzhukku* and *koova paayasam* among Nairs and Namboodiries during *thiruvathira*.

Ekadashi, *somavara vratham*, *shashti*, *sivarathri*, *pradoshavratham*, etc were other *vrathas* observed which are characterized by partial or complete restriction of rice based food preparations. Subbulakshmi (2005) indicated that Hindus observed fasting during *ekadashi*. Shyna (2001) also reported that *ekadashi*, *shivarathri*, *sankranthi*, *thiruvathira*, *savithri noimbu*, *somavara vratham* were some of the important *vrathas* of Hindus and during such occasions rice is completely or partially avoided or some special foods were prepared. Onion, asafoetida, garlic, mustard etc were strictly avoided in foods used on these days.

The month of *Karkkidakam* is the period for rejuvenating vital power through taking different types of medicated food preparations which are based on Kerala's rich ayurvedic tradition. *Karkkidakam* is a season for taking different medicated gruels like *marunnu kanji*, *navadhanya kanji* and *njavarakanji*. Lalithambika (2007) reported that medicated *kanji* was consumed traditionally during the first 10 days of *Karkkidakam*. Bishi (2007) also reported the consumption of traditional *marunnu kanji*, the medicated gruel during the 15 days of *Karkkidakam*. Traditionally, majority of the respondents

collected the herbs and roots which have medicinal value and prepared the medicated gruels. Even now, majority consumed medicated *kanji* during this season and it was found that they bought the commercial retail packet of medicated gruel from market. Koodathingal (2007) mentioned about the increased purchase of instant *karkkidaka kanji* mix from the market. *Pathilacurry*, a preparation with ten locally available edible leaves with medicinal value was consumed by Kerala Brahmins during this period for health care. The ten leaves consumed differed from region to region. However, drumstick leaves were never included in *pathilacurry* in any of the regions due to the belief that drumstick leaves contained toxins during the month of *Karkkidakam*.

Tamil Brahmin community is renowned for their celebrations of different festivals. An essential component of all these festivals is serving of a wide variety of traditional dishes. Celebration of festivals with a variety of delicious sweets, savouries and snacks is a customary practice of Tamil Brahmins. *Deepavali*, one of the key functions of Tamil Brahmins was celebrated by preparing large sized *dosa*, *ukkarai*, *therattupal*, *maaladu*, *murukku*, *thenkuzhal*, *laddu* and *payasams* during ancient times. Shyna (2001) indicated that *deepavali* is an occasion for sweetmeat like *ukkara* and *maladau* among Tamil Brahmins. Subbulakshmi (2005) reported that *deepavali* was celebrated with lots of sweets and savouries. Presently, *ukkarai* had changed its form to *mysorepak*.

For *navarathri* also they prepared different dishes daily for nine days. Traditional items prepared during this season included *kosumalli*, *kozhukattai*, *Madura puttu*, *pollavada*, *aval puttu* and *maaladu*. Even though, Tamil Brahmins prepared variety of traditional items at home for different festivals, presently, majority bought it from local vendors or bakeries. Moreover, several new items were also purchased either along with or instead of traditional items.

Thrikarthiaka festival is celebrated in the month of *Vrischikam* (Nov-Dec). Display of light in the evening is an integral and unique part of this festival, and Tamil Brahmins prepared *aval pori*, *malar pori*, *neyyappam* and *nolumbu ada*. Shyna (2001)

mentioned about the preparation of *aval pori*, *nel pori neyyappam* and *ada* during *karthika*.

For *vinayaka chathurthi*, different types of *modakams* were prepared by Tamil Brahmins, which was believed to be the most favourite item of lord "Ganesha". Shyna (2001) observed the preparation of different types of *kozhukatta* for this festival. *Ashtami rohini*, the birthday of Lord Krishna is celebrated with great fervor by Tamil Brahmins. It is celebrated in the month of *Chingam* (Aug- Sept) and they prepared *vella cheeda* as a special item. Shyna (2001) also observed the preparation of *vella cheeda* on this occasion. *Thiruvathira kali* was the special item prepared by Tamil Brahmins on the occasion of *thiruvathira*. Shyna (2001) also observed the preparation of this item among the Tamil Brahmins of Thrissur district.

Even though, the traditional festive food items had immense importance among Tamil Brahmins, majority of the younger generation bought it from market for different occasions and the skill behind the preparation is not passed on to the next generation and is becoming extinct.

As Ezhavas were the economically and socially backward community, they had less variety in foods prepared for festivals and ceremonies also. *Uthradam*, the day previous to *thiruvonam* was celebrated by making *ada*, and non vegetarian dishes. Shyna (2001) also reported that Ezhava families used to prepare *ada* during *uthraadam* day. *Thiruvonam* was celebrated by preparing a lunch with more than one or two curries, which was considered as a feast during ancient times. *Vishu* was celebrated by preparing *vishu katta*, which is a traditional item taken in the morning along with jaggery syrup. Shyna (2001) also observed that Ezhavas prepared *vishu katta* during *vishu*. A lunch with more than one curry was also arranged. For festivals related to temples, *unniyappam*, *kinnathappam*, *murukku etc* were prepared. Non vegetarian items were an inseparable component of all feasts. Toddy was served on all occasions related to festivals.

As Scheduled Caste communities were economically backward and socially marginalized because of the caste system, feasting habits was very rare among them during ancient days. But, *Onam* was celebrated with a major meal at noon which consisted of rice, one or two curries and *puzhukku* or *thoran*. This menu was considered as feast, because, during the normal days the item for lunch was only *kanji*. All of these practices were found to be changed and presently, *Onam* is celebrated with an elaborate *sadya* according to the economic status of the families. It was found that all the respondents celebrated *Onam* and *Vishu* with *sadya* prepared at home similar to that of other communities. Different festivals related to temples were celebrated by serving *kanniyappam*, meat preparations and toddy. Generally, among backward communities, consumption of locally available foods with *chama*, ragi, tapioca, jack fruit seed, mango kernel flour and tamarind seed flour during *Karkkidakam* was observed. As *Karkkidakam* is a lean season, poor communities might have depended on such low cost foods.

Muslim cookery have distinctive role in the culinary culture of Kerala. Typical Muslim culinary art can be seen on the occasion of *noyambu thura* that is breaking the religious fasting at the evening every day during the month of *Ramadan*. This occasion is especially well-known for a wide variety of dishes. Shyna (2001) reported that Muslims were very strict about observing the religious practices and they prepared a variety of traditional dishes for breaking the fast. Majority of respondents had the opinion that all the items were prepared every year during the *noyambu* season without any change. However, many traditional items had been replaced by novel items. The respondents also remarked that preparations like *aleesa*, *allahu aalam*, *lakkottappam*, and some types of *pathiri* were not at all prepared now a days for *noyambu thura* ceremony. Among religious festivals (*perunnal*), the important one was *ramdan* for which Muslims arranged a grand feast and prepared *pathiri*, *neichoru*, and *biriyani*. Many of the respondents opined that *neichoru* was the common dish prepared on festivals among Muslims and *biriyani* was prepared by upper class families and it became popular among all during the last 20 years only.

Twenty fifth day of religious *vratha* called *ambathu noyambu* observed by Christians was especially distinguished by the preparation of *inderiyappam*, a special dish based on rice flour to which coconut and seasonings are added. Shyna (2001) also indicated the preparation of *inderiyappam* on the 25th day of Easter *noyambu*. Abraham (2007) reported the preparation of *inderiyappam* among Syrian Christians of Kerala. Majority of the young house wives did not know the method of preparation as this item is traditionally prepared only once in a year.

Christmas is an important festival of Christians, and is celebrated with traditional non vegetarian feast and special traditional preparations like *muttayappam*, *vattayappam*, *appam* and non vegetarian curries. Cake was prepared in affluent traditional Christian families by conventional baking using the vessel cake *patram* placed over coal.

Avilosu podi, *avilosunda*, *churuttu*, *cheppappam*, *payattunda*, *kuzhalappam*, *achappam*, *unniyappam*, *vettappam* etc were the snack items prepared by Christians and carried to houses of close relatives on different occasions in connection with marriage, pregnancy etc as a token of love and joy. Majority had the opinion that this traditional custom still existed in its full fledged mode. Majority of respondents had the opinion that along with these items, some other bakery items were also came into the list of foods consigned for this occasion. Earlier, these items were prepared by the ladies, but now this has become highly commercialised. All the respondents agreed that *acchappam*, *kuzhalappam*, *vellayappam*, *avilosu podi* etc were commercially available and preferred to buy rather than making these at home.

Traditionally, special food items were included by different communities during different physiological conditions. Among Kerala Brahmins, it was customary to give different food formulations during the first trimester of pregnancy for the health of the foetus and pregnant women (Andarjanam, 2003).

Tamil Brahmins prepared *poruvelangai*, a protein rich snack using rice, wheat, green gram and jaggery. *Kurunthotti kanji* of Ezhavas, *oralappam* and *paniyaram* of Hindus of Palakkad, and gingelly oil given by Scheduled Castes were found to be the

special foods given to the pregnant women traditionally. Rekha (2007) also observed the same traditional health foods given to pregnant women. In general, special foods given to pregnant women consisted of green gram, gingelly oil, jaggery and different types of herbs which were found to be rich in protein, fat, vitamin E and iron essential for the increased demands of the body during pregnancy.

Early lactation was traditionally considered as the most important period by all communities and they provided nutrient rich food items during post parturition period. Among Kerala Brahmins, a special preparation called *mukkidi* was given to the lactating women. Different ayurvedic preparations were found to be an inevitable part of the daily menu of the lactating women of all communities. Except Brahmins, respondents of other communities abundantly used pepper, garlic, onion, dry ginger, asafoetida and tamarind in the dishes prepared for lactating women. Traditionally, onion was included in these preparations for the purpose of blood purification and garlic, dry ginger and pepper were meant for preventing gastritis and also for wound healing. Shyna (2001) also observed that onion sorted in ghee is consumed for healing purpose and onion *lehyam* and garlic *lehyam* for general health and for milk secretion respectively. *Pookula lehyam* was consumed by lactating women at the early lactation period which was believed to prevent back ache. The same findings were also reported by Shyna (2001) and Leena (2007). Sorted drumstick leaves, *thenga kanji*, fenugreek *verukiyathu* were also given to the lactating women for supplying a nutrient rich balanced diet. The nutrition science also suggest increased requirement during lactation and ICMR has recommended maximum nutritional requirement during this period.

During olden days different communities celebrated the occasion of attainment of puberty by the girls of the family by preparing different special food items. *Pal kanji*, a traditional sweet dish consisting of broken raw rice and milk prepared by Kerala Brahmins is supposed to provide energy to the girl. The importance of *pal kanji* on this occasion was mentioned by Rekha (2007).

