TECHNOLOGY ADOPTION BEHAVIOUR OF CASSAVA GROWERS IN KOLLAM DISTRICT

by

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THESIS

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DECLARATION

I, hereby declare that this thesis entitled **'Technology adoption behaviour of cassava growers of Kollam district'** is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed on the basis for the award to me of any of degree, diploma, associateship, fellowship or another similar title, of any other University or Society.

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CERTIFICATE

Certified that this thesis entitled **'Technology adoption behaviour of cassava growers in Kollam district'** is a research work done independently by Ms. Kavya V. S. under my guidance and supervision and that it has not previously formed the basis of the award of any degree, diploma, associateship or fellowship to her.

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Kavya V.S.

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List of Abbreviations

%	:	Per cent
/	:	Per
@	:	At the rate
Agri.	:	Agriculture
Agric. Sci.	:	Agricultural Science
Agril.	:	Agricultural
CTCRI	:	Central Tuber Crops Research Institute
Dev.	:	Development
et al.	:	et alia (and associates)
etc.	:	Etcetera's
Extn. Educ.	:	Extension Education
Fig.	:	Figure
Freq.	:	Frequency
gov.	:	Government
ha.	:	Hectares
Hrs.	:	Hours
i.e.	:	That is
ICAR	:	Indian Council of Agricultural Research
J.	:	Journal
Kg	:	Kilogram
KAU	:	Kerala Agricultural University
NPK	:	Nitrogen, Phosphorus, Potassium
PG	:	Post Graduate

Ph.D.	:	Doctor of Philosophy
POP	:	Package of Practices
SAU	:	State Agricultural University
SD	:	Standard Deviation
Soc. Sci.	:	Social Sciences
Std.	:	Standard
UG	:	Under Graduate
Unpub.	:	Unpublished
Viz.,	:	Namely
Yrs.	:	Years

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CHAPTER 1

INTRODUCTION

Root and tuber crops are important cultivated staple energy sources, second to cereals, generally in tropical regions of the world. They include potatoes, cassava, sweet potatoes, yams, and aroids belonging to different botanical families but are grouped together as types that produce underground food. They contribute about 6 per cent of the world's dietary calories. Taking into account the annual volume production of tubers; cassava, potato and sweet potato ranks in top ten food crops produced by the developing countries (Scott, 2000). An important agronomic advantage of root and tuber crops as staple foods is their favourable adaptation to diverse soil and environmental conditions and a variety of farming systems with minimum agricultural inputs. In addition, variations in the growth pattern and different cultural practices make tubers suitable in production systems.

Cassava (*Manihot esculenta* Crantz.) commonly known as tapioca, is the king of tropical tubers that assures food security to millions of people especially in developing countries of the world. It plays an important role in mitigating hidden hunger through diet diversification. Compared to other food crops, cassava is bestowed with the ability to grow on marginal lands and has climate resilience. It is relatively easy to cultivate and requires less cultural attention. Nweke *et al.* (1994) observed that many soils can be used for growing cassava but high tuber yield was mainly seen in friable and light soils. The crop was introduced to India during 17^{th} century by Portuguese when they reached the Malabar region. The king of Travancore, Shri. Visakham Thirunal widely promoted tapioca as a food crop of Kerala. People of low-income category used it as a substitute for rice. But in present times, it is a source of raw material for many diversified products such as starch, sago, alcohol, liquid glucose, vitamin C and many other industrial products and even in the livestock feed industry, industrial starch production and brewing industries. The leaves serve as forage and as a vegetable.

In India, cassava production is mainly confined to the southern states viz., Kerala, Tamil Nadu and Andhra Pradesh. India is the ninth largest producer of cassava with a total area of 0.17 million hectares and production of 4.9 million tonnes (GOI, 2019). The crop has proved to be life sustaining in times of natural calamities and famine by being a part of the prominent diet. Cassava being a concentrated source of carbohydrate, can effectively bridge the likely demand-supply gap of major food grains. Generally, cassava varieties are of long duration when compared to the annual food crops. Contrary to this, the variety Vellayani Hraswa, released from Kerala Agricultural University, is of short duration (150-180 days) with creamy tubers and good cooking quality (KAU, 2016).

Ani (2006) reported that the recurrent food crisis in country is partly due to high population growth rates over the food production level and erratic amounts of food crops produced from time to time. In addition to this, environmental hazards, low rainfall, deforestation, continuous cropping and unhindered desert encroachment adds to this. These situations can be mitigated through transfer of appropriate technologies to the farmers. With increasing globalization and transfer of information through modern communication technologies, farmers can have access to various information channels and technologies further helps to exploit information.

1.1 Objectives of study

To assess rate of adoption, level of knowledge and constraints faced by cassava growers in adopting KAU Package of Practices (POP) in Kollam district.

1.2 Main observations made

- Profile characteristics of cassava farmers.
- Rate of adoption of technologies by the cassava farmers.
- Extent of knowledge of cassava farmers.
- Constraints and issues faced by the cassava farmers.
- Attitude of farmers towards cassava production technologies.

- Adoption and knowledge of other practices (CTCRI) in cassava cultivation.
- List of ITKs practiced by traditional cassava farmers.

1.3 Limitations of the study

Although utmost care has been taken to make sure that the results obtained were true and study was carried out in amiable manner, inherent limitations of time and assets might have affected the study. The data was collected from cassava farmers only and was based solely on their understanding and opinions; this might also have an effect on research outcome.

1.4 Presentation of the study

The entire thesis is divided into five chapters. Introduction is the first chapter and it briefly deals with the topic, statement of the problem, its significance and obstacles confronted by the researcher. The review of literature deals with the topic, goals and variables selected in the study and is discussed in the second chapter. Third chapter presents the methodology involved with the process of investigation, method of data collection, sample size, sampling diagram, variables to be measured and different statistical methods used. The results obtained with suitable discussions and inferences are dealt in the fourth chapter titled results and discussions. The work is summarized in the fifth chapter named summary. References and appendices are given at end of the report.

CHAPTER 2

REVIEW OF LITERATURE

This chapter mainly aims to link research findings and observations in the area of study with that of the research problem. This process of searching through information that had already been published guides the researcher in a right way and aids to get a clear picture or image of the research problem. In order to develop good understanding of the present study acquaintances with earlier relevant studies have been made to formulate appropriate hypothesis and research methodology.

An attempt has been made to review the relevant literature on "TECHNOLOGY ADOPTION BEHAVIOUR OF CASSAVA GROWERS IN KOLLAM DISTRICT" and is presented in a systematic manner under the following sub headings.

2.1 Independent and dependent variables of the study

2.2 Constraints and issues faced by cassava farmers

2.1 INDEPENDENT AND DEPENDENT VARIABLES OF THE STUDY

2.1.1 **Age**

Age can be simply defined as the number of calendar years completed by the individual respondent at the time of interview.

According to Kalakanavar (1999), the relationship between age and knowledge was positive and significant as reported in his study.

Sreedaya (2000) in her study on Performance analysis of Self Help Group reported that a no significant relationship exist between age and extent of adoption of recommended practices among the vegetable growers in Thiruvananthapuram district.

Singh (2001) reported that a high percentage of contact and non-contact farmers belonged to middle age who adopted scientific gram technology.

Mate (2005) in his study on knowledge and adoption of recommended potato cultivation practices by the farmers in Pune district reported that 41.50 per cent of the potato growers were in the old age group, whereas 35.50 per cent and 23.00 per cent of them belonged to young and old age group, respectively.

Suresh (2008) in his work showed majority of the respondents were middle aged who adopted protection practices of soyabean cultivation.

Anupama (2014) in her study on Content development on agricultural expert system for organic vegetable cultivation reported that majority of (58%) organic farmers belonged to old age category and 42 % were middle aged farmers.

Anu (2017) in her study observed that majority of organic coconut growers (53 %) were old aged, followed by 43 per cent in the middle-aged category and remaining 4 per cent in the young age category.

2.1.2 **Education**

A person's educational status can be defined as the academic qualification obtained by an individual through formal and informal means by which he/she can understand and interpret information.

Gangadharan (1993) in his research on Adoption of improved agricultural practices by pepper growers of Idukki district reported that 7.07 per cent were illiterate, 23.42 per cent pepper growers had received education up to primary level, 8.42 per cent up to middle level and 61.09 per cent high school and above level.

Jaganathan (2004) in his study on Analysis of organic farming practices in vegetable cultivation reported that majority of the respondents (58 %) had high level of education. Farmers with better education were applying improved technologies in their fields compared to farmers with low levels of education.

Sasakan (2004) in his research titled Study on entrepreneurial behaviour of vegetable seed producing farmers in Haveri district of Karnataka showed that nearly half a percentage of farmer respondents (49 %) were having secondary education level and a very smaller number of respondents were illiterates (2 %).

Kanel *et al.* in 2005 reported that majority of the respondents were educated and comparatively a higher percentage of respondents were having middle school education.

The studies of Nnadi and Akwiwu (2008) showed the relationship between education and increased adoption of agricultural technologies especially among the rural women.

Rathod (2013) reported that in the educational category only 2 per cent of farmers were illiterates and remaining 98 per cent were literates. Among the literate group majority of respondents had middle school education followed by high school and college and above education.

Ajieh (2014) in his research on Adoption of improved cassava production and processing technologies in Oshimili north area of Delta state, Nigeria, showed that a wholesome majority of respondents (94%) had formal education and this was found to be positively related with technology adoption.

Ijioma *et al.* (2014) in their study on adoption of selected NRCRI cocoyam technologies showed that 45 per cent had primary education followed by 33.30 per cent of respondents having tertiary education. The educated farmers were found more to understand the benefits of adopting improved agricultural technologies in their fields.

Edouard *et al*. (2013) in their study about farmers knowledge and opinions towards bollgard II implementation in cotton production showed that 49.1 per cent of respondents had non-formal education, 31.8 per cent of respondents had no education followed by 11.4 per cent having primary education, 4.9 per cent secondary education and 2.8 per cent respondents with college level education.

2.1.3 **Family size**

Family size is operationally defined as the number of persons in the family who are dependent on the head of the family on head of family.

Gangadharan (1993) observed that family size is one of the important factors in influencing farmers labour forces in field.

About 46.79% of respondent families had members below 5 and majority (53.21 %) of families had members more than 5 members (Shailaja and Nair, 1997).

Koli (2012) reported that the personnel who are more satisfied with the home atmosphere are more likely to produce better outcome.

Sathyanarayan *et al.* (2010) concluded that more than half of the livestock farmer's *i.e.* 53.85 per cent belonged to medium family size category followed by small which comprised of 40.00 per cent and then large family size comprising 6.16 per cent.

Essakimuthu (2015) reported that majority (60.09 per cent) of the respondents belonged to medium size family while 27.70 per cent of respondents belonged to small family. Remaining 12.21 per cent respondents constituted the class of large family.

According to Bunde and Kibet (2016), majority of the respondents had family members above ten with a 39.80 per cent followed by 30.30 per cent which had members between 6-8, 10.20 percent had 9-10 members and 19.70 per cent had household members below five.

2.1.4 **Farming experience**

Farming experience refers to the number of years the respondent has been engaged in farming.

Sivasubramanian (2003) in his research on impact of coconut development schemes among coconut growers stated that majority of respondents (58.34 %) had greater degree of experience in coconut cultivation followed by medium level (26.66 %) and low level (15.00 %) of farming experience.

Kumar (2004) opined that 41.33 per cent of the coconut farmers were having medium farming experience followed by low (38%) and high (20.67 %) levels of farming experience.

Vaishali (2010) reported that majority of potato growers (52.50%) had medium level of experience in potato cultivation, while one-fourth (25.00%) and the remaining (22.50%) potato growers had high and low level of experience in potato cultivation, respectively.

Koli (2012) published that medium level of experience in coconut cultivation were recorded in 44.44% of coconut growers, while low and high levels of farming experience by 28.70 and 26.86 per cent of farmers respectively.

Rahman (2012) in his study on Practice of indigenous knowledge system by the farmers in maintaining ecosystem in Bangladesh suggested that the large group of the farmers (57.60%) had medium farming experience followed by 30.40 and 12.00 per cent respondents had high and low farming experience, respectively.

About 65 per cent of respondents had medium level of farming experience in chickpea. (Sharma and Nair, 2013).

Reddy (2013) studied knowledge of cotton farmers on health hazards by usage of pesticides in Kurnool district of Andhra Pradesh and observed that majority (58.33%) of the respondents had medium level of farming experience followed by high (26.67%) and low (15.00%) level of farming experience respectively.

Anupama (2014) in her study on Content development on agricultural expert system for organic vegetable cultivation reported that 54 per cent of farmers were having an experience of over 25 years in farming.

Fayaz (2015) in his study on impact of entrepreneurial behaviour on farming performance of cotton growers in Kurnool district of Andhra Pradesh discovered that majority (64.17 per cent) of the respondents had medium level of farming experience followed by low (19.17 per cent) and high level of experience (16.66 per cent) in farming.

Anu (2017) showed that 39 per cent of the respondents had experience of 25 years in coconut cultivation, while 31 per cent were experienced between 11-25

years, 13 per cent of the respondents had experience of 6-10 years and the rest 17 per cent of respondents had experience of less than 5 years in coconut cultivation.

Kantheti (2018) observed that the majority (70.83 %) of the Bt Cotton tenant farmers of Guntur district of Andhra Pradesh had medium farming experience followed by low (16.67 %) and high (12.50 %) level of farming experience.

Rathwa (2018) studied knowledge and attitude of cotton growers towards integrated pest management in Surendranagar district of Gujarat state observed that 61.60 per cent of the respondents had medium farming experience. Whereas, 25.60 and 12.50 per cent of the respondents had high and low farming experience respectively.

2.1.5 **Means of livelihood**

Vocation of the farmer at the time of interview is considered as the means of livelihood for the respondent.

Kalakanavar (1999) reported that agriculture was the primary occupation of majority of respondents, followed by service and then business.

Deshmukh (2007) observed that majority of farmer respondents (96.52 %) was engaged in agriculture which was primary means of livelihood and the rest 3.48 % had agriculture as secondary occupation.

2.1.6 **Farm size**

Farm size can be defined as the area which is either cultivated or uncultivated provided a part of it is put to agricultural production during the reference period.

Tripathi *et al.* in 2006 in his study on extent of knowledge of farmers about chickpea production technology reported that majority of the respondents (54 %) had below one-hectare size of landholding.

Ravikumar (2010) in his study on knowledge and adoption of post- harvest management practices among mango growers of Northern Karnataka district showed that 57 per cent of the respondents had more than 0.5 acre.

