RATIONALISATION OF INDIGENOUS TECHNICAL KNOWLEDGE ON PEST MANAGEMENT IN THE FARM PRODUCTION SYSTEMS OF PALAKKAD DISTRICT

By

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THESIS

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Dedicated To My

Dearest Achan,

Amma And Sooraj

DECLARATION

I hereby declare that the thesis entitled **"Rationalisation of Indigenous Technical Knowledge on pest management in the farm production systems of Palakkad district"** is a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other university or society.

Vellanikkara
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CERTIFICATE

Certified that the thesis entitled **"Rationalisation of Indigenous Technical Knowledge on pest management in the farm production systems of Palakkad district"** is a record of research work done independently by Ms. Swapna T.R under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, associateship or fellowship to her.

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LIST OF ABBREVIATIONS

ITK	-	Indigenous Technical Knowledge
ITK's	-	Indigenous Technical Knowledge items
IK	-	Indigenous Knowledge
IKS	-	Indigenous Knowledge System
KAU	-	Kerala Agricultural University
KIW	-	Key Informant Workshop
KIF's	-	Key Informant Farmer's
PE	-	Perceived Effect
SR	-	Scientific Rationality
FSS	-	Farmer Sub System
ESS	-	Extension Sub System
RSS	-	Research Sub System
RCS	-	Rice based Cropping System
PCS	-	Plantation (including spices) based Cropping System
SCS	-	Seasonal based Cropping System
ACS	-	Annuals based Cropping System
HMFS	-	Homestead based Mixed Farming System

INTRODUCTION

1. INTRODUCTION

"For dear me, why abandon a belief
merely because it ceases to be true?
Cling to it long enough, and not a doubt
it will turn true again, for so it goes".

Edwin, A. Robinson
1994. (Quotations for all occasions (ed. Sharma, H.D, 1994) Ullas Sharma for Indian Bibliographic center, Varanasi).

Over centuries, indigenous people and farmers have developed their own region specific knowledge and practices in agriculture and natural resource management. Farming communities have developed innumerable ways of obtaining food and fibre from animals and plants through a wide range of indigenous farm practices based on generations of experiences, informal experiments and intimate understanding of their biophysical and socio-cultural environments. They had started agriculture as an activity very close to the nature and in harmony with all living and non-living things on earth.

India has made tremendous progress and development in agriculture and allied fields especially after the green revolution. As a result, many high yielding varieties, hybrids and frontier technologies have found their way into agriculture. Hence the emergence of technologies and intensive use of inputs without considering their adverse impact on environment and sustainability resulted.

Today attention is shifting to a sustainable form of agriculture to ensure the attainment and continued satisfaction of human needs for the present and more importantly for the future generations. Thus the latest trend world over is unwrapping the indigenous knowledge as an alternative to high input agriculture.

WHAT IS INDIGENOUS TECHNICAL KNOWLEDGE?

Indigenous Technical Knowledge refers to the unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area (Grenier, 1998). This complex of knowledge and practices is generally known as 'Traditional Knowledge' (TK), 'Indigenous Knowledge' (IK), 'Indigenous Technical Knowledge' (ITK), 'Folk Knowledge', 'Local Knowledge' and 'Wisdom of the elders'. These synonyms refer to the local origin and promotion by a community (Seeland, 2000). Indigenous knowledge is complex and dynamic which are the contribution of traditional wisdom generated through experience, observation, rational thinking, on-farm trials and intimate understanding of the environment in a given culture that enables the communities to survive.

Indigenous practices have two powerful advantages over outside knowledge: they have little or no cost and are readily available. Indigenous knowledge system and technologies are found to be socially desirable, economically affordable, sustainable and involve minimum risk to rural farmers and producers and above all, they are widely believed to conserve resources (Grenier, 1998). Indigenous knowledge draws on local resources (Warren 1993).

INDIGENOUS TECHNICAL KNOWLEDGE AND PEST MANAGEMENT

Indigenous knowledge plays an important role in pest management. The indiscriminate use of broad spectrum chemicals for plant protection has threatened the biodiversity of natural enemies, out break of secondary pests, development of resistance to pesticides, induce pest resurgence, contamination of soil, water, environment and food stuffs. During the last century, there has been almost cent percent increase in the number of insects and mites mainly due to the indiscriminate use of pesticides (Singh, 2000). Adoption of time-tested IK can help the farmer to minimise the risk of health and environmental hazards and bring down the cost of cultivation by reducing insecticides and pesticides. Since the indigenous pest management practices are friendly to the nature and beneficial organisms, going back to traditional practices can help in maintaining our ecology and biodiversity. Local

communities in many parts of the tropical developing world rely on indigenous knowledge for raising livestock even today.

Post-green revolution agricultural science has now realized the need and importance of farmers' experimentation and farmer participation (Farrington, 1995) and Indigenous Technical Knowledge (Thurston, 1990) in the development of technologies that enhance sustainability.

Most of the indigenous practices are unknown to the present generation. It is very important that this valuable treasure of knowledge may be tapped from the older generation before they are lost forever. By documenting this knowledge and also making people aware of the importance of indigenous practices, it will prove beneficial not only to the present generation but also to many generations to come.

Hence a detailed study and search for the unique pedagogy to promote ITK systems is urgent as they are disappearing rapidly through the absorption of indigenous communities into mainstream societies. Knight (1980) has called for the systematic documentation of traditional farmers' knowledge into an "Information Bank" from which scientists, extensionists and farmers can draw enlightenment and insight.

Besides collection and documentation of traditional practices, one more requirement has to be met. Documentation of ITK may not take us very far unless the scientific rationale behind each of the traditional practice is being probed into (Talwar and Singh, 1991). Hence research has to be diverted further from mere compilation and romanticization, to find out the practical and scientific reasoning behind each ITK.

The advantages of indigenous practices can be brought to more light by blending or integrating the traditional practices with modern technology. Thus it becomes important to study and isolate the elements and concepts of sustainability in indigenous knowledge system to integrate into the modern practices of resource management.

The present study was conducted to identify and document the indigenous pest management practices of five major farm production systems viz., Rice based Cropping System (RCS), Plantation (including spices) based Cropping System (PCS), Seasonal based Cropping System (SCS), Annuals based Cropping System (ACS) and Homestead based Mixed Farming System (HMFS) followed in the Palakkad district of Kerala State. The study has also attempted to analyse the perceived effect and scientific rationality behind each ITK item from the view point of farmers, extensionists and scientists, so as to feed them back to the formal research and extension system for further validation and dissemination.

In the aforesaid background, the present research study was initiated with the following specific objectives:

i) To compile and catalogue the Indigenous Technical Knowledge (ITK) on pest management in the five major farm production systems of Palakkad district
ii) To analyse the evaluative perception of ITK items by the Farmer Sub System (FSS), Extension Sub System (ESS) and Research Sub System (RSS) of Palakkad district
iii) To analyse the scientific rationale behind the ITK items by the extensionists and scientists of Palakkad district
iv) To present to the formal research system, a package of ITK items for further validation and recommendation.

SCOPE OF THE STUDY

Even in the midst of a modern concept of correctness, science and progress, there is also an emerging attempt from local to global level to recover the ITK, which modernization has ignored over the years. Now the entire world needs an agricultural system and culture, which should be very close to the nature, more eco-friendly and sustainable.

The present study proposes a participatory endeavor to identify, rationalize, and document the ITK and contemporary farmers' innovative technologies on pest management (insect and non insect pests, crop diseases, weeds, pests of animals and

birds) in farm production systems with an ultimate objective of judiciously blending the traditional wisdom, farm folks' innovations and modern packages through an ecologically sound integration, to attain high productivity and sustainability. The documentation and making people aware of the importance of indigenous practice would prove beneficial both to the present and future generations.

The rationalization analyses can give confidence to the client system, extension system and research system either to accept or reject the ITK and contemporary farmers' innovations rather than their romanticization. The evaluative perception of the respondents on the ITK items would throw light on the practicability and viability of the indigenous practices. The study can serve as a useful feedback to the research system for designing research agenda, research projects and on-farm trials for testing, validation, refinement and blending of ITK with modern technologies for large-scale recommendation.

Screening of items from the collected ITK list would help to identify the strength, relevancy and suitability of indigenous practices from the angle of farmers.

The Participatory Learning and Action (PLA), Key Informant's Workshop (KIW) and other methodological innovations designed for the study would help standardise useful tools, for such unconventional approaches in similar future studies.

LIMITATIONS OF THE STUDY

The present research forms a part of the M.Sc Programme, which is a single student endeavour and hence, has the inherent limitation of time, money and other resources. Being a postgraduate research work, the study was confined to Palakkad district. Indigenous knowledge systems being highly location specific in terms of specific needs and resource availability, all the findings of the study need not be amenable to generalisation and extrapolation.

The major limitation of the present study is that the rationality of several ITK items presented was mainly based on the inductive / deductive opinion of the

scientists and extensionists and not based on their real field experience and empirical evidence.

There could be some distortion in the interpretation of the respondents though all care was taken to collect the information as objectively as possible. The ITK items originally gathered from the Key Informant Farmers were subjected to a logical screening and hence not included in the further stages of study. This does not mean that those ITK items eliminated in the screening process lack rationality.

Despite these limitations, it is expected that the documentation and rationalisation of the available indigenous pest management practices of the five major farm production systems would be an invaluable record for the present and future generation of farmers, extensionists and scientists.

ORGANIZATION OF THE STUDY

The thesis is presented through the chapters namely, Introduction, Review of Literature, Materials and methods, Results, Discussion and finally the summary and conclusion of the study, followed by References, Appendices and Abstract of the thesis.

REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

The prime focus of this chapter is to analyse theoretical and empirical information concerning the present study. The importance of Indigenous Knowledge System (IKS) became the focus of scientific study only very recently. Not many research studies on this new emerging field were available to the researcher. A theoretical framework would help form a clear concept about Indigenous Knowledge (IK) and its allied aspects. In accordance with the specific objectives set, the review of literature is presented under the following heads:

2.1. Indigenous Technical Knowledge (ITK) / Indigenous Knowledge (IK) - definition and concept
2.2. Nature and importance of Indigenous Knowledge
2.3. Perceived effect and measurement attributes of Indigenous Knowledge
2.4. Rationality of Indigenous Knowledge
2.5. Integration of scientific and indigenous wisdom
2.6. Importance and need of indigenous pest management
2.7. Concept of participatory research
2.8. Indigenous knowledge on pest management identified and documented by different authors
2.9. Conceptual frame work of the study

2.1. INDIGENOUS TECHNICAL KNOWLEDGE (ITK) / INDIGENOUS KNOWLEDGE (IK) - DEFINITION AND CONCEPT

Indigenous knowledge is defined as a system fine-tuned and adapted both biologically and socially to counter the process of what are often harsh and inimical environments and often represents hundreds or thousands of years of adaptive evolution in which the vagaries of climate, the availability of land and water, the basic needs of people and their animals for food, shelter and health have been amalgamated in a system which has helped societies to exist and develop in the face of tremendous odds.

Indigenous Knowledge (IK) is the sum total of knowledge and practices that are based on people's accumulated experience in dealing with situations and problems in various aspects of life and such knowledge and practices are special for a particular culture (Wang, 1988).

According to Altieri (1991) local knowledge can be defined as the accumulated knowledge, skills and technology of the local people, derived from the direct interaction of human beings and their environment.

Goldman (1991) stated indigenous knowledge as reflecting climatic and socio-economic factors, embedded as they are in social organisation, cultural traditions and preferences and even more fundamentally in the conceptual system in which the individual members of the society have learned to think and in terms of which they interpret their society and environment.

Indigenous Knowledge is the local knowledge - knowledge that is unique to a given culture or society (Warren, 1991). It is the basis for local-level decision making in agriculture, health care, food preparation, education, natural resource management and a host of other activities in rural communities.

Indigenous Knowledge is the knowledge of the people living in a certain area, generated by their own and their ancestors' experience including the knowledge that originated from elsewhere and has been internalised by the local people (Reijntjes, 1992).

Agricultural practices that are evolved locally and inherited over a long period of time are referred to as indigenous practices (Talwar and Singh, 1994).

Indigenous Knowledge refers to unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographical area (Grenier, 1998).

The knowledge derived through trial and error with many crops and practices and with sharing of knowledge within many farming families; which are crop, climate and soil specific are referred to as Indigenous Knowledge (Babu, 2000).

The information gained over a period of time was passed on from generation to generation by word of mouth. This knowledge in today's parlance is called local knowledge, traditional knowledge or simply indigenous knowledge (Gupta, 2002).

To summarise, ITK / IK in agriculture are used synonymously to indicate farmers' practical knowledge about their local production system, their farming techniques and skills to manage with their natural resources to gain the basic needs with sustainability. It is dynamic and unique to a given culture or society.

2.2. NATURE AND IMPORTANCE OF INDIGENOUS KNOWLEDGE (IK)

The study of Indigenous Knowledge is important in planning and implementing new programmes. These are the entry points for future scientific work and development of appropriate and acceptable practice (Chitamber, 1961; Sikhana, 1994).

Alcorn (1984) and Hunn (1985) opined that farmers' practical knowledge about the local ecosystem is reflected in their farming techniques and in their skill in using the natural resources to gain their livelihood. They may reveal ideas, which contain 'seeds' of adaptive value.

The nature of Indigenous Knowledge is highly localised and restricted. These technologies have been developed by the local people, refined through their wisdom and is practiced over the centuries (Samantha, 2000). These vary among countries, regions and even from farm to farm.

Indigenous Knowledge is mainly inherited through the socio-cultural system, which is maintained and developed through oral traditions, folk tales and proverbs (Verma and Dhukia, 1991; Atte, 1989; Vijayalaxmi,1996).

Moockes and Rhoades (1992) argued that along with biological science, past and present indigenous farmer knowledge can play a key role in sustainable agricultural development.

Vijayalaxmi (1993) suggested that knowing about and enriching tradition in indigenous agricultural practices will help in finding ways of continuing with high yield farming without poisoning the soil, water and air with pesticides and fertilizers.

Balasubramanian (1992) opined that farmer initiated technology does not occur by accident, but there is a farmer based method of research, similar to scientific method. It is concrete and relies strongly on institution, historical experience and directly perceivable evidence.

It has been reported that one of the main reasons why conventional development approaches had failed was that they had intended to ignore the local knowledge system and practices (Salas, 1994).

It is of utmost importance that farmers' knowledge is taken into account before any agricultural technology is developed and disseminated to its users (Kieft, 2002).

Indigenous information systems are dynamic and are continually influenced by internal creativity and experimentation as well as by contact with external systems (Flavier, 1995; Paul and Ramanathan, 2002).

Gupta (1990), Reijntjes *et al.* (1992) and Altieri (1996) stressed the need to revise the ITK of farmers from the threatening impact of green revolution and associated attempts to boost agricultural production.

Indigenous Knowledge is held in the rural society, usually based on the experience of many generations and unique to each cultural group (Rani *et al.*, 2002). Usually it contains more information on local diversity and complexity than scientifically derived knowledge, which could serve as the basis for sustainable agriculture.

Khanna and Bissa (1997) opined that Indigenous Knowledge is based on traditional wisdom and ethnoscience, which has been evolved over generation as a product of man and environment interaction. It may be pointed out that ITK is

dynamic, changing and at times borrows from other knowledge systems through contact and by gathering first hand experience.

The basic component of any country's knowledge system is IK (World Bank, 1997). It encompasses the skills, experiences and insights of people applied to maintain or improve their livelihood.

Kashem (1999) stated that the use of IT/ITK by rural men and women farmers, often with slight modifications and or reinvention may be very important in respect of sustainable agricultural development at the one hand and to save the environment on the other hand.

The studies made by Sulaja (1999); Mandal and Chauhan (2002) on endangered skills revealed that identification, validation and reappropriation of relevant indigenous farm technologies form the starting point of on-farm research. Such efforts can form the base for sustainable and ecofriendly agricultural development.

Benz *et al.* (2000) opined that traditional knowledge may be able to survive the modernization process today where such knowledge has an important role in subsistence.

Eventhough traditional knowledge are declining at an accelerated rate, this knowledge coupled with biological diversity are essential to maintain the options for the survival of mankind in a changing world (Juma, 2000; Klemn, 2000).

Gabriel (2000) stressed the need for respect for the cultural life styles of indigenous peoples, because traditional knowledge can build on the scientific knowledge of our country's aquatic ecosystem.

Neto (2000) opined that indigenous techniques and knowledge are significant in areas such as environmental assessment, resource management and sustainable development.

Sound traditional agricultural practices need to be studied critically and evaluated under farmers' resource management for inculcation of improved components of technology under existing weather and microfarming situations for higher productivity and sustainability (Singh *et al.*, 2001).

From the above review it could be concluded that the indigenous practices are important in the process of agricultural development. This knowledge provides a basis for identifying ecologically sustainable options of research use that are time tuned, both biologically and socially.

2.3. PERCEIVED EFFECT AND MEASUREMENT ATTRIBUTES OF INDIGENOUS KNOWLEDGE

Chakravarthy (1982) found that indigenous farm practices in general were perceived to be more culturally compatible, safe, physically compatible, simple and flexible. The necessity of labour evaluative perception of ITK items by farmers were highlighted by Vasu, 1994.

Chittiraichelvan and Raman (1991) and Rajaram *et al.* (1991) stated that despite advances in dry farming research, the rainfed farmers depend more on traditional practices involving less cost, having ecological and farming system adaptability and providing more or less stable productivity under aberrant weather conditions to contain the risk.

Socio-economic factors affect the farmers' perception towards indigenous knowledge (Kumar, 1994). It was found that acceptance of innovation was dependent on cost effectiveness in the case of big farmers and the compatibility with established procedures in the case of small farmers.

Babu (1995) reported that the indigenous practices commonly adopted by the homestead farmers were found to be highly cost effective, less expensive, and easy to practice.

Preetha (1997) has operationally defined indigenous practices as resource saving, site specific, farmer devised technologies experimented and adapted by themselves which is simple to practice, flexible in use, and sustainable in effect.

Indigenous knowledge systems and technologies were found to be readily available, socially desirable, economically affordable, sustainable and involve minimum risk to rural farmers and producers and above all, they are widely believed to conserve resources (Grenier, 1998).

The studies conducted on traditional beliefs of farmers commented that the scientists have turned their eyes into sustainable development. Those beliefs that are considered as primitive leftovers of the past have gained much significance. These age-old time tested beliefs are not only environmental friendly but also cost effective (Sunil, 1998; Sulaja, 1999).

Kashem *et al.* (1999); Ravi kumar *et al.* (2002) Suresh and Hegde (2002) identified certain advantages of Indigenous Technical Knowledge like cost effectiveness, location specificity, suitability with farmers' needs and situations.

In general, indigenous practices were perceived to be more culturally compatible, safe, simple, flexible and sustainable. However, the level of perception varies among farmers, extensionists and scientists.

2.4. RATIONALITY OF INDIGENOUS KNOWLEDGE

A survey conducted by Gupta (1987) concluded that scientists perceived peasant farming practices as intriguing, sub optimal and unscientific.

Documentation of indigenous belief assumes greater importance in understanding the scientific rationale to accelerate increased awareness among youth and practising farmers (Chittirachelvan and Raman, 1991; Chandra *et al.*, 2000).

Talwar and Singh (1992) unravelled the rationality of some of the seed techniques in arid regions of Karnataka state. The indigenous practices were based on

and confirmed with the logics envisaged in the modern sciences. In this direction, the aim of probing with scientific rationality of IKS was achieved by abstraction and conceptualisation of IK and further by comparing with the findings of the formal research and development system.

Babu (1995) and Kurup (2000) stressed that the scientific rationale of many of the indigenous practices has to be looked into systematically which could benefit mankind in many ways.

There must be a deliberate attempt on the part of educational institutions to find out the scientific relevance of the traditional practices for continuous use (Verma *et al.*, 1997).

A study on traditional veterinary practices among the people of northern plains of Uttar Pradesh by Tripathi *et al.* (1997) established that their beliefs were scientific.

Most of the traditional practices lack scientific basis, thus there is an urgent need to validate the local knowledge (Preetha, 1997 and Ahmad *et al.*, 2002).

From the above reviewed literature it is clear that there must be a deliberate attempt to find out the scientific rationality behind each ITK item/ Indigenous Knowledge, besides its mere documentation. The above mentioned studies reveal that many of the farmers' practices had rationality.

2.5 INTEGRATION OF SCIENTIFIC AND INDIGENOUS WISDOM

Rudramoorthy (1964) pointed out that a judicious combination of folk knowledge and scientific knowledge will help speed up the adoption of improved practices by the farmers.

A critical analysis of existing traditional agricultural wisdom, its element and concept and need to integrate the same with scientific wisdom for boosting productivity and its sustainability seems to be the demand of the era (Singh *et al.*, 2001).

Development thinkers argued that IK of farmers may not work in every situation, but the integration of local and external technologies can result in appropriate solutions (Shah, 1994).

Sustainable agriculture lies in the modern technology which should be followed along with traditional technology in a harmonious fashion so that agriculture could remain sustainable which is today's demand (De walt, 1994; Altieri, 1996; Lal and Singh, 1997; Obinne and Ozowa, 1997; Gupta, 2000; Chandra *et al.*, 2000).

Abstraction and conceptualisation of IK and its integration with modern farming techniques can evolve efficient resource management system (Sain *et al.*, 1995; Sulaja, 1999).

Several cases have been reported where traditional practices have surpassed modern technical know how (Verma *et al.*, 1997; Tripathi *et al.*, 1997). The integration of scientific and indigenous wisdom would help develop need based technologies.

Ramkumar (1998) opined that if the livestock sector in India is to be improved and sustained, the value of ITK and farmer formulated rations must be recognised and efficiently blended with scientific technology or information.

According to Kimmerer (2000), native peoples' traditional knowledge of the land differs from scientific knowledge; both have strength that suggests the value of partnership between them.

Lakshmanan (2000) and Pinstrup *et al.* (2000) stated that modern technological means and traditional experience of the past when blended together can definitely help evolving nationalist programme which can help increasing the annual food production of India.

To summarise, there is immense scope for blending the traditional practices with modern techniques to make farming sustainable.

2.6 IMPORTANCE AND NEED OF INDIGENOUS PEST MANAGEMENT

Several authors have exposed the ill effects of plant protection chemicals on human health and agro eco-system. The value on pest management using ITK has been repeatedly stressed by authors like Warren (1989), Mathias (1995) Sulaja (1999) and Ravi *et al.* (2002).

Warren (1992) stressed about the efforts to be taken to apply traditional knowledge on pest management so that usage of pesticides can be minimised which will cause the termination of beneficial insects along with the pest. Since the indigenous pest management practices are environment friendly, going back to traditional practices can help maintain our ecology and bio-diversity.

World Bank (1998) has shown 25 per cent of the medicines as contributed from IK world. Of the estimated 2,50,000 to 5,00,000 plant species in the world, more than 85 per cent are in environments that are the traditional homes of indigenous people.

According to Apantaku (1999), farmers have developed forest plant products for crop pest control.

The indigenous practices of Indian farmers to manage crop disease by adjusting planting methods and time of planting and cultural practices have been appraised by Gupta (2000) and Karthikeyan (2002) in terms of their eco-friendliness and non-monetary nature.

Kashyap *et al.*, (2000) stated that farmers and live stock raisers throughout the developing world rely on traditional practices to keep their animals healthy. Such indigenous livestock production practices include the medicinal plants, surgical techniques and management practices to prevent and treat livestock diseases to keep their animals healthy.

2.7 CONCEPT OF PARTICIPATORY RESEARCH

Participatory approaches in scientific investigations and the technique of Participatory Rural Appraisal (PRA)/Participatory Learning and Action (PLA) was originally propounded and propagated by Robert Chambers (1991). Later on, they were used by workers such as Witcombe *et al.* (1996), Joshi and Witcombe (1996), Sthapit *et al.* (1996) and the like.

Talwar and Singh (1992) have reported the use of participant techniques in data collection of indigenous knowledge on climate and crop-pest-climate interactions.

The superiority of farmer participatory research over the conventional research based approach was that, the technology developed through farmer participation was better adapted to local conditions (Worade and Mekhib 1993; Prema *et al.*, 2000).

NCAER (1993) concluded that the cost incurred for the training of field staff and data collection for the sample survey-based study, were higher by more than one-half of the cost incurred in PRA based data collection.

The approach would be extremely flexible, meaningful and joyous to the participants and researchers, provided the later believed that the people were the store-houses of knowledge and had clear perception of their own needs (Ahamed *et al.*, 1996).

The research findings of Action Aid Nepal (1992), Haddad *et al.* (1993), Rajarathnam *et al.* (1993) and Malik and Richard (1994) suggested that PRA could be applied to a larger scale of inquiry and could be scaled up for large areas under consideration.

When IKS and PRA approaches are placed in the context of communicative action theory, they will gain theoretical, political and practical significance and should improve the cross- cultural co-operation for development (Hess, 1997).

The potential of IKS as a foundation for sustainable development has established participatory methodology as a tool to compile and explain the scientific reasoning and adaptability of ITKs (Kashyap *et al.*, 2000).

Singh *et al.* (2001) analysed critically the full involvement of the farmers/farm women by way of using different tools of participatory rural appraisal (PRA) for documenting the ITK items to find out the rationale behind it.

2.8. INDIGENOUS KNOWLEDGE ON PEST MANAGEMENT IDENTIFIED AND DOCUMENTED BY DIFFERENT AUTHORS

Table1 List of indigenous knowledge on pest management by different authors

Sl.No.	Author	Year	ITK practices
1	Chakravarthy	1982	Use of indigenous plough, rat traps and constructions of field burrows
2	Alteiri and Liebman	1986	Chrysanthemum as a decoy crop against the nematode *Meloidogyne incognita*
3	KAU	1989	Seed treatment practices, crop rotation practices, seed storage practices and application of common salt in coconut basin
4	Gupta	1990	Mixing grains with dried tender stems of *Clerodendron*
5	Gnanadeepa	1991	Pest control by neemcake
6	Kanagasabapathi	1991	Plant protection measures using ash, red earth, neem cake and cow's urine
7	Thurston	1992	Disease resistance of land races
8	Vivekananda	1993	Alternatives to chemical pesticides
9	Kanagasabapathi	1993	Fibrous pericarp of coconut against the weed *Marselia quadrifolia*
10	Gupta	1994 a	Crab control using tamarind seed
11	Gupta	1994 b	A natural pesticide out of *Tinospora vumpii* for rice
12	Gupta	1994 c	Rat control by hood winking
13	Jyothimani	1994	Use of common salt to give tolerance to leaf blight disease of vegetables

Table 1 contd.

Sl.No.	Author	Year	ITK practices
14	Vivekananda	1994 a	Neem cake to control stem borer and gall fly of rice
15	Vivekananda	1994 b	An insecticidal formulation comprising phenoil, neem oil, kerosene and soap
16	Vivekananda	1994 c	Use of *Azadiracta indica*, *Vitex negundo* and *Pongamia glabra* as botanical insecticides
17	Gupta	1994 b	Leaves of *Acacia nilotica* used against crab control in rice.
18	Babu	1995	Use of cow's urine, common salt, fumigation of field, painting of coconut barks with milk of lime for pest control in coconut
19	De and Rao	1995	Ethnoveterinary practices with locally available herbs
20	Thomas	1995	Practice of flooded weed management, duckling penning and cow dung slurry application in paddy fields
21	Toyang *et al.*	1995	Ethnoveterinary medicinal practices Indigenous treatment for digestive disorders in bovines
22	Tripathi *et al.*	1995	Indigenous treatment for digestive disorders in bovines
23	Yadav	1995	Spreading fumes from burned cycle tyres against rice bug
24	Manju	1996	Indigenous rat control followed by coconut farmers of Thrissur district
25	Manju	1997	Identified 47 indigenous practices of vegetable growers mainly pest control measures and use of fine sand on leaves, tobacco decoction for seed storage and in raising seedlings. Application of salt used for storing dried fish in the root zone of vegetable against termites. Application of fenugreek boiled water over bittergourd plants to control sucking pests.

Table 1 contd.

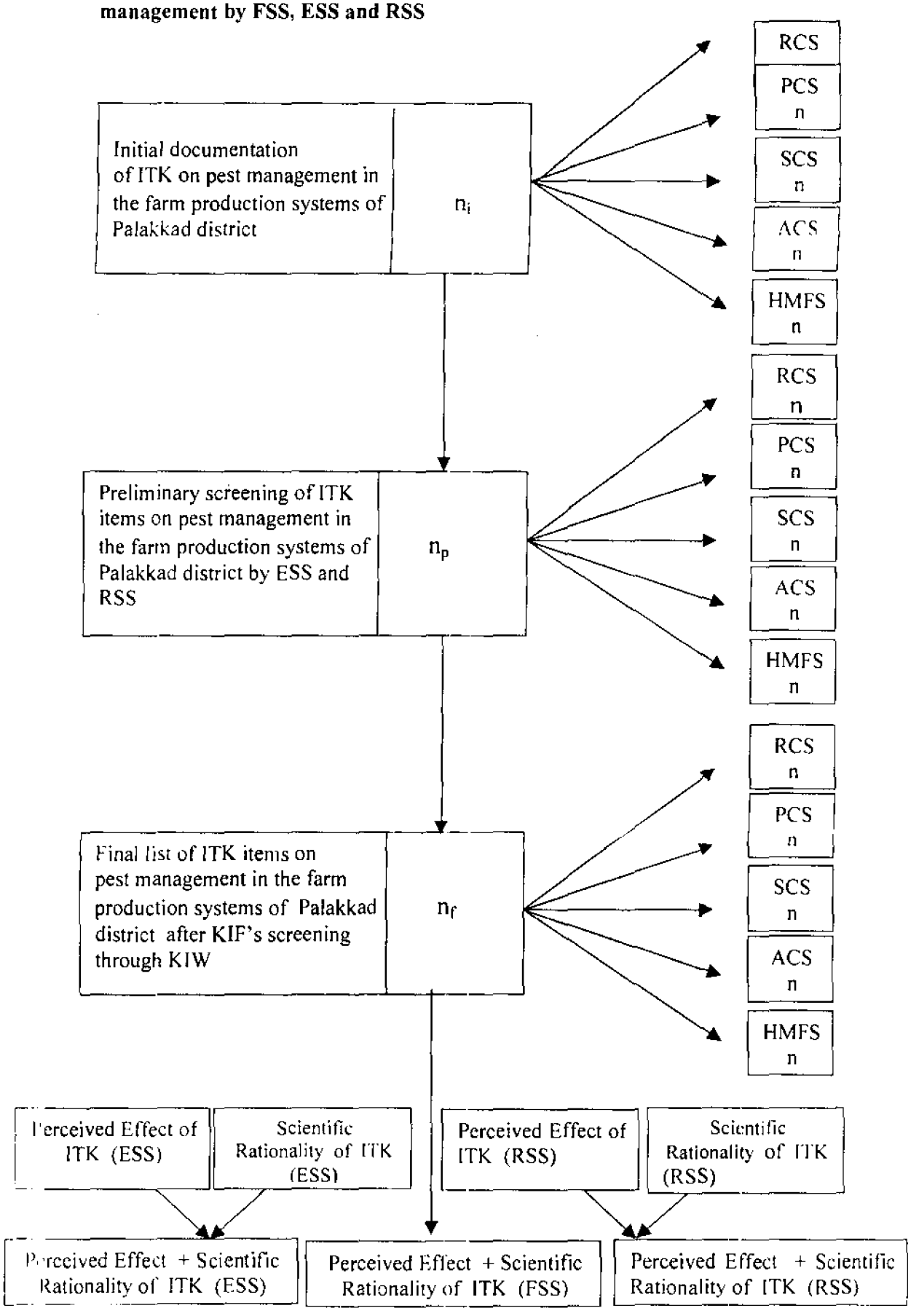
Sl.No.	Author	Year	ITK practices
26	Prectha	1997	Identified 80 practices of rice farmers of Thrissur district like '*Kundakootal*', of seedlings, *chazhikked*, and different types of rat traps Baiting with leaves or bark or seeds of glyricidia (*Glyricidia sepum*) with cereals against rodents
27	Verma *et al*	1997	Use of turmeric and neem leaves for storing grains
28	Bandyopadhyay and Saha	1998	Seed selection and seed storage practices in Andaman & Nicobar islands
29	Sunil	1998	Powdered bark of *Acacia luecophloea* used for healing wounds of live stock
30	Sulaja	1999	Identified endangered skills, management related to growth of various crops and livestock of Thrissur district Harvested cucumbers are stored by hanging after covering with dried banana sheath from the roof

From the above reports it is evident that India has a vast treasure of outstanding indigenous agricultural practices in different parts of the country, which was for long remained hidden from the farmers of other states and which deserve to be unearthed for the benefit of agriculture as a whole in India.

2.9. CONCEPTUAL FRAMEWORK OF THE STUDY

The step-by step procedure highlighting the documentation and rationalisation of the ITK's on pest management in the major farm production systems as envisaged in the study are depicted in the form of a conceptual model in figure 1.