Tamil Brahmins prepared *therandukuli puttu* using rice flour and jaggery and *cheeli* with gingelly seeds and jaggery on this occasion. Rajagopalan and

Ananthalakshmy (2007) also indicated about *therandukuli puttu* and *cheeli* prepared by Tamil Brahmins on this occasion. Ezhavas, Scheduled Castes, Muslims and Christians gave raw or half boiled egg and gingelly oil to the girl. Muslims also prepared *manjal kanji* and Hindus of Palakkad district prepared *kanji* with green gram for the girl.

Generally, it was seen that all these items prepared on the occasion of attainment of puberty by different communities have some common features. All are either energy dense, protein rich or rich in micro nutrients. Jaggery is a common ingredient in different preparations like *therandukuli puttu*, *cheeli*, *neyyappam*, *malarunda* etc. which provided iron.

Food preservation is an indigenous technique which was handed over through generations. Seasonal nature of agriculture and increased availability of foods during seasons demanded preservation of foods. Our ancestors had many preserved items which they used throughout the year. But, modern consumerism and advancement of technology decreased the need for food preservation at home. However, majority of the respondents prepared pickles which are one of the most enjoyed food adjunct all over the world. Despite this being one of the important commercialised food items it is reasonable that majority still prepared pickles at home. The practice of preparing *uppumanga*, *erimanga* and different types of *kondattams* were less among different communities. Many of the elders avoided *kondattam* and *vattals* because of the hesitation towards fried items. Rajashekhar (2005) reported that Keralites are becoming more and more health conscious and so the food is made less oily and spicy. This also contributes to the shifting of food habits.

Commercialisation is another reason for the decreased trend of preparing these foods at home. Many of the respondents also opined that preparation of all these items were time consuming and the young generation preferred to buy it from market. In the present study, maximum number of respondents who prepared traditional foods was Hindus of Palakkad. From this, it is evident that Palakkad district, the granary of Kerala had different food preservation techniques evolved through the rich heritage of agriculture ever existed there.

The frequency of purchase of traditional foods indicated that nearly 43 per cent of respondents purchased traditional snack items occasionally and 39 per cent once in a month. More than 40 per cent purchased savouries monthly or occasionally. In the present situation, the interest of internal market is very much akin to the purchase of traditional food items. The high literacy of women and increased women's work force in Kerala demanded increased purchase of traditional items owing to their convenience and time saving. Purchase of snack items was found to be high in different communities especially among Christians and Ezhavas. This could be attributed to the fast adoption of changes in both these communities. Jacob (2004) remarked that Christian community had a peculiar nature of adopting any novel change occurring in the course of time. This is well reflected in their food habits also. According to Lekha (2003), present Ezhava community is educationally and culturally developed and has undergone several transitions showing a fast adoption of novel trends.

Purchase of savouries was also found to be high among the respondents of different communities. About 36 per cent of Muslim respondents purchased savouries once in a week and the respondents of other communities also purchased savouries often. This is a clear evidence of increased consumption of different snack items among Keralites. Traditionally, savouries were prepared in households on different occasions only except in the case of high income groups. Increased availability of packed traditional foods even in the rural market could be one of the reasons for the increased purchase of these items. Many of the respondents opined that these snacks and savouries were purchased mainly for children and for treating guests.

Traditional utensils used by different communities showed that only very few traditional utensils were presently used in the households. *Kuzhiuruli* for making *kuzhiyappam*, *manchatti* for preparing curries, *nazhi* for house hold measuring purposes were used by about 60 per cent of respondents. Different wooden vessels like *korika*, *marapathi*, *marika* were traditionally used by our ancestors for preparing and serving foods. Shyna (2001) also reported the use of *marika* for keeping salt and *marapathi* for keeping prepared curries. Various metal vessels like *cheena chatti*, *neyyuruli*, *pichala*

chembu, *kuzhi uruli* were traditionally used by all the communities. *Pattanicheppu* and cake *pathram* were the traditional vessels used by Christians for preparing *appam* and cake respectively. *Biriyani chembu* made up of metal and *pathirichatti* made up of clay were traditionally used by Muslims. Shyna (2001) reported that various traditional kitchen utensils made up of clay, iron, copper, brass and stoneware were used most commonly in the households. Different types of earthenware pots called *chatti* were commonly used in ancient days in Kerala to prepare delicious fish curries with distinctive flavor and taste. *Kannan chiratta* and *mulam kutti* were used for making *puttu*. *Nazhi*, *edangazhi*, *para* and *kazhinjukol* were traditionally used for measuring purposes. Shyna (2001) also reported the same.

Next to clay, metal was most commonly used traditionally for domestic purposes. Foods cooked in various metal vessels absorbed certain trace minerals and elements beneficial to health (Ramakrishnan, 2000). Only around 10 per cent of respondents used earthenware hearth for cooking purposes. *Ammi* and *muram* were used by 14.98 and 29.15 per cent of respondents respectively. The traditional practice of using *ural* and *ulakka*, *koondani* and *aattukallu* were replaced by electric labour saving devices like mixie and grinder by majority of the respondents.

Noojum (2007) indicated that the fast growing home appliance industry played a major role in the fast adoption of newer technologies and refusal of conventional practices. Majority of the respondents presently used steel and aluminium vessels which are easy to handle and convenient for cooking and storing foods instead of clay and brass vessels. Kerala Brahmins still used most of the traditional wooden vessels for *shradham*. Even though, measuring system has changed to SI units, many of the respondents still used *nazhi* for measuring.

Nirmala (2007) indicated that caste discrimination affected the food habits as well as the cooking and serving vessels of each community in ancient Kerala. Vessels made up of copper, brass and silver were considered as symbols of wealth. Vessels made up of *chiratta* and clay was considered as the vessels of backward communities.

5.2 Transition in the traditional food pattern and trends occurred in food habits

Food choices and food habits are an outcome of cultural heritage and economic and social factors and now these are scaled up to the present need. Seshadri (2005) also mentioned that in a short life span of about 50 years, food choices and dietary pattern have changed quite dramatically especially in urban areas of India. Rajashekhar (2005) opined that there occurred a marked change in the food habits of Keralites and indicated that the abolition of joint family system, the increased demands of the working women, and change in life style were the major reasons for these transitions.

The Namboodiri Brahmins are Hindu Brahmins of Kerala, who are considered as the most orthodox Brahmins in India. Its members regard themselves as the true repositories of the ancient Vedic religion and of the traditional Hindu code. The Namboodiri Brahmins are renowned for their rigid orthodox beliefs and sense of caste and purity. *Prathaloonu*, a meal taken at 11 am in the morning was considered as breakfast by Kerala Brahmins. During ancient times, rice with curd / buttermilk, salted mango or pickle were the items for *prathaloonu*. Different breakfast items like *ada*, *pal kanji*, *noolappam*, *dosa* and *idli* were prepared occasionally. But, this became a common practice only during late 1970's. About 53.33 per cent indicated the use of wheat based items for breakfast during 1960's. Presently, majority prepared different rice and wheat based breakfast items.

Traditional breakfast habits of Tamil Brahmins also indicated that they did not take breakfast and gave *vellachoru* and *uppilittathu* for children in the morning for breakfast. Subbulakshmi (2005) reported that cooked rice kept overnight in water was consumed next day traditionally in South India. Use of *idli*, *dosa*, *seva*, *uppuma kozhukattai*, *tharavadu kozhukattai* etc. as breakfast items started during 1960's. Presently, different types of breakfast items like *idli*, different types of *dosa*, *chappathi*, *poori*, *puttu*, *appam*, *noolappam* etc. were prepared by Tamil Brahmins.

In both of these Brahmin communities, majority started preparing different items for breakfast only after 1960's. There was a shift from the traditional pattern

during this period. Major reason for this change is the fact that more number of people of these communities began to involve in new jobs leaving behind their traditional livelihood during this period. As a result, certain food habits of other communities gradually invaded to Brahmin community. Adoption of some food items like *appam* and *puttu* from other communities is clearly visible in the timeline. Increased availability and accessibility of different instant mixes and semi processed foods, increased number of working women in Brahmin community and high literacy level among women are the major reasons for the present condition.

The leftover rice of the previous day namely *vellachoru*, or *kanji* or *puzhukku* made up of locally available yam, colocasia, plantain, cowpea, tapioca and coleus were the breakfast items of back ward communities like Ezhavas and Scheduled Castes. Lalithambika (2007) remarked that consumption of left over rice or *kanji* was practiced among the poor. On occasions, they prepared different breakfast items like *ottada*, *puttu*, *noolputtu*, *uppuma* etc. After 1960 Ezhavas started preparing different breakfast items based on wheat, ragi and *chama*. It is only during early 1970's, they commonly started preparing different breakfast items.

Chama choru, ragi *kanji*, wheat *puttu*, tapioca *puttu*, tapioca *puzhungiyathu* were the common breakfast items of Scheduled Castes during ancient times. They prepared different types of *thoran* also with locally available leaves. Nirmala (2007) reported that rice was rarely consumed among the poor and backward communities and cheap foods like *chama*, *thina*, ragi, bamboo rice, horse gram, cowpea etc were consumed by these groups. Subbulakshmi (2005) indicated that traditional food habits were governed by the availability of food ingredients. After 1960's, several social changes occurred among these communities in terms of economic development and education which well reflected in their dietary pattern.

In Muslim community, *kanji* or *puzukku* made up of tapioca, plantain or jack fruit along with dry fish baked over flame or fish curry or *chammanthi* as side dishes were found to be the common breakfast items. All these were cheaply available items. Later, they switched on to the pattern of having rice with fish curry in the morning.

From 1970 onwards, Muslims commonly prepared *puttu*, *thaaripola*, *maida pola*, *uppuma*, *idli*, *dosa*, *noolappam* and different types of *pathiri*. The mass migration to the gulf countries and the subsequent improvement in the economic status led to variation in food culture. Availability of different energy saving devices and semi processed food items during this period could be the reasons for increased preparation of different breakfast items.

Kanji with *chammanthi* or a serving of *puzhukku* were the breakfast items consumed in almost all Christian families during ancient period. *Puzhukku* was prepared with tender jack fruit, green plantain, tapioca, colocasia, cowpea, yam, bread fruit, coleus etc. All these were cheap and locally available food items. Jacob (2004) reported that *kanji* with *puzhukku* or tapioca and fish curry were traditionally consumed as breakfast by Christians. Abraham (2007) reported that either *pazhankanji* or *kanji* along with *puzhukku* were consumed for breakfast by Christians. *Puzhukku* made up of either fresh or dry tapioca was a common item prepared for breakfast by this community. Presently, several wheat and rice based items were prepared by all respondents.