Vaishali (2010) opined that 42.51 per cent of potato cultivators possessed

medium size of land holding whereas 20.83 per cent and 15.83 per cent possessed small and large size of land holdings respectively.

Ghimire *et al.* (2012) identified that farmer's total area owned is always directly proportional to their economic status. If a major proportion of total land is devoted to a specific crop it shows the significance of that particular crop to the farmer in relation to other crops he is cultivating.

Ijioma *et al.* (2014) revealed that 34.20 per cent of the cocoyam farmers had between 1.0 to 1.5 hectares of land, followed by 25.00 per cent who had 0.5 to1.0 and 41 per cent growers had 1.5 to 2.0 hectare of land.

Anu (2017) in her study on adoption behaviour of coconut growers showed that 39 per cent of the respondents had low category of land holding, 36 per cent of respondents had medium category of land holdings and 25 per cent of respondents had high category of land holding.

2.1.7 **Area under cassava cultivation**

Area is operationally defined as the actual land possessed by the farmer under cassava cultivation.

Kalathiya *et al.* (2000) in their study showed that 46 per cent of the respondents had small size of coconut garden followed by 14 per cent having marginal size of holding whereas remaining 20 per cent had large size of land holding and remaing 20 per cent with medium sixe of land holding.

Prasad *et al.* (2010) presented in their study that 31.59 per cent of farmers were having a land holding of 2 ha, 27.91 per cent of the farmers were having less than 1 ha, 17.25 per cent of them were having more than 4 ha, 12.79 per cent of them were having 3-4 ha and remaining 10.47 per cent of them were having 2-3 ha. Results showed that most of the oil palm growers were small and marginal farmers.

Ajai (2012) reported that there was no significant relationship between area under banana cultivation and innovation proneness, and extension agency contact. His results showed that approximately 70 per cent of respondents had up to 60 cents of area under banana cultivation.

Koli (2012) indicated that 57.41 per cent of the coconut growers had medium

land holding (1.1 to 3 ha) under coconut cultivation followed by 31.48 per cent and 11.11 per cent had small up to 1.00 ha and large above 3.0 ha area under coconut cultivation.

Jaganathan and Nagaraja (2015) in their study about the characteristics of arecanut growers showed that 75.6 per cent of farmers had area up to 1 ha(low), followed by 17.8 per cent between 1.1-2 ha (medium) and remaining 6.7 per cent had between 2-4 ha (high) under arecanut plantation.

2.1.8 **Information seeking behaviour**

It can be defined as the act of actively seeking behavior in order to answer a specific query.

A diagnostic study on capacity of factors associated with shift from paddy to tapioca clearly showed that respondents had mass media exposure in the level of medium (58.34 %), low (26.66 %) and high (15 %) as reported by Saravanan (1992).

Singh (2001) in his research titled socio-economic impact of *Bt.* cotton cultivation among the farmers of Punjab revealed that a majority of the respondents (57.33 %) were reading newspapers for agriculture information, whereas 20.67 per cent respondents read agricultural magazines and 22.67 per cent of farmers was not interested in reading and did not read any kind of agriculture literature. Lack of time was the main reason posed by them.

Sivasubramaniam (2003) observed that 60.84 per cent of the respondents had medium level of extension contact followed by low (30.83 %) and high (8.33 %) levels of extension contact.

Sengupta (2008) in his study on farmers commit suicide showed that due to lack of information sources and low mass media exposure many of the farmers were vulnerable to misguiding and false information about crops. This was considered as a sound and strong reason for increasing suicide among the farming community.

Manjunath (2011) in his work on knowledge and adoption of Bt cotton recommended production practices followed by farmers in Raichur district of Karnataka concluded that most frequently consulted information sources were progressive farmers, T.V, extension personnel of private organizations, friends, radio

and Assistant Agriculture Officers.

Zanjar (2011) in his work on constraints faced by the cotton growers in adoption of integrated pest management gave results that more than half of the respondents (56.33 %) had high level of information seeking behavior followed by medium (28.39 %) and 12.40 % belonging to the low-level category.

Koli (2012) concluded that 63.86 per cent of coconut growers had medium extension contact with extension personnel of different organizations whereas, 25.00 and 11.11 per cent of them had high and low level of extension participation, respectively.

Sarada (2016) in her study on Innovative Farmers Network (IFN) for transfer of cotton production technologies in Telangana state showed that, majority of network members (66.70%) had medium level of information seeking behaviour followed by high (21.60%) and low (11.70%) information seeking behaviour.

2.1.9 **Innovativeness**

Innovativeness can be defined as an idea, practice, or object that is perceived as new by an individual or other unit of adoption.

Shashidhar (2004) in his research titled influencing factors and constraints in drip irrigation by horticulture farmers of Bijapur district of Karnataka reported that an increased percentage of farmer respondents (47.50 %) belonged to the medium innovativeness category and rest of 31.66 % and 20.83 % to the low and high innovativeness category levels.

Pruthvi (2011) concluded that majority of Bt. Cotton farmers nearly three forth of the respondents 71.67 per cent belonged to medium level of innovation proneness whereas, 16.67 per cent in high group and rest 11.66 per cent to the low innovation proneness level group.

Shilpashree (2011) in her research prolific study on awardee farmers in North Karnataka reached conclusions that in low innovativeness category there were 52.50 per cent of respondents, medium consisting of 37.50 per cent and last 10 per cent in high level category.

Kantheti (2018) showed that majority (70.83 %) of the Bt. Cotton tenant farmers had medium innovativeness, then low class consisting of 16.67 per cent and high class with remaining 12.50 per cent.

Rathwa (2018) concluded that 55.84 per cent of respondents had medium level of innovativeness, 23.33 and 20.83 per cent of surveyed farmers had low and high level of innovation proneness, respectively.

2.1.10 **Attitude of growers towards scientific production technologies**

Attitude is positive or negative feeling towards a same object. It is beyond the conscious acknowledgement of the individual or he or she may not choose to reveal it.

Thrustone in the year 1946 explained attitude by connecting it with psychological objects and it can be either in a positive or negative sense.

A study of socio-psychological values and some biographical characteristics in relation to adoption of farm mechanization by farmers of Ludhiana by Singh and Singh in 1976 concluded that farmers had a positive approach to the different farming technologies and their decision-making ability and attitude scores showed a positive and significant relationship.

Sudhakar in 2002 studied about the awareness, knowledge and adoption of technologies relating to cotton pest management practices. The study reached a positive relationship between attitude of farmers and different physical, chemical and biological ways of pest management.

Hanjabam (2013) in his study about adoption of technologies by precision farmers and conventional farmers reported that about a total of 76.85 per cent of conventional farmers had medium attitude with a low mean score.

2.1.11. Extent of Knowledge about Cassava Production Technology

Knowledge in simple terms can be defined as the facts, information and skills acquired through experience or education that is both theoretical and practical understanding of a subject.

Choukidar and George (1972) in their report on Adoption behaviour and

characteristics of farmers, reached to conclusions that lack of knowledge about package of practices was the main reason for non-adoption.

In accordance to Kumar (2004), in his research on adoption of package of practices of coconut farmers concluded that farming experience, education, social participation, scientific orientation and risk orientation had a positive and significant relationship with understanding level of farmers about package of practices of coconut.

Tripathi *et al.* (2006) revealed that majority of farmers (67%) had medium level of knowledge whereas 19.00 per cent and 14.00 per cent had low and high levels of knowledge respectively about chickpea production technology. The mean scores were calculated to be 52.86 with a range of scores that lies between 35.64 and 77.54.

Gupta *et al.* (2010) in their study among vegetable growers reported that a strong knowledge is inevitable for a proper adoption of new agricultural technology by vegetable growers.

Singh *et al.* (2010) revealed that major group of cut flower cultivators were found to have high (31.30 %), very high (28.8 %), medium (20.00 %), low (11.3 %) and very low (8.6 %) level of knowledge about the various cut flower cultivation technology. A mean score of 10.32 out of maximum score of 12 indicated the strong knowledge level of farmers. The main reason plotted for this strength in knowledge was that cut flowers were cultivated commercially on a large scale, and strong knowledge is required to survive in this field. Nearly 80 per cent of cultivators surveyed were having high to medium level of knowledge about cut flower production technology.

Rai *et al.* (2012) in their research titled extent of knowledge and adoption of mustard production technology showed 53.33% respondents belonged to the medium category of knowledge followed by high (20%) and low (26.67%) knowledge level.

Sharma and Lijuan 2015 in their study on knowledge about recommended production technologies about pearl millet showed that majority of respondents had

full knowledge on topics of improved varieties, land preparation, seed rate and time of sowing, seed treatment and spacing, fertilizer application etc, whereas partial knowledge in areas of use of bio- fertilizers, micronutrients, IDM, IPM and weedicide use.

2.1.12. Adoption behaviour of farmers

Adoption is operationally defined as a decision to make full use of an innovation as the best course of action available. It is influenced by factors like knowledge, persuasion of individuals within the system etc.

The adoption process is said to be influenced by interrelated series of various factors such as personal, social, cultural and institutional factors which also includes the five stages of adoption *i.e.* awareness, interest, evaluation, trial and adoption. Development, dissemination and application at the farm level of novel and old chemical, biological, and mechanical techniques which forms an integral part of farm capital and inputs also affects the adoption of any technology. Training, education, advice and information which lies the foundation to the farmers knowledge is also reckoned to influence the adoption of technology. (OECD,2001)

Sivaramakrishnan (1981) in his study on differential adoption of selected recommended agricultural practices of selected crops, showed that adoption of new plant protection measures had very low effect on tapioca and hence farmers showed restraints to new practices.

Sreedaya (2002) in her study on extent of adoption of recommended practices by the vegetable growers came to conclusion that majority of the respondents of both KHDP and SHG were found to be high adopters of the recommended practices.

Singh *et al.* (2010) enumerated that 60.00 per cent of farmers displayed moderate adoption level, while 28.00 per cent exhibited low level of adoption and remaining 12.00 per cent of them showed high adoption. The findings of the study pinpointed that there was a scope for enhancement in the extent of adoption of improved production practices of mango to ensure higher fruit production.

Singh and Pandey (2010) in their study showed that 58 per cent of respondent’s cultivators had medium adoption level towards scientific potato

cultivation practices, 24 per cent with low adoption level and only 18.00 per cent had high level of adoption.

Mandavkar and Talathi (2013) in a study on adoption level of cotton pest management technology in Konkan region of Maharashtra noticed that 60.00 per cent of the respondents belonged to the medium category followed by low (24.8%) whereas only 15.20 per cent farmers were in high adoption category.

Ajieh (2014) found that out of the 17 technologies chosen for the study, for seven technologies respondent's recorded high adoption and low adoption in 10 technologies. Improved technologies that showed high adoption were planting time, intercropping, fertilizer application, pesticides and herbicides, mechanized cassava grater. These technologies were proved to increase the yield and improve cassava processing. Plastic mulch, cassava chips slicing machine, mechanized drying equipment, storage in polyethylene bags, were technologies that had low level of adoption. Complexity and cost associated with their utilization was the reason plotted for poor adoption.

Pal *et al.* (2015) in their work about harvesting practices in mentha, showed that 34.10 per cent of farmers partially adopted the improved technologies, 33.33 per cent having full adoption and remaining 32.50 per cent respondents were not adopting.

2.2. Constraints faced by the cassava farmers in adoption of cassava production technology

The difficulties and problems faced by the farmer respondents during the time of cultivation of cassava operationally define constraints faced by the cassava farmers in adoption of cassava production technology in the study.

Deshmukh *et al.* (2007) in their study revealed that 62.5 per cent of farmers faced problem of limited or no information about varieties released and agricultural technologies recommended by MAU, while constraints like costly seed, lack of information regarding seed cost, place of sale and proper guidances were recorded by 56.94 per cent respondents as inevitable ones. Non availability of seeds, lack of transportation facilities, and unavailability of seeds during sowing time was expressed by 52.77 per cent respondents.

Kumbhare and Singh (2011) in their study revealed that major constraints noted by the respondents in cultivation of paddy were improved mechanization facility like absence of paddy milling facilities in nearby locality for processing (66.66 %) was ranked first. Breakage of grain during milling/ processing (61.66 %), lack of transportation facilities (58.33 %), low market price, low cooking quality due to breakage of grains (43.33 %) and marketing problems (41.66 %) were the other important constraints noted.

Kumbhare and Singh (2011) revealed that technical constraints expressed by 58.33 per cent respondents was non-availability of quality seeds of wheat followed by high weed problems (*Phalaris minor* and *Chenopodium album)* infestation (41.66 %). Significant proportion of the respondents expressed high cost of fertilizers (50.00 %), high cost of diesel (41.66 %), inadequate availability of electricity (45.0 0%) and non-availability of zero tillage machineries locally (36.66 %) in the resource constraints section. 47.00 per cent of the wheat growers expressed lack of market facilities as an important constraint.

Phiri (2011) revealed in his research, notable concerns that influenced the adoption of cassava cultivation included lack of resources such as training and weak research, extension and farmers linkage, which lead to poor knowledge level of farmers about the innovative technologies, about improved varieties developed in this field etc.

Singh *et al.* (2012) in their work on adoption technology of soyabean production concluded that lack of education and knowledge were major prolific problems of the farmers. Credit acquisition at right time and proper amount, high rate of interest and small land holding were the socio-economic constraints. Socio-psychological constraints included lack of social participation, non-availability of information at right time and right place were the major informational constraints. Lack of irrigation facility, non-availability of input i.e. seeds, fertilizer and chemicals for plant protection reported under the technological constraints faced by the respondents.

Rai *et al.* (2012) in their research work reported that major constraints perceived were lack of training in scientific mustard production technology (93.33 %) under the technical constraints section followed by non-availability of agricultural materials in village (88.33 %) and high cost of labour (74.2 %) as the situational constraints.

Singh *et al.* (2012) showed that constraints like lack of supporting price (92 %), inefficient marketing system (88 %) followed by non-availability of skilled labour in time and high labour cost (79 %) and increasing price of inputs (70%) were the major constraints. In technological constraints, lack of awareness and knowledge about certain technological interventions were the major constraints expressed by 83 per cent of the respondents in adopting recommended soybean production technologies in their farm. Lack of conviction in new technologies was also expressed by 75 per cent of the respondents in the soybean cultivation. Majority of the respondents were not convinced about the importance of production technologies and could not adopted them. Weak extension activities at village level were reported by 62 per cent of the respondents.

Sunil Kumar (2014) in his study on tomato growers in Belgaum district of Karnataka reported that, problem of technical knowledge was faced by majority of the farmers (75.83 %) and guidance about improved cultivation practices were also lacking. High fluctuation in market price was an important concern for about 65.00 per cent of the respondents, high transportation cost (62.53 %), labour shortage and high wages (55.83 %) and lack of irrigation facilities and power shortage (46.66 %) were the other constraints.