Fig: 1. Conceptual model of preference ranking of ITK items on pest management by FSS, ESS and RSS



MATERIALS AND METHODS

3. MATERIALS AND METHODS

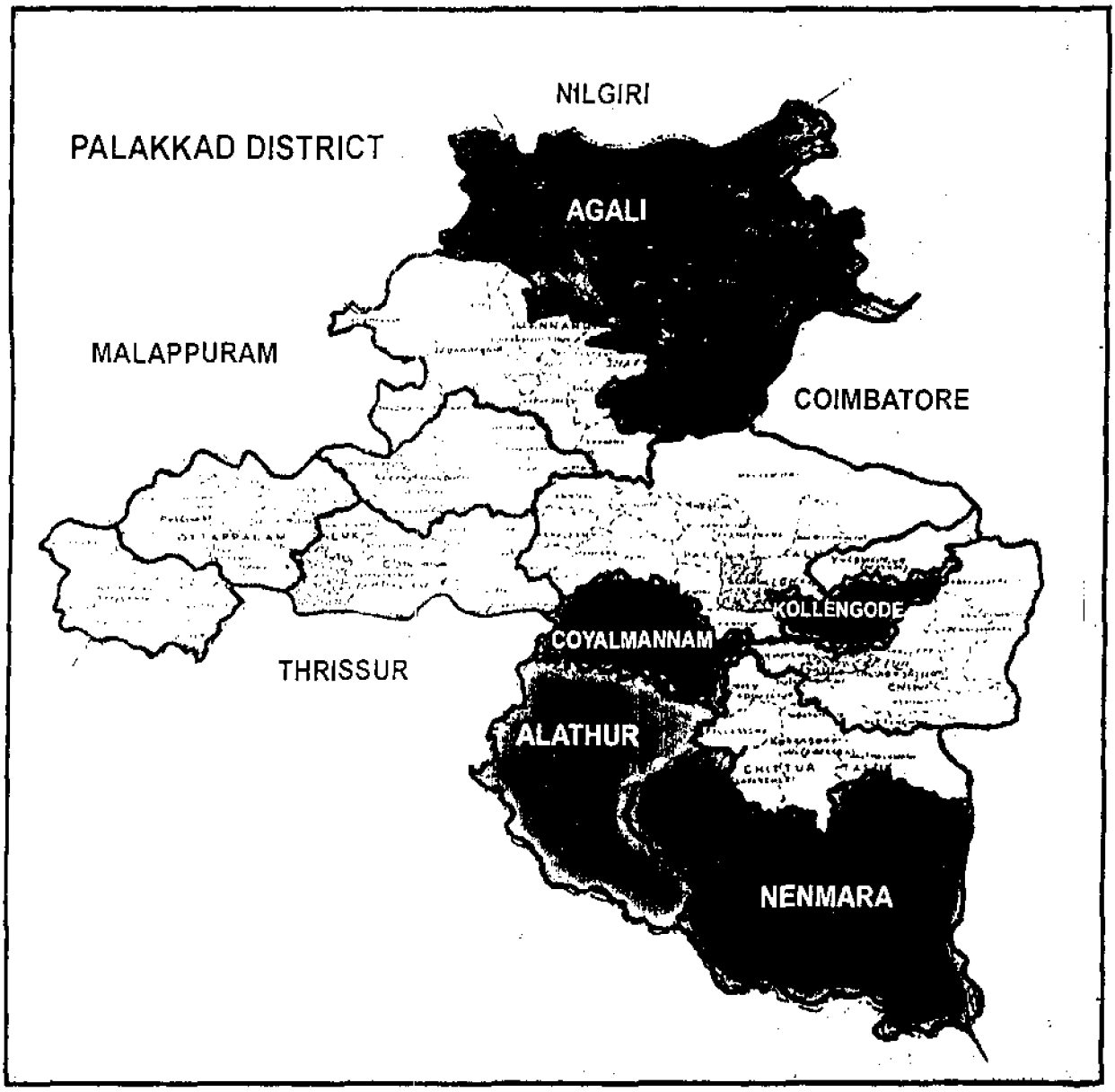
The present investigation was undertaken with the main objective of documenting and analyzing the evaluative perception and rationality of ITK items on pest management in the five major farm production systems of Palakkad district. A step by step description of the methodology and procedure adopted in conducting the study are furnished here under:

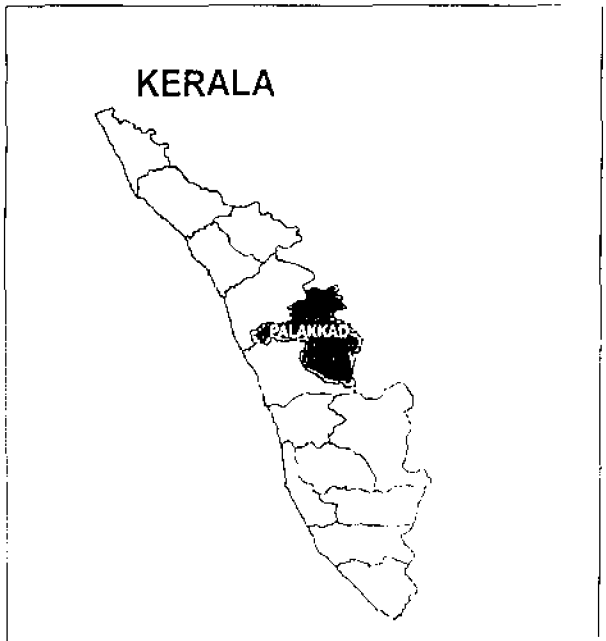
3.1 DESIGN OF THE STUDY

Based on the analysis of available literature and keeping in view the objectives of the study, it could be well inferred that most of the attributes included in the study were *ex-post facto* in nature and offered little chance to be manipulated by the researcher. Therefore, *ex-post facto* research design was considered appropriate to be used for the study. According to Kerlinger (1964) *ex-post facto* research is a systematic empirical enquiry in which the researcher does not have direct control over the independent variables because their manipulation have already occurred or because they are inherently not manipulatable.

The study was conducted in two phases. The first phase accomplished the major objective of compilation and cataloguing of Indigenous Technical Knowledge (ITK) on pest management in the five farm production systems of Palakkad district namely, Rice based Cropping System (RCS), Plantation (including spices) based Cropping System (PCS), Seasonal based Cropping System (SCS), Annuals based Cropping System (ACS) and Homestead based Mixed Farming System (HMFS). The second phase focused on the rest of the objectives viz., evaluative perception and

FIG. 2 : Map of Palakkad highlighting the study area





rationalisation of indigenous practices by Key Informant Farmers (KIFs), extensionists and scientists and presenting a package of ITK items to the research systems for further validation.

3.1.1 Profile of the Study Area

3.1.1.1.Locale of the Study

The Palakkad district that encompasses five agro-ecozones, out of the thirteen agro-ecozones of Kerala, was purposively selected for the study due to its crop diversity and availability of various farm production systems.

1. Palakkad district is an agriculturally predominant area with wide crop diversity and various farm production systems.
2. The district holds I and II ranks in Total Cropped Area (TCA) and Net Area Sown (NAS) respectively.
3. Area under total food grains is the highest in Palakkad district.
4. The district ranks first in area and production of rice and third in area under vegetables.
5. Palakkad holds second position in net area irrigated.
6. Palakkad district has got the highest cattle population.
7. Agali block of Palakkad district is unique as a tribal tract of Kerala possessing rich local wisdom.
8. Kerala's share in the total groundnut area and production is solely contributed by Palakkad district.
9. Being a district adjacent to the Kerala Agricultural University, the researcher had enough operational feasibility.

3.1.1.2. Description of the Study Area

Palakkad district, the east central portion of Kerala state covers an area of 4,38,947 ha as per the survey of India toposheet. The district is bounded on the east by Coimbatore district of Tamil Nadu, on the north and north west by Malappuram district and south by Thrissur district. The district is considered as the rice granary of Kerala. It has predominantly high rural population with agriculture as the main

occupation. The entire district falls under midland region except the Attappadi area in Mannarghat taluk, which lies in high land. The cropping pattern of the district reveals that major portion of the cropped area is under food crops.

The district, known as the 'rice bowl' of Kerala is divided into five taluks namely Palakkad, Alathur, Chittur, Ottappalam and Mannarkkad. The district consists of 13 Development Blocks (DB's) and 12 Assistant Director of Agriculture Blocks (ADB's), comprising of 93 Krishi Bhavans (KB's). Out of the 13 Development Blocks, five blocks namely, Alathur, Coyalmannam, Nenmara, Kollengode and Agali were selected for the present study which are agriculturally predominant and having almost all major farm production systems. The area selected for the study contained marginal, small, medium and large farms including commercial farmers making use of all the traditional, modern and integrated farm production practices.

3.2 PHASE I OF THE STUDY

3.2.1 Sampling Design

A multi-stage sampling procedure was followed for the purpose of drawing samples for the present investigation. The schematic representation of sampling design is presented in Fig. 3.

3.2.1 The System Concept

The three systems conceptualized by Chand (1971) viz, Client, Extension and Research systems were involved in the study. Studies of similar nature were conducted by Talwar and Singh (1992, 1993), Singh (1975), Jaiswal and Arya (1981), Sen (1984) and Kishore (1986).

Thus the respondent groups of the present study comprised of the Farmer Sub System (FSS), the Extension Sub System (ESS) and the Research Sub System (RSS).

3.3 Procedure for Data Collection

The representative areas under the study were selected following a four stage sampling method based on two criteria viz., highest agricultural predominance and presence of atleast three production systems out of the five envisaged in the study namely, Rice based Cropping System (RCS), Plantation (including spices) based Cropping System (PCS), Seasonal based Cropping System (SCS), Annuals based Cropping System (ACS) and Homestead based Mixed Farming System (HMFS).

Out of the thirteen development blocks (DB's), one block each was selected to represent one agro-ecozone. Thus five blocks were selected as the first stage units from 13 blocks in consultation and discussion with the Principal Agricultural Officer of the district. The selected blocks were: Alathur, Coyalmannam, Nenmara, Kollengode and Agali. From each development block, except Agali, six panchayats were selected based on the criteria-'agricultural predominance' and 'availability of atleast three of the five production systems' as the second stage units. In Agali block there are only three panchayats. Thus there were 27 panchayats. The third stage unit comprised of the Agricultural Officer and one Agricultural Assistant of each of the selected Panchayat. This purposive sampling gave a group of 54 extensionists. Through judgment sampling, with the help of the extensionists of the respective panchayats, five Key Informant Farmers (KIF's) were selected from the five farm production systems except Agali as the last stage units. From Agali, ten KIF's were selected from each of the three panchayats. Thus there were 150 KIF's from the 27 panchayats (Table 2). Besides the 54 Agricultural Extensionists mentioned above, finally 30 Agricultural Scientists, 30 Veterinary Scientists and 30 Veterinary Extensionists were selected to offer the evaluative perception and scientific rationality of the ITK items.

Table 2 Distribution of the Key Informant Farmers (KIF's)

N=150

District	Name of the Block	Name of the Panchayat	No of KIF's per KB
Palakkad	Alathur	Vadakkanchery	5
		Kizhakkanchery	5
		Kavassery	5
		Tarur	5
		Vandazhi	5
		Puthukkode	5
	Coyalmannam	Coyalmannam	5
		Kottayi	5
		Pudussery	5
		Peruvemba	5
		Kannadi	5
		Kuthanur	5
	Kollengode	Kollengode	5
		Vadavannur	5
		Kodumba	5
		Edappalli	5
		Polpully	5
		Puthunagaram	5
	Agali	Agali	10
		Sholayar	10
		Pudur	10
	Nenmara	Nenmara	5
		Agali	5
		Elavanchery	5
		Pallassena	5
		Ayilur	5
		Nelliyampathy	5
Total			150

3.3.1 Selection of respondents

Representatives from all the sub systems identified viz., Farmer Sub System (FSS), Extension Sub System (ESS) and Research Sub System (RSS) were included as respondents for the investigation (Fig 3).

3.3.1.1 Farmer Sub System (FSS)

The list of Key Informant Farmers (KIF's) from each farm production system were prepared with the help of Agricultural Officers (AO's) and Agricultural Assistants (AA's) of the concerned Krishi Bhavans (KB's) by referring the registers maintained in KB's. This farmer sub system functioned as the local level compilers and feeders of ITK items for the study. Altogether 150 KIF's from the 27 panchayats formed the FSS (Table 2).

3.3.1.2. Extension Sub System (ESS)

The Agricultural Officer (AO) and one Agricultural Assistant (AA) from each of the 27 panchayats constituted the respondents of the ESS, as detailed in Table 2. Thus 54 Agricultural Extensionists formed the ESS who participated in the rationalisation of the ITK items. Besides, a sample of 30 Veterinary Extensionists of the district was randomly drawn to respond to the rationalisation exercise of the ITK items from veterinary and animal husbandry.

3.3.1.2 Research Sub System (RSS)

A sample of Agricultural Scientists (30) and Veterinary Scientists (30) from the research stations, Krishi Vigyan Kendra and Colleges of the Agricultural University were drawn on a multidisciplinary basis. (Agronomy, Plant Protection, Horticulture, Plantation crops, Veterinary and Animal Science, Agricultural Economics, Plant Breeding and Agricultural Extension). The selected ITK's were subjected to evaluative perception and rationalization by them.

3.3.1.3 Data Collection Procedure

Primary data were collected from the respondents of FSS (150 Key Informants). Frequent rapport and contact were maintained with the KIF's. They were oriented to the method of gathering and reporting the ITK's in pre-scheduled sessions.

3.3.1.3.1 Participatory Learning and Action (PLA) Tools

Modified, shortcut PRA/PLA sessions were resorted to elicit the required data for the present investigation. The procedure was free from lengthy questionnaires and schedules. Instead, a combination of Focussed Group Discussions (FGD), Brainstorming and Semi-structured Group Interviews (SSGI) were followed. The approach was 'listening to the farmers and learning from them'. The investigator was not an interrogator, but a 'facilitator', 'silent listener' and 'recorder'.

3.3.1.3.2 Key Informant Workshops (KIW's)

The second stage of data collection were in the form of KIW's planned in line with the Innovative Farmers' Workshop (IFW) established by Abedin and Haque (1983) at the On-Farm Research Division, Bangladesh Agricultural Research Institute, Jessore.

Talwar and Singh (1992) reported an in-depth study of indigenous knowledge through workshops with field level extension workers and farmers. They concluded that workshops involving farmers, externally employed youth (belonging to farm families) and extension workers proved to be a good means of acquiring information. In the said phase of the study, the mode of data gathering was a blend of Focussed Group Interview (FGI) and KIW, following the principles contained in Participatory Learning and Action (PLA).

3.3.1.4 Data Collection from the FSS

3.3.1.5.1 Development of Semi-Structured Interview Schedule

The study of Indigenous Technical Knowledge in the present study involved PRA/PLA tools using semi-structured interview schedule. As against the conventional method of survey and interview, focussed group interview with interaction was employed where KIF's could express themselves in an informal conducive atmosphere of participatory learning.

A semi structured interview schedule was prepared as a frame of reference for the investigation (Appendix 2). Rather than restricting only to the questions enlisted in the checklist, the researcher exercised a greater degree of freedom in including or excluding certain questions and information according to the insight gained and from the vantage point of the respondents. Hence each PRA/PLA session was interactive, iterative and semi-structured one.

The semi-structured interview schedule was divided into five major sub headings of production systems namely, Rice based Cropping System, (RCS), Plantation (including spices) based Cropping System (PCS), Seasonal based Cropping System (SCS), Annuals based Cropping System (ACS) and Homestead based Mixed Farming System (HMFS). The schedule listed out major crops, their pests, diseases, non-insect pests and weeds, under each cropping system. The procedure followed was as detailed hereunder:

Each cropping system was presented in a sequence with all its major pests and diseases, non-insect pests and weeds. The KIF's were asked to list out the ITK practices used for each situation.

The ITK practices on pest management were identified and compiled from the KIF using participatory methods. Finally compiled ITK items were logically screened to avoid incompleteness, lack of clarity, irrelevance and superfluousness. The final list of screened ITK items formed the interview guide for the KIW's in the phase II of the study.

3.4 PHASE II OF THE STUDY

3.4.1 Selection of Attribute Measures of ITK Items Under Study

Based on the objectives and by reviewing relevant literature and discussion with experts, the following broad attribute measures were selected: 'Degree of belief', 'Strength of ITK's', 'Perceived effect' and 'Rationality of ITK items'. The measures of the evaluative perception of the ITK's included simplicity / complexity, compatibility with the existing farming system, practicability, availability of raw materials, precision/skill requirement, drudgery, labour intensity, and operational costs. In the present study the respondents were asked to express their evaluative perception of each ITK based on an over all consideration of the aforesaid measures.

3.4.2 Collection of data on evaluative perception from the FSS

The data on evaluative perception of ITK's were gathered through a series of three Key Informant Workshops (KIW's) conducted at different places of Palakkad district (Kodumbu, Puthussery, Nenmara). Groups of 50 KIF's participated in each KIW. The workshop was participatory and interactive in nature, without much formality. The researcher functioned as the moderator to keep the sessions in order. The participants were oriented to the purpose and 'modus operandi' of the workshop, thereby developing confidence in them.

Each KIF was given a copy of the ITK evaluation guide. The guide contained the ITK's screened in phase I. The classified list of ITK's under insect pests, diseases, weeds, birds, rodents and wild animals under each of the five farm production systems was the content of ITK evaluation guide (Appendix 3). The researcher presented the guide with the help of OHP slides also. Each ITK was evaluated by the respondents in the copy of the guide given to them, considering the 'degree of belief', 'strength of ITK' and 'perceived effect'. The evaluative perception of each ITK was also measured from the overall assessment of the item based on the measures of evaluative perception as presented under 3.4.1 and as described under 3.5. Ultimately, based on the overall consideration of all the aforesaid attributes and measures and

based on the outcome of the interaction, the KIF's were asked to assign a weightage score (out of a maximum of 10) to each ITK item.

3.4.3 Development of ITK Rationalisation Guide for ESS and RSS

The ITK rationalisation guide was designed from the outcome of the three KIW's. The data obtained from the KIW's for each ITK item were subjected to statistical analyses.

The top 75 percentage of the ITK items (with high scores) were ranked and included in the final rationalisation guide meant for the ESS and RSS.

3.4.4 Rationalisation of ITK items by ESS and RSS

The final rationalisation guide consisted of ITK's for pest management in two broad aspects namely, 'crops' and 'animal husbandry'. The guide was prepared in the form of a questionnaire to be filled up by the ESS and RSS (Appendix 4). The pests and diseases of each farming system were listed in sequence. The ESS and RSS were requested to assess each ITK item in terms of two dimensions, viz., 'perceived effect' and 'scientific rationality'. Both the dimensions had to be expressed on a five-point continuum, the two extreme points described as the 'least' and the 'most'. The questionnaire also contained space to write the probable reasons for their judgment.

3.5 OPERATIONALISATION AND MEASUREMENT OF ATTRIBUTE MEASURES OF ITK

As mentioned under 3.4.1. the attribute measures and measures of evaluative perception of ITK's were: 'degree of belief', 'strength of ITK', 'over all evaluative perception' 'weightage', 'perceived effect' and 'scientific rationality'.

3.5.1 Degree of Belief in ITK Items

The degree of belief in ITK items was measured using an arbitrary scale of three point continuum with scores of 3, 2, 1 for 'strong belief', 'some what belief' and 'no

belief at all' respectively. The FSS were asked to express their opinion towards a particular ITK item by choosing a score according to their belief. Thus the maximum and minimum possible scores, for 'degree of belief' in each ITK item was 150 and 50 respectively in a KIW.

Sl.No.	ITK items	Degree of beleif		
		Strong beleif (3)	'Somewhat' belief (2)	No belief at all (1)
1	RCS-1			
2				
3				
4				
.				
n.	RCS-n			

3.5.2 Strength of ITK Items

The strength of ITK items was measured using a two - point arbitrary scale of 'Done' (have done the ITK before) and 'Will Do' (will do the ITK in future) which had to be expressed on a dichotomy as 'Yes' or 'No'. The KIF's expressed their opinion by choosing either 'Yes' or 'No' option with a score of 4 and 1 for 'Done' and 2 and 1 for 'Will Do'. The maximum score for each ITK in each KIW was 200 for 'Done' and 100 for 'Will Do" and a minimum score of 50 for both 'Done' and 'Will Do' situations.

Sl.No.	ITK items	Done		Will Do	
		Yes (4)	No (1)	Yes (2)	No (1)
1	RCS-1				
2					
3					
4					
.					
n.	RCS-n				

3.5.3 Assignment of Weightage to ITK Items

Farmers were well explained of measures of evaluative perception of ITK items like simplicity / complexity, compatibility with the existing farming system,

practicability, availability of raw materials, precision/skill requirement, drudgery, labour intensity, and operational costs. They were also briefed about the implications of 'Done' and 'Will Do' situations. The farmers were facilitated to assign marks (out of a maximum of 10) to each ITK item.

Sl.No.	ITK items	Marks out of 10
1	RCS-1	
2		
3		
4		
.		
.		
.		
n	RCS-n	

3.5.4 Assessment of ITK Items by ESS and RSS

3.5.4.1 Evaluative Perception of ITK Items by ESS and RSS

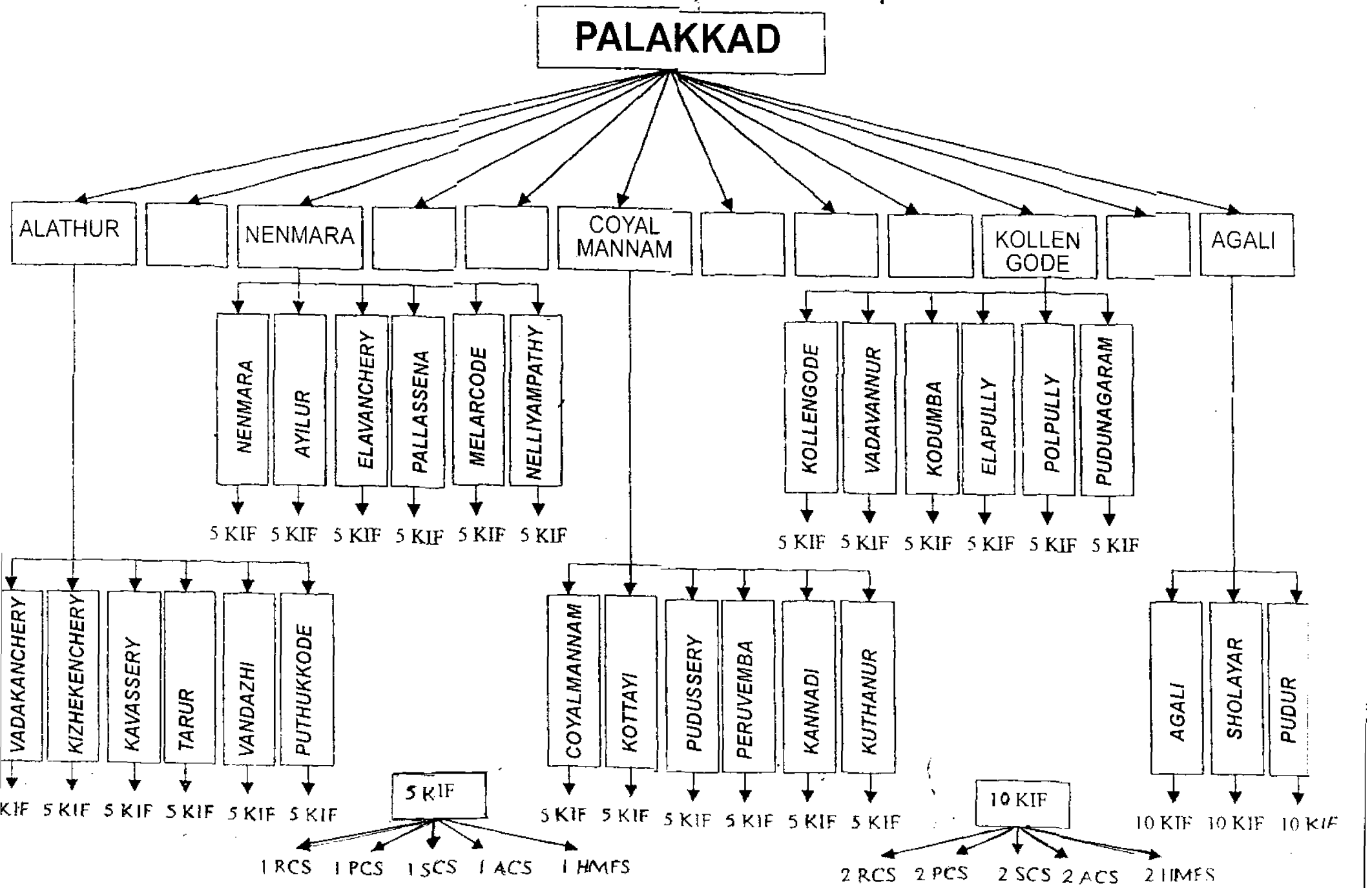
The 'perceived effect' of ITK items was measured using a five-point continuum (1 to 5) ranging from 'least effective' to 'most effective'.

3.5.4.2 Rationalisation of ITK Items by ESS and RSS

The scale developed by Padaria and Singh (1990) to find out the scientific rationale of indigenous practices in dry farming was used in the present study with slight modification. The scale consisted of a five-point-continuum viz., very rational, rational, undecided, irrational and very irrational with scores of 5,4,3,2 and 1 respectively.

The sum of scores of 'perceived effect' and 'scientific rationality' as recorded by the ESS was computed. Similarly the sum of scores of 'perceived effect' and 'scientific rationality' as reported by the RSS was also calculated. Finally the cumulative sum of both the ESS and RSS taken together was computed. This was first done separately for crops-related ITK's and animal husbandry related ITK's. At later stages, the crops-related and animal husbandry-related ITK's were clubbed together and the ITK's were arranged in the descending order of combined scores so that the

FIG. 3 : The Schematic Representation of Selection of Respondents



best ITK came on top. Cumulative sum upto any stage is the total of all the sum upto that stage.

3.6 STATISTICAL TOOLS USED

3.6.1 Kendall's Coefficient of Concordance (Kc)

Kendall's coefficient of concordance (Kc) measures the extent or degree of agreement among the respondents on a particular case. A significant Kc means that there is sufficient degree of agreement among the respondents with respect to the ITK's on selected attributes.

In the present study, Kendall's coefficient of concordance was used to find out the degree of agreement of FSS in their 'degree of belief', 'strength' and 'weightage' of ITK items. The same statistical tool was used to compute the degree of agreement among the respondents from ESS and RSS on measures like 'perceived effect' and 'scientific rationality' separately, as well as taking their combined effect. The statistics was done separately for the five farm production systems. The mean scores obtained were arranged in the descending order in such a way that ITK items with higher scores could be reckoned as better than the others.

The formula used was,

$$Kc = \frac{[\Sigma c_j^2 - (\Sigma cj^2/n)]}{{}^1/_{12}\, K^2 n\,(n^2-1)} \quad \text{where,}$$

C_j be the j th column for J = 1,2,.....n

n be the number of observations in each variate

K be the number of variates

3.6.2 Canonical discriminant function

A discriminant function is a regression equation with a dependent variable that represents group membership. It discriminates groups from one another on the basis

of sets of measures. It gives the "best" prediction, in the least square sense of the "correct" group membership of the sample.

To discriminate the viewpoints on ITK items, that really distinguished the scientists (RSS) and Extensionists (ESS), Canonical discriminant function was worked out in a step-wise procedure. It was purposefully done to identify the ITK items that had clearly discriminated the views of RSS and ESS both in crops and animal husbandry related ITKs. The coefficient of discriminant function was worked out.

3.6.3 Spearman's Rank Order Correlation

Spearman's rank order correlation coefficient (r_s) was worked out to measure the relationship between the ranks of items under study. It estimates the correlation between two characters on the basis of ranks of individuals in the whole lot for each of the characters without making an exact measurement for any of the individual.

The relative 'evaluative perception' and 'scientific rationality' of the ESS and RSS regarding the ITK items was compared by working out the Spearman's rank order correlation (r_s). It was compared separately for the five farm production systems between the veterinary and agricultural faculties.

The formula used was as given below:

$$r_s = 1 - \frac{6\Sigma d^2}{n(n^2-1)}$$ Where,

r_s - Spearmans rank order correlation coefficient

d - difference between the two sets of values

n - number of items

3.7. OPERATIONALISATION OF CONCEPTS AND DEFINITIONS

Agricultural system

An agricultural system is an assemblage of components which are united by some form of interaction and interdependence and which operates within a prescribed boundary to achieve specified agricultural objective on behalf of the beneficiaries of the system.

Indigenous Technical Knowledge

It refers to the age-old practices developed by forefathers or local elders as well as contemporary farmers/peers, which are passed over generation to generation. This knowledge is dynamic in nature and is specific to a particular geographical area.

Rice based Cropping System

In rice based cropping system, rice will be the base crop, which may have several rotations/ relays/alternatives like sesamum, cowpea, vegetables etc. during specific season.

Plantation (including spices) based Cropping System

Plantations are large-scale agricultural units with plantation crops as the major crops with intercrops possible to utilise the spacing. The system comprises of crops coming under plantation crops suited to midland areas with spices grown as an intercrop. In this study, the plantation crops included are coconut, arecanut and pepper, as an intercrop in coconut plantation.

Seasonal based Cropping System

The crops that are seasonal in nature are included in this system. Vegetables like cucurbitaceous crops, solanaceous crops, cowpea and amaranthus were listed.

Annuals based Cropping System

Crops of one-year duration viz., banana and tapioca included in this study constituted the annuals based cropping system

Homestead based Mixed Farming System

It is a special type of agricultural production system or an operational farm unit with a number of multispecies of annuals or perennial crops grown around the home in conjunction with livestock, poultry or fish mainly for the purpose of satisfying the farmers' basic needs.

Farmer Sub System (FSS)

The key informant farmers representing all the five-farm production systems of various panchayats who formed the farmer respondents of the study constitute the FSS.

Extension Sub system

The Agricultural Officers (AOs) and Agricultural Assistants (AAs) of the selected Krishi Bhavans (Grama Panchayat level agricultural offices) and the veterinary doctors of selected panchayat constitute the ESS.

Research Sub System

The scientists of both agriculture and veterinary disciplines from Kerala Agricultural University and other research stations who formed the researcher respondents of the study constitute the RSS.

Relative advantage

It is the degree to which an innovation or practice is perceived as being better than the idea it supersedes.

Compatibility

It is the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters. An innovation or practice can be compatible or incompatible with the socio-cultural values and beliefs, with previously introduced ideas or with client needs for innovations.

Complexity

It is the degree to which an innovation is perceived as relatively difficult to understand and use.

Simplicity

It is the degree to which an innovation is perceived as relatively easy to understand and use.

Trialability

It is the degree to which an innovation may be experimented with on a limited basis.

Observability

It is the degree to which the results of an innovation are visible to others.

Technology attributes / measurement attributes

It denotes the various components of a technology deals with the complexity, compatibility, simplicity, trialability and so on.

Perceived effect

This refers to ones perception or attitude towards a particular innovation or technology on various attributes of the technology.

Scientific rationality

Rationality is the use of most effective means to reach a goal, which is not easily measurable. In the study, the scientific rationality means the scientific basis of a particular technology (for example, the active principles of the plant is having many properties which can justify the action on pest).

Focussed group interview

This is a semi-structured interview where the investigator attempts to focus the discussion on the actual effects of a given experience to which the respondents have been exposed.

Plate 1. Key Informant Workshop on ITKs

Plate 2. PRA Session : Learning from Farmers

RESULTS

4. RESULTS

The findings of the study are presented under the following sub-heads:

4.1 Compilation and cataloguing of ITK items on pest management

4.2 Rationalisation of ITK items on pest management by ESS and RSS and screening of ITK items by the FSS

4.3 Evaluation of 'perceived effect' and 'scientific rationality' of ITK items on production systems by ESS and RSS

4.4 Comprehensive assessment of ITK items by both ESS and RSS

4.5 Comparative evaluation of perceived effect and scientific rationality of ITK's within ESS and RSS

4.6 Identification of ITK's that clearly discriminate the perception of ESS and RSS

4.1.COMPILATION AND CATALOGUING OF ITK ITEMS ON PEST MANAGEMENT

The ITK on pest management in the five major production systems of Palakkad district viz., Rice based Cropping System, Plantation (including spices) based Cropping System, Seasonal based Cropping System, Annuals based Cropping System and Homestead based Mixed Farming System. In the initial phase, the KIF's reported a total of 432 ITK's on the five farm production systems as given in Appendix-1. This list was screened for superflousness, lack of clarity, incompleteness and a final list comprising 213 items was retained as presented in Table 3.

4.1.1 Rice based Cropping System

Table 3 Compilation and cataloguing of ITK items on pest management in Rice based Cropping System

Sl. No.	ITK items	Code No.
1	**Pest and disease control in general** *Kundakootal*- Seedling treatment practice before transplanting. The seedling bundles are arranged one above the other in a circle forming a pyramid shape. The bundles are placed with their roots facing outside	RCS-1 $
2	Spray the extract of garlic (*Allium sativum*), asafoetida (*Ferula asafoetida*), ginger (*Zingiber officinale*), tobacco (*Nicotiana tabacum*), neem (*Azadirachta indica*), green chilli (*Capsicum annum*) or birds eye chilli (*Capsicum fruitiscens*) after mixing it with soap and water	RCS-2 $
3	Keep a 200 W bulb above furadan solution in a container, which attract insect pests in the field focused group	RCS-3 $
4	Bundles of leaves and stems of *karimcheru* (*Holigarna nigra*) are kept in the water inlet of paddy field	RCS-4
5	Paddy fields are ploughed with cashew (*Anacardium occidentale*) leaves at the rate of 50 sacs per acre	RCS-5 $
6	Green leaf manuring with the leaves of *kanjiram (Strychnos nux vomica)*, *venga (Pterocarpus marsupium)*, *paanal (Glycosmis pentaphylla)*, mango (*Mangifera indica*), and bamboo (*Bambusa arundinaceae*) reduces pests and disease incidence	RCS-6 $
7	Adjust the sowing time by *Aswathy (April 14th to 26th) or Bharani njattuvela* (April 27th to May 10th)	RCS-7 $
8	Incorporate tender banana (*Musa* sps.) pseudostem along with cowdung during last ploughing	RCS-8 $
9	Application of poultry manure in the field reduces pests and diseases	RCS-9

Table 3 contd.....

Sl. No.	ITK items	Code No.
10	Field application of ash mixed with powdered fruits of *mulliyilath (Bombax malabaricum)*	RCS-10
11	Seed treatment in a solution containing cow dung and top soil	RCS-11 $
12	Spray supernatant liquid of cow dung slurry	RCS-12 $
13	Spray diluted extract of lemon grass (*Cymbopogan citratus)* and garlic (*Allium sativum*) in the field	RCS-13
14	Spray the extract of garilc (*Allium sativum*) and asafoetida (*Ferula asafoetida*) mixed with fresh cow dung	RCS-14
15	Spray either the leaf extract of *arootha (Ruta graveolens*) and sweet flag *(Acorus calamus*) or diluted leaf extract of *kanjiram (Strychnos nux vomica), thulasi (Ocimum sanctum),* and lemon grass (*Cymbopogan citratus)*	RCS-15
16	Burn discarded cycle tyres on the field bunds during evening hours	RCS-16 $
17	Insert sticks tied with fruits of palm (*Borassus flabellifera*) in the field	RCS-17 $
	Stem borer	RCS-18 $
18	Use leaves of *oduku (Cleistanthes collinus*) as green manure	
19	Keep neem (*Azadirachta indica*) cake sacs in irrigation channel	RCS-19 $
20	Green leaf manuring with *erikku (Calotropis gigantia*) and *karpoorappacha* (*Lantana camera*)	RCS-20 $
21	Nip the seedling tips	RCS-21 $
	Leaf roller	RCS-22 $
22	Sweeping the field using bamboo baskets	
23	Dragging thorny branches or rope dipped in kerosene across the field	RCS-23 $
24	Application of Cashew (*Anacardium occidentale*) Nut Shell Liquid (CNSL) in the field	RCS-24 $
25	Swinging twigs of *therakom (Ficus asperimma*) across the field	RCS-25 $

Table 3 contd.....