In general, breakfast pattern of different communities indicated that formerly, they consumed *kanji* and *puzhukku* as the common breakfast items. Majority prepared different rice based items on occasions only. Preparation of wheat based items became common during 1960's. This might be due to the famine that hit the period and subsequent shortage of rice which especially affected the back ward communities. Thomaskutty (2007) mentioned that the famine occurred during 1960's due to Chinese war resulted in the unavailability of rice and poor backward communities resorted to cheap and locally available foods like tapioca, bamboo rice, mango kernel flour etc.

Transition in the lunch pattern of different communities indicated that during ancient days the major dishes of lunch of Kerala Brahmins consisted of *mulakushyam*, *pulinkarry*, *mezhukkupuratty*, *erissery*, *uppilittathu* and *injithairu*. They avoided onion, garlic, asafoetida and coriander in curries and used pepper instead of red chilies. Later, they started using *sambar* and *rasam* which were originated from Tamil culture.

Achuthavarier (2007) indicated *pulinkarry* as a traditional Kerala dish. Vijayakrishnan (2007) indicated that *sambar* and *rasam* were adopted from Tamil culture. During 1960's, majority (63.33%) of Brahmins started using onion, asafoetida, garlic, coriander and red chilies in curries. Presently, all respondents used these items in dishes.

Similarly, Tamil Brahmins also started using onion, garlic, asafoetida and vegetables like *churakka*, papaya, carrot, cabbage, cauliflower, beans, tomato, potato etc during late 1970's. Presently, along with their traditional curries like *morukuzhambu*, *pulinkuzhambu*, *mulakootal*, *pachadi*, *vattakuzhambu*, they prepared different Kerala dishes like *avial*, *olan*, *kalan*, *kootu* curry, dhal curry added with vegetables and *varutharacha* curry. Subbulakshmi (2005) indicated that vegetarian rice based lunch of South India consisted of *koottu* and curry made up of one or two vegetables, or *avial*, a mixed vegetable preparation along with *sambar*/dhal or *morukuzhambu* with butter milk and *papadam*. Formerly, Tamil Brahmins prepared most of the curries using tamarind juice without adding coconut. However, presently they incorporated ground coconut and coconut milk also in typical Kerala curries.

Lunch pattern of Ezhava and Scheduled Caste communities indicated that traditionally they consumed *kanji* or cooked rice along with dry fish preparations and *chammanthi*. The practice of having rice with different curries came only during 1950's and presently they included variety of side dishes for lunch including non vegetarian items. Traditionally, side dishes prepared for lunch were based on locally cultivated vegetables. But, presently, different types of vegetables and pulses including temperate vegetables from other states were used in curries. Taking fried non vegetarian items became common after 1970's only. Ammukutty (2007) reported that before 1940's backward communities were in a pitiable situation of extreme poverty and so they used low cost ingredients like *chama*, *thina*, ragi, bamboo rice and prepared side dishes with green leaves available in the homesteads. Nirmala (2007) also reported cooked rice as a rare food item among the backward communities and they consumed *kanji* as the major meal.

The major changes that occurred in the lunch pattern of Muslims and Christians indicated the inclusion of different meat preparations and fried non vegetarian items as well as vegetarian dishes in the menu. This is in line with the studies by Khwaja (2004) who indicated that during 1980's, consumption of both animal and vegetable products increased substantially.

Inclusion of modern dishes using meat and fish became common among Christians of high income groups (Jacob, 2004). The author also indicated that the vegetarian curries like *sambar*, *erissery* and *pulissery* used by Christians were adopted from other communities. Abraham (2007) noticed the inclusion of parboiled rice, fresh or dry fish preparations, *thoran* with vegetables or pulses like cowpea or horse gram and *varutharacha* curry in the lunch of Syrian Christians. The author indicated that traditionally Christians prepared meat items during Sundays. Lunch and dinner pattern of Muslim and Christian communities changed remarkably due to the impact of modernization and economic development of these communities.

Traditionally, marriage *sadya* of Kerala Brahmins was simple consisting of *kutharichoru* and *nalucurry* which comprised of *erissery*, *olan*, *varuthuppery* and *madhura* curry. Traditional dessert *payasam* was then known as *madhuracurry*. This is in line with the observations of Vijayakrishnan (2007). The main *payasam* served was *ada pradhaman*. *Parippu pradhaman* and jack fruit *pradhaman* ranked second and third places in popularity. Jack fruit *pradhaman* was considered as sub standard by high income groups. Some of the respondents considered *upperi* as a curry. Achuthavarier (2007) reported that cooked rice and four different side dishes called *nalukootam* along with *inchithairu* and *upperi* were the traditional pattern of Kerala *sadya*. Venugopalapanicker (1999) indicated that *olan*, *kalan* and *erissery* were the three important items of *nalukootam* and observed regional differences in these items. Venugopalapanicker (1999) and Vijayakrishnan (2007) indicated that the origin of *avial* is from southern part of Kerala and were formerly known as *ramayyan* curry. Venugopalapanicker (1999) reported that Brahmins rated *avial* as low standard and was not included in traditional Brahmin *sadya*. Rajashekhar (2005) indicated that the most

important part of the *sadya* are the curry - *erissery* (fried), *kalan* (sour), *olan* (neutral) and *madhura* curry (sweet), in the order of importance. *Varutha upperi* (banana fries), *uppilittathu* (pickles) and *papadam* formed the essential side dishes.

Kumar (2003) reported differences in pattern of *sadya* among different zones of Kerala. The author also indicated that *sambar* and *pulissery* have close relationship with Tamil culture. The use of beet root in *kichadi* was a new trend observed in *sadya*. The author also reported the new form of *madhuracurry* called pineapple curry which originated in Central Kerala. One of the major changes that occurred during 1970's was the inclusion of *palada pradhaman* which augmented most popularity in Kerala *sadya*. Vijayakrishnan (2007) also reported that it is during mid 1970's *palada pradhaman* came into Kerala *sadya* and became the most essential item now. According to the author, the reason for the popularity was the availability of milk in large quantities. However, Achuthavarier (2007) indicated cow's milk as unimportant in traditional Kerala cuisine and instead, curd gained prime importance. In the present *sadya*, there are many modern curries also. A spicy curry made up of green peas and soya chunks which resembled meat curry in taste and a curry with bitter gourd and tomato almost similar to fish curry were found to be the new comers in Kerala *sadya*. Traditional *olan* is presently getting replaced with potato stew.

Blending of six tastes by Vedic practice is still, more or less observed during a meal in most parts of India. The order of serving differed from region to region. In the present study, the order of Kerala *sadya* as mentioned by majority was serving of *upperi*, pickles, *pulinchi* at the left end of the banana leaf, and *erissery*, *kalan*, *olan*, *avial*, and *thoran* from right to left on the top half of the leaf. Vijayakrishnan (2007) also reported that items like *upperi*, *uppilittathu*, *papadam* were served on the left top of the banana leaf. On the right top, ghee with dhal, *sharkkaravaratty* and *pazham nurukku* should be served. *Erissery*, *kalan* and *olan* were served from right to left in order. When *sadya* got elaborated the order changed to *pachadi*, *kichadi*, *kootu* curry, *kalan*, *olan*, *avial*, *thoran*, and *uppilittathu* which were served from right to left.

In traditional marriage *sadya* of Tamil Brahmins, the influence of Kerala culture is clearly visible. Earlier, the major items included were of purely Tamil in origin. Presently, several Kerala dishes like *kalan*, *olan*, *pulinchi* and *upperi* were added and the pattern of *sadya* is not different from that of Kerala Brahmin *sadya*. Very recently Tamil Brahmins also started using onion, garlic, asafoetida and vegetables like carrot, cabbage, potato, big onion, papaya, beans, peas and ladies finger. Traditionally, Tamil Brahmins prepared rice, dhal with ghee, sweet *pachadi*, sour *pachadi*, *kootu*, *moru kuzhambu*, *sambar*, *podithooval* (plantain, bread fruit, jack fruit, *kothavara*), *rasam*, butter milk, pickle, *appalam*, fried chips, *pal payasam* and *ada pradhaman*. Shyna (2001) reported that the items for marriage feast of Tamil Brahmins were cooked rice, dhal with ghee, *sambar*, *avial*, *pachadi*, *olan*, *thoran*, *pulinchi*, *kichadi*, big papad, *rasam*, *kalan*, *maladu*, mango pickle and *mahani* pickle, butter milk, curd, *pongal*, plantain and *payasam*. *Ada payasam* or *pradhaman* with rice or green gram dhal were also prepared.

Traditionally, Ezhavas and Scheduled Caste communities did not have much variety in their side dishes prepared for marriage *sadya*. The caste system enforced by certain sections of the Namboodiris in Kerala was one of the most rigid in India. They considered all other castes as untouchable and this restricted the backward communities from procuring money, land and education. All these limitations are well depicted in their culture and also in culinary habits.

Pulinkary, *kootu* curry, *injipuli*, butter milk, lime pickle and *chakkarachoru* instead of *payasam* were the items of Ezhava *sadya*. As years went on, they adopted different dishes from other communities and presently it is similar to the *sadya* of higher Hindu castes. The only criteria which determined the number of curries and type of *payasam* was the financial position of the families. Shyna (2001) also reported that *sadya* of Ezhavas was similar to Nairs and Namboodiris and did not contain ginger, curd and fried items like yam and brinjal. The usual *payasam* served for *sadya* included *pradhaman* with green gram dhal or wheat. Similar trend was observed for the *sadya* of Scheduled Caste communities also. Presently, the *sadya* of Scheduled Caste is elaborated than the traditional pattern. Nirmala (2007) reported that during 19th century,

rigid caste discrimination imposed restrictions in preparing and serving *papadam*, *payasam* and sugar in their marriage *sadya*.

Muslim community is blessed with a number of rich mouth watering dishes. According to Achaya (1998) Muslims of Kerala called *Moplahs* meaning bridegroom or a person held in high esteem who were the descenders of Arab traders. In dishes of Muslims, an Arab influence is clearly visible. Traditionally, Muslims prepared and served either cooked rice or ghee rice along with a meat curry for marriage feast. Ghee rice was prepared by high income families only. The most commonly prepared meat item for marriage was beef curry. Later, ghee rice and meat preparations became the most common menu for marriage feast. Even though, *biryani* is a traditional item, it was prepared by the affluent group for marriage during 1970's. The recent trend is the shift towards a course lunch. According to Achaya (1998) traditional Muslim wedding eve feast consisted of *neichoru* and the wedding dinner was *biryani* prepared with mutton, chicken or prawn. The author also indicated that Arab invasion enriched the food items of native India with nuts, raisins, spices and ghee. Achaya (1998) indicated fish as an important item of both regular and ceremonial diets.