CHAPTER 3

METHODOLOGY

A sound research methodology makes a research systematic and orderly. This chapter deals with the methods and procedures used for attaining the objectives set forth for the research work. It also enumerates the strategies adopted for completion of research underneath the following subheadings.

3.1 Research design

According to Kerlinger (2004) research design is a plan, structure and strategy through which we can obtain answers to our questions and control variance. For conducting this research *ex post facto* research design was used. This type of research investigation is done after the phenomenon had occurred. Here there cannot be any manipulation of variables because there is no direct control over and it had been already exposed. This study was a survey-based research.

The variables both dependent and independent variables were identified through judges rating, discussions with subject matter specialists and searching related literature. For recording the primary data from the respondents at field level, direct survey method was used.

3.2 Locale of study

Kerala is the fifth largest producer of cassava in India. (Farm guide, 2019). Kollam district was selected purposefully for the study as it was having maximum area of

14421 ha under cassava cultivation. (Farm guide, 2019). In addition to this there are pockets of extensive cultivation and traditional farmers in this region.

3.3 Sampling Procedure

Kollam district has 11 blocks and from which 2 blocks were purposefully selected, namely Sasthamkotta and Ithikkara as these two blocks have maximum area under cassava cultivation. Sasthamkotta has an area of about 2284.78 hectares followed by Ithikkara having 1491.20 hectares under cassava cultivation. (Gok , 2019) Again, from each of the two blocks selected, 40 farmers from each block were randomly selected.

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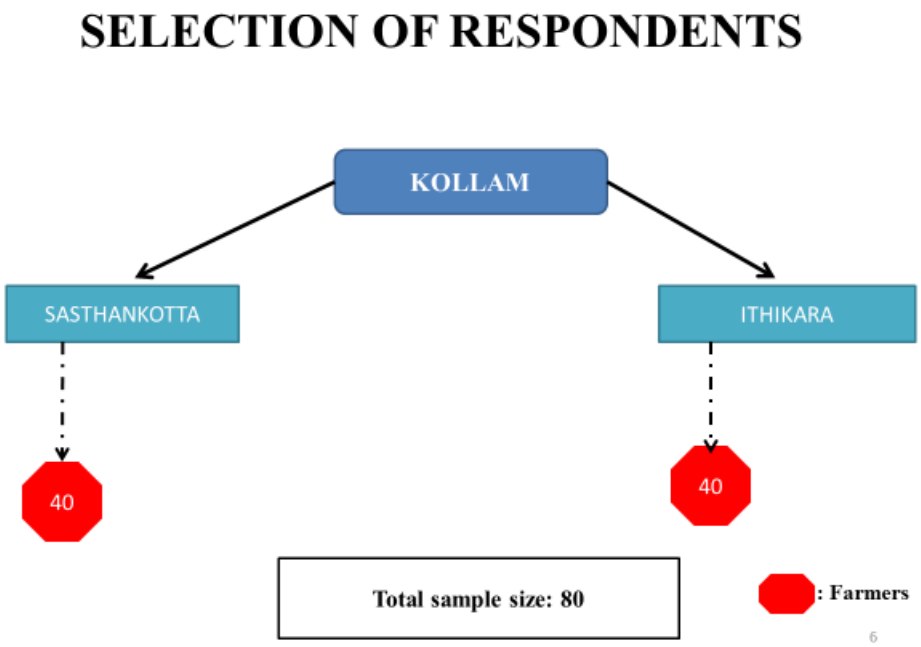

Fig. 1. Sampling diagram

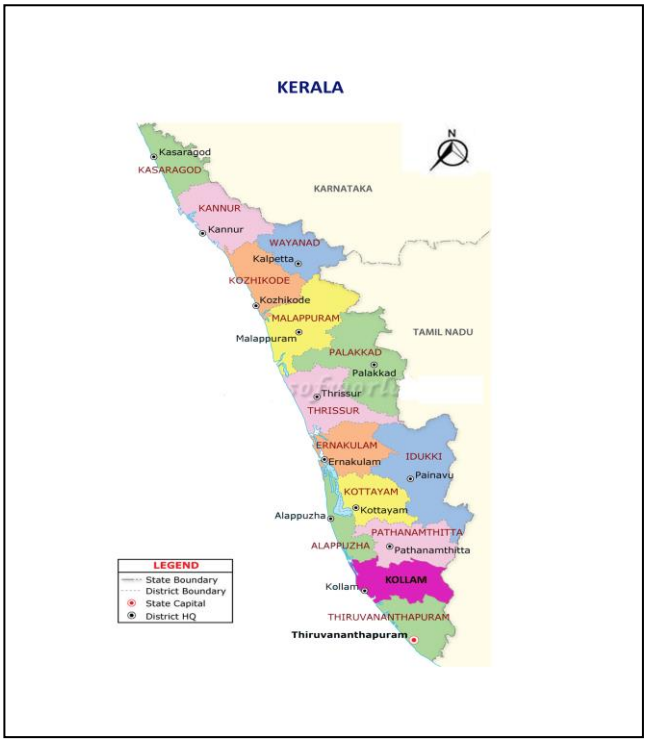

Fig. 2. Map of Kerala

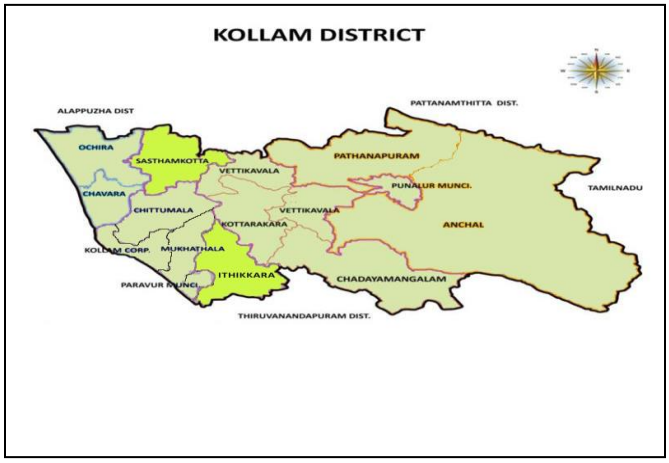

Fig. 3. Map of Kollam district

3.4 Data collection methods and tools

As per the objectives, review of literature, discussion with experts and observations made by the researcher, the following independent variables were considered for the study which have relationship with the dependent variable. Twenty-four independent variables were selected based on various literatures which were then given for judges rating to extension experts. It was given in the form of a questionnaire to collect responses from the judges on a five-point continuum with response pattern “most relevant”, “more relevant”, “relevant”, “less relevant”, and “least relevant” with scores 5,4,3,2, and 1 respectively.

The copies of questionnaire were sent to thirty-four judges via post and mail. Twenty-three of the judges responded. The score obtained from the judges were added for the variable individually. The variables with high scores were selected as the independent variables for the study as represented in Appendix I.

3.5 Operationalization of variables and their measurements

3.5.1 Age

Age is operationally defined as the number of calendar years completed by the respondent at the time of interview. The scoring pattern was done with the census report (2011) by Government of India.

Category	Age(years)	Score
Young	<35	1
Middle	35-55	2
Old	>55	3

3.5.2 Education

Education is operationally defined as the extent of formal learning possessed by respondent at the time of interview. The scoring procedure adopted for study was developed by Trivedi (1963) with slight modification by Sobha(2013). Data was interpreted by performing frequency and percentage analysis. The scoring procedure is given below.

Sl. No.	Category	Score
1	Illiterate	1
2	Write and read	2
3	Primary School	3
4	Middle School	4
5	High School	5
6	Higher secondary School	6
7	College education	7

3.5.3 Family size

Family size is operationally defined as total number of members in family dependent on head of the family.

Sl. No.	Category	Score
1	2-4 members	1
2	5-7 members	2
3	More than 7	3

3.5.4 Means of livelihood

Operationally defined as the vocation of the respondent at the time of interview. Coding pattern by Anju (2018) was used in the study.

Sl. No.	Category	Score
1	Primary (Agriculture alone)	2
2	Secondary (Others + Agriculture)	1

3.5.5 Farming experience

Farming experience refers to number of years respondents engaged in farming. The actual number of years respondents engaged in farming was noted. The scoring pattern followed was as follows

Sl. No.	No. of years	Score
1	<10	1
2	10-20	2
3	21-30	3
4	31-40	4
5	41-50	5
6	>50	6

3.5.6 Farm size

Farm size can be defined as the functional area undertaken for farming activities, and is measured in acres. Actual land area under farming by the respondents was directly asked. From the data collected mean and SD was calculated and scoring procedure is as follows

Sl. No.	Category	Score
1	<1 acre	1
2	1-2 acre	2
3	>2 acre	3

3.5.7 Area under cassava cultivation

Operationally defined as actual land possessed by the respondent under cassava cultivation and expressed in cents. Actual land area under tapioca grown by farmers were collected and divided into categories of high, medium and low by calculation of mean and standard deviation.

Sl. No.	Category (cents)	Score
1	Low (50-150)	1
2	Medium (151-250)	2
3	High (251-350)	3

3.5.8 Information seeking behaviour

Refers to sources or channels from which farmers get technological information regarding agriculture. Scoring procedure followed by Anupama (2014) was used for the study. Different communication means like television, radio, newspaper, agricultural literatures, trainings and mobile phones was listed as sources. The respondents were asked to rate them on a three-point continuum as frequently (3), occasionally (2) and rarely (1). This was summed and divided into categories of high, medium and low by calculation of mean and standard deviation.

Sl. No.	Category	Score
1	Low (<14)	1
2	Medium (14-23)	2
3	High (>23)	3

3.5.9 Innovativeness

According to Rogers (1983) innovativeness is defined as the degree to which a person is relatively earlier in adopting a new idea considering the other members of the society. Scoring procedure by Singh and Choudary (1977) was followed. Respondents were asked to give responses for adopting improved practices in cassava cultivation and they were fitted into different categories as follows.

Sl. No.	Particulars	Score
1	As soon as it is brought to my knowledge	3
2	After I have seen other farmers tried successfully in their farm	2
3	I prefer to wait and take my own time	1
4	I am not interested in adopting improved farming practices	0

3.5.10 Attitude of farmers towards cassava production technologies

Attitude of farmers towards cassava production technologies is operationally defined as the degree of agreeability or disagreeability of the farmers towards various production technologies. For the quantification of data scale used by Patel (2005) with minor modifications was used in the study. Scale consisted of 7 statements which were alternatively positive and negative. A five point continuum scale ranging from strongly agree, agree, undecided, disagree and strongly disagree having scores 5, 4, 3, 2, and 1, respectively was given to respondents for marking their responses. In case of negative statements, the whole scoring procedure was reversed.

The scores ranged from 0 to a maximum of 35. Mean and standard deviation was calculated and respondents were further categorized into groups of low, medium and high.

DEPENDENT VARIABLES

3.5.11 Extent of knowledge

Knowledge was operationalized as the respondent's level of understanding to various scientific production technologies. For calculating the knowledge levels, a teacher made test was used for the study. A separate test consisting of 12 questions including the production practices of KAU, POP and 10 questions for technologies of CTCRI was used. A score of one was given to the correct answer and zero to wrong answer.

$$\text{Knowledge Index (KI)} = \frac{\text{Obtained knowledge score}}{\text{Maximum knowledge score}} \times 100$$

Total knowledge score was calculated by summing up the scores. KI was worked out using the above formula. Further, respondents were arranged into categories of low, medium and high based on scores.

3.5.12 Adoption behaviour of farmers to various technologies

Adoption behaviour was calculated using the formula given by Singh and Singh in 1967 for adoption quotient. In this research, adoption level refers to the adoption of recommended cultivation practices of cassava by the respondents of the study. Fifteen recommended practices from package of practices of KAU and 10 from CTCRI package had been used for the study. The scoring was done on the basis of three-point continuum for full adoption, partially adoption and no adoption with scores of 3, 2, 1 respectively. The adoption quotient was calculated using the formula.

$$\textbf{Adoption Quotient (AQ)} = \frac{\sum_{i=1}^{n} \frac{e_i}{p_i} \times 100}{N}$$

Where, AQ = Adoption quotient

ei = Extent of adoption of each practice

pi = potentiality of adoption of each practice

N= Total number practices selected

Based on total adoption quotient, its mean and standard deviation were calculated and respondents were categorized as high, medium and low adopters.

3.5.13. Constraints faced by cassava farmers

Use of force to prevent or influence an action is constraints as defined by Reading (1971). The Oxford dictionary simply states the meaning of word constraints as confinement, restriction of liberty or compulsion of circumstances, or simply compulsion put upon the behaviour**.**

It can be operationally defined as problems, encounters or difficulties faced by cassava farmers during adoption of various cassava production technologies at field level. The constraints were listed and further analyzed on the basis of calculation weighted mean and further ranked.

3.7 STATISTICAL TOOLS USED IN THE STUDY

3.7.1 Frequency and percentage analysis

For simple comparison and classification of the respondents, the selected variables were subjected to and interpreted using frequency and percentage analysis, wherever it was found necessary. First frequency was calculated and the percentage was obtained by multiplying it with 100 and then further dividing it with total number of respondents.

3.7.2 Arithmetic mean

Arithmetic mean was calculated by summing of all individual scores and dividing it by frequency.

3.7.3 Standard Deviation (SD)

It is the most stable index of variability which can be used in research studies. It is the measure of variability calculated around mean. It is usually denoted by Greek word (σ) ie sigma

3.7.4 Coefficient of correlation

Correlation analysis was done to illustrate the relationship between the dependent and independent variables of study. Correlation coefficient measures the association or relation between the dependent variable and the different independent variables.

3.7.5 Weighted mean

It is similar to normal average, but here each of the data points equally to the final average.

3.7.6 t test

t test is a type of inferential statistic used to determine if there is a significant difference between means of two groups, which may be related in certain features. t test was done assuming equal variance, and to check whether the two means are usable even if standard deviation differs.

3.8 HYPOTHESIS

The following were the hypotheses formulated in order to fulfill the

objectives of the study

H0: The farmers exhibit very low knowledge level with regard to the selected cassava production technology of KAU

H0: The farmers exhibit very low knowledge level with regard to the selected cassava production technology of CTCRI

H0: The extent of adoption of selected KAU practices of cassava is found to be low

H0: The extent of adoption of selected CTCRI practices of cassava is found to be low

H0: There is no significant relationship between the knowledge level and the independent variables

H0: There is no significant relationship between the extent of adoption and the independent variables

CHAPTER 4

RESULTS AND DISCUSSION

This chapter deals with the results of the survey and discussions of the data presented. The data were collected from 80 respondents from two blocks, Sasthamkotta and Ithikara of Kollam district and appropriate statistical tests were used for drawing the inferences from it. The results of the study are presented and discussed under the following headings.