Sl. No.	ITK items	Code No.
	Storage Pests	RCS-26 $
26	Seed storage in bamboo baskets plastered with cow dung	
27	Place the leaves of neem (*Azadirachta indica*) or *karinochi (Vitex negundo)* or *ungu (Pongamia glabra)* between sacs in storage bins	RCS-27 $
28	Seeds are stored along with the dried tender stems of Clerodendron	RCS-28
29	*Mampookanikkal or manjukollikkal*-It is a seed drying technique where the seeds are exposed to three dews (nights) and three days successively	RCS-29 $
30	Mix the seeds with fruits of *karimcheru (Holigarna nigra) or kattucheru (Holigarna arnottiana)* while storing	RCS-30 $
31	Store seeds in a mud pot smoked with mango (*Mangifera indica*) leaves, leaf stalk of jack (*Artocarpus heterophyllus*) and lemon grass (*Cymbopogan citratus*)	RCS-31 $
32	Hang *bougainvillae* leaves in storage bins	RCS-32 $
	Bacterial Leaf Blight (BLB)	RCS-33 $
33	Application of neem (*Azadirachta indica*) cake (8 sacs) repeated every twenty five days	
	Gall fly	
34	Adjust the sowing time by *Aswathy* (April 14th to 26th) or *Bharani njattuvela* (April 27th May 10th)	RCS-34 $
	Sheath rot	RCS-35 $
35	Dusting the field with lime and ash	
	Plant hoppers	
36	Spray a mixture of solution containing phenyl (1 litre), Neem (*Azadirachta indica*) oil (1/4 litre), kerosene (1/2 litre) and soap	RCS-36 $
37	Spray the emulsion of neem (*Azadirachta indica)* oil and soap after draining the field	RCS-37 $
38	Apply kerosene water mixture	RCS-38 $
39	Broadcast the field with saw dust soaked with kerosene	RCS-39 $

Table 3 contd.....

Sl. No.	ITK items	Code No.
40	**Weed control** Follow sequential cropping with gingelly (*Sesamum indica*)	RCS-40
41	Plough the field after getting second rains and add poultry or cattle manure	RCS-41$
42	Placing *errikku (Calotropis gigantia)* leaves in irrigation channels	RCS-42
43	Application of coconut (*Cocos nucifera*) husk in paddy field	RCS-43
44	Transplantation of seedlings during *Karthika njattuvela* (May 11th to May 24th) reduces weed growth	RCS-44 $
45	*Insitu* ploughing of *daincha* (*Sesbania acculeata*) in the paddy field reduces the weeds in the succeeding crop(s)	RCS-45 $
46	**Rat control** Spraying kerosene in the bunds reduces rat attack	RCS-46 $
47	Insert palm leaves in the field	RCS-47
48	Use of various rat traps like *kumbam, adichil*, saw toothed scissor trap, earthen pot trap, box trap, burrying mud pots at ground level where field bunds meet from four sides	RCS-48 $
49	Baiting with a mixture of fried prawn shell powder and cement	RCS-49 $
50	The borrow holes are either smoked or flooded with coir	RCS-50 $
51	Application of neem (*Azadirachta indica*) cake urea mixture at booting stage	RCS-51
52	Baiting with rice powder mixed with glass powder	RCS-52 $
53	Baiting with leaves, seeds or bark of glyricidia (*Glyricidia sepum*) with cereals	RCS-53 $
54	Boiled rice and insecticide mixture	RCS-54
55	Baiting and poisoning with tapioca chips or snail flesh and poison	RCS-55 $
56	Planting *chettikoduvely (Plumbago rosea)* in the field bunds	RCS-56
57	Fixing white flags in fields	RCS-57 $
58	**Crab control** Releasing flocks of geese/ducks in puddled field	RCS-58 $

Time tested low cost rat traps

Plate 3. Innovation of Attappadi tribes

Plate 4. Mancompu trap

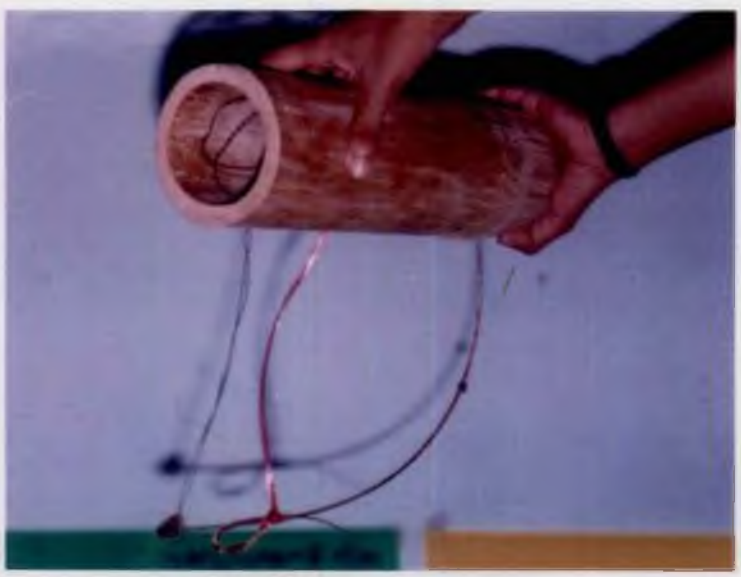


Plate 5. Bamboo trap

Table 3 contd.....

Sl. No.	ITK items	Code No.
	Bird control	
59	Use of plastic cover tied to long poles	RCS-59 $
60	Old and discarded audio/video tapes are used as scarers	RCS-60 $

$ denotes the selected ITK's after KIF's screening

4.1.2. Plantation (including spices) based Cropping System

Table 4 Compilation and cataloguing of ITK items in pest management in Plantation (including spices) based Cropping System

Sl. No.	ITK items	Code No.
	COCONUT	
	Rhinoceros beetle	PCS-1 $
1	Keep a pot filled with starch water mixed with castor cake (*Ricinus communis*) 250 g in coconut plantation	
2	Application of sand and salt or *marotti (Hydnocarpus wittiana)* cakes in equal proportion in the leaf axils of coconut during August - September	PCS-2 $
3	Use of *perumaram/ matti (Ailanthus malabarica)* leaves in cowdung pits	PCS-3 $
4	Application of lime, ash and sand in the leaf axils during rainy season	PCS-4 $
5	Application of neem (*Azadirachta indica*) oil and kerosene in equal proportions in the crown region.	PCS-5
6	Hang a pot filled with starch water mixed with *marotti (Hydnocarpus wittiana)* fruits	PCS-6
	Bud rot	
7	Clean the crown frequently and apply ash and salt mixture solution	PCS-7 $

Table 4 contd.....

Sl. No.	ITK items	Code No.
8	Application of quick lime in the coconut basins	PCS-8 $
9	Apply the affected area with bordeaux paste and cover with paddy husk and then cover it with a pot	PCS-9 $
	Stem bleeding	
10	Lime paste or Cashew Nut Shell Liquid (CNSL) application on the affected parts of the trunk	PCS-10 $
11	Application of neem (*Azadirachta indica*) oil and common salt in basins	PCS-11 $
12	Spray kerosene and burn the affected parts of the trunk	PCS-12 $
	Abnormal nut fall or button shedding	
13	Basin application of old battery powder mixed with neem cake reduces abnormal nut fall	PCS-13 $
14	Removal of alternate inflorescence	PCS-14 $
15	Application of a mixture of fish waste and salt or chopped banana pseudostem in the coconut basin	PCS-15 $
16	Spray cow's urine (fresh) on the bunches	PCS-16 $
	Leaf eating caterpillar	
17	Spray a preparation made of garlic (*Allium sativum*), green chilli (*Capsicum annum*), *moringa* (*Moringa oleifera*) and *kayam* (*Ferula asafoetida*)	PCS-17 $
	Mite control	
18	Frequent smoking of coconut gardens using coconut husks	PCS-18 $
19	Spray concentrated solution of salt water on the coconut bunches	PCS-19 $
	Root grub	
20	Plant an arrow root (*Maranda arundinacea*) or turmeric (*Curcuma longa*) along with coconut seedling	PCS-20 $
	Termite control	
21	Application of salt and ash in the basin	PCS-21 $
22	Planting wild variety of arrow root (*Maranda arundinacea*) in coconut basins	PCS-22

Pest Repellent

Plate 6. ***Kozhipen chedi:***
Eleocharis capitata **- age old bio repellent in poultry**

Plate 7. ***Vayambu – Achorus calamus***

Plate 8. ***Kongimpoo: Lantana camera***

Table 4 contd.....

Sl. No.	ITK items	Code No.
23	Application of crushed fenugreek (*Foenm greesium*) in coconut basin	PCS-23 $
24	Application of neem (*Azadirachta indica*) cake and salt in equal proportion in the basin	PCS-24 $
25	Plant *kattarvazha (Aloe vera)* in coconut plantations	PCS-25 $
	Rodent control	
26	Baiting with jaggery and cotton balls	PCS-26 $
	ARECANUT	
	Yellowing	
27	Spray washing blue solution at the rate of 1Kg in 50 litre water	PCS-27 $
28	Application of lime mixed with neem (*Azadirachta indica*) cake in the basin	PCS-28 $
29	Application of the extract of arrow root (*Maranda arundinaceae*) in the crown region reduces pests and diseases	PCS-29
30	Application of lime and ash mixture reduces pests and diseases	PCS-30
	PEPPER	
31	Dusting of lime in the pit as well as up to one metre height of the vine reduces disease incidence	PCS-31 $
32	Keep small stones in the root zone reduces *Phytophthora* wilt	PCS-32

$ denotes the selected ITK's after KIF's screening

4.1.3 Seasonal based Cropping System

Table 5 Compilation and cataloguing of ITK items on pest management in Seasonal based Cropping System

Sl. No.	ITK items	Code No.
1	**COWPEA** Application of asafoetida (*Ferula asafoetida*) 25g mixed in water (1L) against flower shedding	SCS-1
2	Releasing the colonies of red ants reduce aphids attack	SCS-2
3	Dusting wood ash over leaves in early morning	SCS-3 $
4	Application of rice soup mixed with ash against fungal diseases	SCS-4 $
5	Dusting ash frequently reduces flower shedding	SCS-5 $
6	Application of leaf extract of *Koovalam* (*Aegle marmelos*) diluted with water along with cow dung against sucking pests	SCS-6
7	**AMARANTHUS** Seeds are sown along with turmeric (*Curcuma longa)* powder or rice flour	SCS-7 $
8	Sowing seeds of green amaranthus and red amaranthus in alternate rows reduces fungal attack	SCS-8 $
9	Spray cow's urine diluted ten times against pests and diseases in bitter gourd	SCS-9 $
10	Solution containing the leaf extract of bougainvillae and garlic (*Allium sativum*) extract controls mosaic or yellowing disease of pumpkin	SCS-10
11	Bitter gourd seeds are treated in cow dung slurry/cow dung solution for 12 hours before sowing	SCS-11 $
12	White clothes are hung on snake gourd *pandals* against fruit fly attack	SCS-12 $
13	Extract of *appachedi (Chromelina odoratum)* reduce stunted growth	SCS-13
14	Spraying the extract of *aaval (Holoptelia integrifolia)* leaves mixed with tobacco (*Nicotiana tobacum*) extract on bitter gourd and ash	SCS-14

Table 5 contd.....

Sl. No.	ITK items	Code No.
	gourd against many vegetable pests (7 leaves in 1 L water)	
15	Smoking around bitter gourd *pandals* during evening hours to ward off fruit flies	SCS-15 $
16	Apply the extract of bird's eye chilli (*Capsicum fruitiscens*) diluted in water mixed with soap solution	SCS-16 $
17	Diluted cowdung slurry is sprinkled on leaves of bitter gourd plants	SCS-17 $
18	Mulching the basins of bitter gourd with leaves of *kanjiram (Strychnos nux vomica)* against sucking pests	SCS-18 $
19	Application of fenugreek (*Foenm greesium*) boiled water over bitter gourd plants against sucking pests	SCS-19
20	Application of the solution prepared out of jaggery and one or two days old starch water against sucking pests	SCS-20 $
21	Use of *pookaitha (Pandanus odoratissimis)* fruits in plots to minimise the attack of fruit flies	SCS-21
22	Application of salt in the bitter gourd pit reduces yellowing disease	SCS-22
23	Extract of neem (*Azadirachta indica*) leaves, Glyricidia (*Glyricidia sepum*) or *karinochi* (*Vitex negundo*) and *kanjiram* (*Strychnos nux vomica)* leaves (one litre in 20 litres of water) and spray against grass hopper attack	SCS-23 $
24	Spray the solution containing 30g *vayambu* (*Acorus calamus*) in four litres of water boiled for 45 minutes	SCS-24
25	Spray *sitaphal (Annona squamosa)* leaf extract mixed in water to control sucking pests	SCS-25
26	Cultivate elephant yam (*Amorphophallus companulatus*) as an intercrop in bitter gourd plots to reduce stunting	SCS-26 $
27	Spray previous day's rice soup against mosaic	SCS-27
28	**SOLANACEOUS CROPS** Spray solution containing 5 L cow's urine, 1 Kg cowdung and one teaspoon kerosene	SCS-28
29	Application of garlic (*Allium sativum*) extract or neem (*Azadirachta*	SCS-29 $

Table 5 contd.....

Sl. No.	ITK items	Code No.
	indica) oil mixed with starch water against chilli mosaic and leaf curling	
30	Spray tender coconut water mixed with cow's milk on 60-70 days after planting and 90 days after planting against flower and fruit shedding in chilli	SCS-30 $
31	Mulching the seedbeds with tamarind (*Tamarindus indica*) leaves control weed growth	SCS-31 $
32	Application of salt used for storing dried fish in the root zones of vegetables against termite attack	SCS-32 $
33	Application of *palkayam* (*Ferula asafoetida*, 20 g) powder mixed in one litre milk and diluted with five litres of water against flower shedding	SCS-33
34	**Storage pests** Mix seeds with *vayambu (Acorus calamus*) rhizome or dried leaf powder of *karinochi* (*Vitex negundo)*/ broken chilli (*Capsicum annum*) parts	SCS-34 $
35	Smearing seeds with coconut (*Cocos nucifera*) oil or groundnut *(Arachis hypogea)* oil or gingelly (*Sesamum indica*) oil	SCS-35 $
36	Cowpea seeds are stored along with sand or clay	SCS-36 $
37	Cowpea seeds are stored after smearing the ash made out of burning the cowpea pods	SCS-37 $
38	Store seeds near the hearth of kitchen	SCS-38 $
39	Store seeds first in dry places and later in wet areas	SCS-39 $

$ denotes the selected ITK's after KIF's screening

4.1.4 Annuals based Cropping System

Table 6 Compilation and cataloguing of ITK items on pest management in Annuals based Cropping System

Sl. No.	ITK items	Code No.
1	**BANANA** Keep or plant rhizome in a cover containing lime	ACS-1 $
2	Green leaf manuring with *kanjiram* (*Strychnos nux vomica*) and neem (*Azadirachta indica*) repels pseudostem borer	ACS-2 $
3	Fried fenugreek (*Foenm greesium*) application in leaf axils control pseudostem borer	ACS-3 $
4	Smoke treatment of suckers from burning bamboo poles	ACS-4 $
5	Green leaf manuring with *parakom* (*Ficus hispida*) and *maruthu* (*Terminalia paniculata*) *or konginipoo* (*Lantana camera*)	ACS-5 $
6	**TAPIOCA** Planting *chettikoduveli* (*Plumbago rosea*) resist rat or pig attack	ACS-6 $
7	Plant turmeric (*Curcuma longa*) in plot to scare away rats	ACS-7 $

$ denotes the selected ITK's after KIF's screening

4.1.5 Homestead based Mixed Farming System

Table 7 Compilation and cataloguing of ITK items on pest management in Homestead based Mixed Farming System

Sl. No.	ITK items	Code No.
1	**Foot and Mouth disease (FMD)** Apply boiled water of sitaphal (*Annona squamosa*) leaves and tamarind leaves (*Tamarindus indica*) on animal foot	HMFS-1
2	Smearing neem (*Azadirachta indica*) oil in the mouth is found to be effective	HMFS-2
3	Allow the cattle to walk through the hot sand or clay	HMFS-3 $
4	Boil the water with *kanjiram* (*Strychnos nux vomica*) leaves, guava (*Psidium gujava*) leaves and tamarind (*Tamarindus indica*) leaves with salt and pour on the leg	HMFS-4 $
5	Feed the animal with *palayamkodan* banana along with pig fat	HMFS-5 $
6	Bandage the wound with the paste of *oduku* (*Cleistanthus collinus*) leaf, tobacco (*Nicotiana tobacum*) leaf and *karippodi*	HMFS-6 $
7	Apply oil of *kattucheru* (*Holigarna arnottiana*) on the wound	HMFS-7
8	Tender teak (*Tectonia grandis*) leaves are made into a paste and applied on the leg	HMFS-8 $
9	Allow the cattle to inhale the smoke of burned fishmeal	HMFS-9
10	Small fishes are ground together to make a paste and applied to the foot lesion	HMFS-10 $
11	Ground snake skin and wild pig fat applied with a feather on foot	HMFS-11 $
12	Apply warm ash on the affected parts of the foot	HMFS-12
13	Equal proportion of camphor, garlic (*Allium sativum*), turmeric (*Curcuma longa*) and *punna* (*Dillinia pentagyna*) are boiled together and applied on the leg	HMFS-13 $
14	Paste of neem (*Azadirachta indica*) leaf is mixed in sour curd or toddy and given to the cattle to prevent the disease	HMFS-14 $
15	Cashew nut (*Anacardium occidentale*) oil and coconut (*Cocos*	HMFS-15 $

Table 7 contd.....

Sl. No.	ITK items	Code No.
	nucifera) oil are mixed together and applied	
16	**Wound** Leaf and stem of *chettikoduvely* (*Plumbago rosea*) are made into a paste and applied	HMFS-16 $
17	The bark of *kadalavanakku* (*Jatropha curcas*) is made into a paste and applied	HMFS-17 $
18	Crushed bark of *kattucheru* (*Holigarna arnottiana*) if fed orally can expel maggots from wound	HMFS-18 $
19	A paste made from *thumba* (*Leucas aspera*) tobacco (*Nicottiana tobacum*), and lime can expel the maggots from wound	HMFS-19 $
20	Smear the paste made of *karpooram* (Camphor), neem (*Azadirachta indica*) oil, salt and sugar on the wound	HMFS-20
21	Broken horn is bandaged with burned carbon and neem (*Azadirachta indica*) oil	HMFS-21
22	Tender leaves of mimosa (*Mimosa pudica*) and goat manure in equal proportion are fried together in coconut (*Cocos nucifera*) oil and the paste is applied	HMFS-22 $
23	Powdered paste of black gram (*Vigna mungo*) is mixed with egg white and bandaged at the broken area of the horn	HMFS-23 $
24	**DIGESTIVE DISORDER** **Diarrhoea** Mustard (*Brassica juncea*) 250ml, water 250ml, and edible soda (Sodium bicarbonate) 100g is mixed together and given orally	HMFS-24
25	Feed the cattle with tender pseudostem of banana (*Musa sps*)	HMFS-25 $
26	Dried leaf powder of pome granate (*Punica granatum*) is given as feed	HMFS-26 $
27	Feed the cattle bamboo (*Bambina bambosa*) leaves	HMFS-27
28	Administration of *thippali* (*Piper longum*) is effective	HMFS-28 $
29	A mixture made out of 50 gram of pomegranate (*Punica*	HMFS-29 $

Table 7 contd.....

Sl. No.	ITK items	Code No.
	granatum), 10 g dried ginger (*Zingiber officinale*), pepper (*Piper nigrum*) and curd given 4 times daily	
30	**Indigestion** Pineapple ground into a paste and given orally	HMFS-30 $
31	Oral feeding of *kodangal* (*Centella asiatica*) leaves and milk is given	HMFS-31
32	Extract of onion (*Allium cepa*) is given	HMFS-32 $
33	Extract of *malayinji* (*Zingiber officinale*) is given	HMFS-33
34	Oral administration of fish fat	HMFS-34
35	Crushed bark of moringa (*Moringa oleifera*) mixed in orange juice is given	HMFS-35 $
36	Feed 75 g paste made of *irattimaduram* (*Glycyrrhiza glabra*), *appakaram*, garlic (*Allium sativum*), asafoetida (*Ferula asafoetida*), dried ginger (*Zingiber officinale*), *thippali* (*Piper longum*), *induppu* and pepper (*Piper nigrum*)	HMFS-36 $
37	Administration of *changalampparanda* (*Cissus quadrangularis*) ground paste is effective	HMFS-37 $
38	Oral adminisatration of arrack	HMFS-38 $
39	Oral dose of ground *thippali (Piper longum)*	HMFS-39 $
40	Oral administration of paste made from leaves of castor (*Ricinus communis*), moringa (*Moringa oleifera*), *thumba* (*Leucas aspera*) and *vayambu* (*Acorus calamus*)	HMFS-40 $
41	Administration of wild pig fat is given	HMFS-41 $
42	**Fever and cough** Administration of paste made of *thulasi (Ocimum sanctum)*, coriander (*Coriandrum sativum*), *Kodumpuli* (*Garcinia cambogia*), asafoetida (*Ferula asafoetida*), garlic (*Allium sativum*), dried ginger (*Zingiber officinale*) pepper (*Piper nigrum*), *kiriyath* (*Andrographis paniculata*), mixed in extract of *thumba* (*Leucas aspera*), and ginger (*Zingiber officinale*) twice daily	HMFS-42 $

Table 7 contd.....

Sl. No.	ITK items	Code No.
43	25 g each of *adalodakom* (*Adhatoda zeylanica*), tamarind leaves (*Tamarindus indica*), inflorescence of *thulasi* (*Ocimum sanctum*) mixed with 5 g camphor and jaggery is given	HMFS-43 $
44	Give *thippali* (*Piper longum*) mixed in toddy	HMFS-44 $
45	**Mastitis** Boil 120 g of crushed *thazhuthama* (*Boerhavia diffusa*), *njerinjil* (*Tribulus terrestris*) in 6 litres of water and make to 3 litres and given one litre of the solution daily	HMFS-45 $
46	*Appakkoovai* (*Coccinia grandis*) leaves and stem along with turmeric (*Curcuma longa*) is made into a paste and applied	HMFS-46 $
47	Smear bhasmam or sandal on the udder	HMFS-47 $
48	Allow the cattle to stand in pond or river and then pour water forcefully on the udder using a vessel or pump	HMFS-48 $
49	Apply paste of neem (*Azadirachta indica*) leaves, turmeric (*Curcuma longa*), and salt in equal proportion	HMFS-49 $
50	**Worm trouble** Feed the paste made of *changalampparanda* (*Cissus quadrangularis*) and salt	HMFS-50 $
51	Black tea without sugar is given for 8 days	HMFS-51 $
52	Tender arecanut (*Areca catechu*) is ground well and orally given	HMFS-52 $
53	*Thumba* (*Leucas aspera*) leaves or *Kuppameny* (*Acalypha indica*) leaves and stem is ground well and given	HMFS-53 $
54	**Poisoning (Snake bite/ rubber or tapioca leaves fed)** Give coconut (*Cocos nucifera*) oil or groundnut (*Arachis hypogea*) oil if the animal is poisoned with rubber (*Hevea braziliensis*) / tapioca (*Manihot esculenta*) leaves.	HMFS-54 $
55	*Kilimookku* (*Corallocorpus egigaeus*) onion (*Allium cepa*) and *keezharnelli* (*Phyllanthes deblis*) are ground well and given orally for snakebite.	HMFS-55

Table 7 contd.....

Sl. No.	ITK items	Code No.
56	**Ticks and lice** Smear sesamum (*Sesamum indicum*) oil on the animal body after one hour of bathing	HMFS-56 $
57	Smear the paste made of *adakkamanian* (*Sphearanthus indicus*) on the body	HMFS-57 $
58	Neem (*Azadirachta indica*) oil application on the animal body is found to be very effective	HMFS-58 $
59	Fumigation is found to be good	HMFS-59
60	Camphor and crushed garlic (*Allium sativum*) mixed in neem (*Azadirachta indica*) oil applied on the body	HMFS-60 $
61	Extract of arecanut (*Areca catechu*) leaf is applied	HMFS-61 $
62	Powdered naphthalene balls are applied on the body surface	HMFS-62 $
	POULTRY	
63	*Kozhivasantha* **or Ranikhet** Feed them with previous days rice and small onion	HMFS-63 $
64	Oral administration of neem (*Azadirachta indica*) and turmeric (*Curcuma longa*) paste	HMFS-64 $
65	Feed a mixture of onion (*Allium cepa*) and coconut (*Cocos nucifera*) oil	HMFS-65
66	Feed a paste made of turmeric (*Curcuma longa*) pepper (*Piper nigrum*) and salt	HMFS-66 $
67	Feed ground papaya (*Carica papaya*) leaf mixed in coconut (*Cocos nucifera*) milk	HMFS-67
68	Feed a paste of *kodangal* (*Centella asiatica*) and turmeric (*Curcuma longa*) in equal proportion	HMFS-68
69	**Ticks and lice** Use castor (*Ricinus communis*) plants to clean and remove the waste from poultry house	HMFS-69 $
70	Sprinkle tobacco (*Nicotiana tobacum*) powder in the poultry house	HMFS-70 $

Table 7 contd.....

Sl. No.	ITK items	Code No.
71	Dip the hen in the solution made of *vayambu (Acorus calamus)* rhizome	HMFS-71 $
72	Wild *thulasi* (*Ocimum sanctum*) leaf extract or *Kozhippenchedi* (*Eleocharis capitata*) kept in poultry house	HMFS-72 $
73	Spray lemon (*Cymbopogan citratus*) grass extract mixed in water	HMFS-73 $
74	***Thodurakkatha mutta* or Soft shelled egg** Feed the hen with papaya (*Carica papaya*) leaf	HMFS-74 $
75	Give supernatant liquid of lime or give powdered limestone.	HMFS-75 $

$ Selected ITK's through KIW's for further analyses

4.2 RATIONALISATION OF ITK ITEMS ON PEST MANAGEMENT BY ESS AND RSS AND SCREENING OF ITK ITEMS BY FSS

4.2.1 Rationalisation of ITK items by ESS and RSS

4.2.1.1 Rice based Cropping System

Table 8 Probable reasons attributed by ESS and RSS for ITK items in Rice based Cropping Sytem

Sl.No.	ITK items	Probable reasons
1.	RCS-1	Generation of heat kills various stages of pests and diseases (17); fermentation of seedlings (2); lethal gas production (3); hardening the seedlings (4); kills nematode juvenile stages (2); enhances growth of seedlings (4) ----
2.	RCS-2	Repellent action (9); insecticidal or insectistatic (9); antifeedent (4); acts as a biocontrol (2); botanical insecticides which favour natural enemies (2); fungicidal action (3)

Table 8 contd.....

Sl.No.	ITK items	Probable reasons
3.	RCS-3	Attracts insects and kill (25); light trap for monitoring (8)
4.	RCS-5	Controls termite (1), organic matter (1); antifungal (2), nematicidal (2); effect of tannins on soil borne pests and diseases (2); improves soil texture and moisture retention (50); phenolic compound disinfects the soil borne pest (3)
5.	RCS-6	Medicinal and antiseptic properties (5); antifeedent (4); repellent (6); soil conditioning (2); soil enriching (3); antifungal action (2); pesticidal (5); allelopathic (2); nematicidal (2); manurial (3)
6.	RCS-7	Reception of one or two rains in *aswathy njattuvela* helps dry season crop to establish and by June (rainy time) the plants grow vigorously (2); ensures uniform planting (5); during rainy season the crop tides over the unfavourable stages (2); utilisation of pre-monsoon rain for dry sowing (2)
7.	RCS-8	Increases organic matter content of the soil (4); increase aeration (3); moisture retention (2) takes long time for decomposition and hence not encouraging (1)
8.	RCS-11	Enhances microbial activity (5); biocontrol agents reduce seed borne pathogens (2); increases seed viability (4); antibacterial (9); cow dung supplies hormones and microbes (4); bactericidal action (5); maintains viability and stability of seeds by physical exclusion of pests and diseases (3)
9.	RCS-12	Repellent action due to smell (16)
10.	RCS-16	Strong smell (6); repellent action (17)
11.	RCS-17	Repellent action (4); bactericidal action (3); bacteriophages reduce parasitic microbes (2)
12.	RCS-18	Increases resistance against stem borer (3); the plant is too small to use as green manure (2); repellent (4); antimicrobial (2)
13.	RCS-19	Repellent action (7); nematicidal (40); pesticidal action (7); fungicide (3)

Table 8 contd.....

Sl.No.	ITK items	Probable reasons
14.	RCS-20	Repellent action (3); increases the resistance of the plant (4); reduce incidence of nematodes and soil insects (4); nematicidal (4); insecticidal (5); fungicidal (3); release of toxins (2) phyto principle as pest avertive (2)
15.	RCS-21	Removes egg masses (22); avoid egg deposition in leaves (2)
16.	RCS-22	Physical or mechanical control of pests (19)
17.	RCS-23	Unfold the leaves and kill larva (13); repellency (4)
18.	RCS-24	Termiticidal property (6); repellency (5); pesticidal action (4); effect of tannin reduce pest (1); reduces oxygen availability
19.	RCS-25	Insecticidal action (1)
20.	RCS-26	Ward off storage pests (4); sealing holes and prevent insect entry (8); antibacterial (6); prevents adsorption of moisture (3); repellent action (2); temperature control measure (2); conditioning the air with optimum level of moisture (2)
21.	RCS-27	Repellent action (21); pesticidal action (5)
22.	RCS-29	Improves viability of seeds (5), uniform drying (4), seed hardening (6); seed conditioning practice (5); improves germination practice (2), slow thermal balancing of embryo increases viability (1)
23.	RCS-30	Allelochemical repel insects (6); active principle cause allergy to storage pest (2)
24.	RCS-31	Repellent action (8); ash avoids drying of seedlings (2); insect borne pests are get killed due to desiccation (2) insecticidal and antimicrobial action (3)
25.	RCS-32	Repellent action (7); pesticidal action (2)
26.	RCS-33	Improves resistance and direct action on bacteria (4); germicidal action (4); Bactericidal action (8); pesticidal and nutritional action (3)
27.	RCS-34	Less rain reduces pest and disease incidence (4) climatic condition reduces gall fly attack (3); avoids high rainfall, reduces

Table 8 contd.....

Sl.No.	ITK items	Probable reasons
		crop loss (1)
28.	RCS-35	Imparts resistance to host (5); adverse effect on the fungus by reducing pH (3); fungicidal action (2)
29.	RCS-36	Repellant action (8) antifeedent (1); insecticidal action (5)
30.	RCS-37	Insecticidal and repellent action (13); antifeedant (3)
31.	RCS-38	Repellent action (4); fumigant action (3); insecticidal action (4); antifeedent (2);
32.	RCS-39	Repellent action (6); fumigant action (2); insecticidal action (3); kerosene arrests oxygen movement to the water and thus kills larva (5)
33.	RCS-41	Decomposes sprouted weeds (11)
34.	RCS-43	High rainfall and flooding reduces weed emergence (1)
35.	RCS-45	Smothering effect of daincha (5); allelopathic effect (3)
36.	RCS-46	Repellent action (12); physical poison (3)
37.	RCS-48	Movement of rats can be reduced (4), traps the rat (1)
38.	RCS-49	Disrupts the digestive system (7); blocks the body (5); upset the stomach (4); smell attracts the rats and the cement blocks the gut (5)
39.	RCS-50	Causes suffocation (14)
40.	RCS-52	Internal haemorrhage (21)
41.	RCS-53	Boiled glyricidia releases HCN (6);active principle fatal to rats (5)
42.	RCS-55	Poisonous effect after attraction (2)
43.	RCS-57	Scare the pest (16); repellent action (2)
44.	RCS-58	Biological control (predatory) of crab (16)
45.	RCS-59	Sound scarer (22); repellent action (4)
46.	RCS-60	Vibration and flickering scares (15); temperory scaring (6)

Figures in parentheses denote the frequency of reasons opined

4.2.1.2. Plantation (including spices) based Cropping System

Table 9 Probable reasons attributed by ESS and RSS for ITK items on Plantation (including spices) based Cropping System

Sl.No.	ITK items	Probable reasons
1.	PCS-2	Repellent action (12); aberration on the insect (8);
2.	PCS-3	Lethal action (2); ovicidal property (9); toxins released (2); grubs malformation (1)
3.	PCS-4	Aberration of beetle and desiccation of insects (10); prevents egg laying by adults (8)
4.	PCS-17	Pungent and toxic principle kills the pest (5); anti- repellant (8)
5.	PCS-20	Poisonous (2); allelopathic root exudates may repel (13); insecticidal property (3); catch crop (2)
6.	PCS-9	Reduce pest and disease due to microclimatic situation (2)
7.	PCS-7	Sterilising effect (2); change in pH disfavours the fungus (3); fungicidal action (3); sanitation (2); physical repellent (1)
8.	PCS-8	Creating unfavourable conditions for the fungus (3)
9.	PCS-10	Fungicidal action (6); prevents moisture (1); provides protective covering (8); insect repellent (1)
10.	PCS-11	Enhances antagonistic microflora (5); induces resistance (2); reduces the multiplication of organism (2); improves the health of the plant (2)
11.	PCS-12	Burn away fungal propagules (5); thermal effect kills the pathogen (2)
12.	PCS-14	Artificial thinning enhances setting (6)
13.	PCS-16	Antifungal activity (2); auxins (NAA, IAA) in cow's urine have hormonal activity (3); bactericidal action (2); pesticidal action (3)
14.	PCS-15	Moisture conservation-improves water holding (8); increases potassium availability and gives resistance (5); mulching effect (4)
15.	PCS-13	Improves organic matter content (5); increases availability of nutrients and resistance (8); improves soil structure (3)
16.	PCS-25	Insecticidal property (4); repellency action (9); allelopathic effect

Table 9 contd.....

Sl.No.	ITK items	Probable reasons
		(3)
17.	PCS-26	Blocks alimentary canal (13); physical chocking agent (7)
18.	PCS-27	----------
19.	PCS-28	Repellent action (3); nutritional balance (2); nematicidal action (8); fungicidal action (4); activates antagonistic organisms (5)
20.	PCS-31	Antifungal (4); anti-bacterial (5)
21.	PCS-18	Smoke reduces population/smoke screen (12); repellent action (7)
22.	PCS-19	Reduces mite population (2); causes desiccation (4); salt is essential for coconut growth and nut setting (4)
23.	PCS-22	Medicinal value (3); root exudates repulsive action (9); insecticidal action (4)
24.	PCS-21	Repellent action (7); insecticidal action (4); sodium and potassium supply (4)
25.	PCS-23	Repellent action (7); insecticidal action (3)
26.	PCS-24	Repellent action (10); insecticidal action (7)

Figures in parentheses denote the frequency of reasons opined

4.2.1.3 Seasonal based Cropping System

Table 10 Probable reasons attributed by ESS and RSS for ITK items in Seasonal based Cropping System

Sl.No.	ITK items	Probable reasons
1	SCS-3	Irritates insect body (3); repellent action (8); cuticular dessication (9); physical poison (8); reduce the surface area of leaves to attack (3)
2	SCS-4	Fungicidal (5); flakes out of the hyphal mass and physically choke them (6);
3	SCS-5	Repellent action (4); potassium imparts resistance (14)

Table 10 contd.....