Traditionally, for Christian marriage feast, different non vegetarian preparations were served. Some changes in the preparations occurred as years went on. Traditionally, chicken was prepared by adding ash gourd pieces or papaya pieces into it. It was believed that ash gourd pieces helped for digestion. Beef *ularthiyathu* was prepared adding finely cut coconut pieces and onion, ginger, garlic, and sufficient quantity of crushed pepper. Plantain and yam were added to pork preparation and is dry fried in its own fat. Achaya (1998) reported that Syrians consumed beef and *eracchi ularthiyathu* as a wedding special item. Even though, there were non vegetarian preparations of different meat stuffs, each preparation was different and enjoyable with its unique taste. Different tubers like potato, *kavath*, coleus, tapioca etc were added to the meat preparations in order to increase the total quantity as necessitated by the joint families for ensuring an even handed food distribution. Preparation of beef *ularthiyathu* adding pepper was traditionally done to extend its keeping quality. Fish preparations called fish *pattichathu* which was very thick in consistency, prepared with adding

different spices and *kudampuli* also had high keeping quality. Achaya (1998) observed that fish is cooked differently in different areas of Kerala by Syrian Christians. River fish was used in Kottayam and Thrissur and prepared by adding red chilies and sour kokum fruit rind called *kudampuli*. The author also indicated that fish *pattichathu* was prepared with small fishes with coconut gratings. *Panampani* was the traditional dessert served at the end of *sadya*. Achaya (1998) mentioned about a wedding special item *thairum – pazham – pani* in which sweet palmyra juice was thickened by boiling and pouring on ripe bananas, which was mashed together and eaten with curd.

The recent modifications that occurred in *sadya* of Christian marriages during 1980's as identified by the present study was the inclusion of some vegetarian dishes like salads, desserts like ice cream, fruit salad or puddings. The inclusion of vegetable dishes was meant for the invited guests. The present trend indicated that the style of marriage *sadya* changed to a course lunch which included different types of food items and majority of respondents indicated that the traditional Christian *sadya* is rapidly shifting towards this pattern. Jacob (2004) also is of the opinion that Christians have a broad mentality of accepting and adopting any new change and so they are very much prone to transitions.

With respect to the transition in the ingredients, method of preparation and vessels/utensils used, wide variation in the basic ingredients of different preparations was not noticed in the study. The major change observed was in the use of labour saving devices and mechanization implemented in processing raw ingredients. All respondents were nostalgic about the taste difference occurred due to this. But these changes were brought about by the technology revolution in the field of food processing and also demand by the changed social role of women. Studies by Shyna (2001) also indicated that apart from the cooking methods, the recipes of the traditional dishes including the way of cooking, selection and quantity of ingredients used, type of vessels and fuel have changed considerably over the years with changing trends in taste and awareness about physical fitness. Subbulakshmi (2005) indicated that traditional food preparations are undergoing changes due to mechanization imparted by advancement of technology and the arrival of ready to use foods.

Items like *ada*, *appam*, *aluva*, *ukkarai*, *vattayappam*, *cheeli*, *vellayappam*, *ottada* and *poruvelangai* were prepared using hand pounded grains traditionally. During early 1970's powdered grains and semi processed ingredients were used instead of hand pounded grains. This might be due to the rapid eruption of local flour mills even in the rural areas of Kerala during this period. *Uppuma*, traditionally prepared with *rava* made by hand pounding whole rice is presently made out of readymade wheat *rava* purchased from market. During 1980's the use of house hold energy saving equipments like mixie, grinder, refrigerator, gas stove, pressure cookers etc became common. The increased accessibility to milling facilities and the revolutionary changes occurred in the traditional kitchen led to changes in the preparation of different food items. The change in vessels used to prepare dishes was also noticed which was significant in the case of *puttu* which was prepared in *kannan chiratta* and bamboo *puttu kutty*, were replaced by modern steel and aluminium *puttu* makers. Majority of the families replaced earthen ware vessels with aluminium or steel vessels and the recent trend is the use of nonstick vessels. Wood was the conventional source of fuel in earthen ware hearth which then shifted to kerosene stove followed by LPG stove and majority used LPG as the source of fuel for cooking. The recent trend observed in the shift from conventional fuel sources were the microwave cooking and use of electric cookers. Shyna (2001) reported that particular taste and flavor of traditional dishes would come only when the traditional items were cooked in the traditional way. The author also indicated that most of the families of Muslim, Christian, and Tamil Brahmin communities of Thrissur district preferred either LPG stove or LPG stove and ordinary hearth for cooking.

Vettappam and *aluva* were prepared using *maida* as the basic ingredient. Formerly, these were rice based items. In some traditional items like *ukkarai*, *vattayappam* etc, jaggery was traditionally used as the sweetener, but presently, sugar is used instead of jaggery. Jaggery added products were dark in colour and using sugar crystals was comparatively easy and time saving. *Poruvelangai*, prepared traditionally was hard due to the use of thick jaggery syrup and was big in size. But, presently due to the use of thin jaggery syrup it had a soft texture and the size also was reduced.

Ukkarai, traditionally in powder form was presently replaced as *mysorepak* with same taste but with a cube shape. From this, it is evident that traditional food preparations were undergoing changes in appearance, shape, size and texture as demanded by the preferences of younger generation. Increased urbanisation has seen the rise of the middle classes and it is predominantly the lifestyle preferences of this group that marked a change with the past (Khwaja, 2004).

The current wave of consumerism has pervaded, to the eating habits too. Eating from outside restaurants and hotels became regular even among middle class families. In the present study, it was found that frequency of having snacks from outside restaurants was high among different communities. This is because of the increased snacking habits among Keralites. Even though, majority followed three major meal pattern, taking prepared snacks from restaurants, canteens, bakeries and hotels were found to be getting more common especially among working class and students. In the present study, either going out for having snacks or buying prepared snacks by the members who go out were also observed. Seshadri (2005) indicated that cursory visits to proliferating fast food outlets and convenience food stores are increasing now a days.

Instant mixes are really a boon for today's women. The high acceptance of packed instant mixes by the home makers was observed in the study. Majority of respondents used instant curry powders and spice powders. Instant mixes for breakfast were also getting more renowned recently. The major reason for the warm welcome by the home makers was the less drudgery and time saving in household work. Shyna (2001) reported that very few families of different communities purchased instant mixes and the instant mixes commonly purchased were *puttu podi*, *idli mix*, *idiyappam podi*, and *vellayappam mix*. The author also indicated that most of the curry powders like *rasam powder*, *sambar powder*, chicken, fish and egg *masalas*, spice mixes and spice drops which are available in the market were purchased by housewives in different communities due to the lack of time to prepare such items which are laborious and time consuming. Khwaja (2004) reported that as more women enter the labour force, the traditional role of the Indian housewife to be in charge of food preparation is eroding.

The consumption of readymade meals or foods that cut the long preparation time of traditional dishes, are likely to be a predominant feature of the diet where there is a high female participation rate. Rajashekhar (2005) reported that convenience foods both ready to eat and ready to cook are easily available in the market. The author also indicated that the major reason for the changing food habits was the increased number of migrants to foreign countries and they get accustomed to a different palate, which influenced the family members also.

The most marked feature of food consumerism is depicted by the purchase of bakery items. One of the major reasons for the decreasing interest in preparation of traditional items was the availability of almost all items in the market in convenient consumer packs in attractive prices. In the present study, it was found that chips and savouries were the most frequently purchased items by majority of the respondents. Biscuits and bread were the other two items which were frequently purchased from bakery. Biscuits were highly favoured by children and bread is used by people of all age groups as it is easily digestible and considered as the most suitable instant food for the present busy life style. Deep fried snacks and sweets were the other highly favoured bakery items. Khwaja (2004) reported that trade liberalization greatly facilitated the widespread establishment of global supermarket chains and fast food outlets and thus speeds up the diffusion of homogenous foods and global diet in the Indian market. The growth of supermarkets is thus a crucial determinant for the second stage of the change in dietary habits.

5.3 Quality evaluation of selected traditional foods

Twelve traditional foods and three beverages replicated under laboratory conditions were evaluated for chemical constituents, organoleptic qualities and microbial counts. The replicated foods and beverages were packed in suitable packaging materials and stored under ambient or ambient and refrigerated conditions and evaluated at frequent intervals for acceptability and microbial growth.

Chemical composition of replicated traditional foods revealed that most of the traditional foods are rich in certain macro and micro nutrients. The evaluation of nutrient content showed a variation in nutritional composition among the replicated traditional foods due to the variation in the ingredients used for the preparation. Inamdar *et al.* (2005) also indicated variation in the nutritional composition of traditional festive foods of Karnataka.

Inderiyappam, *karinellikka*, *madhura puttu*, *muttayappam*, *niracha pathiri*, *rankayyan* and *vishu katta* had high moisture content of 21.67 to 62.95 per cent and the moisture content of *kala kala*, *kaliyadakka*, *paniyaram* and *poruvelangai* were found to be in the range of 1.77 to 3.55 per cent. The foods with high moisture content had a soft texture and were highly perishable.

Traditional foods like *paniyaram*, *poruvelangai* and *vishu katta* which were prepared using different grains and pulses were found to be rich in total carbohydrates. Sharon *et al.* (2006) also reported high carbohydrate content in traditional foods of Kerala which varied from 24 to 79 per cent. Nagaraja (2006) indicated 40 per cent carbohydrate in *Halu bayi*, a Karnataka traditional food based on peanut and ground coconut.

The highest protein content was observed in *rankayyan*. This might be because of the use of green gram as the basic ingredient in the preparation. Devi *et al.* (2000) indicated that green gram based products were nutritious in terms of protein and calories and observed a protein content of 16 per cent in green gram dhal based supplementary foods. Kalra *et al.* (1996) also indicated protein content in the range of 9.1 to 14 per cent in *mathi* a traditional *maida* based product of North India. High protein content of 30 per cent was noticed in *Halu bayi* by Nagaraja (2006). *Putharo*, a traditional rice based snack of Khasi tribes of Meghalaya had a protein content of 3.9 to 9.1 per cent (Pasricha, 1991). The author also indicated that *dosa* and *idli*, the South Indian traditional foods had 7.4 and 4.2 per cent of protein respectively. Sharon *et al.* (2006) indicated protein content in the range of 2.36 to 9.41 per cent in traditional Kerala foods.

High fat content was observed in *niracha pathiri* which is a deep fried non vegetarian item followed by *kala kala* another fried snack. In a study on *mathi*, a traditional fat fried food, Kalra *et al.* (1996) observed a fat content in the range of 30 to 45 per cent.

Among the replicated traditional foods, the calcium content varied from 9.23 to 57.03 mg per 100 g with the highest calcium in *paniyaram* and lowest in *manda*. The major reason for the lowest calcium in *manda* might be due to the use of *maida* and *rava*, two refined food items as the basic ingredients. Iron content of most of the traditional foods was less than 2 mg per 100 g, mainly due to the use of cereals or pulses as the basic ingredients which are comparatively low in iron.