4.1. Distribution of cassava farmers based on independent variables

4.2. Distribution of cassava farmers based on dependent variables

4.3.Comparison of adoption of KAU Package of Practices with CTCRI cassava production technology

4.4. Relationship between independent and dependent variables

4.5.Constraints faced by the farmers in adoption of cassava production technology

4.6. List of ITKs followed by traditional cassava farmers

4.1 Distribution of cassava farmers based on independent variables

The results pertaining to the selected characteristics with reference to age, education, family size, means of livelihood, farming experience, farm size, area under cassava cultivation, innovativeness, information seeking behaviour and attitude have been presented under the following sub heads.

4.1.1 AGE

Age of an individual denotes the chronologically completed calendar years by the respondent at the time of interview. The distribution of respondents according to their age group is presented in Table 1.

Table 1: Distribution of respondents according to their age group

(n=80)

Sl. No.	Age	Frequency	Percentage
1	Young (< 35 years)	04	05.0
2	Middle (35-55 years)	30	37.5
3	Old (>55 years)	46	57.5
	Total	**80**	**100**
Mean :57.57 SD :10.65 Max :70 Min :40			

Results showed that, majority of the respondents (57.5%) belonged to old age group (>55 years) followed by 37.5 per cent respondents in middle age group (35-55 years) and 5 per cent belonged to young age group (<35 years). Mean age of respondents was found to be 57.57 years with minimum age being 40 and maximum being 70. Similar findings were also revealed by Mate (2005).

4.1.2 EDUCATION

Educational status can be operationally defined as the academic qualification in terms of formal education obtained by the respondents. The data regarding education of respondents are presented in Table 2.

Table 2: Distribution of respondents according to their educational level

(n=80)

Sl. No.	Education	Frequency	Percentage
1	Primary school (1^{st} to 4^{th} std)	01	01.25
2	Middle school (5^{th} to 7^{th} std)	10	12.50
3	High school (8^{th} to 10^{th}std)	29	36.25
4	Higher secondary school (11^{th} to 12^{th}std)	15	18.75
5	College education	25	31.25
	Total	**80**	**100**

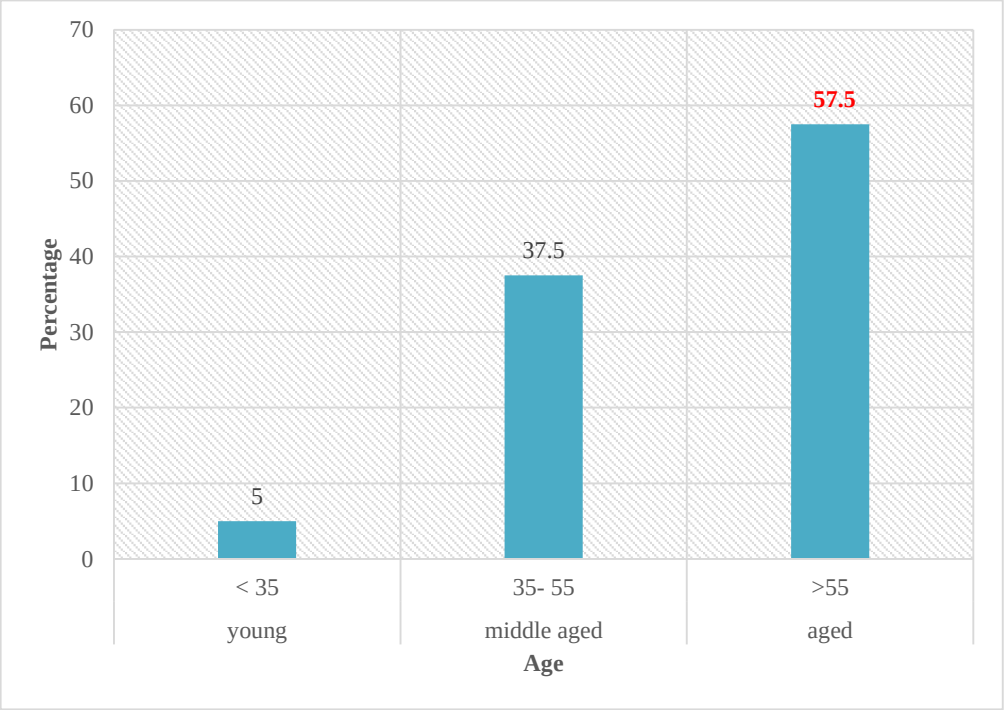

Fig. 4. Distribution of respondents based on age.

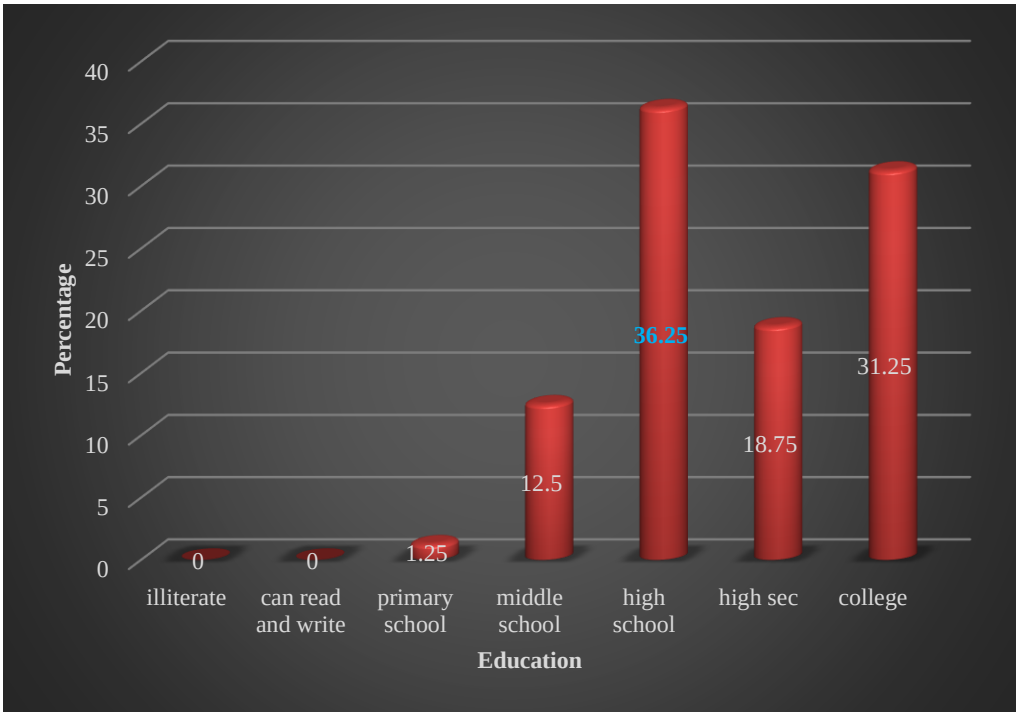

Fig. 5. Distribution of respondents based on education

Table 2 shows that more than half of the respondents were having education from high school to college level. Among them majority group of farmers had high school education i.e. (36.25%). Higher educational status throws light into the high literacy rate of Kerala. According to the census report 2011, the literacy rate of the Kollam district was recorded to be 94.06 per cent of which 96.03% and 92.29% were literate males and females, respectively (GOI, 2011).

4.1.3 FAMILY SIZE

Operationally defined as the number of family members living together including the head of family at the time of interview. The results are presented in Table 3.

Table 3: Distribution of respondents according to the size of family

(n=80)

Sl. No.	**Category**	**Frequency**	**Percentage**
1	2-4 members	41	51.25
2	5-7 members	39	48.75
	Total	**80**	**100**

Data recorded showed that majority of the families had only 2 to 4 members (51.25 per cent) which showed the increasing trend of nuclear families in Kerala. Kamarulzaman (2011) in their study concluded that most of the family (68.86 %) of the respondents were nuclear family ranging from 2 to 5 members.

4.1.4 MEANS OF LIVELIHOOD

The main occupation of the person at the time of interview was determined as his/her means of livelihood. The distribution of cassava farmers based on the classification is presented in Table 4.

Table 4. Distribution of respondents according to their profession

(n=80)

Sl. No.	Category	Frequency	Percentage
1	Primary (Agriculture alone)	46	57.5
2	Secondary (Others + agriculture)	34	42.5
	Total	**80**	**100**

From the above table it is clearly evident that higher per cent of people were engaged in farming as their sole means of livelihood. The area selected for study was high in number of farmer groups and majority of them continued their ancestors' means of livelihood instead of being driven towards white collar jobs. Similar findings were also reported by Deshmukh (2007).

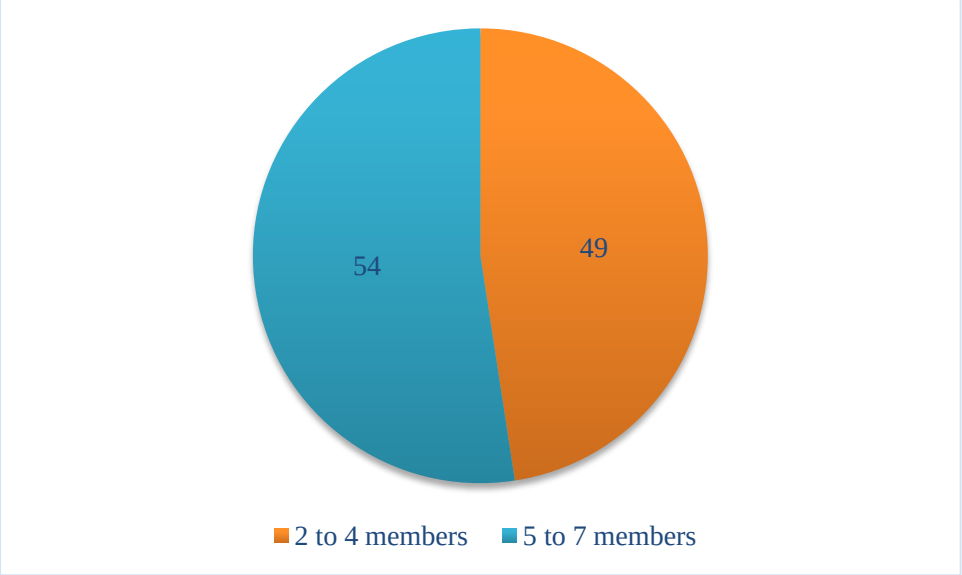

Fig. 6: Distribution of respondents based on family size

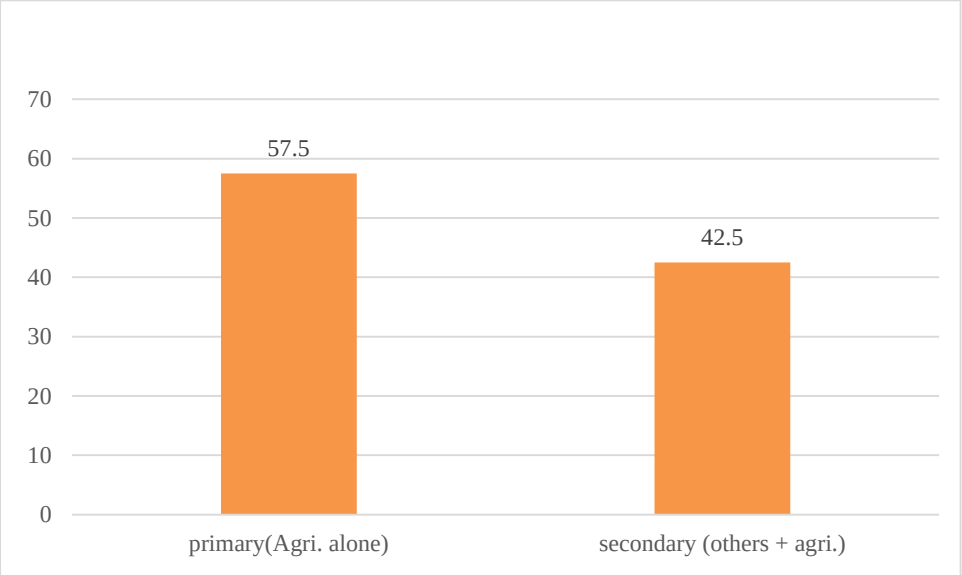

Fig. 7: Distribution of respondents based on means of livelihood

4.1.5 FARMING EXPERIENCE

It is operationally defined as the number of years respondents are engaged in farming. Distribution of the respondents with respect to the experience in farming is given in Table 5.

Table 5. Distribution of respondents according to their experience in farming

(n=80)

Sl. No.	**Experience in cassava cultivation (No. of years)**	**Frequency**	**Percentage**
1	<10	12	15.00
2	10-20	36	45.00
3	21-30	22	27.50
4	31-40	07	08.75
5	>50	01	01.25
	Total	80	100
Mean: 20.18 SD: 11.32 Max: 60 Min: 6			

In Table 5 it is indicated that, majority of the respondents (45%) had 10-20 years of experience in cassava cultivation, followed by 27.5 per cent with 21-30 years of farming experience, also majority of farmers were having more than 10 years of farming with shows cassava is one of the native traditional crop of the region. These findings are in similarity with Vaishali (2010).

4.1.6 FARM SIZE

Operationally defined as total farm area owned by the respondent at the time of survey. The respondents were asked to give total farm area in acres. The information regarding the farm size are presented in Table 6.

Table 6. Distribution of respondents according to farm size

(n=80)

Sl. No.	Farm size	Frequency	Percentage
1	<1 acre	34	42.50
2	1-2 acres	23	28.75
3	>2 acres	23	28.75
	Total	**80**	**100**
Mean: 1.21 SD: 11.32 Max: 5 acres Min: 0.55 acre			

It is observed from Table 6 that, nearly half of the cassava farmers (42.5%) had land holding up to 1 acre followed by 28.75 per cent cassava farmers who had 1.0 to 2.00 acre and >2 acre of land by 28.75 per cent farmers. Average land holding of cassava farmers in study was found to be 1.21 acres.