Sl.No.	ITK items	Probable reasons
4	SCS-7	To ward off ants (3); repellent action (14)
5	SCS-8	Green amaranthus got resistant action (13)
6	SCS-9	Repellant and antifungal activity (&); allelopathic (4); antibacterial (3)
7	SCS-11	Antiseptic action (4); to ward off external seed borne pathogen (8); improves viability and vigour (9); bactericidal action (4)
8	SCS-12	Repellent action (3)
9	SCS-13	Antiviral (3); nematicidal (5); antihelmintic (2); insecticide (2)
10	SCS-15	Repellent action and attraction by light (14); prevents oviposition (4)
11	SCS-16	Toxic activity (4); repellent (2); deters insects by its pungency (4); insecticidal property (3)
12	SCS-17	Bactericidal action (7)
13	SCS-18	Poisonous (3); repellent action (6)
14	SCS-20	Trap (8)
15	SCS-23	Antirepellent (16); insecticide (3)
16	SCS-26	Improves soil structure (1)
17	SCS-30	Tender coconut water is rich in potassium (2); growth regulating ingredients of coconut water retard fruit drop
18	SCS-31	Weedicidal action (3); allelopathic (9); smothering effect (2); presence of tartaric acid (2)
19	SCS-32	Salt repels termites (6); high osmotic effect (4)
20	SCS-29	Antiviral (8); insecticide (8); repellent action (7); biochemical supression of microbes (2)
21	SCS-34	Antirepellent (12); pesticidal action (3)
22	SCS-35	Oily coating prevents egg laying by deterring oviposition (10)

Table 10 contd.....

Sl.No.	ITK items	Probable reasons
23	SCS-36	Physical exclusion (7); asphyxiant (2)
24	SCS-37	Physical poison (3); ash property retards movement and multiplication of pests (3); cuticular desiccation (4); Repellent (2)
25	SCS-38	Constant drying reduces pest and diseases (2); temperature and smoke prevent attack (14); less moisture (5)

Figures in parentheses denote the frequency of reasons opined

4.2.1.4 Annuals based Cropping System

Table 11 Probable reasons attributed by ESS and RSS for ITK items in Annuals based Cropping System

Sl.No.	ITK items	Probable reason
1	ACS-1	Reducing the pH minimises pests and disease attack (8)
2	ACS-2	----------
3	ACS-3	Nematicide (3); Moisture conservation (3); aromatic principles repel weeds (3)
4	ACS-4	Aromatic principle repels (2); General repellent action (5)
5	ACS-5	Medicinal value of fenugreek repels pests (5)
6	ACS-6	Burning sensation of plumbagin repels (8)
7	ACS-7	Repellent action (7)

Figures in parentheses denote the frequency of reasons opined

4.2.1.5. Homestead based Mixed Farming System

Table 12 Probable reasons attributed by ESS and RSS for ITK items in Homestead based Mixed Farming System

Sl.No.	ITK Code	Probable Reasons
1.	HMFS-1	Antiseptic (14); astringent (2); soothening effect (2); fly repellent (2); analgisic (2); inflammatory (2); astringent (2)
2	HMFS-14	Neem fly repellent (9); antiseptic property (13) adsorbent (5); antifungal (2); palliative (4); astringent (2); haemostatic (prevents hemorrhage from the wound) (3); smoothening effect (2)
3	HMFS-3	Astringent (1); disinfectant (1); protective (2); palliative and adsorbent (4)
4	HMFS-4	Antiseptic (18); astringent (9); tamarind and salt reduce oedema (6); antibacterial (6); disinfectant (3) hydragogue (3); anti-inflammatory agent (3)
5	HMFS-7	Disinfectant (4) antiseptic (2); smoothening agent (6)
6	HMFS-8	Fly repellent (14); soothening agent (2); antiseptic Maggicide (4)
7	HMFS-13	Antiseptic disinfectant (18); astringent (3); fly repellent (8) deodorant; (2); rubifacient / sedative(5); soothening agent (2)
8	HMFS-15	Protective barriers (1); soothening action (6); Fly repellent (4); disinfectant (1); promots healing (4); hygroscopic (2)
9	HMFS-5	Soothening effect (8); demulscent action (4); emollient action (6); astringent effect (2)
10	HMFS-3	Emollient action (7)
11	HMFS-6	Repellent action (7); adsorb toxin (6); antiseptic (6) disinfectant (2); antimicrobial action (3); relieve pain antifungal (5); antiseptic and haemostatic (6)
12	HMFS-17	Antiseptic (5); astringent (6); emollient (5); blood coagulation (5); disinfectant (2); soothening (2); promotes healing (3); styptic property (3); fly repellent (2);

Table 12 contd.....

Sl.No.	ITK Code	Probable Reasons
13	HMFS-20	Antiseptic (19); disinfectant (3); improve vascularity (2); fly repellent (13); adsorb toxicant (3); antibacterial lymph lavage action (2); hydragogue (1); rubifacient and soothening(5)
14	HMFS-18	Biogenic therapy (5); antiseptic (4)
15	HMFS-23	Counter irritation (3); styptic (4); soothening exudation (3); lesser irritation (3)
16	HMFS-22	Antiseptic (4); astringent (4); antibacterial (2); blood coagulation (5); soothening (2); biogenic substance (1); parasiticide (2); anti-inflammatory (4)
17	HMFS-16	Heals wounds (4); antispasmodic (3); relieve pain (3); reduces exudates (4); antiseptic (5); soothening (2); parasympathalytic agent (2); anti-inflammatory (4)
18	HMFS-19	Antiseptic (7); disinfectant (3); antiparasitic (1); fly repellent (8); astringent
19	HMFS-25	Adsorbent (2)
20	HMFS-26	Astringent (7); stool binding (6); antiseptic (2); stomachic (5)
21	HMFS-29	Astringent (5); carminative (5); stomachic (4); antiseptic (7); digestive stimulant (4)

Table 12 contd.....

Sl	ITK code	Probabale reasons
22	HMFS-28	Antiseptic (3); carminative (6); stomachic (7); antispasmodic (6); astringent (2)
23	HMFS-30	Digestion (3); stomachic (2); digestive stimulant (3)
24.	HMFS-36	Antizymotic (2); alter pH (6) antacid (7); stomachic (12)
25.	HMFS-32	Antiseptic (3); carminative (6); demulscent (4); digestant (5); anticholestrol effect (4); stomachic (4); antisymotic (4)
26.	HMFS-35	Improve GI function (4); stimulant (1); digestive (6); stomachic (2)
27.	HMFS-34	Emollient (3); demulscent property (2)
28.	HMFS-38	Improves GI function (2); stimulant (2); stomachic (3); digestant (4); regulate gastric mobility (6); antiseptic (1); prevent fermentation (2)
29.	HMFS-40	Removes GI function (4); digestant (3); demulscent (2) antiseptic (5)
30.	HMFS-39	Carminative (4); stimulant (3); stomachic (5); anti-inflammatory (3)
31.	HMFS-37	Stomachic (2); appetizer (1)
32.	HMFS-42	Expectorant (10); antiseptic (3); stimulant (5); antipyretic (9); carminative (7); diuretic (2); bronchodilator (7); anti-inflammatory (6); antispasmodic (3)
33.	HMFS-43	Expectorant (9); mucolytic (1); antispasmodic (1); antiseptic (3); carminative (1); bronchodilatory (4); antibiotic (7); stomachic (2); astringent (2)
34.	HMFS-44	Respiratory stimulant (2); antiseptic (6); expectorant (6); diuretic (2); antipyretic (2) febrifuge (2)
35.	HMFS-45	Anti-inflammatory (3); disinfectant (5); diuretic (10); immunomodulator (2); antiseptic(4)
36.	HMFS-47	Antibacterial (4); antiseptic (4); soothening (1); astringent (6)
37.	HMFS-48	Cold water increases blood circulation (5)

Table 12 contd.....

Sl	ITK code	Probabale reasons
38.	HMFS-49	Antiseptic and anti-inflammatory (11); antibacterial (3) soothening (2)
39.	HMFS-46	Hypoglycemic action (2); antiseptic (2); anti-inflammatory (6)
40.	HMFS-50	Vermifuge (7)
41.	HMFS-51	Astringent (2)
42.	HMFS-52	Anticestodal (3); arecoline effective against tape worm (2); antihelmentic (3); dewormer (2); vermifuge(4)
43.	HMFS-53	Antihelmentic (3)
44.	HMFS-54	Demulscent action (2); prevent bleaching (2)
45.	HMFS-56	Fly repellent (4); emollient (1); adsorbent (1)
46.	HMFS-57	Repellent (2); miticidal (2); antiparasitic (2); insecticidal (1)
47.	HMFS-60	Antiparasitic (7); antiseptic (1); fly repellent (5); miticidal (1)
48.	HMFS-58	Repellent (14); antiparasitic (6); antiseptic (2)
49.	HMFS-61	Astringent (3); parasiticide (2)
50.	HMFS-62	Repellent (9)
51.	HMFS-64	Antiviral (2); antiseptic (2); anti-inflammatory (5) Antibacterial (6)
52.	HMFS-63	Antiviral (2); symptomatic relief (2); astringent action (4) antipyretic (7)
53.	HMFS-66	Symptomatic relief (5); antiseptic (3); antispasmodic (4)
54.	HMFS-69	Repellent (4)
55.	HMFS-70	Toxic (2); insecticidal (2); antiparasitic (3); repellent (6)
56.	HMFS-72	Disinfectant (2); repellent (12); antiseptic (2); antifungal (4)
57.	HMFS-71	Fly Repellent (12); antiseptic (2); antifungal (7)
58.	HMFS-73	Repellent (10); antiseptic (2)
59.	HMFS-74	Repellent (5)
60.	HMFS-75	Calcium supplement (19)

Figures in parentheses denote the frequency of reasons opined

4.2.2 Screening of ITK items by FSS

The ITK's on pest management were subjected to screening by FSS through KIW on all the five-farm production systems.

4.2.2.1 Rice based Cropping System

The rank order of ITK items on pest management in Rice based Cropping System obtained by using Kendall's coefficient of concordance is presented in Table 13. The 'degree of belief' and 'strength' of each ITK is represented in the form of 'mean weightage scores' against each ITK item. The high-ranking ITK's in the descending order as perceived by FSS were: RCS-29, RCS-1, RCS-26, RCS-7 and RCS-30.

Low ranking ITK's in the ascending orders were: RCS-25, RCS-10, RCS-43, RCS-28 and RCS-17. The Kendall's coefficient of concordance (0.251) was significant at 0.01 level.

Table 13 Rank order of ITK items on pest management in Rice based Cropping System as perceived by the FSS (Results of Kendall's coefficient of concordance)

n = 30

Sl.No	ITK Code No.	Mean weightage score/ rank
1	RCS-29	50.63 (1)
2	RCS-1	48.27 (2)
3.	RCS-26	47.75 (3)
4.	RCS-7	46.93 (4)
5.	RCS-30	43.8 (5)
6.	RCS-5	42.95 (6)
7.	RCS-39	39.57 (7)
8.	RCS-19	38.05 (8)
9.	RCS-6	37.83 (9)

Table 13 contd.....

Sl.No	ITK Code No.	Mean weightage score/ rank
10.	RCS-59	37.77 (10)
11.	RCS-60	37.32 (11)
12	RCS-45	36.12 (12)
13.	RCS-50	36.08 (13)
14.	RCS-36	35.62 (14)
15.	RCS-27	34.6 (15)
16.	RCS-46	34.33 (16)
17.	RCS-57	33.75 (17)
18.	RCS-55	33.33 (18)
19.	RCS-41	33.3 (19)
20.	RCS-58	33.48 (20)
21.	RCS-34	32.12 (21)
22.	RCS-54	32.03 (22)
23.	RCS-20	31.87 (23)
24.	RCS-49	31.62 (24)
25.	RCS-21	31.3 (25)
26.	RCS-11	31.18 (26)
27.	RCS-47	31.07 (27)
28.	RCS-18	31.05 (28)
29.	RCS-35	30.98 (29)
30.	RCS-48	29.62 (30)
31	RCS-8	29.35 (31)
32	RCS-3	29.25 (32)
33	RCS-52	29 (33)
34	RCS-38	28.57 (34)
35	RCS-22	28.38 (35)
36	RCS-12	27.38 (36)
37	RCS-16	27.32 (37)
38	RCS-37	27.22 (38)
39	RCS-31	27.67 (39)

Table 13 contd.....

Sl.No	ITK Code No.	Mean weightage score/ rank
40	RCS-44	27.62 (40)
41	RCS-23	26.72 (41)
42	RCS-24	26.6 (42)
43	RCS-53	25.6 (43)
44	RCS-32	25.48 (44)
45	RCS-33	25.25 (45)
46	RCS-2	24.55 (46)
47	RCS-15	24.32 (47)
48	RCS-13	24.3 (48)
49	RCS-40	24.12 (49)
50	RCS-51	23.98 (50)
51	RCS-42	23.83 (51)
52	RCS-56	23.63 (52)
53	RCS-14	22.55 (53)
54	RCS-9	21.52 (54)
55	RCS-4	21.2 (55)
56	RCS-17	20.5 (56)
57	RCS-28	20.25 (57)
58	RCS-43	20.03 (58)
59	RCS-10	17.25 (59)
60	RCS-25	13.25 (60)

Figures, in parentheses denote ranks

Kendall's coefficient of concordance (K_C) = 0.251**

** Significant at 0.01 level

4.2.2.2 Plantation (including spices) based Cropping System

The rank order and mean weightage scores of each ITK as perceived by the FSS are presented in Table 14. It could be seen from the table that the high-ranking ITK's in the descending order were: PCS-2, PCS-1, PCS-3, PCS-11 and PCS-26, while the low ranking ITK's in the ascending order were: PCS-6, PCS-33, PCS-14, PCS-9 and PCS-1. The Kendall's coefficient of concordance (0.219) is significant at 0.01 level.

Table 14. Rank order of ITK items on pest management in Plantation (including spices) based Cropping System as perceived by the FSS (Results of Kendall's coefficient of concordance)

n = 30

Sl.No	ITK Code No.	Mean weightage score/ rank
1	PCS-2	23.98 (1)
2	PCS-1	23.95 (2)
3.	PCS-3	22.8 (3)
4.	PCS-11	22.22 (4)
5.	PCS-26	22.02 (5)
6.	PCS-4	20.33 (6)
7.	PCS-7	20.05 (7)
8.	PCS-24	19.6 (8)
9.	PCS-9	19.6 (9)
10.	PCS-28	19.35 (10)
11.	PCS-12	19.32 (11)
12	PCS-10	17.7 (12)
.13.	PCS-20	17.45 (13)
14.	PCS-23	16.65 (14)
15.	PCS-18	16.47 (15)
16.	PCS-21	16.25 (16)
17.	PCS-15	16.17 (17)
18.	PCS-22	15.85 (18)

Table 14 contd.....

Sl.No	ITK Code No.	Mean weightage score/ rank
19.	PCS-8	14.78 (19)
20.	PCS-25	14.6 (20)
21.	PCS-31	14.6 (20)
22.	PCS-16	14.48 (21)
23.	PCS-14	14.37 (22)
24.	PCS-17	14.23 (23)
25.	PCS-13	13.75 (24)
26.	PCS-19	13.22(25)
27.	PCS-27	13.03 (26)
28.	PCS-5	12.08 (27)
29.	PCS-30	11.08 (28)
30.	PCS-32	11.03 (29)
31	PCS-29	10.28 (30)
32	PCS-6	6.65 (31)

Figures, in parentheses denote ranks

Kendall's Coefficient of concordance (K_C) = 0.219**

**Significant at 0.01 level

4.2.2.3 Seasonal based Cropping System

The data in Table 15 represent the mean weightage scores and rank order of ITK items in Seasonal based Cropping System, computed using Kendall's coefficient of concordance.

It could be observed that according to the FSS, the ITK's: SCS-11, SCS-38, SCS-39, SCS-17 and SCS-31 were judged to have high ranks, whereas SCS-22, SCS-10, SCS-28, SCS-25 and SCS-19 held low ranks in ascending order. The Kendall's coefficient of concordance (0.244) was significant at 0.01 level.

Table 15 Rank order of ITK items on pest management in Seasonal based Cropping System as perceived by the FSS (Results of Kendall's coefficient of concordance)

n = 30

Sl.No	ITK Code No.	Mean weightage score/rank
1	SCS-11	32.53 (1)
2	SCS-38	30.98 (2)
3.	SCS-39	28.62 (3)
4.	SCS-17	27.78 (4)
5.	SCS-31	27.58 (5)
6.	SCS-37	27.53 (6)
7.	SCS-3	26.48 (7)
8.	SCS-7	26.17 (8)
9.	SCS-20	24.93 (9)
10.	SCS-34	23.33 (10)
11.	SCS-18	22.65 (11)
12	SCS-16	22.43 (12)
.13.	SCS-32	21.6 (13)
14.	SCS-15	21.23 (14)
15.	SCS-4	20.4 (15)
16.	SCS-5	20.07 (16)
17.	SCS-35	19.88 (17)
18.	SCS-30	19.8 (18)
19.	SCS-36	19.5 (19)
20.	SCS-8	19.4 (20)
21.	SCS-23	19.3 (21)
22.	SCS-29	18.87 (22)
23.	SCS-26	18.68 (23)
24.	SCS-12	18.42 (24)
25.	SCS-24	17.83 (25)
26.	SCS-2	17.6 (26)
27.	SCS-13	17.28 (27)

Table 15 contd.....

Sl.No	ITK Code No.	Mean weightage score/rank
28.	SCS-1	17.25 (28)
29.	SCS-9	16.92 (29)
30.	SCS-14	15.62 (30)
31	SCS-33	15.4 (31)
32	SCS-36	14.32 (32)
33	SCS-27	14.28 (33)
34.	SCS-21	14.13 (34)
35	SCS-19	13.9 (35)
36	SCS-25	13.65 (36)
37	SCS-28	13.55 (37)
38	SCS-10	10.78 (38)
39	SCS-22	9.3 (39)

Figures, in parentheses denote ranks

Kendall's coefficient of concordance (Kc) = 0.244**

**Significant at 0.01 level

4.2.2.4 Annuals based Cropping System

The degree of agreement in the response of FSS was worked out using Kendall's coefficient of concordance. The mean weightage scores and rank order of ITK items are presented in Table 16.

The high-ranking ITK's in the descending order as perceived by the FSS were: ACS-1, ACS-3 and ACS-4. The low ranking ITK's in the ascending order were: ACS-5, ACS-6 and ACS-7. The Kendall's coefficient of concordance (0.276) was significant at 0.01 level.

Table 16 Rank order of ITK items on pest management in Annuals based Cropping System as perceived by the FSS (Results of Kendall's coefficient of concordance)

n=30

Sl. No	ITK Code No.	Mean weightage score/ rank
1	ACS-1	5.35 (1)
2	ACS-3	4.5 (2)
3	ACS-4	4.18 (3)
4	ACS-2	4 (4)
5	ACS-7	4 (4)
6	ACS-6	3.97 (5)
7	ACS-5	2 (6)

Figures, in parentheses denote ranks

Kendall's coefficient of concordance (K_C) = 0.276**

** Significant at 0.01 level

4.2.2.5 Homestead based Mixed Farming System

Table 17 presents the results of Kendall's coefficient of concordance in Homestead based Mixed Farming System.

The ITK's namely HMFS-48, HMFS-54, HMFS-39, HMFS-42 and HMFS-64 were found to have high ranks in the descending order as perceived by FSS. The low ranking ITK's in the ascending order were: HMFS-73, HMFS-66, HMFS-16, HMFS-71 and HMFS-37. The Kendall's coefficient of concordance (0.193) was significant at 0.01 level.

Table 17 Rank order of ITK items on pest management in Homestead based Mixed Farming System as perceived by the FSS (Results of Kendall's coefficient of concordance)

n= 30

Sl. No.	ITK Code No.	Mean weightage score/rank
1	HMFS-48	59.45 (1)
2	HMFS –54	56.17 (2)
3.	HMFS –30	53.3 (3)
4.	HMFS-42	52.3 (4)
5.	HMFS-64	49.85 (5)
6.	HMFS-51	48.63 (6)
7.	HMFS-61	48.25 (7)
8.	HMFS-20	47.82 (8)
9.	HMFS-1	47.62 (9)
10.	HMFS-58	47.43 (10)
11.	HMFS-30	47.80 (11)
12	HMFS-45	46.83 (12)
13.	HMFS-38	46.72 (13)
14.	HMFS-57	46.43 (14)
15.	HMFS-33	45.88 (15)
16.	HMFS-43	44.75 (16)
17.	HMFS-47	44.37 (17)
18.	HMFS-49	44.2 (18)
19.	HMFS-21	44.17 (19)
20.	HMFS-22	43.97 (20)
21.	HMFS-4	43.8 (21)
22.	HMFS-50	43.8 (21)
23.	HMFS-67	43.88 (22)
24.	HMFS-56	43.13 (23)
25.	HMFS-25	48 (24)
26.	HMFS-40	42.78 (25)

Table 17 contd.....

Sl. No.	ITK Code No.	Mean weightage score/rank
27.	HMFS-7	42.78 (25)
28.	HMFS-72	42.53 (26)
29.	HMFS-75	41.67 (27)
30.	HMFS-44	41.62 (28)
31	HMFS-7	41.37 (29)
32	HMFS-26	41.05 (30)
33	HMFS-62	40.4 (31)
34	HMFS-29	40.08 (32)
35	HMFS-2	39.67 (33)
36	HMFS-17	39.65 (34)
37	HMFS-28	39.47 (35)
38	HMFS-41	39.33 (36)
39	HMFS-36	39.03 (37)
40	HMFS-15	37.07 (38)
41	HMFS-3	36.87 (39)
42	HMFS-32	36.35 (40)
43	HMFS-19	36.22 (41)
44	HMFS-6	36.2 (42)
45	HMFS-46	35.83 (43)
46	HMFS-5	35.73 (44)
47	HMFS-35	35.43 (45)
48	HMFS-65	35.27 (46)
49	HMFS-13	34.88 (47)
50	HMFS-52	34.65 (48)
51	HMFS-53	34.27 (49)
52	HMFS-37	33.67 (50)
53	HMFS-71	33.43 (51)
54	HMFS-16	32.47 (52)
55	HMFS-66	32.4 (53)
56	HMFS-73	32.12 (54)

Table 17 contd.....

Sl. No.	ITK Code No.	Mean weightage score/rank
57	HMFS-15	31.87 (55)
58	HMFS-19	31.77 (56)
59	HMFS-44	31.12 (57)
60	HMFS-37	31.07 (58)
61	HMFS-17	30.48 (59)
62	HMFS-18	30.33 (60)
63	HMFS-30	28.98 (61)
64	HMFS-26	28.52 (62)
65	HMFS-74	27.03 (63)
66	HMFS-3	26.8 (64)
67	HMFS-8	26.78 (65)
68	HMFS-70	26.73 (66)
69	HMFS-75	25.65 (67)
70	HMFS-17	23.3 (68)
71	HMFS-5	22.75 (69)
72	HMFS-34	22.4 (70)
73	HMFS-7	22.02 (71)
74	HMFS-6	18.37 (72)
75	HMFS-61	16.7 (73)

Figures, in parentheses denote ranks

Kendall's coefficient of concordance (K_C) = 0.193 **

** Significant at 0.01 level

4.3 EVALUATION OF PERCEIVED EFFECT AND SCIENTIFIC RATIONALITY OF ITK ITEMS ON PRODUCTION SYSTEMS BY ESS AND RSS

From the list of the ITK items screened by the FSS in section 4.2.2, the first three quartiles of each production system were retained, based on the ranks in the descending order, for further analyses in the succeeding stages of the study and the results are furnished here under.

4.3.1 Evaluation by the ESS on Perceived Effect and Scientific Rationality of ITK Items

4.3.1.1 Rice based Cropping System

The ITK items on pest management documented under Rice based Cropping System were ranked using Kendall's coefficient of concordance by the ESS. The results are presented in Table 18. Kendall's coefficient of concordance was computed separately for the perceived effect, scientific rationality and combination of both perceived effect and scientific rationality of each ITK item.

The data in table 18 revealed a comparison of the ITK items in terms of their perceived effect, scientific rationality and both. The ITK's namely RCS-27, RCS-58, RCS-3, RCS-59 and RCS-26 secured high ranks in the descending order on perceived effect. The low ranking ITK's were: RCS-25, RCS-18, RCS-30, RCS-5 and RCS-39 in the ascending order as perceived by the ESS. The practices like RCS-27, RCS-58, RCS-48, RCS-3 and RCS-41 secured high ranks in descending order and RCS-25, RCS-18, RCS-30, RCS-31 and RCS-32 secured low ranks in ascending order as perceived by ESS on scientific rationality of ITK items. In terms of their 'combined effect' RCS-27, RCS-58, RCS-3, RCS-59 and RCS-26 occupied high ranks while RCS-25, RCS-18, RCS-30, RCS-31 and RCS-6 secured low ranks. The ITK's RCS-58 and RCS-3 occupied first and second rank positions in all the three attributes while RCS-25, RCS-18 and RCS-30 secured low ranks in ascending order for all the three attributes. The Kendall's coefficients of concordance (0.148, 0.152,and 0.132) were significant at 0.01 level for perceived effect, scientific rationality and combined effects respectively.

Table 18 Evaluation by the ESS on perceived effect and scientific rationality of ITK's in Rice based Cropping System

n = 54

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
RCS-27	89.57 (1)	RCS-27	85.14 (1)	RCS-27	124.71 (1)
RCS-58	82.04 (2)	RCS-58	78.82 (2)	RCS-58	160.86 (2)
RCS-3	80.07 (3)	RCS-48	74.43 (3)	RCS-3	154.37 (3)
RCS-59	77.99 (4)	RCS-3	74.3 (4)	RCS-9	149.53 (4)
RCS-26	76.45 (5)	RCS-41	72.8 (5)	RCS-26	146.5 (5)
RCS-7	75.32 (6)	RCS-59	71.54 (6)	RCS-7	143.39 (6)
RCS-21	74.01 (7)	RCS-29	70.21 (7)	RCS-29	142.83 (7)
RCS-29	72.62 (8)	RCS-26	70.05 (8)	RCS-21	142.2 (8)
RCS-11	71.34 (9)	RCS-21	68.19 (9)	RCS-48	141.47 (9)
RCS-1	69.12 (10)	RCS-7	68.07 (10)	RCS-1	135.3 (10)
RCS-48	67.04 (11)	RCS-55	68.01 (11)	RCS-41	134.42 (11)
RCS-2	66.04 (12)	RCS-57	66.61 (12)	RCS-11	133.62 (12)
RCS-53	65.41 (13)	RCS-1	66.18 (13)	RCS-57	130.35 (13)
RCS-49	64.51 (14)	RCS-52	65.71 (14)	RCS-55	129.69 (14)
RCS-60	63.89 (15)	RCS-6	63.56 (15)	RCS-49	127.6 (15)
RCS-57	63.74 (16)	RCS-49	63.09 (16)	RCS-6	126.84 (16)
RCS-6	63.28 (17)	RCS-50	62.4 (17)	RCS-2	123.95 (17)
RCS-55	61.68 (18)	RCS-11	62.28 (18)	RCS-50	122.49 (18)
RCS-41	61.62 (19)	RCS-36	60.94 (19)	RCS-60	119.58 (19)

Table 18 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
RCS-23	60.41 (20)	RCS-19	60.05(20)	RCS-23	119.06 (20)
RCS-33	60.14 (21)	RCS-39	58.79(21)	RCS-52	118.62 (21)
RCS-50	60.09 (22)	RCS-23	58.65(22)	RCS-34	117.61 (22)
RCS-34	59.19 (23)	RCS-34	58.42(23)	RCS-53	117.01 (23)
RCS-45	57.53 (24)	RCS-2	57.91(24)	RCS-19	115.8 (24)
RCS-44	57.32 (25)	RCS-46	57.58(25)	RCS-17	113.03 (25)
RCS-16	57.18 (26)	RCS-17	56.76(26)	RCS-45	113.02 (26)
RCS-17	56.27 (27)	RCS-60	55.69(27)	RCS-33	111.7 (27)
RCS-35	55.85 (28)	RCS-45	55.49(28)	RCS-12	110.5 (28)
RCS-19	55.77 (29)	RCS-2	55.47(29)	RCS-46	110.26 (29)
RCS-12	55.03 (30)	RCS-35	53.26(30)	RCS-44	109.9 (30)
RCS-24	53.36 (31)	RCS-44	52.58(31)	RCS-35	109.11 (31)
RCS-20	53.27 (32)	RCS-16	51.86(32)	RCS-16	109.04 (32)
RCS-22	52.96 (33)	RCS-53	51.6(33)	RCS-24	103.89 (33)
RCS-52	52.91 (34)	RCS-33	51.56(34)	RCS-20	102.83 (34)
RCS-46	52.68 (35)	RCS-24	50.53(35)	RCS-22	102.16 (35)
RCS-38	46.65 (36)	RCS-38	49.61(36)	RCS-39	101.61 (36)
RCS-32	43.57 (37)	RCS-20	49.56(37)	RCS-36	101.55 (37)
RCS-39	42.82 (38)	RCS-37	49.25(38)	RCS-38	96.26 (38)
RCS-37	42.81 (39)	RCS-22	49.2(39)	RCS-37	92.06 (39)
RCS-8	41.62 (40)	RCS-8	45.8(40)	RCS-8	87.42 (40)
RCS-36	40.61 (41)	RCS-5	40.19(41)	RCS-32	82.6 (41)

Table 18 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
RCS-31	36.69 (42)	RCS-32	39.03(42)	RCS-6	75.56 (42)
RCS-5	35.35 (43)	RCS-31	36.63(43)	RCS-31	73.32 (43)
RCS-30	30.47 (44)	RCS-30	35.56(44)	RCS-30	66.03 (44)
RCS-18	27.86 (45)	RCS-18	38.5(45)	RCS-18	58.36 (45)
RCS-25	27.34 (46)	RCS-25	27.33(46)	RCS-25	54.67 (46)

Figures in parentheses denote ranks

Kendall's coefficient of concordance (K_C) = (0.148, 0.152 and 0.132)**

** Significant at 0.01 level

4.3.1.2 Plantation (including spices) based Cropping System

Kendall's coefficient of concordance was worked out for the 27 ITK items. The ITK items PCS-28 and PCS-3 held the same rank position of 18 with a score of 45.89. As per the perceived effect (alone) of ITK items, the highest ranks were: PCS-2, PCS-10, PCS-1, PCS-26 and PCS-4, in descending order. The low ranking ITK's were: PCS-23, PCS-19, PCS-25, PCS-27 and PCS-12, in ascending order; while in terms of scientific rationality the ITK's namely PCS-1, PCS-31, PCS-9, PCS-2 and PCS-10 got the highest ranks in the descending order and PCS-27, PCS-20, PCS-26, PCS-28 and PCS-14, stood in low ranking positions in the ascending order of importance. The ITK item PCS-1, PCS-10, PCS-31, PCS-20 and PCS-17 were the high ranking ones, where as, PCS-27, PCS-19, PCS-17, PCS-23 and PCS-12 were low ranking ITK's when their combined effects were reckoned. The Kendall's coefficient of concordance (0.122, 0.142 and 0.118) were significant at 0.01 level for perceived effect, scientific rationality and combined effect.

Table 19 Evaluation by the ESS on perceived effect and scientific rationality of ITK's in Plantation (including spices) based Cropping System

n = 54

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
PCS-2	74.39 (1)	PCS-1	70.19 (1)	PCS-1	152.42 (1)
PCS-10	71.82 (2)	PCS-31	66.22 (2)	PCS-10	133.2 (2)
PCS-1	69.14 (3)	PCS-9	64.55 (3)	PCS-31	124.6 (3)
PCS-26	65.15 (4)	PCS-2	61.42 (4)	PCS-20	119.79 (4)
PCS-4	63.05 (5)	PCS-10	61.38 (5)	PCS-11	119.17 (5)
PCS-18	61.08 (6)	PCS-11	59.7 (6)	PCS-3	117.35 (6)
PCS-20	59.57 (7)	PCS-15	59.59 (7)	PCS-18	113.95 (7)
PCS-11	59.47 (8)	PCS-8	57.4 (8)	PCS-15	111.16 (8)
PCS-31	58.38 (9)	PCS-3	54.33 (9)	PCS-26	107.05 (9)
PCS-17	55.55 (10)	PCS-4	54.3 (10)	PCS-20	107.04 (10)
PCS-9	55.24 (11)	PCS-18	52.85 (11)	PCS-4	104.18 (11)
PCS-14	52.68 (12)	PCS-13	49.7 (12)	PCS-2	100.22 (12)
PCS-7	51.7 (13)	PCS-25	49.16 (13)	PCS-13	99.35 (13)
PCS-15	51.57 (14)	PCS-17	48.63 (14)	PCS-8	96.26 (14)
PCS-13	49.65 (15)	PCS-20	47.47 (15)	PCS-7	96.26 (14)
PCS-24	48.34 (16)	PCS-23	46.89 (16)	PCS-9	95.73 (15)
PCS-21	46.16 (17)	PCS-16	45.85 (17)	PCS-14	94.94 (16)
PCS-28	45.89 (18)	PCS-24	44.96 (18)	PCS-24	93.3 (17)
PCS-3	45.89 (18)	PCS-21	44.78 (19)	PCS-21	90.94 (18)
PCS-16	44.42 (19)	PCS-7	44.03 (20)	PCS-16	90.27 (19)
PCS-8	38.86 (20)	PCS-19	42.9 (21)	PCS-28	87.86 (20)
PCS-20	37.55 (21)	PCS-12	42.74 (22)	PCS-25	83.65 (21)
PCS-12	37.23 (22)	PCS-14	42.26 (23)	PCS-12	79.97 (22)
PCS-27	36.11 (23)	PCS-28	41.97 (24)	PCS-23	78.35 (23)

Table 19 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
PCS-25	34.49 (24)	PCS-26	41.9 (25)	PCS-17	77.1 (24)
PCS-19	31.69 (25)	PCS-20	39.55 (26)	PCS-19	74.59 (25)
PCS-23	31.46 (26)	PCS-27	23 (27)	PCS-27	59.11 (26)

Figures in parentheses denote ranks

Kendall's coefficient of concordance (K_C) = (0.122, 0.142 and 0.118)**

** Significant at 0.01 levels

4.3.1.3 Seasonal based Cropping System

Table 20 presents the rank order and mean weightage scores of ITK items. The Kendall's coefficient of concordance was found to be significant in all the three cases namely, perceived effect, scientific rationality and their combination. The scores and ranks were arranged in the descending order of importance of the ITK items. The ITK items varied in their order of preference in all the three attributes. The high ranking ITK items as perceived by ESS on the 'perceived effect' were : SCS-11, SCS-7, SCS-3, SCS-17 and SCS-37 in the descending order, while SCS-26, SCS-32, SCS-38, SCS-13 and SCS-12 were low ranking ITKs in the ascending order. In terms of scientific rationality, the high ranking ITKs were SCS-38, SCS-11, SCS-37, SCS-7 and SCS-15 whereas, SCS-32, SCS-12, SCS-30, SCS-13 and SCS-26 were considered low ranks. In terms of the 'combined effect' SCS-11, SCS-38, SCS-7, SCS-37 and SCS-3 were ranked high and SCS-26, SCS-32, SCS-13, SCS-12 and SCS-30 were ranked low. The Kendall's coefficient of concordance (0.141, 0.139 and 0.117) were significant at 0.01 level for perceived effect, scientific rationality and their combination.