Karinellikka showed maximum crude fibre content of 3.6 per cent in which amla was used as the basic ingredient. Saima (2002) reported a fibre content of 3.10 per cent in fresh amla products. *Karinellikka*, an amla based product with considerable amount of vitamin C, retained much of the vitamin C even after prolonged heat processing. Srivastava *et al.* (1997) and George (2000) also observed retention of much of the vitamin C in different amla based products. The retention of vitamin C in amla based products might be due to the polyphenolic substances present in amla. Some of the traditional foods were found to be rich in minerals also.

Among different beverages, the lime based beverage *cherunaranga then vellam* had vitamin C and jaggery added beverage *paanakam* had more iron also. These beverages contained minor amounts of sodium, calcium and iron.

Most of the replicated foods got a mean score of above 7 for overall acceptability. This indicates the high preference for these traditional foods by the younger generation. Mageshwari and Thilagamani (2006) in a study on popularisation of traditional recipes observed a high overall acceptability among consumers for traditional foods.

The organoleptic scores obtained for perishable foods like *inderiyappam*, *madhura puttu*, *muttayappam*, *niracha pathiri*, *rankayyan* and *vishu katta* packed using

different packaging materials and stored under different storage conditions showed a considerable reduction in most of the quality attributes after first day of storage. *Inderiyappam*, *muttayappam*, *niracha pathiri*, *rankayyan* and *vishu katta* were not acceptable after first day of storage under ambient conditions and these foods obtained a mean score below five. *Inderiyappam* and *muttayappam* stored under refrigerated condition were also not acceptable after first day of storage. *Rankayyan* and *vishu katta* packed in PLM and stored under refrigerated condition had maximum overall acceptability of 4.63 and 6.84 during first day after storage. *Madhura puttlu* packed both in PE and PLM was acceptable up to seventh day after storage under refrigerated condition.

The mean scores of most of the replicated traditional foods packed and stored under different conditions gradually decreased in all packaging materials. A gradual deterioration in sensory quality of the traditional sweet *laddu* during storage was reported by Vijayalakshmi (2007)

Kala kala had high mean scores for almost all quality attributes in the initial organoleptic evaluation, but after that there was considerable decrease in the quality attributes. After seven weeks of storage, *kala kala* packed in PLM obtained high scores for overall acceptability when compared to PE and VP. This might be due to the protective effect of the multilayered packing material on flavour and texture.

The mean scores of *kaliyadakka*, a snack item traditionally prepared by Christians decreased during storage with respect to flavour and texture. Overall acceptability was found to be high for the product packed under vacuum at third month of storage and after three months the product got spoiled due to rancidity. Deteriorative changes in fried products during storage and exposure to atmosphere and a loss in flavour and texture was indicated by Bhat *et al.* (1982). Kalra *et al.* (1996) also indicated better acceptability of *mathi*, a traditional *maida* based fried item of Karnataka and indicated development of rancidity and off flavour during storage.

The sensory qualities of *karinellikka* packed in PLM and stored under ambient conditions were found to be high with respect to colour, flavor and taste at the end of

storage. The product stored under ambient conditions had its characteristics flavour and taste at the end of storage

For *manda*, a Muslim traditional snack item, considerable flavour reduction and textural changes were observed throughout the storage period. At the end of fifth week, *manda* packed in PE, PLM and VP obtained a mean score of above five and were in acceptable condition. Rancidity was first observed during sixth week in the product packed in PE. At the end of storage, the overall acceptability of *manda* packed in PLM and VP obtained a mean score of 4.58 and 4.41. Due to moisture regain, textural changes and a subsequent loss in crispness in *mongra*, a green gram based fried traditional food was indicated by Kalra *et al.* (1998) after third month of storage.

A considerable decrease in quality attributes was observed in *poruvelangai* during storage in different packing materials. Mean scores for appearance, colour and flavour were found to be high for *poruvelangai* packed in PLM at the end of storage period. For texture and taste *poruvelangai* packed under vacuum was found to be better. Much variation in the overall acceptability of *poruvelangai* was not noticed in products packed in PLM and VP.

With respect to microbial evaluation, a decrease in pH was observed in almost all products throughout the storage period. This might be due to the growth of acid producing bacteria in the product and due to the decomposition of the constituents present in the product. In contrast to this, Roy and Rudre (1998) found slightly higher pH in amla products than the fresh fruit and indicated that the pH did not change much during storage period.

In almost all perishable traditional foods like *inderiyappam*, *muttayappam*, *paniyaram*, *rankayyan* and *vishu katta* a high total bacterial count was observed after first day of storage. Ying *et al.* (2000) indicated an increase in total microbial count in rice based steam cake on the fifth day of storage. Most of the highly perishable foods were found to be having low pH and thus a sour taste. Ezeama and Ihezue (2006) reported that lowering of pH on storage is due to the decomposition of carbohydrate in rice, which degraded to lactic acid and acetic acid. Akpapunam *et al.* (1997) also

indicated that lower pH in foods leads to sour taste. Stickiness and ropiness were observed in *inderiyappam*, *muttayappam*, *rankayyan* and *vishu katta*, which were kept under ambient conditions irrespective of packaging materials. This might be due to the spoilage bacteria grown in foods under ambient conditions.

During refrigerated conditions the total counts of yeast and fungi were comparatively lower than in ambient conditions. Refrigeration had significant effect on delaying the growth of total bacteria. On third day after storage, presence of fungi and yeast colonies were also observed in *inderiyappam*, *muttayappam*, *rankayyan* and *vishu katta*.

Kala kala, which is rice flour based fried item, did not show much difference in pH throughout the storage period. *Kala kala* provided with vacuum packing was found to be low in microbial load when compared to other packaging materials. Bell and Garout (1994) also indicated vacuum packing as the best to extend the storage life with less spoilage bacteria.

The total microbial count of *karinellikka* was considerably less upto 3 months in all the three packaging materials and two storage conditions. The preparation of *karinellikka* involved repeated boiling for 20 minutes daily and it lasted for a week. This repeated high temperature processing might be the reason for the absence of microbial flora during the initial stages. Nath (1999) reported the absence of microbes in amla candy. The presence of fungi was observed after 4th month in *karinellikka* packed in different packaging and stored under ambient conditions. Khan (2005) indicated that low pH favoured the growth of spoilage fungi.

Poruvelangai is a low moisture hard textured product and so the microbial growth was considerably less. Slight fungi and yeast growth were observed in *poruvelangai* packed in PE and PLM after three months and this was not observed in vacuum packing. Dushyanthan (2000) reported that under vacuum packing the microbial count was retarded due to the absence of oxygen. Similarly, in *kaliyadakka*, which is a fried item, initial total bacterial count was found to be low and showed a slight increase with the minimum in *kaliyadakka* packed under vacuum. Low microbial

growth might be due to the low moisture content in *kaliyadakka*. Ying *et al* (2000) observed increased growth of microbes in the traditional rice based steamed cake *Miago* due to high moisture content and water activity.

A decrease in pH was found to be a marked feature of traditional beverages. This is due to the souring of beverages which was considerable under ambient conditions when compared to refrigerated conditions.

Total bacterial count was high in *inji paneeyam* even at the initial stage. This might be due to the contamination occurred due to the manual crushing and juice extraction of ginger during its preparation. A sudden decrease in pH of *cherunaranga then vellam* stored under ambient condition was observed mainly due to the fermentation occurred during storage. Yeast growth was observed in all the three beverages during storage, due to the presence of available sugars.

Summary

6. SUMMARY

The present study entitled "Documentation and quality evaluation of traditional foods of central zone of Kerala" was undertaken with the aim of identifying and collecting information on the various traditional foods of central zone of Kerala and to document their mode of processing. The study also aims to evaluate the quality characteristics of the selected less used traditional foods. Four districts of central Kerala namely, Ernakulam, Thrissur, Palakkad and Malappuram were selected for the study. Ten study locations were identified from each district, and elderly persons above the age of sixty years with expertise in traditional food preparations were selected to collect the relevant information. The respondents were categorised into different communities like Kerala Brahmins (KB), Tamil Brahmins (TB), Ezhavas (EZ), Scheduled Castes (SC), Hindus of Palakkad (HIPKD), Muslims (MU) and Christians (CH).

All respondents of KB, TB, HI (PKD) and CH and majority of respondents in EZ, SC and MU communities gave preference to traditional foods. Majority of the respondents belonging to TB (88.57%), EZ (65.72%), HI (PKD) (82.50%) and CH (91.43%) communities prepared traditional breakfast items daily. All respondents prepared traditional items for lunch daily. Most of the respondents prepared traditional snack items once in a month and occasionally. Majority of respondents did not prepare traditional health foods at home while 54.66 per cent prepared traditional preserved food items occasionally.

As traditional food habits were highly diversified and these items have strong link with religious and cultural practices, food pattern of different communities during special occasions, festivals/rituals were also studied. The important traditional food items of Kerala Brahmins during special occasions like *annaprasam*, *ayani onnu*, *namakaranam* and *upanayanam* included *ada*, *appam* and a traditional Kerala *sadya*. To celebrate Kerala's prime festival *Onam*, along with traditional Kerala *sadya*, Kerala Brahmins prepared *ada*, *appam*, *pazham puzhuniyathu*, *varuthupperi* and *sharkkaravaratty*. *Vishu* was celebrated by preparing either *vishu kanji* or *vishu puzhukku*. Special preparations like *koovakurukku* and *ettangadi puzhukku* were

prepared for *thiruvathira*. Several rituals and *vrathas* observed were characterized by partial or complete restriction of rice based food preparations.

Tamil Brahmins had a wide diversity in food items in connection with each and every special occasions and festivals. They prepared *laddu*, *murukku*, *muthusaram*, *mysorepak*, *athirasam*, *therattipal*, *thengai therttipal*, etc for various occasions like *seemantham*, *jatha karma*, *namakarana*, and cradling and *annamprasa* ceremonies. *Deepavali*, one of the important festivals of Tamil Brahmins was traditionally celebrated by preparing large sized *dosa*, *ukkarai*, *therattupal*, *maaladu*, *murukku*, *thenkuzhal*, *laddu* and *payasam*. For *navarathri*, different traditional items like *kosumalli*, *kozhukattai*, *madura puttu*, *pollavada*, *aval puttu*, *maaladu* were prepared by Tamil Brahmins. For *pongal*, the Tamil New Year day, *chakkarapongal* and *venpongal* were the special items prepared by Tamil Brahmins.