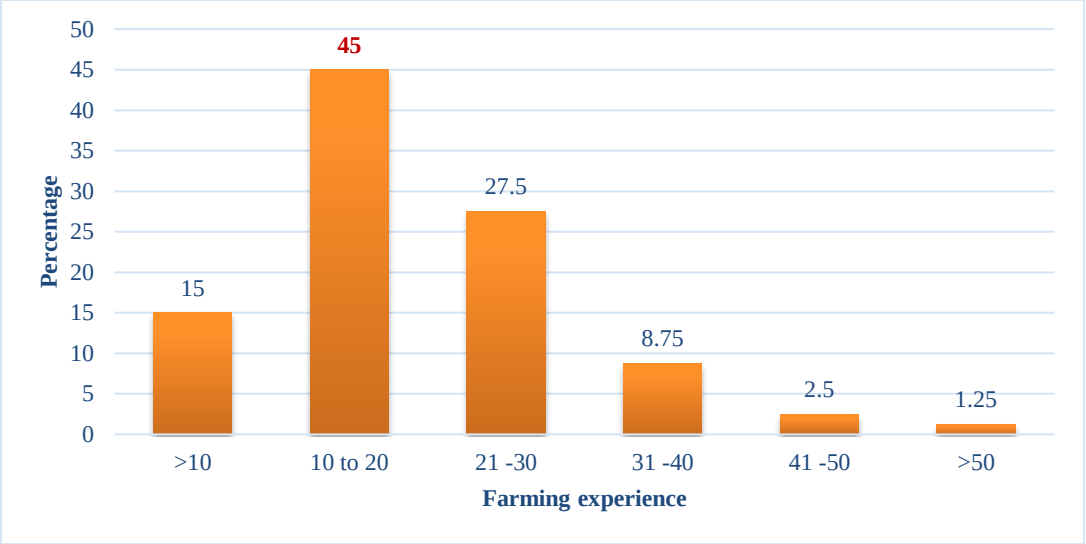

Fig. 8. Distribution of respondents based on farming experience

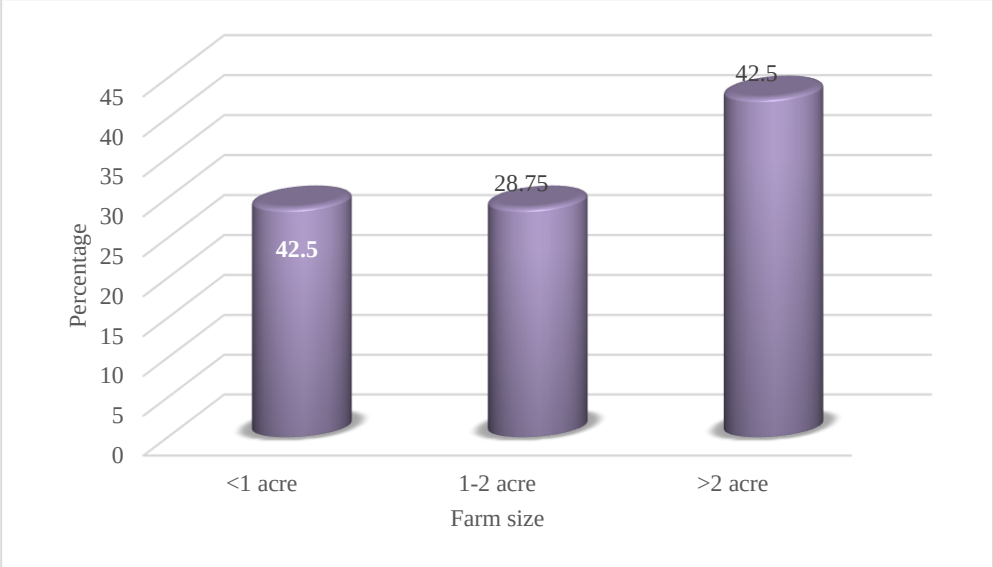

Fig. 9. Distribution of respondents based on farm size

Census report (2011) showed that per capita land availability in Kerala is only 0.13 ha. This can be the main reason for higher percentage of marginal farm size land holders. Findings of Anu (2017) showed similar results.

4.1.7 AREA UNDER CASSAVA CULTIVATION

Area under cassava cultivation is operationally defined as land which is used for cultivation of cassava. The data relating to area under cassava cultivation are presented in Table 7.

Table 7. Distribution of respondents according to area under cassava cultivation

(n=80)

Sl. No.	**Area under cassava cultivation(cents)**	**Frequency**	**Percentage**
1	Low (50-150)	61	76.25
2	Medium (151-250)	14	17.50
3	High (251-350)	05	06.25
	Total	**80**	**100**
Mean: 97.7 SD: 58.4 Min: 50 Max: 300			

Table 7 shows that, majority of cassava farmers (76.25%) had low area under cassava cultivation (50 to 150 cents) followed by 17.5 per cent respondents under medium area (151-250 cents) followed by 6.25 per cent having high (251-350 cents) area. Mean area under cassava cultivation was found to be 97.7 cents.

Thus, it could be seen that majority of the cassava farmers had low area under cassava cultivation. These findings are in par with that of Natraja and Natrajan (2015).

4.1.8 INNOVATIVENESS

According to Rogers (1983) innovativeness is defined as the degree to which a person is relatively earlier in adopting a new idea considering the other members of the society. It is the farmers keenness in knowing about new technologies and ideas, making ideal changes in farming operations, accepting them and practically applying them at field level those ideas which seem feasible for them. The distribution of

respondents on the basis of their innovativeness is presented in the Table 8.

Table 8. Distribution of respondents according to innovativeness

(n=80)

Sl.No.	Innovativeness	Frequency	Percentage
1	Low	26	32.5
2	Medium	38	47.5
3	High	16	20.0
	Total	**80**	**100**
Mean: 20 SD: 12.96			

Data from Table 8 reveals that, majority of cassava farmers fell under the medium category (42.5 %), followed by 32.50 per cent with low and 20 per cent with high innovativeness. Large number of cassava farmers fall into medium innovativeness category as most farmers applied new ideas on to their fields only after seeing it successful under other farmer's field and the other category stick onto their traditional means. These findings are in similarity with the findings of Kantheti (2018) and Rathwa(2018).

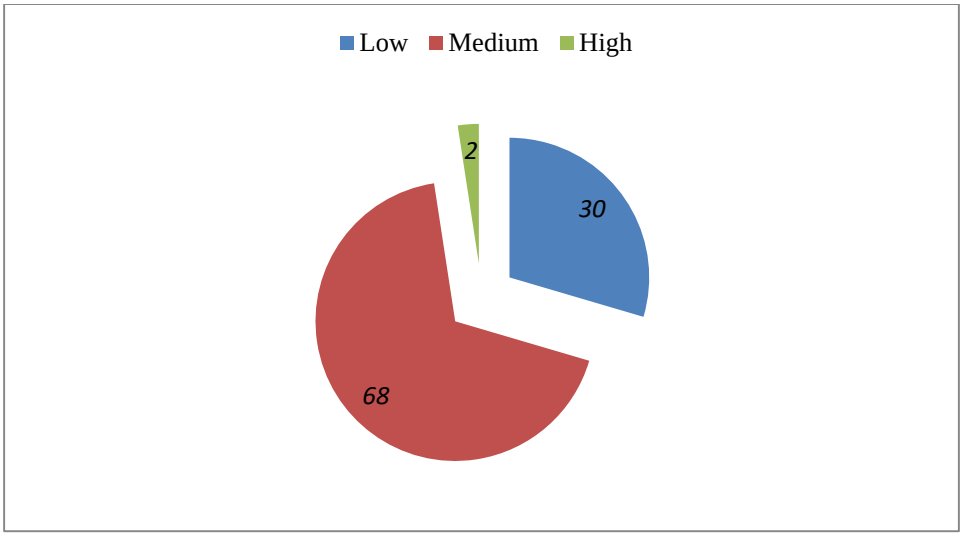

Fig.10. Distribution of respondents based on area under cassava cultivation (cents)

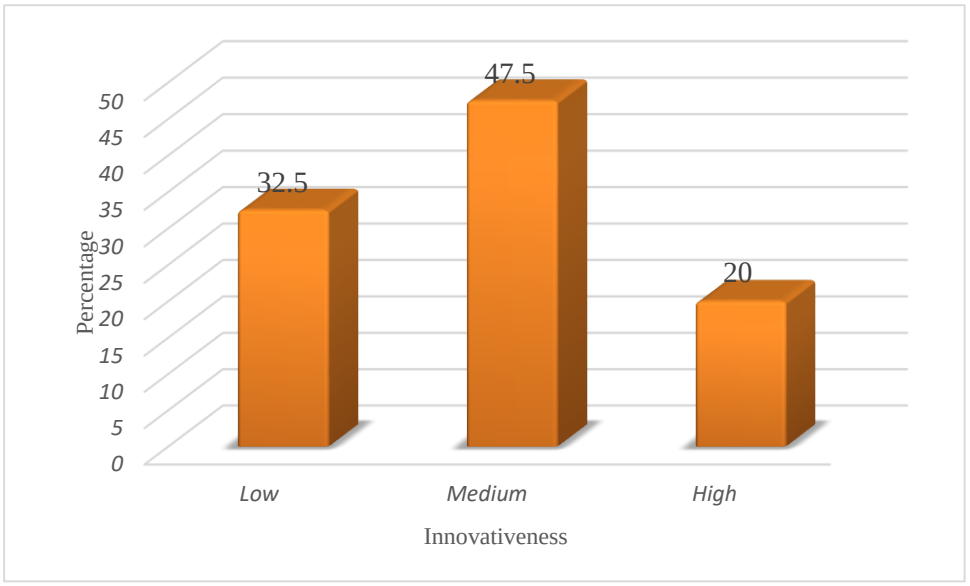

Fig 11. Distribution of respondents based on innovativeness

4.1.9 INFORMATION SEEKING BEHAVIOUR

The information seeking behaviour of farmers depend upon their communication channels and accessibility to resources. Many of the respondents surveyed regularly attended training, were in close contact with Krishi bhavans and active in social networks like WhatsApp groups

Table 9. Distribution of respondents according to information seeking behaviour.

(n=80)

Sl. No.	**Category**	**Frequency**	**Percentage**
1	Low (<14)	11	13.75
2	Medium (14-23)	52	65.00
3	High (>23)	17	21.25
	Total	**80**	**100**
Mean:18.52 SD: 4.49 Min: 10 Max: 27			

On perusal of Table 9 it is observed that, respondents (65%) mainly fall into medium level of information seeking behaviour, followed by 21.25 per cent and 13.75 per cent in high and low level of information sources respectively. The results are in line with the findings of Sarada (2016).

4.1.10 ATTITUDE OF FARMERS TOWARDS CASSAVA PRODUCTION TECHNOLOGY

Attitude of the respondents towards cassava production technologies were investigated with the aid of seven statements which were alternatively positive and negative. Results are shown in Table 10.

Table 10: Distribution of respondents according to their attitude towards cassava production technology.

(n=80)

Sl. No.	Category	Frequency	Percentage
1	Low (<47)	08	10.00
2	Medium (47-59)	61	76.25
3	High (>59)	11	13.75
	Total	**80**	**100**
Mean: 52.87 SD: 5.90 Min: 38 Max: 70			

From the Table 10 it is clearly evident that majority of the farmers had favourable and medium attitude (76.25%) followed by high and low groups which consisted of 13.75% and 10%, respectively towards various factors influencing the cassava cultivation. It can be clearly seen that attitude of the farmers towards adoption of technology was showing a positive and favourable attitude. This result showed that farmers were reacting positively to production technology and they wanted to reap profits, in their farming endeavors.

Favourable attitude of the respondents is because of higher returns by cultivating the crop through better technologies. The active participation of the nearby Krishibhavans and KVK had added to increase in cultivation of cassava in the area. Formation of cluster groups among farmers, trainings attended also helped in forming favourable attitude. Similar results were reported by Hanjabam (2013).

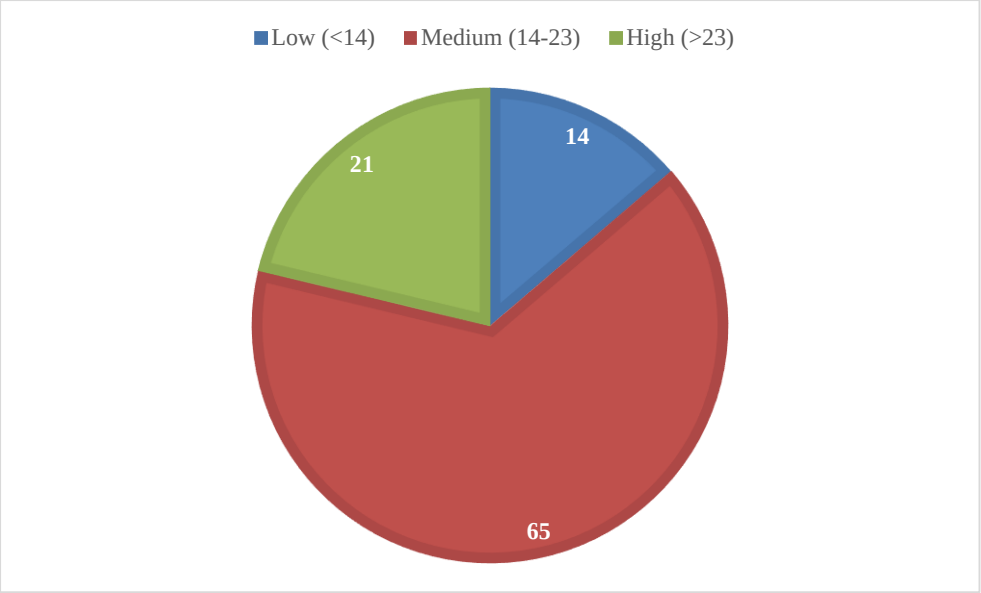

Fig. 12. Distribution of respondents based on information seeking behaviour

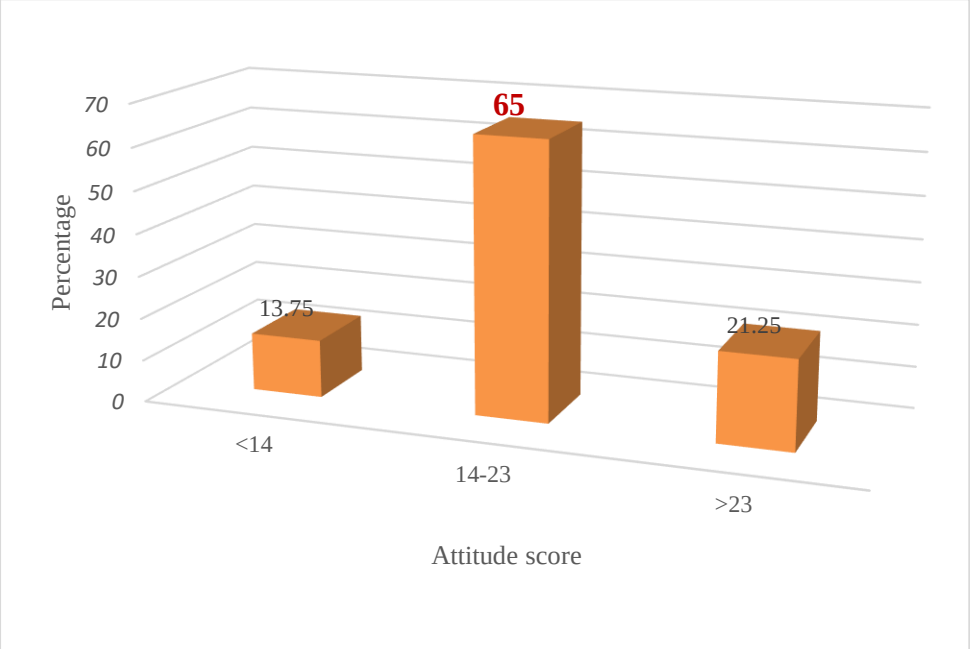

Fig. 13. Distribution of respondents based on attitude towards cassava production technology

4.2 DISTRIBUTION OF CASSAVA FAEMERS BASED ON THEIR DEPENDENT VARIABLES

4.2.1 Extent of knowledge

Knowledge of cassava farmers about the cassava production technology on both KAU Package of Practices (POP) and those related to Central Tuber Crops Research Institute (CTCRI) was studied.The distribution of respondents according to their KAU Package of Practices (POP) wise knowledge is presented in Table 11.