Table: 20 Evaluation by the ESS on perceived effect and scientific rationality of ITK's in Seasonal based Cropping System

n= 54

Perceived Effect (PE)		ScientificRationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
SCS-11	76.68(1)	SCS-38	73.84(1)	SCS-11	147.39(1)
SCS-7	64.22(2)	SCS-11	70.71(2)	SCS-38	142.98(2)
SCS-3	64.19(3)	SCS-37	67.9(3)	SCS-7	132.03(3)
SCS-17	62.34(4)	SCS-7	67.81(4)	SCS-37	128.82(4)
SCS-37	60.92(5)	SCS-15	65.35(5)	SCS-3	127.5(5)
SCS-15	58.09(6)	SCS-3	63.31(6)	SCS-15	123.44(6)
SCS-29	57.18(7)	SCS-5	61.4(7)	SCS-17	121.08(7)
SCS-5	56.99(8)	SCS-17	58.74(8)	SCS-5	118.39(8)
SCS-35	56.45(9)	SCS-8	58.41(9)	SCS-29	115.38(9)
SCS-34	55.77(10)	SCS-29	58.2(10)	SCS-8	112.6(10)
SCS-36	54.73(11)	SCS-16	57.81(11)	SCS-35	112.14(11)
SCS-4	54.58(12)	SCS-34	56(12)	SCS-34	111.77(12)
SCS-8	54.19(13)	SCS-35	55.69(13)	SCS-16	109.72(13)
SCS-9	53.8(14)	SCS-39	54.13(14)	SCS-36	107.56(14)
SCS-16	51.91(15)	SCS-36	52.83(15)	SCS-9	1.6.24(15)
SCS-39	48.19(16)	SCS-18	52.64(16)	SCS-39	102.32(16)
SCS-18	46.97(17)	SCS-9	52.44(17)	SCS-4	101.14(17)
SCS-31	43.23(18)	SCS-31	48.14(18)	SCS-18	99.61(18)
SCS-30	43.16(19)	SCS-23	47.92(19)	SCS-31	91.37(19)
SCS-23	42.65(20)	SCS-20	47.83(20)	SCS-23	90.57(20)
SCS-20	41.3(21)	SCS-4	46.56(21)	SCS-20	89.13(21)
SCS-12	40.41(22)	SCS-26	36.58(22)	SCS-30	78.5(22)
SCS-13	37.04(23)	SCS-13	36.21(23)	SCS-12	75.65(23)
SCS-38	36.11(24)	SCS-30	35.38(24)	SCS-13	73.25 (24)

Table 20 contd.....

Perceived Effect (PE)		ScientificRationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
SCS-32	35.19(25)	SCS-12	35.24(25)	SCS-32	66.7(25)
SCS-26	24.04(26)	SCS-32	31.51(26)	SCS-26	60.62(26)

Figures in parentheses denote ranks

Kendall's coefficient of concordance (K_C) = (0.141, 0.139 and 0.117)**

** Significant at 0.01 level

4.3.1.4 Annuals based Cropping System

As presented in table 21 out of the seven ITK's listed, the highest rank was obtained for ACS-6 and the lowest rank was obtained for ACS-5 in all the three attributes. Coefficient of concordance were found to be highly significant at 0.01 level (0.129, 0.131 and 0.112), which showed that there exists high degree of agreement in all the three attributes.

Table 21 Evaluation by the ESS on perceived effect and scientific rationality of ITK's in Annuals based Cropping System

n=54

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
ACS- 6	57.45 (1)	ACS-6	59.21 (1)	ACS-6	116.66 (1)
ACS- 2	43.59 (2)	ACS-4	40.5 (2)	ACS-1	79.6 (2)
ACS- 7	40.11 (3)	ACS-7	38.65 (3)	ACS-7	78.76 (3)
ACS- 3	35.31 (4)	ACS-1	36.86 (4)	ACS-3	72.17 (4)
ACS- 1	32.84(5)	ACS-3	36.01(5)	ACS-4	70.57 (5)
ACS-4	30.07(6)	ACS-2	34.2(6)	ACS-2	67.04 (6)
ACS-5	25.19(7)	ACS-5	26.11(7)	ACS-5	51.3 (7)

Figures in parentheses denote ranks

Kendall's coefficient of concordance (K_C) = (0.124, 0.131 and 0.112) **

** Significant at 0.01 level

4.3.1.5 Homestead based Mixed Farming System

The practices HMFS-75, HMFS-26, HMFS-58, HMFS-43 HMFS-29 and HMFS-42 were perceived as high potential in all the three attributes, while the low ranking ITK's were: HMFS-37, HMFS-50, HMFS-69 and HMFS-7 for all the cases. The Kendall's coefficient of concordance were 0.361, 0.389 and 0.372 at 0.01 level for perceived effect, scientific rationality and combined effect respectively.

Table 22 Evaluation by the ESS on perceived effect and scientific rationality of ITK's in Homestead based Mixed Farming System

n= 30

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
HMFS-75	52.35(1)	HMFS-75	53.95(1)	HMFS-75	211.18(1)
HMFS-26	51.8(2)	HMFS-26	52.42(2)	HMFS-26	207.32(2)
HMFS-58	49.92(3)	HMFS-58	50.55(3)	HMFS-58	199.99(3)
HMFS-43	46.82(4)	HMFS-43	46.5(4)	HMFS-43	185.62(4)
HMFS-29	46.52(5)	HMFS-42	45.83(5)	HMFS-42	183.02(5)
HMFS-14	45.45(6)	HMFS-14	45.5(6)	HMFS-29	179.45(6)
HMFS-73	43.87(7)	HMFS-52	45.03(7)	HMFS-14	177.59(7)
HMFS-13	43.3(8)	HMFS-29	44.92(8)	HMFS-73	174.43(8)
HMFS-1	41.72(9)	HMFS-73	44.62(9)	HMFS-52	167.48(9)
HMFS-30	41.4(10)	HMFS-13	42.43(10)	HMFS-13	167.38(10)
HMFS-20	40.07(11)	HMFS-1	41.22(11)	HMFS-1	163.9(11)
HMFS-5	39.45(12)	HMFS-20	40.07(12)	HMFS-20	157.38(12)
HMFS-52	39.42(13)	HMFS-28	39.12(13)	HMFS30	155.15(13)
HMFS-54	39.3(14)	HMFS-72	38.87(14)	HMFS-28	154.57(14)
HMFS-28	39.22(15)	HMFS-30	38.32(15)	HMFS-5	153.83(15)
HMFS-72	38.6(16)	HMFS-5	38.2(16)	HMFS-72	15268(16)

Table 22 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
HMFS-19	37.88(17)	HMFS-54	37.3(17)	HMFS-54	152.65(17)
HMFS-8	35.1(18)	HMFS-19	35.6(18)	HMFS-19	140.04(18)
HMFS-64	34.98(19)	HMFS-64	35.57(19)	HMFS-8	138.81(19)
HMFS-48	33.78(20)	HMFS-8	34.67(20)	HMFS-64	137.96(20)
HMFS-60	33.6(21)	HMFS-48	31.85(21)	HMFS-48	130.39(21)
HMFS-26	33.3(22)	HMFS-26	31.68(22)	HMFS-60	128.77(22)
HMFS-45	31.97(23)	HMFS-61	31.57(23)	HMFS-25	126.28(23)
HMFS-49	31.82(24)	HMFS-60	31.47(24)	HMFS-61	123.34(24)
HMFS-61	30.85(25)	HMFS-6	30.2(25)	HMFS-45	122.95(25)
HMFS-35	30.55(26)	HMFS-45	30.17(26)	HMFS-49	119.4(26)
HMFS-4	29.48(27)	HMFS-22	30.07(27)	HMFS-4	117.07(27)
HMFS-63	29.4(28)	HMFS-4	29.93(28)	HMFS-22	115.77(28)
HMFS-62	28.92(29)	HMFS-62	29.58(29)	HMFS-62	115.34(29)
HMFS-22	28.45(30)	HMFS-49	29.32(30)	HMFS-6	115.27(30)
HMFS-6	28.3(31)	HMFS-32	28.77(31)	HMFS-35	114.46(31)
HMFS-32	27.9(32)	HMFS-35	28.18(32)	HMFS-32	112.18(32)
HMFS-57	27.68(33)	HMFS-57	27.92(33)	HMFS-63	112.14(33)
HMFS-38	27.13(34)	HMFS-70	27.78(34)	HMFS-57	108.65(34)
HMFS-74	26.85(35)	HMFS-63	27.47(35)	HMFS-70	106.57(35)
HMFS-17	26.67(36)	HMFS-56	27.27(36)	HMFS-56	106.1(36)
HMFS-56	26.45(37)	HMFS-17	26.47(37)	HMFS-38	104.7(37)
HMFS-	26.38(38)	HMFS-38	25.9(36)	HMFS-17	104.6(38)
HMFS-46	26.35(39)	HMFS-3	25.87(39)	HMFS-74	102.6(39)
HMFS-70	36.27(40)	HMFS-15	25.65(40)	HMFS-3	102.3(40)
HMFS-3	25.92(41)	HMFS-40	25.23(41)	HMFS-46	100.4(41)
HMFS-16	24.68(42)	HMFS-74	25.1(42)	HMFS-15	98.8(42)
HMFS-43	24.47(43)	HMFS-16	24.5(43)	HMFS-40	98.28(43)

Table 22 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
HMFS-40	24.28(44)	HMFS-46	24.1(44)	HMFS-53	94.5(44)
HMFS-15	24.1(45)	HMFS-39	23.88(45)	HMFS-66	93.07(44)
HMFS-53	23.97(46)	HMFS-53	23.78(46)	HMFS-39	92.7(45)
HMFS-39	23.07(47)	HMFS-66	22.5(47)	HMFS-44	88.35(46)
HMFS-44	33.2(48)	HMFS-44	22.47(48)	HMFS-71	82.83(47)
HMFS-71	21.4(49)	HMFS-71	20.5(49)	HMFS-18	74.58(48)
HMFS-51	19.82(50)	HMFS-34	18.73(50)	HMFS-51	74.47(50)
HMFS-23	19.3(51)	HMFS-25	18.55(51)	HMFS-25	73.97(51)
HMFS-18	19.27(52)	HMFS-18	18.52(52)	HMFS-23	73.94(52)
HMFS-25	18.82(53)	HMFS-69	18.45(53)	HMFS-47	72.3(53)
HMFS-47	18.45(54)	HMFS-47	18.2 (54)	HMFS-34	72.1(54)
HMFS-3	18.3(55)	HMFS-23	18.07(55)	HMFS-3	71.5(55)
HMFS-34	17.68(56)	HMFS-10	17.93(56)	HMFS-69	71.36(56)
HMFS-69	17.6(57)	HMFS-51	17.62(57)	HMFS-7	65.6(57)
HMFS-7	17.08(58)	HMFS-7	16.25(58)	HMFS-37	58.44(58)
HMFS-50	15.42(59)	HMFS-37	14.8(59)	HMFS-16	57.35(59)
HMFS-37	14.92(60)	HMFS-50	13.05(60)	HMFS-50	56.03(60)

Figures in parentheses denote ranks

Kendall's coefficient of concordance (K_c) = (0.361, 0.389 and 0.372)**

** Significant at 0.01 level

4.3.2 Evaluation by the RSS on perceived effect and scientific rationality of ITK items

4.3.2.1 Rice based Cropping System

As evaluated by the RSS (Table 23) the high rank order of ITK's in terms of 'perceived effect' were RCS-26, RCS-2, RCS-7, RCS-21 and RCS-29, while RCS-26,

RCS-2, RCS-7, RCS-21 and RCS-34 occupied high ranking in terms of 'scientific rationality'. In terms of their 'combined effect', RCS-26, RCS-2, RCS-7, RCS-21 and RCS-26 secured high ranks in the descending order. The low ranking ITK's in ascending order were: RCS-25, RCS-37, RCS-30, RCS-38, and RCS-35 in terms of perceived effect; RCS-25, RCS-32, RCS-37, RCS-33, and RCS-35 in terms of scientific rationality; and on their combined effect ITK's were RCS-25, RCS-37, RCS-32, RCS-35 and RCS-33. The Kendall's coefficient of concordance (0.148, 0.157 and 0.132) were significant at 0.01 level on perceived effect, scientific rationality and on their combination respectively.

Table 23 Evaluation by the RSS on Perceived Effect and Scientific Rationality of ITK's in Rice based Cropping System

n=30

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
RCS-26	91.75 (1)	RCS-26	84.32(1)	RCS-27	176.07(1)
RCS-2	88.25(2)	RCS-2	81.55(2)	RCS-2	169.8(2)
RCS-7	83.7(3)	RCS-21	80.12(3)	RCS-21	163.78(3)
RCS-21	83.66(4)	RCS-7	79.32(4)	RCS-7	163.02(4)
RCS-29	82.3(5)	RCS-34	77.13(5)	RCS-26	158.28(5)
RCS-26	81.88(6)	RCS-16	76.4(6)	RCS-29	155.22(6)
RCS-58	80.46(7)	RCS-58	74.55(7)	RCS-58	155.01(7)
RCS-3	78.61(8)	RCS-6	73.22(8)	RCS-34	152.63(8)
RCS-6	78.18(9)	RCS-29	72.92(9)	RCS-6	151.4(9)
RCS-34	75.5(10)	RCS-50	72.08 (10)	RCS-3	147.89 (10)
RCS-1	73.84(11)	RCS-52	71.9 (11)	RCS-50	145.44 (11)
RCS-49	73.63(12)	RCS-59	71.83 (12)	RCS-59	144.97 (12)
RCS-50	73.36(13)	RCS-3	69.28(13)	RCS-44	142.76 (13)
RCS-59	73.14 (14)	RCS-49	69.13(14)	RCS-1	142.71 (14)
RCS-55	71.88 (15)	RCS-46	69.07(15)	RCS-55	140.5 (15)

Table 23 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
RCS-11	69.96(16)	RCS-1	68.8716)	RCS-11	135.06(16)
RCS-23	67.52(17)	RCS-55	68.62(17)	RCS-46	133.86(17)
RCS-60	67.5(18)	RCS-14	65.5(18)	RCS-23	132.54(18)
RCS-14	66.5(19)	RCS-11	65.1(19)	RCS-19	132(19)
RCS-46	64.79(20)	RCS-23	65.02(20)	RCS-52	130.26(20)
RCS-57	61.32(21)	RCS-41	64.45(21)	RCS-41	123(21)
RCS-20	60.88(22)	RCS-36	63.52(22)	RCS-57	122.84(22)
RCS-45	59.88(23)	RCS-48	62.28(23)	RCS-16	120.87(23)
RCS-5	59.79(24)	RCS-44	61.58(24)	RCS-48	118.21(24)
RCS-16	59.59(25)	RCS-57	61.52(25)	RCS-5	118.02(25)
RCS-41	58.55(26)	RCS-16	61.28(26)	RCS-60	117.3(26)
RCS-52	58.36(27)	RCS-39	58.28(27)	RCS-45	112.38(27)
RCS-24	57.91(28)	RCS-5	58.23(28)	RCS-20	112.2(28)
RCS-53	57.68(29)	RCS-31	53.07(29)	RCS-39	109.94(29)
RCS-31	55.96(30)	RCS-45	52.5(30)	RCS-44	109.42(30)
RCS-48	55.93(31)	RCS-20	51.32(31)	RCS-31	109.03(31)
RCS-22	55.68(32)	RCS-53	51.13(32)	RCS-53	108.81(32)
RCS-39	51.66(33)	RCS-22	50.02(33)	RCS-36	106.36(33)
RCS-17	48.46(34)	RCS-60	49.8(34)	RCS-24	106.29(34)
RCS-44	47.84(35)	RCS-24	48.38(35)	RCS-22	105.7(35)
RCS-12	47.52(36)	RCS-30	46.57(36)	RCS-17	93.53(36)
RCS-18	44.73(37)	RCS-17	45.07(37)	RCS-12	89.49(37)
RCS-8	44.46(38)	RCS-8	42.42(38)	RCS-8	86.88(38)
RCS-57	42.84(39)	RCS-18	42.02(39)	RCS-18	8675(39)
RCS-32	42.64(40)	RCS-12	41.97(40)	RCS-30	86.43(40)
RCS-33	42.48(41)	RCS-38	41.33(41)	RCS-38	82.06(41)
RCS-35	41.96(42)	RCS-35	37(42)	RCS-33	79.46(42)

Table 23 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
RCS-38	40.73(43)	RCS-33	36.98(43)	RCS-35	78.96(43)
RCS-30	39.86(44)	RCS-37	36.43 (44)	RCS-32	77.59 (44)
RCS-37	35.91(45)	RCS-32	34.95(45)	RCS-37	72.34(45)
RCS-25	30.52(46)	RCS-25	28.7(46)	RCS-25	59.22(46)

Figures in parentheses denote ranks

Kendall's coefficient of concordance (Kc) = (0.148, 0.157 and 0.132) **

** Significant at 0.01 level

4.3.2.2 Plantation (including spices) based Cropping System

As seen in the table 24 the high ranking ITK's in the descending order were: PCS-2, PCS-10, PCS-9, PCS-31 and PCS-4 and low ranking ITK's in the ascending order were: PCS-27, PCS-19, PCS-8, PCS-23 and PCS-16 as perceived by RSS on the perceived effect of ITK items. In terms of scientific rationality the high-ranking ITK's where PCS-1, PCS-20, PCS-31, PCS-3 and PCS-9 and low ranking ITKs were: PCS-27, PCS-26, PCS-14, PCS-28 and PCS-7. While considering the combined effect of the attributes the high ranking ITK's in descending order were PCS-1, PCS-31, PCS-9, PCS-2 and PCS-10 and low ranking ITKs in the ascending order were: PCS-27, PCS-19, PCS-12, PCS-28 and PCS-16. The Kendall's coefficient of concordance (0.139,0.125 and 0.124) were significant at 0.01 level for perceived effect, scientific rationality, and combined effect respectively.

Table: 24 Evaluation by RSS on perceived effect and scientific rationality of ITK's in Plantation (including spices) based Cropping System

n = 30

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
PCS-2	70.91(1)	PCS-1	76068(1)	PCS-1	137.82(1)
PCS-10	69.66(2)	PCS-20	66.22(2)	PCS-31	131.19(2)
PCS-9	67.66(3)	PCS-31	64.85(3)	PCS-9	129.03(3)
PCS-31	66.34(4)	PCS-3	61.52(4)	PCS-2	128.63(4)
PCS-4	64.05(5)	PCS-9	61.37(5)	PCS-10	119.99(5)
PCS-1	61.14(6)	PCS-2	57.72(6)	PCS-4	119.83(6)
PCS-26	58(7)	PCS-8	57.1(7)	PCS-20	116.49(7)
PCS-20	54.61(8)	PCS-27	56.98(8)	PCS-17	109.61(8)
PCS-24	54.04(9)	PCS-25	56.5(9)	PCS-3	107.31(9)
PCS-17	52.63(10)	PCS-4	55.78(10)	PCS-13	105.62(10)
PCS-13	50.89(11)	PCS-15	55.75(11)	PCS-20	104.83(11)
PCS-11	50.7(12)	PCS-13	54.73(12)	PCS-15	104.66(12)
PCS-18	50.43(13)	PCS-23	54.1(13)	PCS-24	101.51(13)
PCS-20	50.27(14)	PCS-10	50.33(14)	PCS-25	98.59(14)
PCS-15	48.91(15)	PCS-20	50.22(15)	PCS-18	94.15(15)
PCS-14	48.46(16)	PCS-16	49.13(16)	PCS-26	92.42(16)
PCS-7	47.59(17)	PCS-19	48.5(17)	PCS-11	91.97(17)
PCS-3	45.79(18)	PCS-24	47.47(18)	PCS-21	87.74(18)
PCS-21	42.86(19)	PCS-21	44.88(19)	PCS-7	87.29(19)
PCS-25	42.09(20)	PCS-12	44.82(20)	PCS-8	85.74(20)
PCS-28	40.46(21)	PCS-18	43.72(21)	PCS-40	83.56(21)
PCS-12	32.7(22)	PCS-11	41.27(22)	PCS-23	82.9(22)
PCS-16	29.34(23)	PCS-7	39.7(23)	PCS-16	78.47(23)
PCS-23	28.8(24)	PCS-28	38(24)	PCS-28	78.46(24)

Table 24 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
PCS-8	28.64(25)	PCS-14	35.1(25)	PCS-12	77.52(25)
PCS-19	27.3(26)	PCS-26	34.42(26)	PCS-19	75.8(26)
PCS-27	24.18(27)	PCS-27	27.7(27)	PCS-27	51.88(27)

Figures in parentheses denote ranks

Kendall's coefficient of concordance (K_C) = (0.139,0.125 and 0.124) **

** Significant at 0.01 level

4.3.2.3 Seasonal based Cropping System

Table 25 highlights the mean weightage scores and rank order of ITK items as perceived by RSS in the three attributes of ITK's.

It could be concluded that the ITK items, SCS-34, SCS-11, SCS-35, SCS-36 and SCS-8 secured high ranks, while SCS-26, SCS-39, SCS-20, SCS-18 and SCS-30 secured low ranks on the perceived effect. In terms of scientific rationality SCS-11 held the top most position followed by SCS-29, SCS-34, SCS-36 and SCS-9 in descending order where as SCS-39, SCS-12, SCS-20, SCS-26 and SCS-30 secured low ranks. On combined effect of the attributes, SCS-11, SCS-34, SCS-36, SCS-35 and SCS-29 occupied the high ranking positions and the low ranking ITK's were SCS-39, SCS-26, SCS-20, SCS-18 and SCS-30. The Kendall's coefficient of concordance (0.129, 0.141 and 0.119) were significant at 0.01 level for perceived effect, scientific rationality and combined effect respectively.

Table 25 Evaluation by the RSS on perceived effect and scientific rationality of ITK's in Seasonal based Cropping System

n = 30

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
SCS-34	66.43(1)	SCS-11	71.48(1)	SCS-11	137.89(1)
SCS-11	66.41(2)	SCS-29	62.72(2)	SCS-34	128.5(2)
SCS-35	62.93(3)	SCS-34	62.07(3)	SCS-36	121.54(3)
SCS-36	62.91(4)	SCS-36	58.63(4)	SCS-35	116.48(4)
SCS-8	54.8(5)	SCS-8	57.38(5)	SCS-29	115.61(5)
SCS-17	53.84(6)	SCS-3	55.5(6)	SCS-8	112.18(6)
SCS-7	53.73(7)	SCS-37	53.83(7)	SCS-3	108.91(7)
SCS-3	53.41(8)	SCS-31	53.77(8)	SCS-37	106.63(8)
SCS-29	52.89(9)	SCS-35	53.55(9)	SCS-31	104.29(9)
SCS-37	52.8(10)	SCS-38	50.77(10)	SCS-17	102.52(10)
SCS-31	50.52(11)	SCS-23	50.23(11)	SCS-38	100.82(11)
SCS-15	50.27(12)	SCS-15	50.23(11)	SCS-15	100.5(12)
SCS-32	50.23(13)	SCS-17	48.68(12)	SCS-7	99.71(13)
SCS-38	50.05(14)	SCS-16	48.65(13)	SCS-23	97.48(14)
SCS-5	49.77(15)	SCS-5	47.45(14)	SCS-5	97.22(15)
SCS-9	48.3(16)	SCS-32	46.38(15)	SCS-32	96.61(16)
SCS-23	47.25(17)	SCS-7	45.98(16)	SCS-9	91.83(17)
SCS-4	45.11(18)	SCS-4	43.95(17)	SCS-4	89.06(18)
SCS-13	40.25(19)	SCS-9	43.53(18)	SCS-16	86.58(19)
SCS-12	40.25(19)	SCS-13	39.28(19)	SCS-13	79.53(20)
SCS-16	37.93(20)	SCS-18	37.65(20)	SCS-12	75.53(21)
SCS-30	36.16(21)	SCS-30	37.55(21)	SCS-30	73.71(22)
SCS-18	35.52(22)	SCS-23	35.43(22)	SCS-18	73.17(23)
SCS-20	34.39(23)	SCS-20	35.32(23)	SCS-20	69.71(24)

Table 25 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
SCS-39	33.7(24)	SCS-12	35.08(24)	SCS-26	68.59(25)
SCS-26	33.16(25)	SCS-39	34.73(25)	SCS-39	68.43(26)

Figures in parentheses denote ranks
Kendall's coefficient of concordance (K_C) = (0.129, 0.141 and 0.119)**
** Significant at 0.01 level

4.3.2.4 Annuals based Cropping System

It could be read in Table 26 that the ITK items ACS-6, ACS-7, ACS-1, ACS-2 and ACS-5 occupied I, II, V, VI and VII rank positions in all the three attributes of ITK namely perceived effect, scientific rationality and their combined effects. The high and low ranking ITKs were ACS-6 and ACS-5 respectively in all the three attributes. The Kendall's coefficient of concordance (0.127, 0.134 and 0.116) were significant at 0.01 level.

Table 26 Evaluation by the RSS on perceived effect and scientific rationality of ITK's in Annuals based Cropping System

n=30

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK N.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
ACS-6	60.39(1)	ACS-6	62.57(1)	ACS-6	122.96(1)
ACS-7	44.41(2)	ACS-7	43.68(2)	ACS-7	88.09(2)
ACS-4	42.52(3)	ACS-3	43.2(3)	ACS-3	76.56(3)
ACS-3	33.36(4)	ACS-4	34(4)	ACS-4	76.52(4)
ACS-1	33.13(5)	ACS-1	32.28(5)	ACS-1	65.41(5)
ACS-2	30.88(6)	ACS-2	30.9(6)	ACS-2	61.78(6)
ACS-5	25.32(7)	ACS-5	26.57(7)	ACS-5	51.89(7)

Figures in parentheses denote ranks
Kendall's coefficient of concordance, (Kc) = (0.127, 0.134 and 0.116)**
** significant at 0.01 level

4.3.2.5 Homestead based Mixed Farming System

It is evident from table 27 that RSS perceived the ITK items like HMFS-26, HMFS-20, HMFS-13, HMFS-29, HMFS-1 and HMFS-75 as high potential practices in all the three cases. The K_C was significant at 0.01 level for perceived effect, scientific rationality and combined effect respectively.

Table 27 Evaluation by RSS on perceived effect and scientific rationality of ITK's in Homestead based Mixed Farming System

n = 30

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
HMFS-26	48.05(1)	HMFS-26	49.33(1)	HMFS-26	193.55(1)
HMFS -20	47.37(2)	HMFS-52	47.87(2)	HMFS-52	187.13(2)
HMFS -13	47(3)	HMFS-1	46.77(3)	HMFS-13	186.62(3)
HMFS -29	46.78(4)	HMFS-13	46.67(4)	HMFS-1	184.84(4)
HMFS -1	46.42(5)	HMFS-75	46.22(5)	HMFS-20	183.18(5)
HMFS -52	46.12(6)	HMFS-20	45.08(6)	HMFS-75	181.8(6)
HMFS -75	45.18(7)	HMFS-29	44.75(7)	HMFS-29	181.3(27)
HMFS -43	42.72(8)	HMFS-43	42.68(8)	HMFS-43	169.65(8)
HMFS -45	41.92(9)	HMFS-45	42.63(9)	HMFS-45	168.02(9)
HMFS -14	41.85(10)	HMFS-14	42.18(10)	HMFS-14	167.14(10)
HMFS -58	40.15(11)	HMFS-28	41.9(11)	HMFS-28	161.57(11)
HMFS -42	40.08(12)	HMFS-42	41.02(12)	HMFS-42	161.31(12)
HMFS -48	39.65(13)	HMFS-19	39.28(13)	HMFS48	156.75(13)
HMFS -19	39.5(14)	HMFS-48	38.98(14)	HMFS-19	156.19(14)
HMFS -28	39.38(15)	HMFS-58	38.88(15)	HMFS-58	156.15(15)
HMFS -5	39.22(16)	HMFS-30	37.52(16)	HMFS-5	150.2(16)
HMFS -30	37.27(17)	HMFS-5	37.15(17)	HMFS-30	148.7(17)
HMFS -4	35.88(18)	HMFS-16	35.52(18)	HMFS-4	141.44(18)

Table 27 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
HMFS -8	34.9(19)	HMFS-4	35.3(19)	HMFS-8	138.28(19)
HMFS -44	34.08(20)	HMFS-40	34.88(20)	HMFS-16	137.68(20)
HMFS -16	33.92(21)	HMFS-6	34.83(21)	HMFS-40	135.72(21)
HMFS -40	33.55(21)	HMFS-38	34.32(21)	HMFS-44	135.29(21)
HMFS -49	32.65(22)	HMFS-44	34.17(22)	HMFS-38	132.58(22)
HMFS -38	32.48(23)	HMFS-49	33.23(23)	HMFS-49	130.76(23)
HMFS -6	31.05(24)	HMFS-70	32.2(24)	HMFS-70	125.44(24)
HMFS -70	31.02(25)	HMFS-17	31.9(25)	HMFS-6	123.5(25)
HMFS -60	30.72(26)	HMFS-6	31.3(25)	HMFS-60	122.8(25)
HMFS -73	30.45(27)	HMFS-60	31.22(26)	HMFS-17	122.16(26)
HMFS -15	29.98(28)	HMFS-39	30.6(27)	HMFS-73	120.48(27)
HMFS -17	29.72(29)	HMFS-26	30.32(28)	HMFS-39	119.33(28)
HMFS -26	29.6(30)	HMFS-73	29.98(29)	HMFS-26	118.95(29)
HMFS -39	29.50(31)	HMFS-72	29.93(30)	HMFS-15	117.47(30)
HMFS -35	29.32(32)	HMFS-15	29.1(31)	HMFS-72	116.28(31)
HMFS -72	29.23(33)	HMFS-32	29.03(32)	HMFS-32	116.02(32)
HMFS -32	29(34)	HMFS-35	27.72(33)	HMFS-35	113.35(33)
HMFS -62	28.47(35)	HMFS-22	27.15(34)	HMFS-62	109.64(34)
HMFS -22	27.73(36)	HMFS-62	27.07(35)	HMFS-22	108.9(35)
HMFS -34	27.2(37)	HMFS-47	25.82(36)	HMFS-34	104.06(36)
HMFS -74	25.83(38)	HMFS-34	25.23(37)	HMFS-47	100.1(37)
HMFS -47	24.7(39)	HMFS-23	24.42(38)	HMFS-23	95.77(38)
HMFS -23	24.08(40)	HMFS-54	24.4(39)	HMFS-54	95.52(39)
HMFS -7	23.67(41)	HMFS-7	23.48(40)	HMFS-7	93.1(40)
HMFS -52	23.58(42)	HMFS-64	23.05(41)	HMFS-74	91.08(41)
HMFS -64	22.82(43)	HMFS-56	22.92(42)	HMFS-64	90.86(42)
HMFS -56	22.75(44)	HMFS-57	22.77(43)	HMFS-56	90.34(43)

Table 27 contd.....

Perceived Effect (PE)		Scientific Rationality (SR)		PE + SR	
ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank	ITK No.	Mean weightage score/rank
HMFS -66	22.23(45)	HMFS-66	21.97(44)	HMFS-57	88.76(44)
HMFS-57	22.17(46)	HMFS-51	21.22(45)	HMFS-66	87.51(45)
HMFS-3	21.3(48)	HMFS-25	20.97(46)	HMFS-3	83.92(46)
HMFS-51	20.98(49)	HMFS-3	20.8(47)	HMFS-25	83.42(47)
HMFS-25	20.7(50)	HMFS-3	20.42(48)	HMFS-18	79.8(48)
HMFS-18	20.22(51)	HMFS-74	20.38(49)	HMFS-46	77.87(49)
HMFS-46	19.4(52)	HMFS-18	20.22(50)	HMFS-3	76.5(50)
HMFS-61	18.52(52)	HMFS-46	20.13(51)	HMFS-61	72.2(51)
HMFS-3	18.25(54)	HMFS-61	18.08(52)	HMFS-53	69.54(52)
HMFS-53	17.6(55)	HMFS-53	17.75(53)	HMFS-69	67.53(53)
HMFS-69	17.37(56)	HMFS-69	16.95(54)	HMFS-71	64.5(54)
HMFS-37	17.23(57)	HMFS-63	15.92(55)	HMFS-63	65.2(55)
HMFS-71	16.63(58)	HMFS-71	15.75(56)	HMFS-37	62.77(56)
HMFS-63	16.62(59)	HMFS-50	14.75(57)	HMFS-50	56.94(57)
HMFS-50	14.25(60)	HMFS-37	14.53(58)	HMFS-15	117.47(30)

Figures in parentheses denote ranks

Kendall's coefficient of concordance, K_C = (0.328, 0.361 and 0.331)**

** Significant at 0.01 level

4.4 COMPREHENSIVE ASSESSMENT OF ITK ITEMS BY BOTH ESS AND RSS

Cumulative sum of the scores assigned by the ESS and RSS were used to rank the ITK items.

The scores given for both the perceived effect and scientific rationality of each ITK item by both ESS and RSS were added together and scores were arranged in their descending order of preference.

4.4.1 Rice based Cropping System

In the Rice based Cropping System, the top score obtained was for ITK RCS-27 with a score of 545 and the least score was 149 for ITK item RCS-25. The sixth rank position was shared by two practices viz., RCS-26 and RCS-7.

The high potential ITK items as perceived by both RSS and ESS were: RCS-27, RCS-58, RCS-3, RCS-21 and RCS-2, while ITK's RCS-25, RCS-18, RCS-32, RCS-37 and RCS-30 were perceived to have low potential (Table 28).