Traditionally, feasting habits were less common among Ezhavas and Scheduled caste communities and had less variety of traditional foods. For marriage, both these communities prepared *sadya*, but this *sadya* was not as elaborate as that of upper castes. Traditional food items like *velichenna appam*, *kinnathappam*, *murukku* and *unda* were prepared in connection with different special occasions. Ezhavas prepared *ada*, *varuthupperi* and *sharkkaravaratty* as the special items for *Onam*. *Vishu* was celebrated by preparing *vishu katta*, and for festivals related to temples *unniyappam*, *kinnathappam*, *murukku*, *avilosu podi* etc. were prepared. Scheduled Caste communities prepared *kanniyappam*, and served meat preparations and toddy for religious festivals.

Traditionally, the feast given for guests during marriage by Muslims included *neichoru*, *pathiri*, beef curry and *biriyani*. During *puthiyapla salkkaram*, organised in bride's house after marriage, variety of dishes like *unnakkaya*, *pazham nirachathu*, *mutta mala*, *mutta surukka*, *mutta marichathu*, *kozhi nirachathu*, *valayappam*, *tharippola*, *pinjanathappam*, *kalathappam* and different types of *pathiri* were prepared for treating *puthiyapla* (bride groom). Muslims prepared variety of special dishes namely *jeeraka kanji*, *thari kanji*, *kuzhal pathiri*, *unnakkaya*, *niracha pathiri*, *aleesa*, *kalathappam* etc for *noyambu thura*.

Christians prepared traditional Christian non vegetarian *sadya* during special occasions like betrothal, marriage, birthday, baptism, holy communion etc. *Kozhukkatta, kozhimbidi, achappam, kuzhalappam, muttayappam, vettappam vattayappam, vellayappam, avilosu podi, avilosunda, churuttu, cheeppappam, payattunda* etc were the major traditional food items of Christians prepared on different occasions. *Inderiyappam* was prepared during twenty fifth day of religious *vratha*.

During the month of *Karkkidakam*, different communities consumed special food preparations with medicinal value which included *pathila* curry, *marunnu kanji, navadhanya kanji, njavara kanji, kakkum kaya kanji, chama choru, thavidappam, thavidu ada* and *cheeda* as well as mango kernel flour and tamarind seed flour based foods like *unda, ada* and *kumbilappam* and *thenga choru*.

Specific restrictions in foods were observed by the family members of all communities during the death of a person in the family.

Special health foods were included in the diet during pregnancy, lactation and also when the girl attains puberty. Porridges with banana flour, ragi flour, rice flour and wheat flour were included as the important weaning foods.

Transition that occurred in the traditional food pattern indicated changes in the menu of breakfast, lunch and marriage *sadya* of different communities as well as changes in the ingredients, method of preparation, vessels and equipments used for the preparation of different traditional foods.

One of the major changes noticed in the breakfast pattern of Kerala Brahmins was the shift from the traditional *praathaloonu* pattern to different types of rice and wheat based items. Tamil Brahmins also had *vellachoru* and *uppilittathu* in the morning during ancient times and presently all the respondents included *dosa, idli, puttu, noolappam, chappathi, appam, poori, uppuma* and *seva* for breakfast. *Vellachoru* or *kanji* and *puzhukku* made up of tapioca, tender jackfruit, bread fruit, green plantain, yam, colocasia, cowpea, or horse gram were the traditional breakfast items of majority

of respondents of other communities. Presently, all communities prepared different rice and wheat based items for breakfast.

One of the important changes occurred in the lunch pattern of Brahmin communities was the use of red chilly, onion, asafoetida, garlic and other seasonings in different dishes which were not used by them traditionally. Among other communities, inclusion of non vegetarian preparations especially fried items became common now a days. Traditionally, curries for lunch were based on locally cultivated vegetables and presently all communities used several other vegetables like carrot, cabbage, beet root, onion, cauliflower, potato etc in dishes.

The important transition observed in marriage *sadya* of different communities was an elaborate *sadya* including different traditional and modern dishes. Hindu communities included nontraditional items and Muslims and Christians shifted to a course meal pattern for marriage feast.

The transition that occurred to different food preparations indicated the use of labour saving devices, change in vessels and use of LPG stove instead of traditional earthen ware hearth. Changes in end products with respect to size, shape and texture were also observed for different food preparations.

The recent trend of food consumerism was portrayed by the increased frequency of eating out habits, purchase of instant mixes and bakery items. It was found that 34.01 per cent of respondents had snacks from outside on weekly basis and 35.22 per cent on monthly basis. Most of the respondents purchased various instant mixes like curry powders (76.92%), spice powders (67.61%) and few of the respondents purchased mixes for breakfast items (34.41%) also. The most commonly purchased bakery items among different communities were chips and savouries, bread, biscuits and deep fried foods.

Quality evaluation of twelve selected traditional foods and three beverages indicated that most of the traditional foods are rich in certain macro and micro nutrients. The highest total carbohydrate content was observed in *paniyaram* (74.22%). Protein

content of the replicated foods varied from 0.56 to 18.97 per cent with the highest protein content in *rankayyan* and the lowest in *karinellikka*. *Niracha pathiri* had the highest fat content of 12.36 per cent. The crude fibre content of traditional foods varied from 0 to 3.6 percent. Above 20 mg of calcium per 100 g was found in *kaliyadakka* (22.43mg), *karinellikka* (32.24 mg), *madhura puttu* (44.71 mg), *muttayappam* (44.01 mg), *paniyaram* (57.03mg), *poruvelangai* (38.9 mg) and *rankayyan* (56.4 mg). The iron content of 100 g of replicated foods varied from 0.36 mg to 2.86 mg. The sodium content of traditional foods varied from 0.016 to 38.4 mg per 100 g. The acidity of traditional beverages was found to be 0.1 percent (*paanakam*), 0.13 percent (*inji paneeyam*), and 0.28 percent (*cherunaranga then vellam*).

Organoleptic evaluation of the replicated foods indicated that most of the traditional foods were acceptable to the younger generation. The mean scores obtained for perishable foods like *inderiyappam*, *madhura puttu*, *muttayappam*, *niracha pathiri*, *rankayyan* and *vishu katta* packed using different packing materials and stored under different storage conditions showed a considerable decrease in the mean scores in the quality attributes of most of the foods after first day of storage. *Inderiyappam*, *muttayappam*, *niracha pathiri*, *rankayyan* and *vishu katta* were not acceptable after first day of storage under ambient conditions and these foods obtained a mean score below five. *Kala kala* was organoleptically acceptable after sixth week of storage under different packagings. *Karinellikka* and *poruvelangai* showed an overall acceptability score of above 5 till fifth month of storage in different packaging materials. *Manda* packed under vacuum was found to be acceptable up to the end of fifth week of storage.

Inderiyappam, *madhura puttu*, *muttayappam*, *niracha pathiri*, *paniyaram*, *rankayyan* and *vishu katta* were highly perishable and hence observed a drastic increase in microbial load under different packagings and also under ambient and refrigerated storage conditions. The minimum microbial count was obtained for *kala kala*, *kaliyadakka*, *manda* and *poruvelangai* at the end of storage period which were packed under vacuum.

Hence, it can be concluded that even though there is a rich treasure of diversified traditional foods in central Kerala, many of them are facing extinction and are undergoing several changes. Transitions and modifications were occurred in the traditional food pattern and food habits. The recent trend of consumerism has affected the food habits and led to the dilution of food preparations. In the present study, documentation of different traditional foods was done with an aim to protect these items from getting endangered. It is evident that the endangered traditional foods can be replicated under prevailing conditions without change in their quality attributes and these can be popularised as an attempt to conserve traditional foods of Kerala.

Future work could be conducted to document, replicate and popularise the traditional foods of southern and northern zones of Kerala.

Appendices

Appendix I

SEMI STRUCTURED INTERVIEW SCHEDULE TO ELICIT INFORMATION REGARDING TRADITIONAL FOODS

- 1) What are the traditional preparations used for breakfast?
- 2) What are the traditional preparations used for lunch/dinner?
- 3) What are the snack items you used to have during your childhood?
- 4) Which are the important occasions of celebration?
- 6) What are the special traditional food items prepared on these occasions?
- 7) What are the traditional food preparations which had medicinal value?
- 8) What are the food items (vegetables, fruits, green leafy vegetables, grains etc) believed to have medicinal value? What are their possible health benefits?
- 9) In which season special health care practices are to be adopted?
- 10) What are the food preparation used for the health care?
- 11) How did you keep seasonal commodities or their preparations without spoilage for long period?
- 12) What are the traditional practices followed for obtaining maximum shelf life of these commodities?
- 13) What are the food items consumed during special conditions like
 - a) Infancy
 - b) Puberty
 - c) Pregnancy
 - d) Lactation
- 14) What are the different types of dry products (papads, vattals, vadakams, kondattams) you use?
- 15) Do you prepare them at home? if No, give reason
When did you prepare them last?
- 16) Do you own any traditional kitchen utensils/equipments now? If yes, give details
- 17) Do you use it now? If No, give reason
- 18) What are the novel kitchen equipments /utensils you have?

Appendix II

Traditional foods of different communities

Kerala Brahmins

1. *Ada*
2. *Aval nanchathu*
3. *Cheeda*
4. *Erimanga/Neerambazham*
5. *Ettangadi*
6. *Inchithairu*
7. *Kaalan*
8. *Kadumanga*
9. *Kaipa kondattam*
10. *Karolappam*
11. *Koova payasam*
12. *Malarpodi*
13. *Manga thera*
14. *Mulaku kondattam*
15. *Mulakushyam*
16. *Ney paayasam*
17. *Olan*
18. *Paal payasam*
19. *Pathilacurry*
20. *Payaru kondattam*
21. *Shraada erissery*
22. *Shraada olan*
23. *Shraada pulissery*
24. *Thavidappam*
25. *Uppu manga*
26. *Uppumanga*
27. *Varattu erissery*

Tamil Brahmins

1. *Ada dosai*
2. *Adai*
3. *Ammini kozhukkattai*
4. *Ash gourd vadam*
5. *Avakkai pickle*
6. *Banana stem chundal*
7. *Banana flower chundal*
8. *Bitter gourd kondattam*
9. *Chundakai vattal*
10. *Dosai*
11. *Elumbicham sadam*
12. *Green chilli pickle*
13. *Idli*
14. *Kadachakka pulinkari*
15. *Kadumangai*
16. *Kalarimarunnu*
17. *Karavadam*
18. *Koozhu*
19. *Kozhukattai*
20. *Kozhukkatai*
21. *Mahanikizhangu pickle*
22. *Manithakkali vattal*
23. *Modakam*
24. *Mulaku kuzhambu*
25. *Muringa ilai adai*
26. *Murukku*
27. *Muthusaram*
28. *Neyyappam*
29. *Oothappam*
30. *Parippu sadam*
31. *Poruvelangai*
32. *Podi(spice powder for curries)*
33. *Podithooval (stir fried vegetables)*
34. *Pollavada*
35. *Pongal*
36. *Pulinjadam*
37. *Rasam*
38. *Parippu rasam*
39. *Jeera rasam*
40. *Milag rasam*
41. *Rasam podi*
42. *Rava dosa*
43. *Rice vadam*
44. *Sambar powder*
45. *Sambar, bitter gourd sambar*