Table 11. Distribution of respondents on the basis of their knowledge regarding KAU POP

(n=80)

Sl. No.	Knowledge score	Frequency	Percentage
1	Low (<7)	06	07.50
2	Medium (7-10)	67	83.75
3	High (>10)	07	08.75
	Total	**80**	**100**
Mean: 8.42 SD: 1.57 Min: 3 Max: 12			

From the data given in Table 11 it is quite clear that a high mean value of 8.42 shows that most of the farmers had strong understanding of the production technologies as per KAU, POP. Only a very small fraction of farmers (7.5%) were in low category which may be due to poor information seeking behavior and less extension agency contact. Similar findings were reported by Rai *et al.* (2012).

Following 12 aspects in KAU POP was administered to the respondents to check their knowledge level and the results are given in Table 12.

Table 12: Knowledge level of respondents regarding various KAU POP technologies in cassava production

(n=80)

Sl.No	Questions	Correct answer	
		Frequency	Percentage
1	What is the best planting season for tapioca tubers?	67	83.75
2	Setts of how much length is used for planting?	62	77.50
3	For planting 1 ha how much setts are required?	47	58.70
4	What is the best method of planting?	72	90.00
5	What is the spacing recommended by KAU in planting tubers?	47	58.70
6	Hoeing and shallow diggings are given upto how many days after planting?	71	88.70
7	Which variety is suitable for intercropping in coconut gardens?	8	10.00
8	Do you know what crop can be intercropped with tapioca mainly during early stages?	60	75.00
9	Name any one cassava mosaic tolerant variety?	25	31.25
10	Name any one hybrid variety?	68	85.00
11	Which plants can be used for warding off rodents in farm areas?	68	58.00
12	When will tapioca become ready for harvesting?	79	98.75

From the above Table it is clear that harvesting time of tapioca (98.75%), best method of planting setts (90%), conduct of intercultural operations like hoeing and diggings (88.7%) were known widely among the farmer groups.

The distribution of respondents according to their knowledge on Central Tuber Crops Research Institute (CTCRI) cassava production technologies is presented in Table 13.

Table 13: Distribution of respondents on the basis of their knowledge regarding CTCRI cassava production technologies

(n=80)

Sl. No.	Knowledge score	Frequency	Percentage
1	Low (<3)	02	02.50
2	Medium (3-7)	71	88.75
3	High (>7)	07	08.75
	Total	**80**	**100**
Mean: 4.96 SD: 1.69 Min: 1 Max: 9			

From the Table 13 it is clear that majority of the farmers belonged to medium category (88.75 %) followed by high and low categories having 8.75 % and 2.5 % respectively regarding their level of knowledge of CTCRI cassava production technologies. A mean score of 4.96 shows farmers have better understanding of CTCRI technologies. This is in line with works of Kumar (2004). Following 10 aspects were included in the interview schedule and administered to the respondents to test their knowledge level on CTCRI cassava production technologies. The results are given in Table 14.

Table 14: Knowledge level of respondents regarding various CTCRI technologies in cassava production

(n=80)

Sl.No	Questions	Correct answer	
		Frequency	Percentage
1	Varieties –Sree Visakham, Sree Vijaya, Sree Sakthi, Sree Athulya, Sree Jaya, Sree Pavithra	53	66.25
2	First intercultural operations at 40-45 DAP	72	90.00
3	Fertilizer recommendation (NPK): 100:50:100 kg/ha	26	32.50
4	Application of *Beauvaria bassiana* and *Metarhizium anisopliae* for white fly control	24	30.00
5	Spraying water at 10 days interval on leaves for control of red spider mite	43	53.75
6	Customized fertilizers based on site specific nutrient management	28	35.00
7	Multinutrient liquid formulations for micronutrient application	24	30.00
8	Poison baiting using 2% zinc phosphide mixed with rava, sugar and oil (90:5:3) for field rats	35	43.75
9	Mulching and green manuring for eco-friendly weed control	72	90.00
10	Use of Sree Poshini a mobile app for tuber crops	21	26.25

From the Table 14 it is clear that technologies like mulching and green manuring for ecofriendly weed control and performing first intercultural operations at 40 to 45 days after planting had a higher frequency in knowledge.

Distribution of farmers on the basis of level of knowledge about the selected cassava production technology (CTCRI) about 88.75 per cent of farmers had medium

knowledge.. Rai *et al.* 2012 in their study on knowledge about mustard production technology showed that majority of the respondents knew well about the method of planting and various intercultural operations.

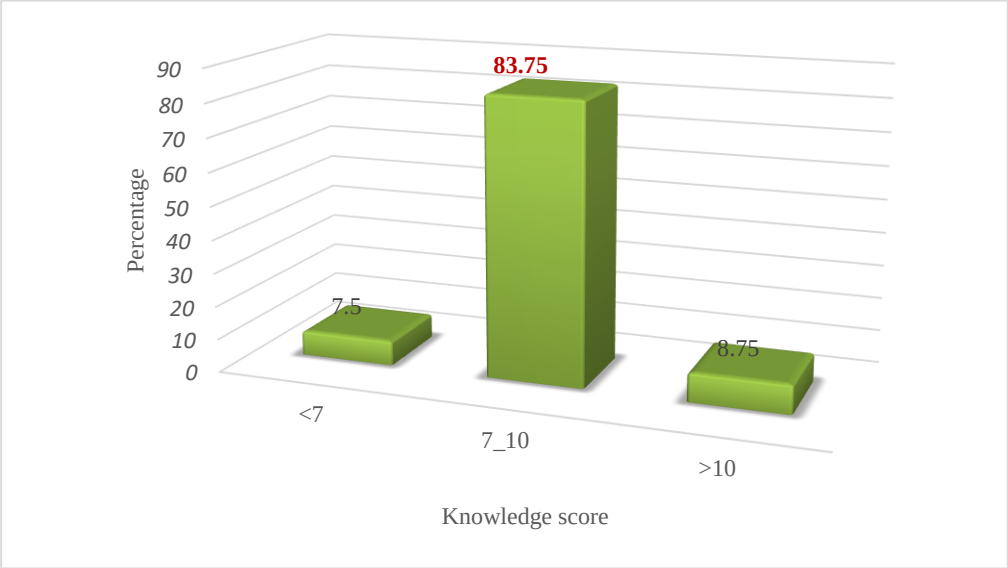

Fig. 14. Distribution of farmers on the basis of level of knowledge about the selected cassava production technology (KAU)

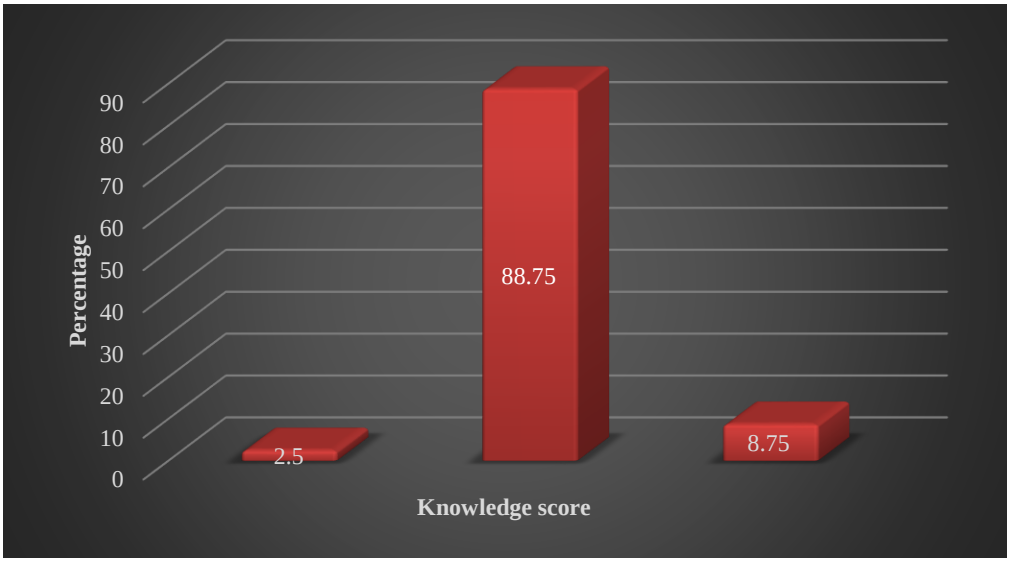

Fig. 15: Distribution of respondents on the basis of level of knowledge about the selected cassava production technology (CTCRI)

4.2.2 **Adoption behaviour of respondents regarding cassava production technology**

Adoption is defined as degree of actual use of improved cassava production technologies from KAU-POP and CTCRI technologies. Response from respondents was measured on three point continuum as complete adoption, partial adoption and no adoption by assigning score as 3, 2 and 1, respectively. The data pertaining to the adoption of respondents is collected and presented in Table 15.

Table 15. Distribution of respondents according to the adoption quotient (KAU POP)

(n=80)

Sl. No.	Category	Frequency	Percentage
1	Low (<62)	15	18.75
2	Medium (62-78)	53	66.25
3	High (>78)	12	15.00
	Total	**80**	**100**
Mean: 69.83 SD: 8.45 Min: 53.33 Max: 88.88			

Data from Table 15 shows that majority of cassava farmers had medium level of adoption (66.25%) followed by low (18.75%) and high (15%) level of adoption of cassava production technology. This is in line with the work of Singh *etal.* (2010).

Table 16. Adoption rate of cassava production technologies of KAU POP

(n=80)

Sl.No	Particulars	Percentage
1	Varieties: Vellayani Hraswa, Nidhi, Kalpaka	49.2
2	Discard 10 cm of lower mature end and 30 cm of upper immature end of harvested stems	90.4
3	Setts of 15-20 cm are used for planting	89.6
4	Spacing – Branching :90 x 90cm Non branching :75 x 75cm	77.5
5	FYM – 12.5 t/ha during land preparation	62.0
6	Gap filling within 15 DAP with longer setts of 40 cm length	85.4
7	Fertilizer recommendation (NPK kg/ha) H-97, H 226-75:75:75 M-4 , Local-50:50:50	52.0
8	Application of Zn as $ZnSo_4$ @12.5 kg/ha	48.3
9	2-3 shallow diggings upto 90 DAP followed by light earthing up	87.5
10	Intercropping with groundnut, cowpea, black gram and green gram	55.4
11	Carbaryl 10% in mounds prior to planting	38.0
12	Planting 2 rows of ginger or turmeric along the borders to ward off	76.7

	rodents	
13	Minisett planting technique	53.0
14	Production of disease free planting material of tapioca by nursery techniques	83.3
15	Harvested stems are stored vertically in well aerated places	99.2

From the Table 16 it is clearly evident that the practice of storing the harvested stem vertically in well aerated places (99.2%), discarding the lower 10 cm mature end and upper 30 cm immature end of harvested stems to be used for planting (90.4%), setts i.e. the planting material size of 15-20 cm (89.6%) are the widely used practices that are followed by farmers. Similar findings are seen in works of Pal *et al*. (2015).

Table 17. Distribution of respondents according to the adoption quotient of CTCRI cassava production technologies

(n=80)

Sl. No.	**Category**	**Frequency**	**Percentage**
1	Low (<45)	09	11.25
2	Medium (45-67)	58	72.50
3	High (>67)	13	16.25
	Total	**80**	**100**
Mean: 56.49 SD: 11.14 Min: 40 Max: 93.33			

From the Table 17, it is understood that a majority of cassava growers falls under medium category (72.5%) while 16.25 per cent belong to high category and only 11.25 per cent belong to the low adoption category. Mean score of 56.49 showed that majority of the farmers were applying improved technologies in their field and were inclined to adoption of better production technologies. Ajieh (2014) in his work had reported similar conclusions.

Table 18. Adoption rate of cassava production technologies of CTCRI

(n=80)

Sl. No.	Practices	Percentage
1	Varieties –SreeVisakham, Sree Suvarna, Sree Vijaya, Sree Sakthi, SreeAthulya, Sree Jaya, Sree Pavithra	54.50
2	First intercultural operations at 40-45 DAP	81.25
3	Fertilizer recommendation (NPK in kg/ha) 100:50:100	47.50
4	Application of *Beauvaria bassiana* and *Metarhizium anisopliae* for white fly control	45.41
5	Spraying water at 10 days interval on leafs for control of red spider mite	60.41
6	Customized fertilizers based on site specific nutrient management	54.58
7	Multinutrient liquid formulations for micronutrient application	44.50
8	Poison baiting using 2% zinc phosphide mixed with rava, sugar and oil (90:5:3) for field rats	47.08
9	Mulching and green manuring for eco friendly weed control	89.16
10	Use of *Sree Poshini,* a mobile app for tuber crops	40.41

From the Table 18 it is clearly evident that using mulching and green manuring for ecofriendly weed control (89.16%), performing intercultural operations at 40-45 DAP (Days After Planting) were the main practices largely adopted by the respondents in the study area. Thus, we can draw conclusion that, cassava farmers had medium adoption level for various production technologies of CTCRI. Considering the knowledge, it's been already discussed that most of the respondents had medium to high level of knowledge. Hence, we can say that extension agencies and officials have to tailor and improve the adoption of innovative techniques in fields and narrow down the technological gap that exist, i.e. bringing the lab to farmers fields. These findings are aided by the similar findings by Singh *et al*. (2013) and Mandavkar and Talathi (2013).