Table 28 Comprehensive assessment of ITK items in Rice based Cropping System by both ESS and RSS

n=84

Sl.No	ITK Code No.	Cumulative sum of scores
1	RCS-27	545(1)
2	RCS-58	572(2)
3.	RCS-3	471(3)
4.	RCS-21	447(4)
5.	RCS-2	441(5)
6.	RCS-26	437(6)
7.	RCS-7	437(6)
8.	RCS-59	435(7)
9.	RCS-29	431(8)
10.	RCS-1	412(9)
11.	RCS-11	403(10)
12	RCS-41	402(11)
.13.	RCS-49	401(12)
14.	RCS-6	396(13)
15.	RCS-52	393(14)
16.	RCS-57	381(15)
17.	RCS-50	381(15)
18.	RCS-48	381(15)

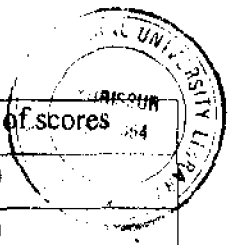


Table 28 contd.....

Sl.No	ITK Code No.	Cumulative sum of scores
19.	RCS-55	380(16)
20.	RCS-23	380(16)
21.	RCS-19	365(17)
22.	RCS-46	358(18)
23.	RCS-34	358(18)
24.	RCS-53	347(19)
25.	RCS-60	346(20)
26.	RCS-16	341(21)
27.	RCS-12	326(22)
28.	RCS-39	325(23)
29.	RCS-44	304(24)
30.	RCS-24	297(25)
31	RCS-22	296(26)
32	RCS-45	294(27)
33	RCS-20	294(27)
34	RCS-17	291(28)
35	RCS-8	291(28)
36	RCS-36	289(29)
37	RCS-33	279(30)
38	RCS-5	279(30)
39	RCS-35	260(31)
40	RCS-38	254(32)
41	RCS-31	238(33)
42	RCS-30	216(34)
43	RCS-37	213(35)
44	RCS-32	212(36)
45	RCS-18	178(37)
46	RCS-25	149(38)

Figures in parentheses denote ranks

4.4.2 Plantation (including spices) based Cropping System

The list of ITK items and their respective rank orders and the cumulative sum of scores as assigned by both ESS and RSS are presented in Table 29.

It could be concluded from table 29 that the ITK PCS-1 viz., 'using a mixture of rice soup /starch water mixed with castor cake against rhinoceros beetle' was preferred most by the ESS and RSS together. The least preferred ITK item was ITK PCS-25, viz; 'application of washing blue to reduce yellowing in arecanut'.

Table 29 Comprehensive assessment of ITK items in Plantation (including spices) based Cropping System by both ESS and RSS

n=84

Sl.No	ITK Code No.	Cumulative sum of score
1	PCS-1	427(1)
2	PCS-31	371(2)
3.	PCS-2	367(3)
4.	PCS-9	349(4)
5.	PCS-10	343(5)
6.	PCS-4	329(6)
7.	PCS-15	316(6)
8.	PCS-13	312(7)
9.	PCS-3	300(8)
10.	PCS-18	297(9)
11.	PCS-17	296(10)
12	PCS-11	291(11)
.13.	PCS-20	287(12)
14.	PCS-26	270(13)
15.	PCS-14	259(14)
16.	PCS-7	253(15)
17.	PCS-20	251(16)
18.	PCS-8	246(17)
19.	PCS-16	237(18)

Table 29 contd.....

Sl.No	ITK Code No.	Cumulative sum of score
20.	PCS-24	236(19)
21.	PCS-21	232(20)
22.	PCS-25	227(21)
23.	PCS-28	216(22)
24.	PCS-12	210(23)
25.	PCS-23	203(24)
26.	PCS-19	196(25)
27.	PCS-27	139(26)

Figures in parentheses denote ranks

4.3.3 Seasonal based Cropping System

The data in the Table 30 present the cumulative sum of weightage scores of ITK items on Seasonal based Cropping System from the viewpoint of both ESS and RSS together.

The top rank position with a score of 423 was for SCS-11 and the least score of 162 was for SCS-26. The second rank was given for SCS-7 with a cumulative score of 342. The third ranks were shared by ITK's SCS-38 and SCS-29 and the fifth rank was shared by SCS-34 and SCS- 8 respectively.

Table 30 Comprehensive assessement of ITK items in Seasonal based Cropping System by both ESS and RSS

n = 84

Sl.No.	ITK Code No.	Cumulative sum of score
1	SCS-11	423(1)
2	SCS-7	342(2)
3.	SCS-38	336(3)
4.	SCS-29	336(3)
5.	SCS-3	331(4)
6.	SCS-34	329(5)

Table 30 contd.....

Sl.No.	ITK Code No.	Cumulative sum of score
7.	SCS-8	329(5)
8.	SCS-5	326(6)
9.	SCS-37	325(7)
10.	SCS-35	323(8)
11.	SCS-15	322(9)
12	SCS-36	321(10)
.13.	SCS-17	308(11)
14.	SCS-16	298(12)
15.	SCS-9	271(13)
16.	SCS-31	264(14)
17.	SCS-4	256(15)
18.	SCS-23	253(16)
19.	SCS-39	247(17)
20.	SCS-18	227(18)
21.	SCS-20	218(19)
22.	SCS-30	211(20)
23.	SCS-32	202(21)
24.	SCS-12	193(22)
25.	SCS-13	186(23)
26.	SCS-26	162(24)

Figures in parentheses denote ranks

4.4.4 Annuals based Cropping System

As presented in table 31, out of the total seven ITK's under the Annuals based Cropping System, ACS-6 stood first and ACS-5 was put to last place. The ITK's were: 'planting *chettikoduvely (Plumbago rosea)* to control rats and pigs; and 'application of fried fenugreek in the leaf axils to control pseudostem borer of banana' respectively, with a mean weightage score of 338 and 127 respectively.

Table 31 Comprehensive assessment of ITK items in Annuals based Cropping System by both ESS and RSS

n = 84

Sl.No	ITK Code No.	Cumulative sum of score
1	ACS-6	336(1)
2	ACS-7	226(2)
3.	ACS-1	193(3)
4.	ACS-4	181(4)
5.	ACS-3	179(5)
6.	ACS-2	150(6)
7.	ACS-5	126(7)

Figures in parentheses denote ranks

4.4.5 Homestead based Mixed Farming System

As seen in table 32 the ITK item that obtained the highest mean weightage score of 439 was HMFS-26 followed by HMFS-75, HMFS-52, HMFS-1 and HMFS-29. The ITK with highest potential was 'administration of powdered pomegranate (*Punica granatum)* for diarrhoea of livestock'. The lowest rank recorded was for ITK HMF-50 viz, 'administration of the paste of *changalampparanda (Cissus quadrangularis)* mixed with common salt to control worm infestation in livestock'.

Table 32 Comprehensive assessment of ITK items in Homestead based Mixed Farming System by both ESS and RSS

n = 60

Sl.No	ITK Code No.	Cumulative sum of score
1	HMFS -26	439(1)
2	HMFS -75	431(2)
3.	HMFS -52	393(3)
4.	HMFS -1	385(4)
5.	HMFS-29	382(5)
6.	HMFS-58	368(6)
7.	HMFS-42	365(7)
8.	HMFS-13	364(8)
9.	HMFS-14	364(8)
10.	HMFS-43	363(9)
11.	HMFS-20	352(10)
12	HMFS-28	326(11)
.13.	HMFS-5	325(12)
14.	HMFS-48	322(13)
15.	HMFS-30	320(14)
16.	HMFS-45	314(15)
17.	HMFS-73	314(15)
18.	HMFS-19	307(16)
19.	HMFS-8	279(17)
20.	HMFS-72	255(18)
21.	HMFS-4	252(19)
22.	HMFS-54	251(20)
23.	HMFS-60	251(20)
24.	HMFS-49	248(21)
25.	HMFS-26	243(22)
26.	HMFS-6	233(23)
27.	HMFS-64	231(24)
28.	HMFS-38	228(25)
29.	HMFS-17	223(26)
30.	HMFS-16	221(27)
31	HMFS-40	216(28)

Table 32 contd...

Sl.No	ITK Code No.	Cumulative sum of score
32	HMFS-35	213(29)
33	HMFS-44	212(30)
34	HMFS-13	210(31)
35	HMFS-70	208(32)
36	HMFS-39	205(33)
37	HMFS-62	205(33)
38	HMFS-32	204(34)
39	HMFS-16	203(35)
40	HMFS-57	185(36)
41	HMFS-3	181(37)
42	HMFS-56	180(38)
43	HMFS-61	180(38)
44	HMFS-34	176(39)
45	HMFS-66	175(40)
46	HMFS-74	170(41)
47	HMFS-47	162(42)
48	HMFS-63	161(43)
49	HMFS-23	160(44)
50	HMFS-46	156(45)
51	HMFS-25	154(46)
52	HMFS-51	151(47)
53	HMFS-8	151(47)
54	HMFS-53	137(48)
55	HMFS-18	136(49)
56	HMFS-5	135(50)
57	HMFS-71	121(51)
58	HMFS-69	109(52)
59	HMFS-37	95(53)
60	HMFS-50	86(54)

Figures in parentheses denote ranks

4.5 COMPARATIVE EVALUATION OF PERCEIVED EFFECT AND SCIENTIFIC RATIONALITY OF ITK'S WITHIN ESS AND RSS

4.5.1 Rice based Cropping System

The relationship between 'perceived effect' and 'scientific rationality' of ITK items within ESS and RSS was worked out using Spearman's rank order correlation coefficient (r_s). The results are summarized in table 33.

As evident from Table 33 there was positive and significant relationship between the attributes 'perceived effect' and 'scientific rationality' in the case of 43 ITK items out of the total 46 from the view point of RSS. There was no significant relationship between the measurement attributes in ITK items RCS-7, RCS-52, RCS-58 and RCS-60. The relationship in the case of ITK, RCS-44 was significant only at 0.05 level. As per the view point of ESS there existed positive and significant relationship at 0.01 level for both attributes for all ITK's except in three namely RCS-11, RCS-27, RCS-52. The ITK item RCS-44 showed significant relationship only at five per cent level for both ESS and RSS.

Table 33 Comparative evaluation of perceived effect and scientific rationality of ITK items in Rice based Cropping System as perceived by ESS and RSS (Spearman's rank order correlation)

Sl.No.	ITK Code No.	Perceived Effect vs Scientific Rationality	
		ESS (n =54)	RSS (n = 30)
1	RCS-1	0.859**	0.881**
2	RCS-5	0.512**	0.525**
3.	RCS-6	0.663**	0.606**
4.	RCS-7	0.351NS	0.676**
5.	RCS-8	0.854**	0.882**
6.	RCS-11	0.532**	0.108NS
7.	RCS-2	0.821**	0.929**
8.	RCS-3	0.860**	0.780**
9.	RCS-12	0.893**	0.923**

Table 33 contd...

Sl.No.	ITK Code No.	Perceived Effect vs Scientific Rationality	
		ESS (n =54)	RSS (n = 30)
10.	RCS-17	0.972**	0.975**
11.	RCS-16	0.804**	0.644**
12	RCS-18	0.815**	0.830**
.13.	RCS-19	0.854**	0.939**
14.	RCS-20	0.583**	0.731**
15.	RCS-21	0.685**	0.818**
16.	RCS-26	0.669**	0.753**
17.	RCS-27	0.526**	0.138NS
18.	RCS-29	0.479**	0.438**
19.	RCS-30	0.809**	0.988**
20.	RCS-31	0.896**	0.812**
21.	RCS-32	0.706**	0.912**
22.	RCS-34	0.5 02**	0.878**
23.	RCS-35	0.880**	0.955**
24.	RCS-33	0.780**	0.7725**
25.	RCS-22	0. 936**	0.918**
26.	RCS-23	0. 847**	0.987**
27.	RCS-24	0.632**	0.871**
28.	RCS-25	0. 824**	0.870**
29.	RCS-36	0.614**	0.465**
30.	RCS-39	0.823**	0.763**
31	RCS-37	0.966**	0.917**
32	RCS-38	0.852**	0.962**
33	RCS-41	0.830**	0.561**
34	RCS-45	0.700**	0.862**
35	RCS-46	0.964**	0.875**
36	RCS-48	0.870**	0.834**
37	RCS-49	0.668**	0.851**
38	RCS-50	0.751**	0.833**
39	RCS-55	0.528**	0.686**
40	RCS-57	0.967**	0.955**
41	RCS-53	0.589**	0.829**
42	RCS-52	0.188NS	0.038NS

Table 33 contd...

Sl.No.	ITK Code No.	Perceived Effect vs Scientific Rationality	
		ESS (n =54)	RSS (n = 30)
43	RCS-58	0.098NS	0.908**
44	RCS-59	0.724**	0.782**
45	RCS-60	0.350NS	0.736**
46	RCS-44	0.386**	0.370**

** Significant at 0.01 level
* Significant at 0.05 level
NS Not Significant

4.5.2 Plantation (including spices) based Cropping System

The results of correlation analysis showing the degree of relationship between perceived effect and scientific rationality of ITKs on Plantation (including spices) based Cropping System of both ESS and RSS are presented in Table 34.

The findings of correlation revealed that out of 27 ITK's, 18 ITK's found to have positive and significant relationship at 0.01 level for both attributes as per the view point of ESS. There was no significant relationship between the two attributes in the case of ITK's namely PCS-2, PCS-3, PCS-20, PCS-8 and PCS-21; the ITK items viz; PCS-1, PCS-15, PCS-13 and PCS-19 were significant only at 0.05 level. According to the RSS the ITK's like PCS-3 and PCS-20 were found to have no significant relationship between the two attributes.

According to ESS, there existed no significant relationship for the ITK's like PCS-1, PCS-3, PCS-20 and PCS- 8. The ITK items PCS-3, PCS-6, PCS-9 showed no significance by both ESS and RSS. There was significant and positive relationship at 0.01 level between the two attributes as perceived by ESS for 21 ITK's out of a total of 27 ITK's. The relationship in the case of PCS-20 and PCS-31 was significant only at 0.05 level.

Table 34 Comparative evaluation of perceived effect and scientific rationality of ITK's in Plantation (including spices) based Cropping System (Spearman's rank order correlation)

Sl.No.	ITK Code No.	Perceived Effect vs Scientific Rationality	
		ESS (n = 54)	RSS (n = 30)
1	PCS-1	0.376*	-0.070NS
2	PCS-2	0.081 NS	0.456**
3.	PCS-3	-0.211 NS	0.189 NS
4.	PCS-4	0.628**	0.601**
5.	PCS-7	0.576**	0.747**
6.	PCS-20	0.001 NS	0.281 NS
7.	PCS-9	0.585**	0.672**
8.	PCS-17	0.628**	0.858**
9.	PCS-8	0.315 NS	0.252**
10.	PCS-10	0.570**	0.901**
11.	PCS-11	0.572**	0.848**
12	PCS-12	0.517**	0.461**
.13.	PCS-14	0.475**	0.773**
14.	PCS-16	0.486**	0.803**
15.	PCS-15	0.386**	0.713**
16.	PCS-13	0.362**	0.841**
17.	PCS-18	0.610**	0.432**
18.	PCS-19	0.457**	0.575**
19.	PCS-22	0.643**	0.343**
20.	PCS-21	0.239 NS	0.484**
21.	PCS-23	0.491**	0.707**
22.	PCS-24	0.575**	0.952**
23.	PCS-25	0.562**	0.461**
24.	PCS-26	0.470**	0.489**
25.	PCS-27	0.757**	0.877**

Table 34 contd...

Sl.No.	ITK Code No.	Perceived Effect vs Scientific Rationality	
		ESS (n = 54)	RSS (n = 30)
26.	PCS-28	0.906**	0.588**
27.	PCS-31	0.685**	0.389**

** Significant at 0.01 level

* Significant at 0.05 level

NS Not Significant

4.5.2 Seasonal based Cropping System

Table 35 gives the result of Spearman's rank order correlation analysis. It could be concluded that ITK item SCS-9 showed no significance for both ESS and RSS. All the ITK's except SCS-9 and SCS-12 showed positive and significant relationship between perceived effect and scientific rationality at 0.01 level as perceived by RSS; while the ITK's viz., SCS-18 and SCS-23 only at 0.05 level. From the view point of ESS, 23 ITK's out of the total 26 showed positive and significant relationship at 0.01 level for the two attributes; where as the ITK SCS-26 was significant only at 0.05 level. There was no significant relationship between the two attributes in the case of ITK's SCS-4 and SCS-9 for ESS.

Table 35 Comparative evaluation of perceived effect and scientific rationality of ITK's in Seasonal based Cropping System (Spearman's rank order correlation)

Sl.No.	ITK Code No.	Perceived Effect vs Scientific Rationality	
		ESS (n = 54)	RSS (n = 30)
1	SCS-3	0.726**	0.672**
2	SCS-4	0.305NS	0.663**
3.	SCS-5	0.765**	0.583**

Table 35 contd...

Sl.No.	ITK Code No.	Perceived Effect vs Scientific Rationality	
		ESS (n = 54)	RSS (n = 30)
4.	SCS-7	0.431**	0.792**
5.	SCS-8	0.807**	0.813**
6.	SCS-11	0.533**	0.962**
7.	SCS-15	0.612**	0.706**
8.	SCS-16	0.613**	0.824**
9.	SCS-17	0.719**	0.486**
10.	SCS-18	0.796**	0.458*
11.	SCS-20	0.614**	0.949**
12	SCS-9	-.203NS	0.298NS
13.	SCS-23	0.675**	0.364*
14.	SCS-12	0.436**	0.251NS
15.	SCS-26	0.401*	0.574**
16.	SCS-13	0.739**	0.573**
17.	SCS-30	0.835**	0.606**
18.	SCS-31	0.832**	0.864**
19.	SCS-32	0.786**	0.692**
20.	SCS-29	0.781**	0.571**
21.	SCS-34	0.759**	0.949**
22.	SCS-35	0.868**	0.574**
23.	SCS-36	0.582**	0.852**
24.	SCS-37	0.933**	0.911**
25.	SCS-38	0.948**	0.843**
26.	SCS-39	0.876**	0.958**

** Significant at 0.01 level

* Significant at 0.05 level

NS Not Significant

4.5.2 Annuals based Cropping System

Out of the seven ITKs, six were found to have positive and significant relationship for the two attributes (perceived effect and scientific rationality) for both ESS and RSS. The ITK, ACS-4 was significant only at 0.05 level as perceived by RSS. While all the seven ITK's showed positive and significant relationship for ESS at 0.01 level. The ITK item, ACS-2 showed highest relationship between the two attributes namely perceived effect and scientific rationality for both RSS and ESS. The results of correlation analysis is provided in table (36).

Table 36 Comparative evaluation of perceived effect and scientific rationality of ITK's in Annuals based Cropping System (Spearman's rank order correlation)

Sl No	ITK Code No.	Perceived Effect Vs Scientific Rationality	
		ESS (n = 54)	RSS (n = 30)
1	ACS-1	0.936**	0.491**
2	ACS-5	0.964**	0.862**
3	ACS-2	0.999**	0.998**
4	ACS-3	0.738**	0.711**
5	ACS-4	0.428**	0.547**
6	ACS-6	0.711**	0.940**
7	ACS-7	0.918**	0.967**

** Significant at 0.01 level

* Significant at 0.05 level

4.5.5 Homestead based Mixed Farming System

Table 37 gives the results of Spearman's rank order correlation coefficient for the perceived effect and scientific rationality of each ITK items as perceived by both ESS and RSS.

Perusal of Table 37 revealed that all the sixty ITK items included in the Homestead based Mixed Farming System showed positive and significant relationship for the attributes of perceived effect and scientific rationality as perceived by both ESS and RSS at 0.01 level of significance. The ITK items HMFS-40 was significant only at 0.05 level (0.621*). The perfect correlation was found for four ITK items viz., HMFS-50, HMFS-56, HMFS-70, and HMFS-75 for RSS and HMFS-17, HMFS-37, HMFS-47 and HMFS-3 for ESS. The ITK items HMFS-1 and HMFS-28 showed least significance for the two attributes at 0.01 level for ESS and RSS respectively.

Table 37 Comparative evaluation of perceived effect and scientific rationality of ITK's in Homestead based Mixed Farming System (Spearman's rank order correlation)

Sl.No.	ITK Code No.	Perceived Effect vs Scientific Rationality	
		ESS (n= 30)	RSS (n = 30)
1	HMFS -1	0.865**	0.662**
2	HMFS -14	0.946**	0.805**
3.	HMFS -10	0.972**	0.995**
4.	HMFS -7	0.879**	0.695**
5.	HMFS -7	0.972**	0.836**
6.	HMFS-8	0.820**	0.899**
7.	HMFS-13	0.960**	0.947**
8.	HMFS-15	0.930**	0.782**
9.	HMFS-5	0.805**	0.709**
10.	HMFS-3	0.805**	0.918**
11.	HMFS-6	0.802**	0.901**
12	HMFS-17	1.000**	0.993**
.13.	HMFS-20	0.915**	0.713**
14.	HMFS-18	0.997**	0.997**
15.	HMFS-23	0.969**	0.985**
16.	HMFS-22	0.812**	0.846**
17.	HMFS-16	0.985**	0.905**
18.	HMFS-19	0.589**	0.977**

Table 37 contd...

Sl.No.	ITK Code No.	Perceived Effect vs Scientific Rationality	
		ESS (n= 30)	RSS (n = 30)
19.	HMFS-25	0.953**	0.838**
20.	HMFS-26	0.987**	0.881**
21.	HMFS-29	0.735**	0.621**
22.	HMFS-28	0.588**	0.780**
23.	HMFS-30	0.916**	0.875**
24.	HMFS-26	0.937**	0.907**
25.	HMFS-32	0.969**	0.848**
26.	HMFS-35	0.953**	0.920**
27.	HMFS-34	0.968**	0.923**
28.	HMFS-38	0.973**	0.798**
29.	HMFS-40	0.957*	0.882**
30.	HMFS-39	0.986**	0.993**
31	HMFS-37	1.000**	0.856**
32	HMFS-42	0.855**	0.925**
33	HMFS-43	0.681**	0.910**
34	HMFS-44	0.990**	0.921**
35	HMFS-45	0.971**	0.980**
36	HMFS-47	1.000**	0.915**
37	HMFS-48	0.915**	0.961**
38	HMFS-49	0.958**	0.975**
39	HMFS-46	0.972**	0.956**
40	HMFS-50	0.952**	1.000**
41	HMFS-51	0.985**	0.953**
42	HMFS-52	0.691**	0.871**
43	HMFS-53	1.000**	0.777**
44	HMFS-54	0.871**	0.814**
45	HMFS-56	0.980**	1.000**
46	HMFS-57	0.914**	0.979**
47	HMFS-60	0.893**	0.917**
48	HMFS-58	0.902**	0.931**
49	HMFS-61	0.948**	0.994**
50	HMFS-62	0.965**	0.953**

Table 37 contd...

Sl.No.	ITK Code No.	Perceived Effect vs Scientific Rationality	
		ESS (n= 30)	RSS (n = 30)
51	HMFS-64	0.987**	0.930**
52	HMFS-63	0.951**	0.938**
53	HMFS-66	0.978**	0.915**
54	HMFS-69	0.967**	0.999**
55	HMFS-70	0.953**	1.000**
56	HMFS-72	0.852**	0.917**
57	HMFS-71	0.998**	0.917**
58	HMFS-73	0.857**	0.849**
59	HMFS-74	0.930**	0.837**
60	HMFS-75	0.788**	1.000**

** Significant at 0.01 level

4.6 IDENTIFICATION OF ITK'S THAT CLEARLY DISCRIMINATES THE PERCEPTION OF ESS AND RSS

Canonical discriminant function analysis was done to discriminate the ESS and RSS on their perceptive evaluation of ITK items.

4.6.1 Discrimination of ESS and RSS on Perceived Effect of Crops-Related ITK Items (Results of canonical discriminant function analysis)

Table 38 List of ITK's that clearly discriminate the perception of ESS and RSS based on perceived effect of crops-related ITK's

ITK Code No.	Function
RCS 16 (Rice based Cropping system)	-.837
PCS-1 (Plantation (including spices) based Cropping System)	-1.009
SCS-8 (Seasonal based Cropping System)	0.996

Table 38 conclusively affirmed that, three ITK's differed in the response of RSS and ESS on perceived effect while considering all the four crops-related production systems put together. The ITK item RCS-16, (-0.837) and PCS-1 (-1.009)

showed wide difference of opinion; while SCS-8 in seasonal based cropping system showed least difference of opinion.

4.6.2 Discrimination of ESS and RSS on scientific rationality of crops-related ITK items (Results of canonical discriminant function analysis)

Table 39 List of ITK's that clearly discriminate the perception of ESS and RSS based on scientific rationality of crops-related ITK's

ITK Code No.	Function
RCS-5 (Rice based Cropping system)	-0.525
RCS-20 (Rice based Cropping system)	-0.733
PCS-26 (Plantation (including spices) based Cropping System)	-0.484
SCS-1 (Seasonal based Cropping System)	0.597
SCS-18 (Seasonal based Cropping System)	0.744

Table 39 shows the results of canonical discriminant function analysis of all the four crops related production systems together by ESS and RSS. The ITKs viz. RCS-5, PCS-20, PCS-26, showed wide difference of opinion on scientific rationality of ITK items by ESS and RSS. While the ITK's SCS-1 and SCS-18 showed least difference of opinion by ESS and RSS on scientific rationality of all ITK's together.

4.6.3 Discrimination of ESS and RSS on Perceived Effect in Animal Husbandry Related ITK Items (Results of canonical discriminant function analysis)

Table 40 List of ITK's that clearly discriminate the perception of ESS and RSS based on perceived effect of animal husbandry related ITK's

ITK Code No.	Function
HMFS-10 (Homestead based Mixed Farming System)	1.028
HMFS-7 (Homestead based Mixed Farming System)	0.687
HMFS-20 (Homestead based Mixed Farming System)	1.595
HMFS-28 (Homestead based Mixed Farming System)	0.443
HMFS-35 (Homestead based Mixed Farming System)	-.746
HMFS-38 (Homestead based Mixed Farming System)	-1.430
HMFS-45 (Homestead based Mixed Farming System)	-1.274

Table 40 contd.....

HMFS-51 (Homestead based Mixed Farming System)	-1.120
HMFS-54 (Homestead based Mixed Farming System)	1.941
HMFS-57 (Homestead based Mixed Farming System)	0.613
HMFS-62 (Homestead based Mixed Farming System)	-0.644
HMFS-66 (Homestead based Mixed Farming System)	-0.925
HMFS-69 (Homestead based Mixed Farming System)	-0.786
HMFS-71 (Homestead based Mixed Farming System)	-1.595

The results of canonical discriminant function analysis of ITK items on perceived effect of Homestead based Mixed Farming System by ESS and RSS are presented in the table 40.

Perusal of table 40 reveals that ITK items HMFS-10, HMFS-7, HMFS-20, HMFS-28, HMFS-54 and HMFS-57 showed least difference of opinion on perceived effect of ITK items by ESS and RSS; while HMFS-35, HMFS-38, HMFS-45, HMFS-51, HMFS-62, and HMFS-66 showed wide difference of opinion.

4.6.4 Discrimination of ESS and RSS on Scientific Rationality of Animal Husbandry Related ITK Items (Results of canonical discriminant function analysis)

Table 41 List of ITK's that clearly discriminate the perception of ESS and RSS based on scientific rationality of animal husbandry related ITK's

ITK Code No.	Function
HMFS-20 (Homestead based Mixed Farming System)	-0.720
HMFS-16 (Homestead based Mixed Farming System)	-0.635
HMFS-26 (Homestead based Mixed Farming System)	0.822
HMFS-44 (Homestead based Mixed Farming System)	-0.811
HMFS-61 (Homestead based Mixed Farming System)	0.650
HMFS-72 (Homestead based Mixed Farming System)	0.799

Table 41 presents the results of canonical discriminant function analysis of scientific rationality of ITK items in Homestead based Mixed Farming System. The ITK items HMFS-20, HMFS-16 and HMFS-44 discriminated the RSS and ESS widely, while ITK's HMFS-26, HMFS-61 and HMFS-72 showed least discrimination of opinion on scientific rationality.

DISCUSSION

5. DISCUSSION

The discussion on the results obtained in the present study are presented under the following broad sub-heads:

5.1 Compilation and cataloguing of ITK items on pest management

5.2 Rationalisation of ITK items on pest management by ESS and RSS and screening of ITK items by the FSS

5.3 Evaluation of 'perceived effect' and 'scientific rationality' of ITK items on production systems by the ESS and RSS

5.4 Comprehensive assessment of ITK items by ESS and RSS

5.5 Comparative eveluation of perceived effect and scientific rationality of ITK's within ESS and RSS

5.6 Identification of ITK items that clearly discriminates the perception of ESS and RSS

5.1 COMPILATION AND CATALOGUING OF ITK ITEMS ON PEST MANAGEMENT

As the first phase of the study, an attempt was made to compile and catalogue the Indigenous Technical Knowledge (ITK) including the contemporary farmer's innovations on pest management in the five major farm production systems of Palakkad district through Key Informant Farmers (KIF's). The effort has contributed to document and preserve a wide range of old farming traditions and wisdom of the farmers from being extinct and lost forever, as experienced by Sulaja (1999). During this documentation, it was felt that many of the traditional pest management practices were either extinct, sparsely used or on the verge of extinction. Despite this, memories of most of the practices lingered in the minds of the farmers and constituted the body of knowledge. While documenting the ITK's, the researcher experienced that the traditional knowledge clearly represented the wisdom embodied in the observations, interpretations and predictions that were shared over ages. As time passed, modern technological means have influenced the traditional ones, as is evident from several blends of traditional and modern practices documented by the present study.

5.1.1 Rice based Cropping System

As shown in Appendix -1, 97 numbers of ITK's were initially documented. A close perusal of the items in table 3 revealed that farmers were aware of a wide range of indigenous practices or approaches to combat insect pests, diseases, rodents, birds, crabs and weeds.

Table 3 contains the traditional technologies related to the 'seed-to- seed' stages of rice cropping: seed drying, seed storage, seed treatment, land preparation, organic manuring, adjustment of sowing time; control of insect pests (like leaf roller, stem borer, plant hopper, gall fly, rice bug and storage pests), during different periods of crop growth; management of diseases like sheath rot, bacterial leaf blight; control of non-insect pests like rodents, birds, crabs, large animals and weeds.

A detailed analysis of the ITK items on pest management in rice revealed that the methods and approaches also had a wide range from adjustment of planting time to the use of baits and traps; scarers; use of biological enemies; repellents; blend of ITK and modern techniques and application of botanicals.

These practices had a wide range of attributes like simplicity/complexity, practicability, availability of raw materials, labour input, drudgery, observability, cost, trialability and compatibility with the existing Rice based Cropping System. This establishes that, as said by Rogers (1962) as in the case of modern technologies, traditional technologies also have their own intrinsic and extrinsic characters.

5.1.2 Plantation (including spices) based Cropping System

As listed in the table 4, 32 numbers of ITK's were documented in crops like coconut, arecanut and pepper. It could be concluded that local people possess deep traditional knowledge to manage various pests and disease problems of these crops.

A close perusal of table 4 revealed that farmers were aware of a range of traditional technologies related to Plantation (including spices) based Cropping

System on preventive measures, mechanical control, organic manuring; control of pests like rhinoceros beetle, leaf eating caterpillar, root grub, termites; management of diseases like bud rot, stem bleeding, button shedding, yellowing; and control of non-insect pests like mites and rodents. The methods and approaches used in managing pests and diseases varied widely through preventive measures, repellents, mechanical control, baiting and physical control. As in the case of rice, here also the practices had a wide range of attributes like simplicity/complexity, practicability, availability of raw materials, labour input, drudgery, observability, trialability, cost and compatibility with the existing cropping system.

5.1.3 Seasonal based Cropping System

Table 5 provides a clear insight with the ITK items listed under vegetables. A perusal of the table revealed that the local people could provide rich traditional knowledge on almost all major crops included under seasonal crops. The list of indigenous practices (Table 5) illustrate how well farmers manipulate and derive advantages from local resources and natural process to overcome the pests and disease problems related to crops like cowpea, amaranthus, cucurbits and solanaceous crops. The documented list contains management approaches in all the growth stages of the crops from seed-to-seed: seed drying, seed treatment, organic manuring, mechanical control, cold treatment, use of biological enemies and botanical pesticides for controlling insect pests (like sucking pests, storage pests, fruit flies, grass hoppers, termites, soil borne insects); managing diseases like stunting, yellowing, mosaic, flower shedding; soil born pathogens and weeds.

5.1.4 Annuals based Cropping System

It is clear from table 6 that only 7 ITK's were documented covering two crops viz, banana and tapioca under the annuals. The farmers had a wide range of knowledge especially in pest control rather than disease management. The listed traditional technologies included control of major pests like pseudostem borer and rhizome weevil of banana; preventive measures like organic manuring to reduce pests and diseases and repellent action against non-insect pests like rats and pigs. These practices had a wide range of perceived attributes like simplicity / complexity,

practicability, availability of raw materials, labour input, drudgery, observability, trialability, cost and compatibility with the existing annuals based cropping system.

5.1.5 Homestead based Mixed Farming System

As shown in table 7, 75 number of ITK's were documented. A bird's eye view of the list revealed that the local people were aware of vast rich traditional knowledge to tackle the farm problems especially in the case of livestock and poultry to combat pests and diseases comprising insects, ticks and lice; wounds and food poisoning etc.

An in-depth appraisal of items listed in Appendix 1 and table 7 brought to light a plethora of traditional technologies related to management of pests and diseases of live- stock and poultry reared in the homesteads: foot and mouth disease, wounds, diarrhoea, indigestion, bloat, fever and cough, mastitis, worm infestation, poisoning, ticks and lice in livestock; ranikhet disease, ticks and lice and soft shelled eggs in poultry. This exhaustive list implies that in the absence of specialised veterinary services, the farmers and the livestock owners themselves could sometimes carry out farm level treatments of a few common ailments occurring in livestock and poultry. The approaches and methods of pest management ranged from preventive measures, external and internal administration of botanicals to mechanical or physical control. As observed in the preceding four farm production systems, the practices documented under homestead based mixed farming system also had a wide range of characteristics like simplicity/complexity, practicability, availability of raw materials, labour input, drudgery, observability, trialability, cost and compatibility.

5.2 RATIONALISATION OF ITK ITEMS ON PEST MANAGEMENT BY ESS AND RSS AND SCREENING OF ITK ITEMS BY THE FSS

As discussed under 5.1, at the time of documentation, it was felt by the KIF's that some of the ITK's lacked 'perceived effect' and 'scientific rationality'. Hence the ITK's under each production system were subjected to further screening in two phases- first by an expert group comprising multidisciplinary scientists and later on by the farmers in the Key Informant Workshops (KIW's).