46. *Seva*
47. *Sughian*
48. *Tapioca papadam*
49. *Taro root mezhukcupuratti*
50. *Thairu sadham*
51. *Thengai sadam*
52. *Thenkozhal*
53. *Therandukuli puttu*
54. *Ubbittu*

55. *Ukkarai*
56. *Undakuzhambu*
57. *Uppuma*
58. *Uppuma kozhukattai*
59. *Vadai*
60. *Vathakuzhambu podi*
61. *Vattakuzhambu*
62. *Vazhathandu pachadi*
63. *Veppilakkati*

Ezhavas

1. *Achappam*
2. *Andiunda*
3. *Ari aluva*
4. *Ariunda*
5. *Aval vilayichathu*
6. *Avilosu podi/unda*
7. *Avilu varuthathu*
8. *Avilunda*
9. *Chakka erissery*
10. *Chakkarayappam*
11. *Cheeda*
12. *Churuttu*
13. *Chukkunda*
14. *Ellunda*
15. *Idichakka thoran*
16. *Kala kala*
17. *Kalathappam*
18. *Kallappam*
19. *Kappa puttu*
20. *Kapplandiunda*
21. *Karinellikka*
22. *Karuka ila ada*
23. *Kinnathappam*
24. *Kokku vada*
25. *Kolli puzhukku*
26. *Koova podi palaharam*
27. *Kozhimbidi*

28. *Kozhukatta*
29. *Kumbilappam*
30. *Kuzhalappam*
31. *Madura seva*
32. *Malarunda*
33. *Mambazha pulissery*
34. *Mangayandi mavu palaharam*
35. *Maniputtu*
36. *Murukku*
37. *Muthira charu*
38. *Mutta pathiri*
39. *Noolappam*
40. *Ottada*
41. *Pal kanji*
42. *Pacha andi curry*
43. *Pazham aluva*
44. *Pazham unda*
45. *Peechampidi*
46. *Poriunda*
47. *Pulinguru mavu palaharam*
48. *Karinellikka*
49. *Unniyappam*
50. *Uppuma*
51. *Vazha ila ada*
52. *Velichenna appam*
53. *Vettappam*
54. *Vishu katta*

Scheduled Castes

1. *Ada*
2. *Ash gourd leaves thoran*
3. *Banana flower thoran*
4. *Banana rhizome thoran*
5. *Banana stem thoran*
6. *Chama kanji*
7. *Chama uppuma*
8. *Chekkurmanis thoran*
9. *Chilly leaves thoran*
10. *Colocasia stem thoran*
11. *Cowpea leaves thoran*
12. *Eendu (cycus) seed flour palaharam*
13. *Jack fruit kondattam*
14. *Jack fruit seed kondattam*
15. *Kanniyappam*
16. *Muringa leaves/flower thoran*
17. *Ottada*
18. *Pana verakiyathu*
19. *Panankoombu curry*
20. *Pulinguru unda*
21. *Pumpkin leaves thoran*
22. *Rice kondattam (pazhanjoru kondattam)*
23. *Tapioca puttu*
24. *Thakara leaves thoran*
25. *Thavidum chakkarayum unda*
26. *Thazhuthama ila thoran*
27. *Thumba leaves thoran*
28. *Vaata manga*
29. *Vatterachi*
30. *Wheat kanji*
31. *Yam leaves/flower thoran*

Hindus of Palakkad District

1. *Ada*
2. *Adamanga*
3. *Arikondattam*
4. *Aripapadam*
5. *Arivaruthunda*
6. *Athirasam*
7. *Avalosu podi/avilosunda*
8. *Avil payasam*
9. *Avil pori*
10. *Banana peel kondattam*
11. *Banana psuedostem*
12. *Chama kanji*
13. *Cheeda*
14. *Cheena mulaku kondattam*
15. *Cheppappam*
16. *Kalathappam*
17. *Kappa papadam*
18. *Kesari*
19. *Koova payasam*
20. *Malar pori (pori thavidu)*
21. *Murukku*
22. *Muthira payasam*
23. *Mutta palada*
24. *Neyyappam*
25. *Pakavada*
26. *Pana verakiyathu*
27. *Panakoombu vevichathu*
28. *Paniyaram*
29. *Pappada vada*
30. *Parippu ada*
31. *Payaru kondattam*
32. *Poondanga unda*
33. *Pulinkuru unda*
34. *Pumpkin/ash gourd peel*
35. *Ragi verakityathu*
36. *Rankayyan*
37. *Rava unda*
38. *Sukhiyan*
39. *Thamara valayam kondattam*
40. *Unniyappam*
41. *Uralappam*
42. *Vazha marichathu*
43. *Vazhuthana kondattam*
44. *Vendakkai kondattam*
45. *Wheat kanji*

Muslims

1. *Aleesa*
2. *Allahu aalam*
3. *Ambayathin ada*
4. *Areerappam*
5. *Biriyani*
6. *Chiratta mala*
7. *Chukkappam*
8. *Jeeraka kanji*
9. *Kai pathiri*
10. *Kalayhappam*
11. *Karakka appam*
12. *Kidutha*
13. *Kozhiyada*
14. *Manda*
15. *Mutta mala*
16. *Mutta marichathu*
17. *Mutta pathiri*
18. *Mutta surukka*
19. *Neichoru*
20. *Nirachapathiri*
21. *Paalayikkappam*
22. *Paalooda*
23. *Pazham vetti*
24. *Tharipola*
25. *Unnakkaya*
26. *Unnkaya pal*
27. *Varutha pathiri*
28. *Vettappam*

Christians

1. *Achappam*
2. *Avilosunda*
3. *Cake*
4. *Chicken with ash gourd curry*
5. *Inderiyappam*
6. *Kalathappam*
7. *Kaliyadakka*
8. *Karayum koorayum*
9. *Kinnathappam*
10. *Kozhimbidi*
11. *Kozhukkatta*
12. *Kuzhalappam*
13. *Muttappachoru*
14. *Muttayappam*
15. *Noolappam*
16. *Paachoru*
17. *Paalappam*
18. *Peecham pidi*
19. *Pork with yam/plantain/jackfruit/bread fruit*
20. *Thamukku*
21. *Vattayappam*
22. *Velichennappam*
23. *Vellayappam*
24. *Wine*

Traditional health foods of central Kerala

1. *Aadu broth*
2. *Aadu soup*
3. *Chembarathipoo thoran/pachadi*
4. *Chukku jeerakavum podi*
5. *Chukku kappi*
6. *Chukkum chakkaraym*
7. *Ellunda*
8. *Inji lehyam*
9. *Jeeraka kanji*
10. *Kaatu chena varuthathu*
11. *Kakkum kaya kanji*
12. *Karimpana podi verakiyathu*
13. *Koova kurukku*
14. *Kozhi marunnu*
15. *Kurunthotti kanji*
16. *Mallikappi*
17. *Manjal kanji/manjal choru*
18. *Muringa ila/poovu thoran*
19. *Nalikera kanji*
20. *Nellikka arishtam*
21. *Paal kanji*
22. *Paal kashayam*
23. *Pathila curry*
24. *Pettiratti lehyam*
25. *Pookula lehyam*
26. *Puli lehyam*
27. *Thakara ila thoran*
28. *Thavidappam*
29. *Thavidu kappi*
30. *Thazhuthama ila thoran*
31. *Ulli lehyam*
32. *Uluva kanji*
33. *Vellulli lehyam*

Traditional beverages of central Kerala

1. *Chakkara vellam*
2. *Cherunanaga then vellam*
3. *Chukku kappi*
4. *Chukku vellam*
5. *Coffee*
6. *Inji paaneeyam*
7. *Jeeraka vellam*
8. *Kachiya moru*
9. *Karingali vellam*
10. *Kasumanga charayum*
11. *Kuruppettikapi*
12. *Malar vellam/kaapi*
13. *Malli kappi*
14. *Mutta chaya*
15. *Nannari sherbath*
16. *Nellikka paneeyam*
17. *Nerinjil vellam*
18. *Omam vellam*
19. *Paanakam*
20. *Panangallu*
21. *Pathimukham vellam*
22. *Phalooda*
23. *Ramacha vellam*
24. *Tea*
25. *Then vellam*
26. *Thengin kallu*
27. *Thulasi kappi*
28. *Vayalchulli vellam*

Appendix III
KERALA AGRICULTURAL UNIVERSITY
DEPARTMENT OF HOME SCIENCE

SEMI STRUCTURED INTERVIEW SCHEDULE

1. Place of Survey :
2. Name and Address :
3. Religion & Caste of Group :
4. Do you prefer traditional foods? Yes/ No
 - i) If Yes, reason
 - ii) If No, reason
5. How often you prepare traditional foods now?

	Daily	Weekly	Monthly	Occasionally	Never
Break fast items					
Lunch items					
Snack items					
Beverages					
Health foods					
Preserved foods					

6. Do you purchase any traditional food item?

If yes, specify

7. What were the traditional foods prepared on special occasions?

Occasion	Items prepared	Ingredients used	Method of preparation	Present modifications
Birthday				
Marriage				
Death				
Pregnancy				
Delivery				
Feasts				
Others				

- a) How long have you been adopted the above modifications?
- b) What are the reasons for the modifications?

8. Foods prepared during religious festivals?

Festivals	Items prepared	Ingredients used	Method of preparation	Present modification

- a) How long have you been adopted the above modifications?
- b) What are the reasons for the modifications?

9. Information about traditional foods prepared during physiological conditions

Physiological conditions	Items	Ingredients used	Method of preparation	Health benefits	Present modifications

- a) How long have you been adopted to the above modifications?
- b) What are the reasons for adopting the modifications ?

10. Details about traditional foods prepared for health benefit.

11. Details about seasonal traditional food preparations.

- a) How long have you been adopted the above modifications?
- b) What are the reasons for the modifications?

12. What are the traditional methods of preservation of fruits and vegetables?

Preserved products	Ingredients	Method of preservation	Modifications if any

a) How long have you been adopted the above modifications?

b) What are the reasons for the modifications?

13. a) Do you prepare any traditional instant food mixes at home ? Yes / No

If yes, specify

b) Do you purchase any instant mix? Yes / No

If yes, specify

14. Details about method of storage of food stuffs.

Do you store any foods in your home? Yes / No

If yes, specify and give details

Name of food stuff	Method of storage	Period of storage	Type of vessel used	Modifications if any

15. Do you use any traditional household kitchen equipment? Yes / No

If yes, give details

Name of equipment	Purpose of use	Particulars	Alternatives currently used

a) When did you adopt the alternative equipments?

b) What are the reasons for the change?