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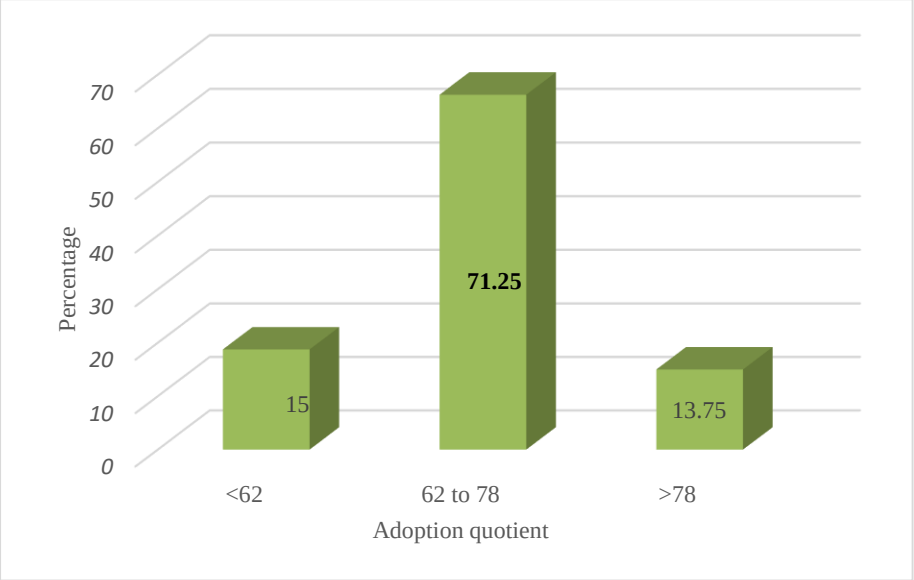

Fig. 16. Distribution of respondents based on the adoption quotient (KAU)

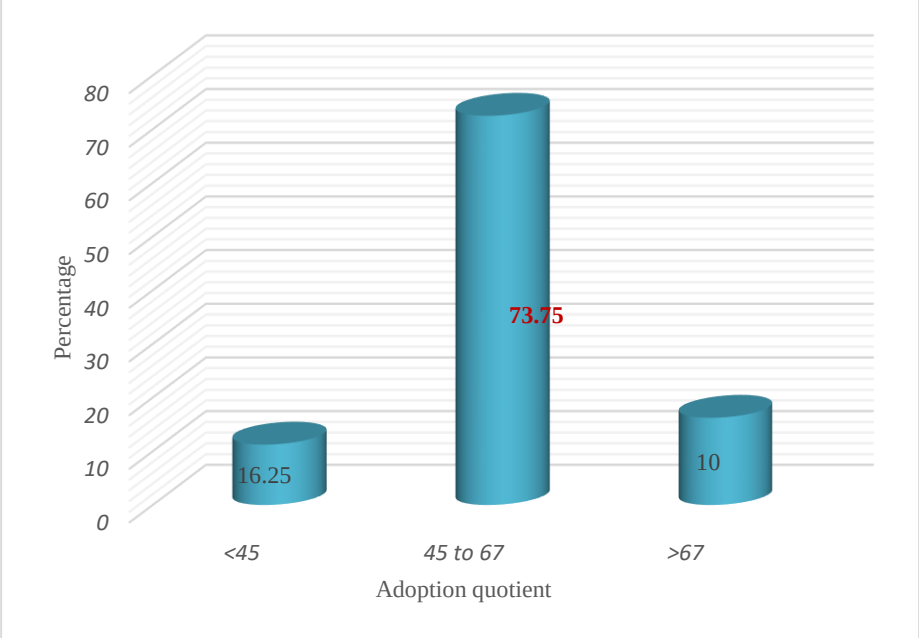

Fig. 17. Distribution of respondents based on the adoption quotient (CTCRI)

4.3. Comparison of adoption of KAU Package of Practices with CTCRI cassava production technology

A t test of two sample assuming equal variance was performed using the AQ (Adoption Quotient) values and the results are shown in Table 19.

Table 19: Comparison of adoption of KAU Package of Practices with CTCRI cassava production technology

(n=80)

Particulars	AQ of POP, KAU	AQ of CTCRI
Mean	69.83333	56.5
Variance	71.48304	122.616
Observations	80	80

Pooled Variance	97.04954	
df	158	
t Stat	8.559965	
t Critical one-tail	1.654555	

From the above Table 19 it can be inferred that calculated value of t is found to be greater than the table value, results are found to be significant. From the table we can reach to the conclusion that respondents were adopting more production technologies recommended by Package of Practices of KAU than the CTCRI techniques.

4.4. Relationship between independent and dependent variable

In order to draw relationship between selected profile, socioeconomic, attitude characteristics of respondents with knowledge and adoption of technologies, coefficient of correlation was worked out.

The results obtained from relational analysis of adoption and knowledge are presented in Table 20.

Table 20. Relationship between extent of adoption and the independent variables

(n=80)

Sl. No.	Independent variables	Correlation coefficient
1	Age	0.029
2	Education	0.261*
3	Family size	0.003
4	Means of livelihood	0.084
5	Farming experience	0.031
6	Farm size	0.105
7	Area under cassava cultivation	0.075

8	Innovativeness	0.394**
9	Information seeking behaviour	0.341**
10	Attitude	0.187*

(*5% level of significance, **1% level of significance)

Table 20 shows that education and attitude were positively and significantly correlated with extent of adoption at 1 per cent level of significance whereas, innovativeness and information seeking behaviour were positively and significantly correlated at 5 per cent level.

A significant and positive relation was found between adoption of technologies and education of farmers. Education has a key role to play in designing the lifestyle of a person. So an educated person will have more influence on knowledge sources and further more knowledge is the prior step in diffusion process. In turn this shows education and adoption has direct influence. Similar results can be seen in studies of Gangadharan (1993) and Jaganathan (2004).

Positive and significant relationship with adoption and information seeking behaviour shows that farmers who have more access to various sources of information tend to adopt new technologies. Also, a large proportion of respondents adopted technologies in their fields which were successful in fellow grower's fields. Similar findings were noted by Sherief *et al.* (2008).

A positive and significant relationship was found between extent of adoption and innovativeness of the farmers. Growers who are progressive in outlook and keep on updating their farming practices according to changing trends can be called innovative. Increased participation of agricultural institutions' and a greater number of progressive farmers in the area was the reason for increased innovation proneness among farmers. Works by Sherief *et al.* (2008) showed similar results.

A positive and significant relation was found between attitude of the farmers and extent of adoption. It shows that a favorable attitude promotes better production

means. Similar results were reported by Singh and Singh (1967)

Table 21: Relationship between Knowledge and the independent variables

(n=80)

Sl. No.	Independent variables	Correlation coefficient
1	Age	0.037
2	Education	0.324**
3	Family size	-0.088
4	Means of livelihood	0.133
5	Farming experience	0.281**
6	Farm size	0.079
7	Area under cassava cultivation	0.099
8	Innovativeness	0.309**
9	Information seeking behaviour	0.224**
10	Attitude	0.401*

*- 5% level of significance, **-1% level of significance

It is clear that education and knowledge show positive significant relationship. Kerala has highest literacy rate i.e., 94 per cent while comparing with other Indian states, therefore, it is justifiable that in an educated environment knowledge level will also be high. In the present work it can be seen that farming experience is positively significant with the knowledge about cassava production technology. It is obvious that when experience in farming increases, the knowledge level about the corresponding farming practice will increase too. These findings are in conformity with the findings of Reddy (2013) and Kantheti (2018).

A positive and significant relationship between extent of knowledge and information seeking behavior was seen. The farmers acquire additional knowledge

about various production technologies of cassava as to get clear understanding about recommended practices and to mitigate the hardships that come their way. Similar results were observed by Koli (2012).

A positive and significant correlation between innovativeness and extent of knowledge was found. Once enough knowledge is acquired there is possibility of adopting or rejecting new innovative ideas by the farmers. At field level it was seen that this process takes time and usually farmers tend to practically use ideas in their field when it is being successfully employed by the fellow growers. Therefore it is essential that extension agencies should strongly focus on improving the participation of cassava growers, make information accessible and improve attitude of the growers which invariably alters the knowledge level in a positive sense.

The remaining characteristics such as age, means of livelihood, farm size and area under cassava cultivation were non significantly correlated with the knowledge about cassava production technology. Hence, hypothesis regarding these variables are rejected. Sangeetha (2004) in her work on adoption technology of cotton farmers concluded that there was no significant relationship between independent variables such as means of livelihood and farm size.

4.5 Constraints experienced by farmers in cassava cultivation

The constraints faced by farmers in adoption of cultivation practices of tapioca were ascertained. The constraints were identified and ranked by collecting response of each individual respondent. The relevant data in this regard has been presented in below Table 22 and ranked accordingly.

Table 22. Constraints faced by respondents in adoption of cassava production technologies

(n=80)

Sl. No.	Constraints	Weighted mean	Rank
1	High labour cost	3.72	I
2	Lack of credit	1.45	V

3	High cost of inputs	3.18	II
4	Lack of marketing facilities	2.10	IV
5	Scarce water resources	1.33	VII
6	Poor transportation facilities	1.30	VIII
7	Incidence of pest and diseases	2.18	III
8	Poor storage facilities	1.40	VI

From the Table 22 it can be inferred that the most important constraint identified from farmer's side was increased cost of labor. Decreasing labor force led to unavailability of work force at correct time and increased labor cost. The labour charges ranged from Rs. 700 to 900/- including food for the day. This in turn created problems for earthing up at correct time and cassava harvesting which further affected the profit.

Another important constraint was high cost of agricultural inputs. Eventhough cassava can be cultivated in almost all types of soil but additional organic matter and nutrient application leads to increased tuberization. In the area surveyed there was deficit of cooperative fertilizer stores due to which farmers in the study area depended on private agencies for meeting their demand of chemical fertilizers which resulted in increase in cost of cultivation.

The third important constraint noted was incidence of pest and diseases. Mealybugs and cassava mosaic virus tend to decrease production. But the most serious threat faced by farmers was rodent attack. It was seen that no effective control measure was there to completely eliminate rodent attack.

Constraints like lack of transportation facilities and scarce water resources did not pose serious threats and was ranked last. These findings are in conformity with the results of Sunil Kumar (2004), Singh *et al.* (2012) and Rai *et al.* (2012).

4.5. ITK practices in cassava cultivation

Indigenous Technical Knowledge about cassava cultivation practices was collected from the area and are listed as below,

- Setts are planted in slanting position, 2 in number in opposite direction in a single mound for increased tuberization
- Slanting position further protects the plant from excessive rains and strong summer
- Arriving at true planting size of setts by counting the number of nodes
- Adding rice bran increases taste of tubers
- If salt is added in small quantity in plots, it increases life span of tubers
- Raw cow dung is not used as manure as it retards cooking quality
- Filling of bore holes of rats with water so that they die of suffocation

VALIDATION OF THE HYPOTHESES

The following were the hypotheses formulated in order to fulfil the objectives of the study. Based on the analysis and the results obtained the following can be inferred

1. The farmers exhibit very low knowledge level with regard to the selected cassava production technology of KAU

From Table 11 it is evident that the significant proportion of the cassava farmer's i.e.83.75 per cent possessed medium level of knowledge which clearly indicates the hypothesis mentioned is rejected

2. The farmers exhibit very low knowledge level with regard to the selected cassava production technology of CTCRI

The results from Table 13 clearly enumerates that a substantial proportion of the cassava farmers in the study i.e. around 88.75 per cent of them exhibit medium knowledge level with regard to the selected cassava production technology of cassava technology of CTCRI. Hence the hypothesis of the farmers exhibiting low knowledge level is falsified.

3. The extent of adoption of selected KAU practices of cassava is found to be low

It was evident from the results obtained that majority of the cassava farmers

exhibited medium level to high level of adoption of the selected cassava production technology with a mean adoption quotient of 69.83 per cent and scores ranging from 53.33 to 88.88. Hence the assumption on cassava farmers exhibiting low level of adoption is rejected.

4. The extent of adoption of selected CTCRI practices of cassava is found to be low

It was evident from the results obtained that majority of the cassava farmers exhibited medium level to high level of adoption of the selected cassava production technology with a mean adoption quotient of 56.25 per cent and scores ranging from 40 to 93.33. Hence the assumption on cassava farmers exhibiting low level of adoption is rejected.

5. There is no significant relationship between the knowledge level and the independent variables

Table 20 represents the result obtained from the correlation analysis of knowledge level with the independent variables which illustrates that five out of ten independent variables showed positive and significant correlation. Variables namely education, farming experience, innovativeness, information seeking behaviour and attitude were positively and significantly related. Hence there is significant relationship between the knowledge level and the independent variables. Thus, the null hypothesis stated above is rejected.

6. There is no significant relationship between the level of adoption and the independent variables

Table 20 represents the result obtained from the correlation analysis of extent of adoption with the independent variables which illustrates that four out of ten independent variables showed positive and significant correlation. Variables namely education, innovativeness, information seeking behaviour and attitude were positively and significantly related. Hence there is significant relationship between the level of adoption and the independent variables. Thus, the null hypothesis stated above is rejected.

CHAPTER 5
SUMMARY

In India, cassava production is mainly confined to the South Indian states of Kerala, Tamil Nadu and Andhra Pradesh. India is the ninth largest producer of cassava with a total area of 0.24 million hectares and production of 5.1million tonnes (GOI, 2019). The present study entitled "Technology adoption behaviour of cassava farmers in Kollam district" was conducted in order to assess knowledge and adoption of cassava production technology and to enumerate the constraints faced by farmers at field level.

The present study was conducted in Kollam district of Kerala. Farmers having minimum of five years' farming experience were purposively selected from two blocks of Kollam district for the study. Totally 80 farmers were randomly selected and surveyed.

Objective of study

To assess rate of adoption, level of knowledge and constraints faced by cassava growers in adopting Package of Practices (POP) in Kollam district.

The independent variables studied were age, education, family size, means of livelihood, farming experience, farm size, area under cassava cultivation, innovativeness, information seeking behaviour and attitude. Dependent variables studied were knowledge and adoption of cassava production technology.

The data were collected from the farmers by personal interview with the help of well-structured and pre-tested schedule. Statistical measures such as mean, standard deviation, frequency, percentage, t test and coefficient of correlation were used for the interpretation of the data.