5.2.1 Rice based Cropping System

The final list of the 60 ITK's, obtained after experts' screening, were subjected to rationalisation by FSS based on their 'degree of belief', 'strength' and 'weightage' of the ITK items. Based on the Kendall's coefficient of concordance, the number could be reduced to 46, by picking the 75 per cent of ITK items, having high ranking as perceived by FSS. Some of the top ITK's, with their scores in parentheses, were: RCS-26 (50.63), RCS-1 (48.27), RCS-26 (47.75), RCS-7 (46.93) and RCS-30 (43.8). It is clear that the perception of the farmers on the ITK's was really based on various contextual, economical and technological criteria.

The ITK item RCS-29 viz., *'Mampookanikkal* or *manjukollikal'* (subjecting the seeds continuously for three dews (nights) and days successively) was perceived by FSS as the first rank ITK item. This age old indigenous practice has got simplicity, practicability, less cost, low labour input and were reported to be very effective against storage pests of rice. The farmers' reasoning was that by subjecting the seeds to alternate hot and cool conditions continuously for three days and night dews would make the seeds hard. After *mampookanikkal* process, when the seeds are broken across, a white needle tip spot at the centre could be seen - an indication of optimum moisture percentage for seed storage. The practice is in conformity with the observation made by Preetha (1997). Usually the seeds of long duration varieties are subjected to midseason moisture treatment to increase its viability. Imbibition of water and then drying activates the metabolic process of old seeds and rejuvenate them to certain extent.

In the case of RCS-1 viz; *'kundakootal'*, 'seedling treatment just before transplanting', was acclaimed by most of the KIF's as a practice in vogue by local farmers to kill various pests and disease stages by generating heat inside the heap. *Kundakootal* was specially commented as a simple technique to practice, which could be done in the field itself, less costly and more labour friendly and sustainable which was again in confirmity with the practice as explained by Preetha (1997).

To quote another example, RCS-26, 'seed storage in bamboo baskets plastered with cowdung': the bamboo baskets and cow dung are easily available and cheep. The

farmers said that plastering the baskets with cowdung make them more airtight and prevent the entry of insects. Besides, the antibacterial property of cowdung would resist further invasion and attack of microbes. Farmers had experienced that, by this method rice seeds could be stored for long periods without losing viability. This practice was observed to be still followed by almost all farmers of the study area. A similar practice noticed was RCS-7, 'adjusting the sowing time by *Aswathy (April 14th to 26th) or Bharani njattuvela'* (April 27th to May 10th). The crop pest-weather interaction being an interesting phenomenon, various meteorological indicators are used for forecasting weather and pest management. Some of the bioindicators used for forecasting rains in the study area were basically in conformity with the observations made by Majumdar (1927), Gupta (1980) and Shukla (1989). Adjusting sowing time is a very good practice to tackle the problems and damages caused by various pests especially gall fly, as the practice is very simple and involving no cost. Another ITK (RCS-30) was the 'control of storage pests using fruits of k*attucheru (Holigarna arnottiana)* - mixing the rice seeds with the halved fruits of *kattucheru.* According to the FSS, this simple practice is being widely used since the material repels pests. The simplicity, trialability, observability and low-cost were well commented by the farmers.

As is seen in table 13, the low ranking ITK's in ascending order were: RCS-25 (13.25), RCS-10 (17.25), RCS-43 (20.03), RCS-28 (20.25) and RCS-17 (20.5). The practice of 'swinging the rice crop with the twigs of *therakom* (*Ficus asperimma*) against leaf roller (RCS-25)' was perceived to have the least 'degree of belief', 'strength' and 'weightage' scores. The practice was not known to most of the farmers and is not widely used now-a-days. Moreover, the availability of *therakom* was reported to be difficult; and swinging the twigs in the rice field is a labour intensive, tedious and drudgerous work. The respondents might have evaluated this practice as non-practicable, less effective and unsustainable. Similarly 'field application of ash along with *mulliyilath* (*Bombax malabaricum*) fruits for general pests and disease control, (RCS-10)' was also perceived to be of low potential in nature. Though ash was said to be easily available, *mulliyilath* fruit was not that much easy to procure and use. More over FSS might have perceived the practice as drudgerous and labour intensive.

The practice RCS-43 viz, 'incorporation of coconut pericarp (husk) in the field during last ploughing to control weeds' was not perceived to have 'belief', 'strength' and 'weightage' by the FSS, since it was not found to be easy and effective. It might be due to the non-availability of large quantities of coconut husk, besides its laborious use. More over, the trialability and observability might be poor as it required long time for decomposition, and hence quick results could not be expected. The ITK RCS-28 viz, 'storing seeds mixed with tender leaves and twigs of clerodendron against storage pests': the traditional knowledge was not fully accepted by most of the FSS, the effectiveness and observability of clerodendron against storage pests were poor. The practice RCS-17 viz; 'erecting sticks tied with fruits of Ficus palm (*Borassus flabellifera*) in the field to ward off rice bug'. The approach obviously is not practicable for vast rice fields. The fermented smell of the fruit might be the reason attributed for the practice, though perceived to be not effective against rice bug and the availability could not be assured throughout the year. More over, rice bug attack occurs at the time of grain setting; by the time the crop grows to its maximum height covering the entire field. Hence it is very difficult to walk through the plots and erect the stick tied with palm fruit.

5.2.2 Plantation (including spices) based Cropping System

The documented ITK's under Plantation (including spices) based Cropping System, subjected to the rationalisation by FSS, were scored considering the 'degree of belief', 'strength' and 'weightage' of each indigenous practice.

The high ranking ITK's in descending order with their mean weightage scores in parentheses were: PCS-2 (23.98), PCS-1 (23.95), PCS-3 (22.8), PCS-11 (22.22) and PCS-26 (22.02). The ITK item PCS-2 viz. 'application of either sand or salt alone or both or salt and *marotti* (*Hydnocarpus wittiana*) cake in leaf axils against rhinoceros beetle', is a well known and already recommended practice which is easy to practice, with good trialability and observability. The effect was commented as 'quick'. The practice was found to be very effective and sustainable. The farmers might have noticed the restriction in the movement of the beetles and its desiccation effect (Manju, 1996).

The ITK PCS-1 viz; 'baiting with starch water and castor cake in coconut plantations against rhinoceros beetles': the approach is to attract the adult pests and kill them. The fermented smell of starch water mixed with castor was experienced to be very effective and sustainable method due to its easiness, low cost, trialability, observability and compatibility with the existing farming situation.

The practice PCS-3 viz; 'use of *perumaram* or *matti* (*Ailanthes malabarica*) in cowdung pits against rhinoceros grub' was found to be a widely accepted practice by the local farmers. The importance given by the farmers in controlling rhinoceros beetle from its grub stage itself shows that it is perceived to be the most important pest of coconut. The leaves of *perumaram* are abundant in all places including shady areas. The practice was also reported to be highly effective, less labour intensive and simple by Manju, 1996. The ITK PCS-11 viz; 'application of neem (*Azadirachta indica*) oil and common salt in coconut basin against stem bleeding of coconut': neem (*Azadirachta indica*) oil and salt was perceived to be effective, easily available and compatible with the existing cropping system. Common salt is cheap and is known to be a partial substitute of potash thereby improving the vigour and resistance of coconut palms. The ITK, PCS-26 viz; 'rodent control by baiting with cotton and jaggery', was perceived to be an effective practice as supported by (Manju 1996). Both the raw materials are easy to procure and the sweetness of jaggery attracts the beetles. The rodents die as the cotton balls being indigestible cellulose, blocks the alimentary canal of rats. The practice was commented as cheap, simple, triable, observable and effective.

The low ranking ITKs in ascending order with their mean scores in parentheses were: PCS-6 (6.65), PCS-29 (10.28), PCS-32 (11.03), PCS-30 (11.08) and PCS-5 (12.08). 'Hanging pot filled with starch water mixed with fruits of *marotti* (*Hydnocarpus wittiana)* in coconut gardens against rhinoceros beetle (PCS-6)': the practice is obviously difficult to practice since *marotti* is not easily available and to hang the pot on the palm requires climbers. The ITK PCS-29 viz; 'application of extract of arrow root on the crown region of arecanut reduces pests and disease especially YLD (yellowing)': this is a high labour intensive and costly practice. The extract of arrowroot is costly and not easily available as required. There is no scientific finding related to this method, though arrowroot has got repellent action as

opined by some scientists. The practice PCS-32 viz; 'keeping stone pebbles in the root zone of pepper to reduce pests and diseases especially quick wilt/ '*Phytophthora*' wilt: majority of the farmers were not aware of this practice and hence they could not rationalise it. The only reason that could be attributed to this practice according to few farmers was that, it minimises rain splashes falling on the lower part of the pepper vines, thus reducing the direct contact of inoculum of soil borne pathogens. Though the technology sounds simple, easy to adopt, less costly and labour friendly, this item was ranked low by the FSS.

The ITK item PCS-30 viz; 'lime and ash application reduces pests and diseases in pepper': though lime and ash application have got scientific rationality, the farmers perceived this practice to be of less important, despite the cheap and easy availability of the raw materials. This practice might not have influenced them, as they had not observed its effect. 'Spraying a mixture of neem (*Azadirachta indica*) oil and kerosene in the crown region reduces the attack of rhinoceros beetle in coconut (PCS-5)', was perceived to have less 'degree of belief', 'strength' and 'weightage' by the FSS. Though neem (*Azadirachta indica*) oil has got insecticidal property, application of kerosene on the crown region may destroy the apical meristem. This might be the reason why the ITK was ranked low despite of it's several attractive attributes.

5.2.3 Seasonal based Cropping System

The documented ITK's scrutinised by the experts were further screened by the FSS from 39 to 26 items.

A cursory glance at the data furnished in table 15 revealed that the mean weightage scores ranged from 32.53 to 9.3, with ITK items SCS-11 and SCS-22 respectively. The high-ranking ITK's in the descending order of preference were: SCS-11 (32.53), SCS-38 (30.98), SCS-39 (28.62), SCS-17 (27.78) and SCS-31 (27.58). Several reasons could be attributed to the envious status of these ITK's as listed by the FSS. The ITK item SCS-11 viz; 'soaking the seeds of bitter gourd in cowdung solution for 12 hours before sowing': it is interesting to find that the already recommended, widely practiced and scientifically proven practice was given top preference by the FSS. It would always be advantageous to follow this practice as a

precaution to ward off pests and diseases. The technology was experienced as profitable, low cost, less labour intensive and compatible with the existing farming situation, and hence farmers used them. The SCS-38 viz; 'storing seeds near the hearth of kitchen to minimise the attack of storage pests': the potential of this ITK could be highlighted when the positive technological attributes are considered. The constant drying and exposure to smoke reduce insect attack. Another interesting situation was observed where SCS-39 was assigned third rank, ie; 'storing seeds first in dry places and later under wet conditions'. Despite the lack of scientific base, the FSS might have followed this ITK due to its simplicity, easiness and trialability. The effectiveness of this approach in controlling storage pests need further validation. The reasons in assigning fourth rank position to ITK item SCS-17 viz; 'application of cow dung slurry reduces pests and diseases in bitter gourd' might be due to its simplicity, low cost and easily available raw materials. It would be worth exploring whether the farmers were aware of the antibacterial property of cowdung while they had evaluated this ITK. The ITK item SCS-31 viz; 'mulching the seed bed with tamarind leaves reduces weeds in solanaceous crops like tomato, brinjal and chilli' was assigned fifth rank by FSS. The potential of ITK could be appreciated if their scientific background is examined. The weed smothering effect of tamarind (*Tamarindus indica*) leaves might be the reasons attributed to this practice. Moreover, it is easy to practice, raw materials are sufficiently available in large quantities with no cost and drudgery at all.

The SCS-22 was assigned low rank in the ascending order followed by SCS-10, SCS-28, SCS-25 and SCS-19. 'Application of common salt in bitter gourd pit reduces yellowing (SCS-22)' was assigned the last rank, might be due to the lack of scientific base in this traditional practice in controlling yellowing.

There are situations now a days, where farmers are reluctant to use some of the traditional practices, though passed over generations. An example to corroborate this was the 'use of extract of bougainvillea and garlic to reduce pumpkin mosaic (SCS-11)'. Though the raw materials were easily available, the extraction procedure was difficult and drudgerous. The ITK item SCS-28 viz; 'application of cow's urine mixed with cow dung and kerosene reduces pests and disease', was assigned low rank, though characterised by its simplicity, low cost, easiness to handle, compatibility and easy availability of raw materials, was assigned low rank. This is an example where

strength of some ITK's contradict positive technology attributes. The indigenous practice SCS-25, 'application of leaf extract of *sitaphal (Annona squamosa)* diluted with water' which is very common and effective against pests and disease in general, was perceived as a low potential ITK.

5.2.4 Annuals based Cropping System

The ITK practices screened by the experts were taken as such and were subjected to Kendall's coefficient of concordance, without doing further screening. Hence the number of ITK's remained the same. As presented in Table 16, the high-ranking ITK's in descending order were ACS-1, and ACS-3. 'Application of cowdung and lime in banana pits against rhizome weevil (ACS-1)', was perceived to be the most preferred ITK. It is a slightly modified version of sucker treatment that is already being recommended and widely used ie; 'dipping the rhizome in cowdung and ash mixture'. It is natural that farmers rightly perceived this as a potential ITK. Moreover, farmers, due to their long experience with this conventional technology, could perceive the practice as simple, easy to adopt, less costly and compatible with the existing farming system. Incidentally, ACS-3 could secure second rank position, though the practice lacked direct scientific rationale. The farmers felt that this practice was worth trying.

The low ranking ITK's were ACS-5 and ACS-6. In certain contexts, farmers show reluctance to adopt certain technologies without assessing their scientific background. For example, 'green leaf manuring with *parakom* (*Ficus hispida*), *maruthu* (*Terminalia paniculata*) or *konginipoo* (*Lantana camera*) to reduce pests and disease incidence in banana (ACS-5)' was preferred least by the farmers, though *lantana* was reported to have 60 to 100 per cent effectiveness as a botanical pesticide (Stein, 1990). Similarly, planting *chettikoduveli* (*Plumbago rosea*) control rats and pig attack in tapioca' was assigned last but one rank without considering the repellent action of *chettikoduveli (Plumbago rosea)*, despite the practice being simple and compatible with the existing farming situation. Though the technology seems to have scientific rationale, farmers felt this as ineffective one.

5.2.5 Homestead based Mixed Farming System

The initial list of traditional practices was screened to 75 items by experts, which was further subjected to screening by farmers which resulted in 60 ITK items.

The forthcoming paragraphs discuss the data in table 17 showing the mean weightage scores and rank of each ITK item. Farmers rightly pointed out HMFS-48 (59.45), HMFS-54 (56.17), HMFS-39 (53.3), HMFS-42 (52.3) and HMFS-64 (49.55) to be the most potential ITKs. 'Application of water forcefully on the cow's udder reduces mastitis (HMFS-48)' was found to be a highly effective and a generally adopted practice, with high observability and trialability even though with no direct scientific rational behind it. In such a situation it was not beyond reasoning that the commonness of the practice might have prompted the farmers to perceive it to be the most relevant traditional practice. The ITK item HMFS-54 (administration of coconut (*Cocos nucifera*) oil or groundnut (*Arachis hypogea*) oil to the animal poisoned with tapioca or rubber leaves) was assigned second rank. This was found to be a very simple, effective and common practice and an immediate first aid that could be administrated to the poisoned animal with no cost and labour input. 'Feeding the animals with *thippali* (*Piper longum*) against bloat (HMFS-39)' was reported to be an effective and a widely used practice, if the availability of raw material were assured. The practice is economical and practicable. The traditional practices followed by our forefathers against fever and cough applicable to both human beings and live stock viz., 'administration of a paste made of *thulasi (Ocimum sanctum)*, *Coriander (Coriandrum sativum)*, *kodampuli (Garcinia cambogia)*, asafoetida *(Ferula asafoetida)*, dried ginger (*Zingiber officinale*), pepper (*Piper nigrum*) and *kiriyath (Andrographis paniculata)* (HMFS-42)' was found to be a very effective and simple treatment. All the raw materials used were reported to be of medicinal value and easily available. The effect could be quickly observed. 'Oral administration of a paste of neem (*Azadirachta indica*) leaves and turmeric (*Curcuma longa*), (HMFS-64) against ranikhet disease of poultry" is a very effective and sustainable practice. This practice was said to be simple to adopt, easily available raw materials, less labour cost and could be practiced by all. The HMFS-61 was assigned the least rank followed by HMFS-6, HMFS-7, HMFS-34, and HMFS-5. 'Smearing the extract of arecanut leaves on the animal body against ticks and lice (HMFS-61)' was least preferred by farmers,

though the practice was easy, less costly and low labour input oriented. The farmers might not have experienced this technique to control ticks and lice, thus prompting them to perceive it as the least preferred ITK.

'Bandaging the lesions on foot and mouth of infected animal using a paste made of *oduku (Cleistanthus collinus)*, tobacco (*Nicotiana tobacum*), charcoal powder and lime (HMFS-6)': though the practice was followed by yester generations, the farmers were reluctant to rate this as a potential technology. 'Smearing the wounds with oil of *kattucheru (Holigarna arnottiana)* or naphthalene balls dissolved in coconut oil (HMFS-7)' was also given low rank. Either the availability of oil could not be assured or the action of preparation might be feeble. These might be the reason why the respondents did not appreciate the practice. The ITK item HMFS-34 viz., 'administration of fish fat for indigestion' was characterised as less effective and not compatible with the existing cultural and social system. The Hindu farmers were comparatively reluctant to give fish products to the livestock, as cow is symbolically related to religion. Hence in such situations the farmers were hesitant to adopt such technologies despite their perceived effectiveness. The traditional practice of 'feeding the cattle with *palayamkodan* banana and pig fat along with smearing the mouth using pig's fat (HMFS-5)' was widely useful and passed over generations by word of mouth. The availability of pig fat was reported to be difficult. This might be the reason why the respondents perceived this ITK as less important.

5.3 Evaluation of 'Perceived Effect' and 'Scientific Rationality' of ITK Items in the Farm Production Systems by the ESS and RSS

A critical examination of mean weighatge scores presented in section 4.3 indicated that the value and rank positions of the three selected attributes differed slightly as perceived by the ESS, in all the farm production systems.

5.3.1 Evaluation by the ESS on Perceived Effect and Scientific Rationality of ITK Items

5.3.1.1 Rice based Cropping System

As discussed under section 4.4.1 and table 18, it could be concluded that ITK items in rice differed in all the three attributes. This differential trend was worth exploring. The ITK items RCS-27 and RCS-58 were assigned first and second rank position in all the three attributes namely 'perceived effect', 'scientific rationality' and their 'combination'. The ITK practice viz., RCS-27: 'Keeping neem (*Azadirachta indica*) and *karinochi (Vitex negundo)* leaves between sacs while storing seeds to ward off storage pests' was reported as a rational ITK as rightly pointed out by the ESS with respect to all the three attributes. The raw materials are easily available, less costly, less labour intensive and compatible with the existing system. The technique has a strong scientific base due to the proven insect repellent action of neem and *karinochi*. The insect repellent action of neem was reported by Stein (1990). The ESS rightly perceived this ITK as good in all aspects. Similarly the ITK item RCS-58 viz., 'releasing ducks to control crab in paddy field' is a widely recommended biological control measure which is compatible with the existing farming situation. This observation is in conformity with that of Preetha, 1997.

The ITK item RCS-3 viz., 'keeping a 200 Watt electric bulb above a container of furadan solution kept in field bunds till 10 O'clock at night' was ranked third position in terms of 'perceived effect' and 'combination of both'. As mentioned earlier, this practice is also widely used, recommended and was found very effective. The practice is a blend of traditional and modern technology. It is easy to adopt, simple, low cost, less labour intensive and compatible with the existing farming situation. The ITK item RCS-48 was ranked third position in terms of scientific rationale with a mean score of 74.43 viz., 'use of various mechanical rat traps. Though the practice lacks scientific rationale, it is still a thought provoking suggestion. 'Seed storage in bamboo baskets plastered with cow dung or in coir bags (RCS-26)' and 'adjusting the sowing time by *Aswathy (April 14th to 26th) or Bharani njattuvela'* (April 27th to May 10th), (RCS-7) was perceived same for 'perceived effect' and their 'combination'. RCS-26 is a potential practice, which makes the seeds

airtight, and plastering with cowdung acts as insect proof along with antibacterial property. The technology attributes of this practice are also very simple, effective, practicable, compatible and sustainable. Adjusting the sowing time by *Aswathy* (April 14th to 26th) or *Bharani njattuvela'* (April 27th to May 10th) is an age-old practice, still followed to exploit weather and pest interaction and was in conformity with the observation of Preetha (1997) and Majumdar (1927).

The ITK item RCS-25 was assigned low rank followed by RCS-13 and RCS-18 in all the three attributes as perceived by ESS. 'Swinging the crop with the twigs of *therakom* (*Ficus asperimma*) against leaf roller' was perceived as least in all the three attributes. It was rightly pointed out by the ESS, since the practice is not practicable for large areas, not easily available, costly and labour intensive. Moreover, any substance or twigs, which could unroll the leaves, can be used for the same purpose. There is no scientific rational reported. The practice followed against stem borer, RCS-18, viz; 'incorporate the leaves of *kudaku (Centella asiatica)* in the field' is a baseless practice and till now no scientific rationale has been reported. Besides that, the requirement of *kudaku* plants in large quantities, its cost and drudgery were the constraints reported to the low adoption of the practice. These might be the reason why the respondents perceived it to be least effective in all cases. Similarly, control of storage pests, RCS-30 viz, 'keeping *kattucheru* fruits (*Holigarna arnottiana*) during storage' was also perceived low in all three attributes. The medicinal properties of *kattucheru* were reported by Kirtikar and Basu (1935). The plant contains a black resinous juice with possible repellent or allergic action against storage pests. The respondents might have felt it as a less effective ITK. The availability of the raw materials was also difficult.

5.3.1.2 Plantation (including spices) based Cropping System

A critical examination of the rank position and mean weightage scores presented in table 19 indicated that out of 27 ITK's listed, there existed a wide difference in the perception of ESS while considering all the three attributes.

Regarding 'perceived effect', the high ranking ITK's in descending order were PCS-2 (74.39), PCS-10 (71.82), PCS-1 (69.14), PCS-26 (65.15) and PCS-4 (63.05).

'Application of either sand or salt alone or both or marotti (*Hydnocarpus wittiana*) cake in leaf axils of coconut palm to control rhinoceros beetle (PCS-2)' was ranked first which was in conformity with the response of FSS (table 14). Reports of Manju (1996) provided ample proof to the effectiveness of this traditional practice in controlling rhinoceros beetle. The practice was reported to be effective due to the simple reason that sand particles causes aberrations on the thorax region and salt causes desiccation, thus restricting the movement of the beetle. 'Application of Cashew Nut Shell Liquid (CNSL) in the affected parts of coconut against stem bleeding disease (PCS-10)' was ranked second. It might be due to easy availability of the material, besides the curing effect of kajidin, and phenols contained in CNSL. The ITK item PCS-1 viz,; 'keeping starch water mixed with castor in coconut plantations to trap and kill rhinoceros beetle'. This was again in conformity with the opinion of the farmers (Table 14). A bitter substance and a toxic alkaloid ricinine and other toxic principles like albumin and ricin might be deleterious to the pest. The PCS-26 viz., 'rodent contol by baiting with cotton and jaggery 'was again in conformation with the report of Manju (1996) and the responses given by the farmers as presented in table 14. Since jaggery is sweet, the rodents get attracted to it and the cotton balls block the alimentary canal, a physical chocking agent. Cotton ball is nothing but cellulose and hence it cannot be digested. It was commented as a simple and cheap practice, easy to adopt, observable, triable and effective and hence readily accepted by the ESS. 'Application of sand, lime and ash in the leaf axils to control rhinoceros beetle (PCS-4)' held the same reason as that of PCS-2.

The low ranking ITK's in the descending order as perceived by the ESS were: PCS-23, PCS-19, PCS-25, PCS-27 and PCS-12. The ITK item PCS-23 viz., 'to manage termite attack, crushed fenugreek application' was practiced by local elders. The practice was commented by the KIF's as effective and costly. The ITK item PCS-19 viz., 'spraying concentrated salt solution on coconut bunches to control mites': no scientific rationale was available to defend this practice except desiccation effect as reported from Agali block of Palakkad district. Though the practice was simple and easy to adopt, the ESS was not sure about the utility of the practice. The practice of 'planting *kattarvazha (Aloe vera)* in coconut plantations to ward off termite attack (PCS-25)' was perceived as less effective: though the RSS pointed out some repellent and 'allelopathic' action of *Aloe vera*, the ESS perceived this practice as of no use

against termite attack. There may be some scientific rationale behind this practice, since it is well known that *kattarvazha* has got medicinal properties. 'Application of powder blue to reduce yellowing in arecanut (PCS-27)' was rightly perceived as low by ESS. As the practice lacked scientific rationale, it requires further observations and validation. 'Burning the affected parts of coconut palm by sprinkling kerosene against stem bleeding (PCS-12)' was reported from all parts of Palakkad district, though the practice was not welcome. Though a temporary control could be achieved, the health of the palm cannot be guaranteed further. That might be the reason why the ESS did not show much interest in the practice.

In terms of scientific rationality, PCS-1 was assigned first rank followed by PCS-31, PCS-9, PCS-2 and PCS-10. 'Baiting with starch and castor cake against rhinoceros beetle' (PCS-1) has been already explained elsewhere in this chapter. The ITK practice PCS-31 viz., 'dusting of lime in the root zone and up to one metre height of pepper vine to control pests and diseases' was assigned second and third rank on scientific rationality and in combination with perceived effect. The practice was simple, less costly and effective. The ITK item PCS-9 viz., 'application of Bordeaux paste in the bud rot affected parts, plastered with paddy husk and covered by an earthen pot' against bud rot, obtained third rank on scientific rationality. The practice was commented as an easy one. It is a blend of traditional and modern technologies. The principle behind the use of paddy husk might be to absorb excess moisture. The practice was reported as effective and widely used. The ITK item PCS-2 was ranked high in all the three attributes which was again in conformity with the response of FSS and agreeing with the reports of Manju, 1996. 'Application of Cashew Nut Shell Liquid (CNSL) in the stem bleeding affected parts of coconut palm' was also ranked high in all the three attributes. The ESS perceived the ITK item PCS-20 viz; 'planting arrow root or turmeric along with coconut seedlings against root grub' as low, though the practice seemed to be scientifically rationale, by the presence of an alkaloid and its repellent action. The traditional practice, PCS-26 viz; 'baiting with jaggery and cotton balls to control rodents' was least preferred by the ESS in terms of scientific rationality though preferred by the farmers (table14). 'Organic manuring with neemcake and lime to control yellowing (PCS-28)' was ranked low in scientific rationality by the ESS, despite neem having insecticidal property and lime with antifungal activity. Though the causal organism of yellowing was still doubtful, an

integrated approach would be useful and advisable. 'Removal of inflorescence as a thinning process to reduce button shedding in coconut (PCS-14)' was reported as a potential practice, which was in conformation with the reports of Manju, 1996. But this ITK was perceived as low in terms of scientific rationality by the ESS. Thinning process enables the plants to get more nutrients and water by reducing competition, and thus the remaining buttons become healthy and minimise button shedding due to nutritional deficiency.

The low ranking ITK's were: PCS-27, PCS-19, PCS-17, PCS-23 and PCS-12. Among these, the potential one's were: PCS-27, PCS-19, PCS-12 and PCS-23, which have been explained elsewhere in this chapter. 'Spraying an extract of garlic (*Allium sativum*), green chilli (*Capsicum annum*), moringa (*Moringa oleifera*) leaves and asafoetida (*Ferula asafoetida*) to control leaf eating caterpillar (PCS-17)' was perceived as low by the ESS. As the active principles contained in the above materials have got some insecticidal action, their effectiveness cannot be ruled out as such.

5.3.1.3 *Seasonal based Cropping System*

The forthcoming paragraphs discuss the results contained in table 20. The perceived effect and scientific rationality of ITK items on Seasonal based Cropping System as perceived by ESS on three attributes are focussed here.

The traditional practices namely, SCS-11, SCS-7 and SCS-37 possessed high ranks in all the three attributes. 'Soaking seeds (seed treatment) of bittergourd in cow dung solution for 12 hours before sowing (SCS-11) to reduce pests and disease': this practice was commented as a potential one with no constraints at all. The antibacterial property of cowdung is a well-known fact. This is a common practice applicable to almost all crops as a method for imparting resistance. The ESS, having immediate contact with the farmers, were well aware of this practice in terms of its perceived effect, scientific rationality and combination of both, which was in conformity with the perception of farmers (table 15). Similarly, SCS-7 viz; 'sowing amaranthus seeds mixed with rice flour or turmeric powder' was referred as a common practice known to all. The principle is just to save the seeds from ants, by attracting them either to

rice flour or to repel the ants by turmeric powder. Due to the easiness and trialability, the practice was found widely adopted by majority of the farmers. The traditional practice 'keeping vegetable seeds in ash made of pods of cow pea (SCS-37)' was also perceived alike in all the three attributes, since ash can make cuticular desiccation on insect pests, the attack would be less. Besides that, while sowing, seeds grow faster and impart resistance and thus the attack would be less. The ash may also act as a basal dose of potassium indirectly. The ITK item SCS-38 viz., 'storing seeds near the hearth of kitchen', was assigned second rank when the combined effect was taken, which was in conformity with the opinion of the farmers (Table 15). Many reasons could be attributed to this: constant drying and exposure to smoke would reduce pest and disease incidence; easy to adopt; simple and not labour oriented; might have prompted the ESS to give it a high rank.

When the ITK's with low mean weightage scores were analysed, SCS-26, SCS-32, SCS-13, SCS-12 and SCS-30 were found to be assigned low ranks for all the three attributes. As was rightly pointed out by the ESS, there was no scientific background in 'planting elephant foot yam as an intercrop to control stunting'(SCS-26), a viral disease in vegetables especially in cucurbitaceous family. Moreover, growing elephant foot yam as an intercrop under bitter gourd pandal is not practicable. 'Application of salt used for storing dried fish in solanaceous crops against termites (SCS-32)' was also assigned low rank. 'Stunting of plants could be prevented by spraying the extract of *appachedi* (*Chromelina odoratum*) (SCS-13)'. Despite the presence of principles like eupatorium, kaemferide, inulin and odaratin in the plant parts, it was perceived as a low potential ITK. There were no reports available to proove its viricidal action. A thought provoking traditional practice viz., 'hanging white clothes or polythene covers in *pandals* to ward off fruit flies attack (SCS-12)', was documented. There could not be any rationale attributed to the effect of white cloth or polythene cover on fruit fly and hence no reasoning could be expected, though the practice was found to be very simple and cheep. Similarly, 'spraying tender coconut water mixed with cow's urine to prevent flower shedding (SCS-30)' was again perceived less rationale though tender coconut water is rich in potassium and growth regulating factors. This practice requires further experimentation and validation. Besides, this practice was commented as costly and hence farmers could not adopt it.

5.3.1.4 *Annuals based Cropping System*

Table 21 presents the ITK items possessing high and low degree of reasoning with high and low mean weightage scores respectively. It could be concluded from the table that all the seven ITK's were perceived more or less same by the ESS with respect to all the three attributes. 'Planting *chettikoduvely (Plumbago rosea)* to control rat and pig attack in tapioca plots' was assigned first rank by the ESS though it was least preferred by the FSS (Table16). The root bark contains an orange yellow pigment named plumbagin, the active principle, which can cause irritation thus scaring the rats and pigs. 'Attack of rhizome weevil could be prevented by the application of cow dung and lime applied in pits (ACS-1)'. This was assigned high rank conforming with the farmers' response as discussed under 5.2.4. Another practice of 'planting turmeric (*Curcuma longa*) in tapioca plot to scare away rats (ACS-7)' was also ranked high, may be due to possible repellant action of turmeric. The traditional practice was commented as simple and easy to adopt. Moreover, planting turmeric would fetch additional income.

Organic manuring using *parakom* (*Ficus hispida*), *Maruthu* (*Terminalia paniculata*), *kongini* (*Lantana camera*) leaves to control different pests and diseases, ACS- 5' was preferred least by both ESS and RSS. The leaves of *kongini* flower (*Lantana camera*) contain a toxic principle lantadine-A, and stem contains quinine like alkaloid. The bark of *Ficus hispida* contains tannins, caoutchoue and a glucoside. The leaves of *Terminalia paniculata* contains tannin. Despite all these, further experimentation and validation are necessary. The availability of raw materials cost and labour are also points of concern. Similarly, 'manuring with the leaves of *kanjiram* (*Strychnos nux vomica*) and neem (*Azadirachta indica*) to manage pseudostem weevil (ACS-2)' was also found to be a good practice though least preferred by the ESS. *Kanjiram* contains the toxic alkaloids mainly strychnine, brucine and strychninine including the newly reported vomicine and icajine. Neem leaves contain nimbine, nibinine, nibidine, and azadictin and also the fruits contain a bitter principle bakayanine. Due to these principles, there could be some scientific rationale behind this practice, a potential avenue for researchers to explore.

5.3.1.5 Homestead based Mixed Farming System

As discussed under the preceding paragraphs, the 75 ITK items under HMFS were evaluated by the ESS on all the three attributes namely 'perceived effect,' 'scientific rationality' and their 'combined effect'. The distribution of the preference of ITK's into 'low' and 'high' potential ITK differed widely in all the cases. From a close perusal of table 22, it could be understood that ITK items like HMFS-75 (211.18), HMFS-26 (207.32), HMFS-58 (199.99), HMFS-43 (185.62) and HMFS-42 (183.02) were perceived as high potential ones by the RSS. Obviously the mean weightage scores were also high. 'Feeding supernatant liquid of lime water to laying hens' was reported effective to minimise the number of soft-shelled eggs in poultry (HMFS-75). Soft-shelled eggs are mainly due to calcium deficiency. This could be overcome by giving a supernatant liquid of lime. The practice is very simple, easy to adopt, low cost, with low labour input and compatible. Similarly, as explained and discussed in the preceding subsections, ITK's like HMFS-26, 'feeding with powdered dried leaves of pomegranate (*Punica granatum*) against diarrhoea' was simple and effective technology, if the availability of the leaves were assured. 'Neem oil application reduces ticks and lice in livestock, HMFS-58': the practice was opined to have high potential. The reasons attributed were: antiseptic, astringent and antiparasitic properties of neem. Insecticidal property of neem is well known. 'Administration of a paste of *adalodakom (Adhatoda vesica)*, tamarind (*Tamarindus indica*) and *thulasi (Ocimum sanctum)* inflorescence mixed with camphor and jaggery (HMFS-45)' was perceived as a good ITK against fever and cough. Human medicinal prescription also follows a similar formula. The reasons attributed could be expectorant, mucolite, antispasmodic, antiseptic, carminative, bronchodilator, antibiotic, stomachic and astringent. Tamarind contains tartaric acid, proline, pipecolin, oxalic acid, vitexin, isovitexin, orientin, isoorientin and an alkaloid hordine. *Thulasi* contains eugenole, carvacrol, methyl euginol, cineole, inalool and methyl chavicol and it has proven to have antibacterial, insecticidal, antitubercular, diaphoretic, antiperiodic, stimulating, expectorant, digestive, tonic, demulscent, diuretic, antimetic, antiseptic and styptic properties. Adathoda is reported to have sedative, expectorant, antispasmodic, anthelmintic, bronchodilatory, respiratory stimulant, moderate hypotensive activity, cardiac depressant effect, anti anaphylactic and uterine stimulant activity and antibacterial activity (HMFS-43), besides its

potential active ingredients like vasicine and vasicinone. Tamarind has medicinal properties like refrigent, carminative, laxative, antiseptic, tonic, and febrifuge and applied as poultice. From all these, it could be concluded that the practice holds good, since the ingredients possess high valued medicinal properties. Hence RSS rightly upheld the practice as good.