16. Do you use any traditional household utensils?

If yes, give details

Name of utensil	Purpose of use	Particulars	Alternatives currently used

a) When did you adopt the alternatives?

b) Reason

17. Do you follow any cultural practices / beliefs with respect to food? Yes / No

If yes, specify

Appendix V

Recipes of selected traditional foods

1. *Inderiyappam*

Raw rice	:	200 g
Black gram dhal	:	20 g
Coconut	:	150g
Garlic	:	20 g
Turmeric powder	:	a pinch
Small onion	:	20 g
Coconut pieces	:	20g
Curry leaves	:	20 g
Cumin seeds	:	20g
Coconut oil	:	10 ml

1. Soak raw rice and black gram dhal in water and grind well
2. Grind coconut, small onion, garlic and cumin seeds into a thick paste and add to the ground batter and add salt to taste.
3. Fry coconut pieces, curry leaves and onion in coconut oil and add to the batter
4. Mix all the ingredients
- 5 Pour in a plate and steam

2. *Kala kala*

Rice flour	:	500g
Coconut	:	100 g
Egg	:	175 g
Sugar	:	150 g
Oil	:	300 ml

1. Beat egg and mix with coconut milk and sugar
2. Add roasted rice flour and prepare a thick dough
3. Keep it for two hours
4. Mold and fry in coconut oil

3. *Kaliyadakka*

Rice flour	:	500 g
<i>Cycus</i> seed flour	:	275 g
Jaggery	:	375 gm
Coconut	:	150 g
Cardamom	:	5 no.
Oil	:	500ml

1. Mix rice flour and *cycus* seed flour
2. Prepare jaggery syrup and coconut milk
3. Mix jaggery syrup, coconut milk and cardamom to the flour and prepare thick dough
2. Shape into small balls
3. Fry in oil

4. Karinellikka

Amla	:	1kg
Garlic	:	20g
Turmeric powder	:	3 tsp
Red chilly	:	20g
Salt	:	200g
Gingelly oil	:	10ml

1. Wash amla and drain water
2. Add salt and sprinkle water and boil over earthen ware hearth for ten minutes
3. Repeat boiling for two to three days
4. Add spice powders and crushed garlic and red chilly
5. Sprinkle water, boil for ten minutes
6. Repeat boiling for two to three days
7. When amla gets darken and water got evaporated, add gingelly oil and pack

5. Madhura puttlu

Rice flour	:	250g
Jaggery	:	360 g
Turmeric powder	:	¼ tsp
Nuts	:	15 g
Raisins	:	10g
Ghee	:	15 g

1. Roast rice flour
2. Sprinkle water added with turmeric powder to the flour and mix well
3. Steam the flour for twenty minutes
4. Melt jaggery and prepare a thick syrup
5. Add steamed rice flour to the jaggery syrup and stir well
6. Fry nuts and raisins in ghee and add to the mixture

6. *Manda*

<i>Maida</i>	:	500 g
<i>Rava</i>	:	250 g
Sugar	:	100 g
Raisins	:	10 g
Nuts	:	10 g
Oil	:	300ml

1. Add salt to *maida* and prepare thick dough
2. Roast *rava*, and mix with sugar and fried nuts and raisins
3. Roll the dough into a thin circle, cook slightly in a thava and cut into two pieces
4. Fold each piece into a cone shape and fill the rava mixture and seal with maida paste
5. Fry in oil until golden brown

7. Muttayappam

Raw rice flour	:	200g
Egg	:	175g
Sugar	:	25g

1. Beat egg, and add sugar and rice flour
2. Stir the mixture well and make a thick batter and keep for two hours
3. Pour batter to a hot appachatti, cover and cook
4. Cook till spongy consistency

8. Niracha pathiri

Beef	:	500g
Maida	:	300 g
Big onion	:	100g
Green chilly	:	6 no
Garlic	:	10g
Ginger	:	10g
Curry leaves	:	few
Pepper powder	:	5 g
Cardamom	:	2 g
Turmeric powder	:	5 gm
Oil	:	500 ml

1. Cook beef and mince in a mixie
2. Saute onion, green chilly, garlic, ginger and curry leaves in coconut oil
3. Add minced beef and salt
4. Add spice powders and cook until dry
5. Prepare thick dough with *maida* and roll into round shape. Add salt while preparing dough
6. Place the prepared beef in the middle of the rolled dough and cover with another one
7. Fry in oil

9. *Paniyaram*

Green gram	:	250 g
Jaggery	:	160 g
Coconut scrapings	:	50g
Oil	:	300ml
Rice flour	:	125 g

1. Roast green gram and powder
2. Melt jaggery and prepare a thick syrup
3. Add coconut scrapings to jaggery syrup
4. Add green gram powder and stir well till it gets thickened
5. Roll into small balls
6. Prepare a thick batter with rice flour and add salt to taste
7. Dip green gram balls in the batter and fry

10. Poruvelangai

Wheat	:	250 g
Green gram	:	250 g
Raw rice	:	250 g
Jaggery	:	500 g
Coconut	:	50 g

1. Roast rice, wheat, green gram separately
2. Powder in a mixie to get fine powder
3. Melt jaggery and prepare a thick syrup
4. Add dry ginger powder and coconut pieces into the syrup.
5. Pour hot jaggery syrup into the powder and mold into small balls
6. Coat the balls again with dry ginger powder

11. Rankayyan

Green gram	:	250 g
Coconut	:	20g
Red chilly	:	2 no
Pepper powder	:	10 g
Salt	:	1 tsp

1. Soak green gram in water overnight
2. Cook and grind into a thick paste
3. Add pepper, and salt to taste
4. Pour in a plate and steam
5. Cut into small cubes
6. Pour coconut oil into a vessel, splutter mustard, red chilies and coconut scrapings
7. Add green gram cubes and stir well

12. Vishu katta

Raw rice	:	500 g
Coconut milk	:	1500 ml.
Cumin seeds	:	10 g
Salt	:	1 tsp

1. Cook raw rice in thin coconut milk
2. After getting half cooked, add thick coconut milk and cumin seeds
3. Cook again so as to get a thick consistency and pour in a plate smeared with ghee
4. Cool and cut into pieces

13. Cherunaranga then vellam

Water	:	200ml
Lemon	:	1
Honey	:	3 tsp

1. Extract lime juice
2. Add honey and water
3. Stir well

14. Inji paneeyam

Ginger	:	10g
Water	:	200ml
Jaggery	:	10g

1. Crush ginger and extract juice
2. Crush jaggery and mix with the juice
3. Add water stir well and strain

15. Paanakam

Jaggery	:	20 g
Water	:	200ml
Coconut scrapings	:	10g
Cardamom	:	2g
Dry ginger powder	:	1/4 tsp

1. Crush jaggery and add scraped coconut, jaggery cardamom and dry ginger powder in water
2. Stir well

Appendix VI

Score card

Organoleptic evaluation of traditional foods

Name of the product:

Characteristics	Score		
	I	II	III
Appearance			
Colour			
Flavour			
Texture			
Taste			
Overall acceptability			

9 point Hedonic Scale

Like extremely	9
Like very much	8
Like moderately	7
Like slightly	6
Neither like nor dislike	5
Dislike slightly	4
Dislike moderately	3
Dislike very much	2
Dislike extremely	1

Date :

Name :

Signature :

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DOCUMENTATION AND QUALITY EVALUATION OF SELECTED TRADITIONAL FOODS OF CENTRAL ZONE OF KERALA

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ABSTRACT OF THE THESIS

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ABSTRACT

The study entitled "Documentation and quality evaluation of traditional foods of central zone of Kerala" was taken up with the objectives of identifying and collecting information on the various traditional foods of central zone of Kerala and documenting their mode of processing, and evaluating quality characteristics of the selected less used traditional foods. The study was conducted in four districts namely Ernakulam, Thrissur, Palakkad and Malappuram comprising the central zone of Kerala. Senior citizens who possess the details of traditional food items and preparations in each locality were selected as the respondents. The respondents were categorised based on the communities they represent.

Details of traditional food habits with respect to preference for traditional foods, the reasons for the preference, frequency of preparation of traditional foods, traditional foods prepared during special occasions, festivals/rituals and during physiological conditions and traditional foods included for breakfast, lunch, dinner, and snacks were collected from the selected respondents. Transition that occurred in the traditional food pattern and in the preparation of traditional foods was also collected. Quality evaluation of selected traditional foods was conducted at laboratory level with respect to chemical constituents, acceptability and microbial growth. The foods were packed in suitable packaging materials and stored under different conditions and the quality evaluation of foods was carried out during storage.

Majority of the respondents preferred traditional foods due to their health benefits and palatability. Most of the respondents prepared traditional foods for breakfast and lunch and also prepared different traditional snack items. Most of the respondents did not prepare traditional health foods at home due to the laborious procedure involved in the preparation and the commercial availability of these products. Respondents belonging to different communities prepared various traditional foods during special occasions, festivals/rituals and consumed traditional foods during

different physiological conditions. Most of the respondents included traditional food items for breakfast and lunch.

Changes were observed in the traditional food pattern and traditional foods over different years with respect to ingredients, method of preparation and vessels/ utensils used for preparation. The recent trend of food consumerism was portrayed by the increased frequency of eating out habits, purchase of instant mixes and bakery items.

From the traditional food items collected, twelve traditional foods namely *inderiyappam*, *kala kala*, *kaliyadakka*, *karinellikka*, *madhura puttu*, *manda*, *muttayappam*, *niracha pathiri*, *paniyaram*, *poruvelangai*, *rankayyan* and *vishu katta* and three beverages namely, *cherunaranga then vellam*, *inji paneeyam* and *paanakam* which were least used, nutritionally viable and organoleptically acceptable were selected and replicated under laboratory level. Quality evaluation of these foods was conducted initially and during storage.

Evaluation of the chemical composition of the traditional foods showed that most of the traditional foods are rich in certain macro and micro nutrients. Organoleptic evaluation of the replicated foods indicated that most of the traditional foods were acceptable to the younger generation.

The replicated traditional foods were packed in suitable packaging materials and stored under ambient or ambient and refrigerated conditions for different intervals. Among the different replicated foods *inderiyappam*, *muttayappam*, *niracha pathiri*, *rankayyan* and *vishu katta* were highly perishable and could be stored only for a day. The quality attributes of *paanakam*, *cherunaranga then vellam* and *inji paneeyam* also decreased considerably during storage.

From the present study, it was found that the selected traditional food items could be replicated under the prevailing conditions without change in their quality aspects. Hence, these technologies should be popularised as an attempt to conserve the traditional cuisines of Kerala.