The major findings of the study are given below,

1. Majority of farmers belonged to old age group (57.5%)
2. Education level of majority of respondents was upto high school level (36.25%)
3. Majority of them had nuclear family of size with 2-4 members (51.25%)
4. For 57.5% of respondents the sole source of livelihood was agriculture
5. Farming experience of 45% respondents was 10-20 years
6. Farm holding of majority of respondents was less than 1 acre (42.5%),
7. Majority of respondents had less area under cassava cultivation ie 50-150 cents (76.25%)
8. The level of innovativeness among 42.5% respondents was medium
9. More than half of the respondents had medium level of information seeking behaviour (65.00%)
10. A whole majority of growers showed medium level of attitude (76.25%)
11. The respondents in the study area had a higher level of knowledge about KAU POP practices about harvesting time (98.75%), the best method of planting (90.00%) and time for intercultural operations (88.7%)

12. Overall, 83.75 per cent of the farmers had medium level of knowledge about KAU POP cassava production technology.

13. While for CTCRI practices for cassava production 90% of respondents had higher level of knowledge about 1st intercultural operations. Mulching and green manuring practices also showed high level of knowledge.

14. Wholesome of farmers are adopting, vertical storage of harvested stems to be used as planting material (99.2%), discarding ends of stems for planting (99.20%), and true sett size for planting (89.6%)

15. Overall, 66.25 per cent of the farmers had medium level of adoption of cassava production technology (KAU POP)

16. While for CTCRI practices,72.5 per cent respondents showed medium level of adoption, of which intercultural operations (81.25%) and mulching and green manuring technique (89.16 %) were adopted widely

17. Selected variables like education, farming experience, information seeking behavior, innovativeness and attitude showed positive and significant relationship with knowledge, whereas, age, farm size, means of livelihood, area under cassava cultivation were non-significant with the knowledge.

18. The relationship between extent of adoption regarding cassava production technology and education, information seeking behavior and innovativeness attitude were positively significant whereas age, family size, means of livelihood, farm size and area under cassava cultivation, were non-significant.

19. The major constraints faced by the respondents in the study area were high labour cost followed by high cost of inputs and incidence of pest and diseases.

Suggestions for future research

Since this study was conducted only in two blocks of Kollam district with reference to knowledge and adoption level of cassava farmers in relation to cassava production technology with few selected characteristics, it is necessary to do similar researches on this crop in order to generalize the results and findings, additional variables

could also be included. Similar studies can be repeated after definite period of time intervals and in different districts. Future lines of work will also help to assess the impact of adoption of recommended package of practices of cassava and aids for increasing the returns of the cassava farmers and to make changes if necessary. Livelihood security of cassava farmers may also be assessed.

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APPENDIX I

KERALA AGRICULTURAL UNIVERSITY

College of Agriculture, Vellayani, Thiruvananthapuram

Department of Agricultural Extension

INTERVIEW SCHEDULE

Respondent number.....

Profile characteristics of cassava farmer

General information

1. Name of farmer:

2. Phone number:

3. Panchayath: **4.Block:** **5.Taluk:**

6. Age:

7. Farming experience:

8. Education:

Sl. No.	**Particulars**	
1	Illiterate	
2	Primary school level	
3	Middle school level	
4	High school level	
5	College level	

9. Size of the family

Sl. No	**Particulars**	
1	2-4 members	
2	5-6 members	

10. Means of livelihood

Primary(Agriculture alone)	
Secondary (Others + Agriculture)	

11. Farm size

Sl. No.	**Particulars**	
1	<1 acre	
2	1-2 acres	
3	>2 acres	

12. Area under cassava cultivation:

13. Experience in cassava farming:

14. Information seeking behaviour:

SOURCES	**FREQUENTLY(3)**	**OCCASIONALLY(2)**	**RARELY(1)**
Television			
Radio			
Newspaper			
Magazine			
Kiosks			
Training			

Mobile phones			
E-extension			
Krishibhavan			
Fellow growers			
Exhibition			
Agriclinics			
Any others			

15. Innovativeness

Sl. No.	**Particulars**	
1	As soon as it is brought to my knowledge	
2	After I have seen other farmers tried successfully in the farm	
3	I prefer to wait and take my own time	
4	I am not interested in adopting improved farming practices	

16. Extent of knowledge of respondents to cassava production technology (KAU POP)

Sl. No	Knowledge items	Answer
1	What is the best planting season for tapioca setts?	
2	Setts of how much length is used for planting?	
3	For planting 1 ha how much setts are required?	

4	What is the best method of planting?	
5	What is the spacing recommended by KAU for planting cassava setts?	
6	Hoeing and shallow diggings are given upto how many DAP?	
7	Which variety is suitable for intercropping in coconut gardens?	
8	Do you know what crop can be intercropped with tapioca mainly during early stages?	
9	Name any one cassava mosaic tolerant variety?	
10	Name any one hybrid variety?	
11	Which plants can be used for warding off rodents in farm areas?	
12	When will tapioca become ready for harvesting?	

17. Adoption of respondents to cassava production technology (KAU POP)

Sl. No.	**Practices**	**Adopted (3)**	**Partially adopted(2)**	**Not adopted(1)**
1	Varieties- VellayaniHraswa,Nidhi,Kalpaka			
2	Discard 10 cm of lower mature end and 30			

	cm of upper immature end of harvested stems .			
3	Setts of 15-20 cm are used for planting			
4	Spacing – Branching :90*90cm Non branching :75*75cm			
5	FYM – 12.5 t/ha during land preparation			
6	Gap filling within 15 DAP with longer setts of 40 cm length			
7	Fertilizer recommendation(NPK kg/ha) H-97,H 226-75:75:75 M-4 ,Local-50:50:50			
8	Application of Zn as Znso4 @12.5kg/ha			
9	2-3 shallow diggings upto 90 DAP followed by light earthing up			
10	Intercropping with groundnut,cowpea, black gram, green gram			
11	Carbaryl 10% in mounds prior to planting			
12	Planting 2 rows of ginger or turmeric along the borders to ward off rodents			
13	Minisett planting technique			
14	Production of disease free planting material of tapioca by nursery techniques			

15	Harvested stems are stored vertically in well aerated places			

18. Adoption and knowledge of recommended practices (CTCRI) in cassava cultivation

Sl. No.	Items	Extent of knowledge (Y/N)	Level of adoption (PA/A/NA)
1	Varieties –SreeVisakham, Sree Suvarna, SreeVijaya ,Sree Sakthi, SreeAthulya, Sree Jaya ,Sree Pavithra		
2	First intercultural operations at 40-45 DAP		
3	Fertilizer recommendation (NPK kg/ha) 100:50:100		
4	Application of *Beauvariabassiana and Metarhiziumanisopliae* for white fly control		
5	Spraying water at 10 days interval on leaves for control of red spider mite		
6	Customized fertilizers based on site specific nutrient management		
7	Multinutrient liquid formulations for micronutrient application		

8	Poison baiting using 2% zinc phosphide mixed with rava, sugar and oil (90:5:3) for field rats		
9	Mulching and green manuring for eco friendly weed control		
10	Use of *SreePoshini* a mobile app for tuber crops		

19. Attitude of farmers towards cassava production technologies

Sl. No.	**Statements**	**SA**	**A**	**UD**	**D**	**SD**
1	I prefer local variety to the improved variety in disease resistance					
2	There is no need for regular contact with extension workers					
3	It is usually for the rich farmers only					
4	They are too complex for my liking					
5	Better in taste than local variety					
6	They do not damage my environment					
7	Have high labour requirement					
8	They are usually more time consuming					
9	It requires less capital outlay and higher returns					

10	Inputs are usually unavailable					

20. Constraints of respondents towards cassava production technologies

Sl no	Constraints	MI(Most Important)	I(Important)	LI(Less Important)	Li(Least important)
1	High labour cost				
2	Lack of credit facilities				
3	High cost of inputs				
4	Lack of marketing facilities				
5	Scarce water resources				
6	Poor transportation facilities				
7	Incidence of pest and diseases				
8	Poor storage facilities				

21. ITKs practiced by the farmer

1.

2.

3.

KERALA AGRICULTURAL UNIVERSITY

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KVK Kollam

Date: 05.12.2019

Sir/Madam,

Ms Kavya.V.S, Post Graduate student in the Department of Agricultural Extension, College of Agriculture ,Vellayani is undertaking a research study entitled "**Technology adoption behaviour of cassava farmers in Kollam district**" as part of her research work. Variables supposed to have close association with the study have been identified after extensive review of literature.

Considering your vast experience and knowledge on the subject, I request you to kindly spare some of your valuable time for examining the variables critically as a judge to rate the relevancy of them. Suggestions if any may also be included. Kindly return the list duly filled at the earliest in the self-addressed stamped envelope enclosed with this letter.

Thanking you

Yours faithfully

Bindu Podikunju

Technology adoption behaviour of cassava farmers in Kollam district

OBJECTIVES OF THE STUDY

To assess the rate of adoption, level of knowledge and constraints faced by cassava growers in adoption of Package of Practices (POP) in Kollam district.

LIST OF VARIABLES

Variables are given in bold cases and their respective meaning is explained for easy understanding of intended meaning. Please rate the statement with a tick mark in the appropriate column against the statement with special reference to its importance to objective of the study.

Sl.No	Variables	Most relevant	More relevant	Undecided	Less relevant	Least relevant
1.	***Age :*** refers to the number of calendar years completed by the respondent at the time of interview					
2.	***Gender:*** indicates whether the respondent belongs to male or female					
3.	***Education:*** refers to informal and formal learning achieved by the respondent					
4.	***Size of family:***Family size refers to the number of members in family living together under one roof and having common mode of cooking and eating.					

5.	***Occupational status:*** refers to the source of income of the respondent in which he/she spends major time and attention					
6.	***Annual income:*** refers to total income of all members of family for one year					
7.	***Farming experience:***refers to number of years the respondent has been engaged in farming					
8.	***Farm size:*** refers to area under cultivation					
9.	***Area under the crop:*** refers to area in acres cultivated under cassava at the time of interview					
10.	***Risk orientation:*** it refers to the degree to which farmer is encountering risks by adopting new ideas					
11.	***Management orientation:*** refers to degree in which respondent scientifically oriented to farming					
12.	***Progressiveness :*** respondent is early in					

	putting the innovation to practice					
13.	***Risk preference :***positive or negative approach of the farmer towards various risk					
14.	***Experience in cassava cultivation :*** refers to the number of years he has been cultivating cassava					
15.	***Attitude towards new technologies :***it refers to the mindset of respondent towards newer technologies developed					
16.	***Innovativeness***: it refers to the characteristics of the respondents in putting new ideas into practice					
17.	***Information seeking behaviour:*** It refers to the degree of frequency of contact by respondent with various information sources. This is the pattern by which respondents get information either seeking on its own or as a consequence of					

	behaviour					
18.	***No of trainings attended:*** Operationally, training has been defined in this study as a kind of learning process where selected groups of individuals undergo learning experience to internalize the skills, resulting in the modification of behaviour towards specific job performance.					
19.	***Cosmopoliteness:*** Operationally defined as the farmer's extent of contact with outside of his social system such as nearest farmers co-operatives, *Padashekhara samities*, farmers clubs etc.					
20.	***Information source utilization:*** Defined as the use of various information sources by the respondent in order to acquire information on crop production and management					
21.	***Level of aspiration :***it					

	refers to the level of achievement he /she focus in accordance with the past performance					
22.	***Economic motivation:*** refers to monetary gains and profit maximization					
23.	***Social participation :***refers to interaction of the respondent with other cassava growers					
24.	***Knowledge in cassava cultivation:*** refers to the scientific information processed by respondents in terms of POP					
25.	**If any other, please specify**					

TECHNOLOGY ADOPTION BEHAVIOUR OF CASSAVA GROWERS IN KOLLAM DISTRCT

by

KAVYA.V.S

(2018-11-169)

ABSTRACT

Submitted in partial fulfillment of the

Requirement for the degree of

MASTER OF SCIENCE IN AGRICULTURE

Faculty of Agriculture

Kerala Agricultural University

DEPARTMENT OF AGRICULTURAL EXTENSION

COLLEGE OF AGRICULTURE

VELLAYANI, THIRUVANANTHAPURAM- 695522

KERALA, INDIA

2020

ABSTRACT

Cassava (*Manihot esculenta* Crantz.) commonly called tapioca is the king of tropical tubers which assures food security for millions of people especially in the developing countries of the globe. In India, cassava production is mainly confined to the South Indian states of Kerala, Tamil Nadu and Andhra Pradesh. India is the ninth largest producer of

cassava with a total area of 0.24 million hectares and production of 5.1 million tones. (GOI, 2019)

The study titled "Technology adoption behaviour of cassava growers in Kollam district" consist of a sample size of 80 farmers from 2 selected blocks of Kollam based on area under cassava cultivation. Data were collected on profile characteristics, attitude, knowledge and adoption of cassava production technology of both POP (Package of practices) of KAU and CTCRI and finally the constraints with the help of structured and pretested interview schedule.

The results of independent variables showed that majority of farmers belonged to old age group (57.5%), education of high school (36.25%), family size of 2-4 members (51.25%), means of livelihood being agriculture (57.5%), farming experience of 10-20 years (45%), less farm size (42.5%), less area under cassava cultivation (76.25%), medium innovativeness (42.5%), medium information seeking behavior (65.00%) and medium attitude (76.25%).

Taking into account the dependent variable, knowledge about POP of KAU farmers had good knowledge about harvesting time (98.75%), the best method of planting (90.00%), time for intercultural operations (88.7%). Overall 83.75 per cent of the farmers had medium level of knowledge about cassava production technology. While for CTCRI practices high level of knowledge were found on first intercultivation operations (90%), mulching and green manuring practices (90%). Majority of farmers were adopting, vertical storage of harvested stems to be used as planting materials (99.2%), discarding ends of stems for planting (99.20%), and true sett size for planting (89.6%). Overall 66.25 per cent of the farmers had medium level of adoption of cassava production technology (POP of KAU). While for CTCRI practices,72.5 per cent respondents showed medium level of adoption, of which intercultural operations (81.25%) and mulching and green manuring technique (89.16%) were adopted widely.

In correlation analysis, the selected variables like education, farming experience, information seeking behavior innovativeness and attitude showed positive and significant relationship with knowledge, whereas, age, farm size, means of livelihood, area under cassava cultivation, were non-significant with the knowledge. Education, information seeking behavior, innovativeness, attitude and knowledge were positively significant with adoption of cassava production technologies and age, family size, means of livelihood,

farming experience, farm size, area under cassava cultivation, were found to be non-significant with adoption. The major constraints faced by the farmers were high labour cost, followed by high cost of inputs, incidence of pest and diseases etc.