Farmers reported and evaluated the practice of 'oral administration of a paste made of *thulasi (Ocimum sanctum)*, coriander (*Coriandrum sativum*), *Kodumpuli (Garcinia cambogia)*, asafoetida (*Ferula asafoetida*), dried ginger (*Zingiber officinale*), pepper (*Piper nigrum)* and *kiriyath (Andrographis paniculata*) twice daily as an effective medicine against fever and cough in livestock, (HMFS- 42)'. The reasons attributed by the RSS towards this practice were: expectorant, antiseptic, stimulant, antipyretic, carminative, diuretic, febrifuge, bronchodilator, anti-inflammatory and antispasmodic. The medicinal properties and active principle of *thulasi (Ocimum sanctum)* have been explained in the preceding paragraph. Asafoetida contains organic disulphide and umbelliferine; pepper contains high piperine, chavicine, piperidine and piperettine. Besides, the oleoresin in pepper is widely known to have bactericidal and fungicidal property. Ginger is carminative, stimulant, rubifacient and antidepressant and antinarcotic with major active principle zingiberin. The RSS reported that *kiriyath* is antityphoidal, antifungicidal, antibiotic, febrifuge and tonic, stomachic, cholagogue, antihelmintic, stimulant, aperients, astringent, anadine, toxic and alexipharmic. The practice is very simple, effective, easy to adopt, observable and cheap and hence rated as a potential practice.

The ITK's least preferred by the RSS were: HMFS-55, HMFS-16, HMFS-37, HMFS-7 and HMFS-69. Out of these, HMFS-60, HMFS-37 and HMFS-69 were found to be common to both RSS and ESS. These results have been discussed elsewhere in this chapter, establishing that these were low potential ITK's. The traditional practice, HMFS-16 viz., 'applying a paste made of leaves and stem of *chettikoduvely* (*Plumbago rosea*) on wounds of livestock': The RSS assigned reasons like anodyne, antispasmodic, relieve pain, reduce exudates, antiseptic, soothening, parasympathetic agent and anti-inflammatory. The wound healing action of *chettikoduvely* might be due to plumbagin, as the active principle along with delphinidin and kaempferol. The practice is simple and practicable if the raw material

is assured. According to the researchers the practice needs further experimentation and validation. 'Smearing the lesion of foot and mouth disease with the oil of *kattucheru (Holigarna arnottiana)*, (HMFS-7): this practice was perceived low by FSS and RSS (Table 7 and 17). Disinfectant, antiseptic and soothening effect were the possible reasons attributed by the RSS. No active principles have been reported. All parts of the tree yield a black resinous juice, a vesicant. Despite all these, the availability and procurement being difficult, might have prompted them to rate it as a low potential ITK.

5.3.2. Evaluation by the RSS on Perceived Effect and Scientific Rationality of ITK Items

The ITK items screened through Key Informant Workshop were subjected to the evaluation by RSS also. The critical examination of the details furnished in subsection 4.3.1 and 4.3.2 established a differential trend in the responses of ESS and RSS. It is natural that RSS being directly related with laboratory and experimental field, view through an angle of scientific rationale, where as the ESS by virtue of direct, frequent and close contact with the clients had viewed from a different angle similar to that of farmers.

5.3.2.1 *Rice based Cropping System*

Table 23 highlights the most and least ranked ITK's as perceived by RSS with respect to all the three attributes. The response pattern is interesting and thought-provoking, suggesting that the researchers perceived each ITK differently based on different attributes. Based on the combined effect of attributes, the high potential ITK's in descending order were: RCS-27 (176.07), RCS-2 (169.8), RCS-21 (163.78), RCS-7 (163.02) and RCS-26 (158.28). Except RCS-27, all the other four were of high potential when the other two attributes namely 'perceived effect' and 'scientific rationality' were taken. Again RCS-26 and RCS-7 (Table 13) had high ranks in the perception of farmers though RCS-27, RCS-3 and RCS-26 (Table 18) were preferred as potential ones by the ESS. From this, it could be concluded that RCS-26 viz., 'seed storage in bamboo baskets plastered with cow dung' is of high potential when all the three attributes were taken together. The traditional practice RCS-27 viz., 'placing the

leaves of neem (*Azadirachta indica*) or *karinochi (Vitex negundo)* or *ungu (Pongamia glabra*) between the sacs while storing, to ward off storage pests' has got strong scientific rationale. Majority of the RSS reasoned the repellent action and pesticidal action of these plants. As already explained, the active principles contained in neem leaves are: nimbin, nimbinin, nimbidin, azadiractin; in *ungu*, an active principle karanjin; and in *karinochi*, two alkaloids namely, nishindine and hydrocotylene are present. The pesticidal action of neem is a proven fact. Similarly the active principles of *ungu* and *karinochi* might also have some repellent action. The practice is simple and easy to adopt, if the availability of leaves were assured.

Pests and disease incidence could be controlled to a certain extent by the application of an age-old practice of 'spraying the extract of garlic, asafoetida, tobacco, neem oil and green chilli mixed with soap solution (RCS-2)'. It has got a strong scientific base. The reasons attributed by researchers to this particular practice were: repellent action, insectistatic, and antifeedent and favouring natural enemies. The active ingredients in garlic are allicin and allinase; chilli contains capsaicin, dihydrocapsaicin; neem oil contains margosic acid; asafoetida contains organic disulphide, umbelliferone and asaresino tannol; and tobacco contains nicotine and nornicotine. Hence it was natural that the scientists assigned high rank to this ITK. The practice was found very simple, low cost with easily available raw materials and compatible with the existing farming system.

'Nipping the leaf tip of paddy plants reduces stem borer (RCS-2)', was assigned third position by the researchers though, ESS and FSS did not prefer the practice. Though the practice is easy, well known and effective. But it could be threatened by the possibility of allowing the BLB bacteria. 'Adjusting the sowing time by *aswathy* or *bharani njattuvela.* (RCS-7)' was perceived as a high potential ITK by both RSS and FSS. The reasons attributed were: reception of one or two rains in *aswathy or bharani njattuvela* helps the dry sown rice crop to establish and by June, water available through monsoon showers would improve the vigour and growth of the plants. thereby helping the plants to overcome the vulnerability of heavy showers.

Some of the ITK's were almost same as perceived as low potential by RSS with respect to all the three attributes. The practice RCS-25 (59.22) was assigned the least

rank followed by RCS-37 (72.34), RCS-32 (77.59), RCS-35 (78.96) and RCS-33 (79.46).

Perception of all the respondent groups showed a differential trend in preferring ITK items, except RCS-25, which was least preferred by all. The practice of 'controlling plant hoppers using neem (*Azadirachta indica*) oil and soap emulsion after draining the field, (RCS-37)' was reported as a common and widely used method. Even though neem oil has got repellent action, it was perceived as a low potential ITK here. The scientists did not appreciate the ITK item RCS-32 viz., 'hanging bougainvillea leaves to ward off storage pests', though the insecticidal property of bougainvillea was reported by Stein (1990). 'Dusting the field with lime and ash against sheath rot' was also perceived as low potential ITK, even though lime has got fungicidal property and ash improves pests and disease resistance. 'Incidence of bacterial leaf blight could be minimised by frequent application of neem cake in the field, (RCS-33)'. As discussed earlier, the germicidal and bactericidal properties of neem would be worth exploring.

5.3.2.2. Plantation (including spices) based Cropping System

As presented in table 24, the traditional practices as preferred by RSS showed differences in all the three attributes, though PCS-1 (137.82), PCS-9 (131.19), and PCS-2 (128.63) were common to all attributes with slight difference in their position. While considering the combined effect, two more ITK's, PCS-34 (131.19) and PCS-10 (119.99) held high ranks.

'Baiting with castor cake mixed with starch water to control rhinoceros beetle', was acclaimed by all the three groups of respondents. The scientific base has been explained in 5.3.1.2. 'Dusting of lime in the root zone and on the plants upto one metre height from the soil in pepper reduces pests and diseases, (PCS-31)' held high rank position in all the three attributes and conforming to the response of ESS. Since lime has got fungicidal property, this particular traditional practice might have got some scientific rationale. An example of a blend of traditional and modern technology was documented: viz., 'application of bordeaux paste in the affected area plastered with paddy husk covered with a pot against but rot of coconut, (PCS-9)'. Rice husk

helps in absorption of moisture leading to speedy recovery of the affected area. The damage caused by rhinoceros beetle could be minimised by a simple farmers' practice of using sand or salt or both in leaf axils. Both ESS and RSS perceived this practice as high potential. The perceived effect and scientific rationality have been well explained elsewhere in this chapter. The damage of stem bleeding in coconut could be minimised by the 'application of Cashew Nut Shell Liquid (CNSL), (PCS-10)' was ranked high by both ESS and RSS. The practice is easy, if the availability of raw materials were assured.

The practices namely, PCS-27, PCS-19, PCS-12, PCS-28 and PCS-16 were assigned low ranks, which were in confirmation with the opinion expressed by the ESS (Table 19). 'Application of washing blue to reduce yellowing in arecanut (PCS-27)', was perceived least by both ESS and RSS, which indicated that there was no scientific rationale behind the practice. The most important pest emerged recently in coconut, the eryophid mite, was reported to be under control by the 'application of concentrated salt solution, (PCS-19)'. This is an example showing that farmers are still developing their own specific techniques to solve the problems. But the scientists contradicted this by saying that eventhough nut growth and nut setting could be favoured by salt application, there would not be direct effect on mite population. But according to some scientists, the possibility of desiccation of mites due to reverse osmosis cannot be ruled out.

'Stem bleeding affected parts of coconut palm could be destroyed by burning the affected part after spraying kerosene (PCS-12)': burning could destroy the entire inoculums of the pathogen, thus minimising its spread. It was found as interesting and thought provoking practice. Some had the apprehension that palm parts might also get damaged including the internal tissues. Hence it is a technique warranting further validation. The detrimental disease of arecanut in recent years, 'yellowing' (YLD of arecanut), where the causal organism is yet to be identified, was reported to be controlled by farmers by 'application of neem cake and lime in basins of arecanut palms. (PCS-28)'. The practice could be interpreted as an integrated approach to overcome the pests, disease and nutritional deficiency. Neem has got insecticidal property and makes the palm resistant to further attack. Lime has got fungicidal property and also favours the effect by changing the pH of the soil. Though the

practice is simple, easy and less costly, it was perceived as less potential. Since the raw materials used in this practice have got some scientific basis, it needs further research and validation. Button shedding in coconut may be due to many reasons like pests, diseases, nutritional deficiency and water imbalance and the like. Farmers also suggested many practices to overcome the malady. 'Spraying cow's urine (PCS-16) was reported against button shedding'. Though it was perceived as low potential by the researchers, the reasons could be attributed as: cow's urine might have got antifungal, antibacterial and pesticidal action; moreover, the auxins (NAA, IAA) present in cow's urine have hormonal activity'. The practice is simple, cheap and compatible. Anyhow, it needs further laboratory research and field validation.

5.3.2.3 Seasonal based Cropping System

Data furnished in Table 25 revealed the preference of ITK item as perceived by RSS in all the three attributes. The succeeding paragraphs discuss the comparative results furnished under 4.3.2.3. as it could be seen from table 25. The ITK item SCS-11 held first rank position as perceived by RSS, ESS and FSS. The practice was 'soaking the seeds of bitter gourd in cowdung solution for 12 hours before sowing'. It could be mentioned that this particular ITK has got high-perceived effect and scientific rationale. The reasons attributed were the antiseptic and bacterial activity of cowdung against seed borne pathogens, besides that, the treatment would improve the vigour and viability of seeds. The high-ranking ITK's almost held the same position in all the three attributes. 'Storing seeds along with the *vayambu* or *karinochi* or pieces of red chilli, SCS-34' was perceived to have high potential. The reasons attributed were: antirepellent property, pesticidal property, chemical and physical exclusion by the materials used while storing. The active principle in *karinochi* are nishindine, hydrocotylene; green chilli contains alkaloids like capsicum, capsaimide, dyhydro capsaicin; *vayambu* contains a bitter principle acorin, all contributing to pesticidal properties. The practice, does not have much technological constraints, making it adoptable by the farmers. 'Storing of vegetable seeds mixed in sand or soil or turmeric' was also perceived as high ranking ITK. The practice was generally preferred by the RSS in all the three attributes. Curcumin, the active ingredient in turmeric, may have repellent action, though use of turmeric is costly. Sand or soil can cause aberration on the body of storage pests. The practice SCS-35 was again related

to storage pests, indicating that farmers have many problems in seed storage. 'Smearing the seed with coconut oil or groundnut oil, SCS-35' was an age-old practice which is still in vogue. The oily coating given to the seeds would deter oviposition, ie., preventing insects from laying eggs which prevent further attack of insects. This practice holds good as it is simple, compatible and easy to adopt. Mosaic in chilli is a viral disease and the only preventive measure is to control the vector. Against chilli mosaic, 'application of starch water mixed with garlic or neem oil, SCS-29' was reported by farmers. The RSS suggested the reasons like antiviral, insecticidal, repellent and a means of biochemical suppression of microbial population.

As discussed earlier, the preferences of low ranking traditional practices were almost same for all the three attributes. The practices least preferred by RSS were: SCS-39 (68.43), SCS-26 (68.59), SCS-20 (69.71), SCS-18 (73.17) and SCS-30 (73.71). 'Seed storage in dry places and later in wet or cool areas' (SCS-39) was least preferred. No reasons were attributed to this practice by RSS. Hence it could be concluded that this practice does have any scientific base though simple, easy to practice. 'Planting elephant foot yam as an intercrop in bitter gourd *pandals* reduce stunting, (SCS-26)' was perceived as low potential ITK as confirmed by the ESS. The reasoning has been given under 5.3.1.3. 'Controlling sucking pests by slurry of jaggery in starch water (SCS-20)': the technique could act as a trap to attract sucking pests. The stickness of *kanjivellam* (rice soup / starch water) seems to be the practical idea. These were the possible reasons given by RSS, though no scientific rationale could be provided. The age old practice of the elders to control soil borne pest, by 'mulching the bitter gourd pit with leaves of *kanjiram* (*Strychnos nux vomica*) (SCS-18)': the toxic and repellent action of *kanjiram* could be the reason to justify this practice. It would be worthy for further research and validation since *kanjiram* contains alkaloids like strychnine, brucine, vomicine, and icajine. So there might be some action of alkaloids on soil born pathogens. Farmers reported that flower shedding in chilli could be minimised by the 'application of a mixture of tender coconut water and cow's milk, (SCS-30)'. The reasoning has been discussed under 5.3.1.3.

5.3.2.4 Annuals based cropping system

A critical examination of tables 26, 21 and 16 revealed that there was wide differential trend in the preference with respect to the three attributes by all the three groups of respondents.

'Planting *chettikoduveli (Plumbago rosea)* to control rats and pig attack in tapioca (ACS-6)' was a preferred ITK by both RSS and ESS, suggesting that the practice has got perceived effect and strong scientific base. The discussion has been given in 5.3.1.4. Similarly 'planting turmeric in tapioca plots to scare rats, (ACS-7)' was given a strong scientific rationale with no constraints in terms of technology attributes. The practice has been defended under 5.3.1.4. The low perceived ITK's were: ACS-2 and ACS-5. It is in conformity with the response given by the ESS.

5.3.2.5 Homestead based Mixed Farming System

The documented traditional practices on animal husbandry aspects were evaluated by researchers on all the three attributes. Table 27 revealed the evaluative perception and scientific rationality of ITK items as perceived by them.

The distribution of the ITK's in terms of the 'perceived effect', 'scientific rationality' and 'combination' showed near similarity. The ITK item, HMFS-26 was assigned first rank followed by HMFS-52, HMFS-13, HMFS-1 and HMFS-20.

Diarrhoea could be managed quickly by 'administering powdered dried leaves of pomegranate (*Punica granatum*), (HMFS-26)'. The ESS had also given the same response. The reasons attributed by the RSS were: astringent, stool binding, antiseptic, wormicidal and stomachic action of pomegranate. It is a simple practice, easy to adopt and compatible. 'Administration of ground tender arecanut (HMFS-52)', was reported effective against endoparasites and was ranked high by RSS, though it was least preferred by ESS. 'Astringent' was the only reason attributed. Arecanut contains catechol, tannin, and alkaloids like arecaine, arecaidine, arecoline, guvacine and catechin. These alkaloids can have some effect on the endoparasites. The traditional ethnoveterinary practice of 'applying boiled water of camphor, garlic,

turmeric and *punna* (*Dillenia pentagyna*) in equal proportion on the lesions caused by foot and mouth disease, (HMFS-13)': the reasons could be explained in terms of the medicinal properties of ingredients like antiseptic, disinfectant, astringent, fly repellent, soothening, rubifacient or sedative and antibacterial. Garlic contains allium and allinase; turmeric contains curcumin. The practice is easy, simple, low cost and less labour-oriented.

'Application of boiled water of *sitaphal* (*Annona squamosa)* leaves and tamarind on foot lesions of foot and mouth disease, (HMFS-1)': the medicinal properties of *sitaphal* and tamarind as opined by the researchers were: antiseptic, astringent, soothening effect, fly repellent, analgesic, and anti-inflammatory. Tamarind contains tartaric acid and amino acids like proline and pipecolinic. *Annona* contains corydine, annonaice, aporphine, corydine, and isocorydine. The medicinal property of sitaphal leaves has proven effects like stimulant, antispasmodic, sudorific, anthelmintic and insecticidal. 'Wound on animal's body could be quickly healed by smearing a paste made of camphor, neem oil *attakkari (*kitchen carbon*)*, and salt, (HMFS-20)'. The antiseptic, disinfectant, fly repellent, lymph lavage action, rubifacient, soothening effect of neem oil; hygroscopic anti hemorrhage activity and antibacterial activity of sugar and salt; adsorption of toxic materials by *attakkari* altogether could heal the wounds quickly. That might be the reasons why the researchers perceived the practice as high potential.

The ITK item HMFS-50 was assigned least rank followed by HMFS-37, HMFS-63, HMFS-71 and HMFS-69. These ITK's also lacked scientific rationale and perceived effect. 'Administration of *changalampparanda* (*Cissus quadrangularis*) leaves with common salt against worm trouble, HMFS-50': vermifuge was the only reason attributed by RSS for this particular ITK. Antifungal property of the leaf extract has been reported. Stem contains two components namely, onocer-7 ene-3-alpha and 2 steroidal principles- I and II. Hence there could be some effect of using *Cissus quadrangularis* related to this practice. Anyhow, these require more experimentation and validation. 'Administration of *changalampparanda (Cissus quadrangularis)* was also reported as effective against bloat'. The active principle of *Cissus quadrangularis* has been mentioned before. Hence it could be concluded that *Cissus* is effective and have medicinal properties.

Ranikhet in poultry is a major disease seen in all parts of the world. 'Administration of previous day's rice and *Allium cepa*, (HMFS-63)' three times daily will give better result. If the availability is assured, the practice seems to be good. This could be why the scientists perceived this ITK as high potential. 'By dipping the hen in *vayambu (Acorus calamus)* solution, HMFS-71' holds good and effective against ticks and lice. The practice was perceived as a low potential ITK. Fly repellant, antiseptic and antifungal properties of the plants were reported. Calamenol, calamone, calamenone, methyl eugenol, eugenol camphene, acorin and cholin are the active principles reported. It could be concluded that the practice is worth and effective though perceived as low potential ITK. Besides, *vayambu* is antispasmodic, carminative antihelmentic, antibacterial, and sedative, potentiating activity, stimulant and have haemostatic, insecticidal, ovicidal and antifungal activity. The practice needs further research and validation. 'The ticks and lice can be minimised by using castor leaves (HMFS-69)'. The principle toxic materials are albumin, recin and recinin. Recin possess antigenic and immunising action.

5.4 COMPREHENSIVE ASSESSMENT OF ITK ITEMS BY ESS AND RSS

The results related to the cumulative sum of ITK's based on the selected evaluation attributes could be discussed as follows:

5.4.1 Rice based Cropping System

Results shown in Table 28 provided an idea on the best ITK's from the view points of ESS and RSS, based on the combined effect of two attributes namely 'perceived effect' and 'scientific rationality'. The forthcoming paragraphs throw light on the most potential, effective and preferred ITK's as opined by the ESS and RSS, when sum of the two attributes were taken. The response pattern presented in Table 28 indicated the preference of ITK items in descending order. Examples for the high potential ITKs were:

- Seed storage in bamboo baskets plastered with cowdung (RCS-27)
- Fixing white flags in fields to control rodents (RCS-58)

- Keep a 200 W bulb above furadan solution in the field, which attract insects (RCS-3)
- Green leaf manuring with *erikku (Calotropis gigantia)* and *karpoorappacha (Lantana camera)* against stem borer attack (RCS-21)
- Spray the extract of garlic *(Allium sativum)*, asafoetida (*Ferula asafoetida*), ginger (*Zingiber officinale*) tobacco *(Nicotiana tobacum)*, neem (*Azadirachta indica*), green chilli (*Capsicum annum*) or birds eye chilli (*Capsicum fruitiscens*) after mixing it with soap and water (RCS-2)

The above mentioned ITK's have been explained and discussed elsewhere in terms of their perceived effect and scientific rationality. Some of the least preferred ITKs were:

- Application of Cashew Nut (*Anacardium occidentale*) Shell Liquid (CNSL) in the field (RCS-25)
- Insert sticks tied with fruits of palm (*Borassus flabellifera*) in the field against stem borer (RCS-18)
- Store seeds in a mud pot smoked with mango (*Mangifera indica*) leaves, leaf stalk of jack (*Artocarpus heterophyllus*) and lemon grass (*Cymbopogan citratus*) (RCS-32)
- Spray the emulsion of neem (*Azadirachta indica)* oil and soap after draining the field (RCS-37) against grass hopper attack
- *Mampookanikkal or manjukollikkal*-It is a seed drying technique where the seeds are exposed to three dews (nights) and three days successively (RCS-30)

The practices were well discussed elsewhere in the preceeding section.

5.4.2 Plantation (including spices) based Cropping System

As is seen in table 29, some examples for the high potential ITK's were:

- Keep a pot filled with starch water mixed with castor cake (*Ricinus communis*) 250 g in coconut plantation against rhinoceros beetle (PCS-1)
- Lime and ash application reduces pests and diseases (PCS-31)

- Application of sand and salt or *marotti (Hydnocarpus wittiana)* cakes in equal proportions in the leaf axils of coconut during August - September months (PCS-2)
- Apply the affected area with Bordeaux paste plastered with paddy husk and then covered it with a pot for bud rot (PCS-9)
- Lime paste or Cashew Nut Shell Liquid (CNSL) application on the affected parts of the trunk against stem bleeding in coconut (PCS-10)

Similarly, examples for some of the low ranking ITKs were:

- Spray washing blue solution at the rate of 1 kg in 50L water against YLD of arecanut (PCS-27)
- Spray concentrated solution of salt water on coconut bunches to minimise the mite population / attack (PCS-19)
- Application of crushed fenugreek in coconut basin against termite attack (PCS-23)
- Spray kerosene and burn the affected parts of the trunk against stem bleeding in coconut (PCS-12)
- Application of lime mixed with neem (*Azadirachta indica*) cake in the basins of arecanut (PCS-28)

5.4.3 Seasonal based Cropping System

As is seen in table 30, some of the high potential ITK's as perceived by ESS and RSS together were:

- Treatment of bitter gourd seeds in cow dung slurry/cow dung solution for 12 hours before sowing against pests and diseases in general (SCS-11)
- Sowing amaranthus seeds along with turmeric (*Curcuma longa)* powder or rice flour to prevent ant attack (SCS-7)
- Store seeds near the hearth of the kitchen (SCS-38)
- Application of garlic (*Allium sativum*) extract or neem (*Azadirachta indica*) oil mixed with starch water against chilli mosaic and leaf curling (SCS-29)
- Dust wood ash over leaves in early morning against general pests and diseases (SCS-3)

Some of the low ranking ITK's listed were:

- Cultivate elephant yam (*Amorphophallus companulatus*) as an intercrop in bittergourd plots to reduce stunting (SCS-26)
- Extract of *appachedi (Chromelina odoratum)* helps to reduce stunted growth in vegetables (SCS-13)
- White clothes are hung on snake gourd *pandals* against fruit fly attack (SCS-12)
- Application of salt used for storing dried fish in the root zones of vegetable against termite attack (SCS-32)
- Application of powdered *palkayam* (*Ferula asafoetida*, 20 g) mixed in one litre milk and diluted with five litres of water against flower shedding (SCS-33)

5.4.4 Annuals based Cropping System

As presented in Table 31, the farmers' wisdom on annuals as preferred the most by the ESS and RSS were:

- Planting *chettikoduveli* (*Plumbago rosea*) resist rat and pig attack (ACS-6)
- Plant turmeric (*Curcuma longa*) in plots to scare away the rats (ACS-7)

Similarly some of the least preferred ITK's were

- Green leaf manuring with *parakom* (*Ficus hispida*) and *maruthu* (*Terminalia paniculata*) *or konginipoo* (*Lantana camera*) (ACS-5)
- Green leaf manuring with strychnine (*Strychnos nux vomica*) and neem (*Azadirachta indica*) are believed to repel banana pseudostem weevil (ACS-2)

5.4.5 Homestead based Mixed Farming System

The high potential ITK's as perceived by these two group were:

- Administration of *thippali* (*Piper longum*) is effective (HMFS-28) against diarrhoea.

- Crushed bark of moringa (*Moringa oleifera*) mixed in orange juice is given for indigestion (HMFS-35)
- Tender arecanut (*Areca catechu*) is ground well and orally given against worms or endoparasites (HMFS -52)
- Apply boiled water of sitaphal (*Annona squamosa*) leaves and tamarind leaves (*Tamarindus indica*) on foot against lesions of foot and mouth disease (HMFS -1)
- A mixture made out of 50 gram of pomegranate (*Punica granatum*), 10 g dried ginger (*Zingiber officinale*), pepper (*Piper nigrum*), and with curd given four times daily (HMFS –29)

The low potential ITK as perceived by these groups were:

- Administration of *changalampparanda (Cissus quadrangularis*) ground paste is effective (HMFS-37)
- Use castor (*Ricinus communis*) plants to clean and remove the waste from poultry house (HMFS –69).
- Dip the hen in solution made of *vayambu* (*Acorus calamus*) rhizomes (HMFS -71)
- Feed the animal with *palayamkodan* banana along with pig fat (HMFS –5)
- Feed the paste made of *changalampparanda* (*Cissus quadrangularis*) and salt against worm trouble (HMFS-50)

5.5 COMPARATIVE EVALUATION OF PERCEIVED EFFECT AND SCIENTIFIC RATIONALITY OF ITK ITEMS WITH IN ESS AND RSS

The attributes of the ITK's namely 'perceived effect' and 'scientific rationality' were subjected to Spearman's rank order correlation to know whether these two attributes of each ITK were correlated or not. Results of the five production systems are discussed hereunder:

It is interesting to note from table 33 that in the RCS, the two attributes related significantly at 0.01 level with respect to all the 46 ITK items, except four, namely RCS-7, RCS-52, RCS-58 and RCS-60 as responded by the RSS. From the response of

ESS, it could be concluded that three ITK's viz., RCS-11, RCS-29, RCS-52 did not show any significant relationship between their perceived effect and scientific rationality. The ITK item, RCS-52 viz., 'baiting with rice-powder mixed with glass pieces for controlling rodents' was perceived similar by ESS and RSS, showing no relation between perceived effect and scientific rationality. The practice causes internal bleeding in rodents was the rationale expressed by RSS. The technique might be difficult to practice, since glass has to be powdered well as that of rice, then only the rats feed on it and cause internal haemorrhage. This might be the reason why both the ESS and RSS found it difficult to relate the perceived effect and scientific rationality of the practice. Under PCS, five ITK items out of 27 did not show any relationship between perceived effect and scientific rationality. The rest 23 ITK's showed significant relationship at 0.01 level which indicated that the perceived effect of each ITK item was closely related to its scientific rationality. The ITK's whose perceived effect and scientific rationality did not relate were: PCS-2, PCS-3, PCS-20, PCS-8 and PCS-21 evidenced by very low 'r' values. While viewing from the angle of ESS, relationship of four out of 27 practices were found to be non-significant. It is further interesting to note that except PCS-1, perception on other ITK's viz., PCS-3, PCS-20 and PCS-8 were same as that of the RSS. Hence these ITKs could be definitely characterized by perceived effect contradicted by scientific rationality or *vice versa.*

In Seasonal based Cropping System, the RSS perceived two practices viz., SCS-9 and SCS-12 as non-significant, while rest of the ITK's were highly significant at 0.01 level, except two (Table 35). This meant that, out of 26 practices, 24 possessed both perceived effect and scientific rationality according to the RSS, despite slight difference in the rank positions. Similarly ESS also expressed that two ITK's viz., SCS-4 and SCS-9 lacked either of the attributes. The conclusion could be again narrowed down to SCS-9 viz, 'spraying cow's urine diluted ten times reduces pests and disease in cucurbits': since the practice was responded to be nonsignificant by both ESS and RSS. Though the practice was simple, the scientific rationality behind it needs further research.

As observed in table 36, in Annuals based Cropping System, it is encouraging to discuss that all the practices were found significant. This means that all the seven

ITK's listed have both perceived effect and scientific rationality. All the seven practices have strong scientific rationale with no constraints to technology attributes, so that farmers would not be reluctant to adopt them.

A cursory glance at the data furnished in table 37 indicated that all the 60 ITK's under Homestead based Mixed Farming System were found to be significant, that too at 0.01 level. It is a thought provoking question that whether all the ITK's listed here possessed a strong scientific rationale with high-perceived effect. The results throw light to the fact that in case of animal husbandry-related agriculture, the practices followed by local elders were comparatively good as perceived by both ESS and RSS, though they had assigned the ranks with slight difference.

5.6 Identification of ITK's that Clearly Discriminate the Perception of ESS and RSS

Results and discussion mentioned in the present and the preceding chapters established that there were some ITK's that were either common or differently preferred by ESS and RSS with respect to their perceived effect and scientific rationality separately. When the overall perceptual trends were anlaysed, it was interesting to observe that there were a few ITK's that showed either wide difference of opinion or close agreement by ESS and RSS. To find out the ITK's which discriminated the respondents, canonical discriminant function analysis was done.

5.6.1 Discrimination of ESS and RSS on Perceived Effect of Crops-Related ITK Items

A close examination of Table 38 gives a picture of the ITK's that discriminated ESS and RSS on perceived effect of ITK's. From crops-related indigenous practices only three ITK's discriminated ESS and RSS. The ITK's showing high difference of opinion were:

- Swinging twigs of *therakom (Ficus asperimma)* across the field against leaf roller in rice (RCS-26)

- Keep a pot filled with starch water mixed with castor (*Ricinus communis*) cake, 250 g in coconut plantation for the control of rhinoceros beetle (PCS-1)

Possible reasons for such a wide difference of opinion have been discussed elsewhere in the preceding paragraphs of this chapter.

The practice in seasonal based cropping system-'planting red and green amaranthus in alternate rows to tide over fungal disease, mainly leaf spot' had only very narrow discrimination between the respondents. This ITK showed more agreement on perceived effect for both ESS and RSS. The reasons suggested by experts were that, green amaranthus was more resistant than red amaranthus to fungal diseases. So it would act as an insurance crop.

5.6.2 Discrimination of ESS and RSS on Scientific Rationality of Crops-Related ITK Items

Table 39 presents the ITK items with closer agreement and wider disagreement by ESS and RSS on scientific rationality. The following practices shared wide disagreement in the sense that the ITK perceived as high rationale by RSS might be perceived as low by ESS.

- Paddy fields are ploughed with cashew (*Anacardium occidentale*) leaves at the rate of 50 sacs per acre as a general pests and disease control (RCS-5)
- Keep neem (*Azadirachta indica*) cake sacs in irrigation channel (RCS-20) against stem borer.
- Baiting with jaggery and cotton balls against rodents (PCS-26)

The following ITK's showed closer agreement:

- Application of asafoetida (*Ferula asafoetida*), 25g mixed in water (1L) against flower shedding in cowpea (SCS-1)

- Mulching the basins of bitter gourd with leaves of *kanjiram (Strychnos nux vomica)* against sucking pests (SCS-18)

This means that both ESS and RSS pointed out the same rationale on these two items.

5.6.3 Discrimination of ESS and RSS on Perceived Effect on Animal Husbandry-Related ITK Items

Table 40 highlights the ITK's that discriminated the RSS and ESS on perceived effect.

The following ITK's exhibited closer agreement in the response of ESS and RSS:

- Small fishes are ground to a paste and applied to the foot lesions of cattle (HMFS-10)
- Apply oil of *kattucheru* (*Holigarna nicottiana*) on the wounds of cattle (HMFS-7)
- Smear the paste made of *karpooram* (Camphor), neem (*Azadirachta indica*) oil, salt and sugar to heal the wounds (HMFS-20)
- Administration of *thippali* (*Piper longum*) is effective against diarrhoea (HMFS-28)
- Give coconut (*Cocos nucifera*) oil or groundnut (*Arachis hypogea*) oil when the animals get poisoned by eating leaves of rubber (*Hevea braziliensis*) / tapioca (*Manihot esculenta*) (HMFS-54)
- Smear the paste made of *adakkamanian* (*Sphearanthus indicus*) on the animal body to ward off ticks and lice (HMFS-57)

The perceived effect of the above ITK items as reported by ESS and RSS were almost similar. In short, these were the ITK's showing almost similar agreement between ESS and RSS. Such a trend gives further strength to these ITK's.

The following ITK's discriminated the ESS and RSS widely in their opinion on perceived effect:

- Crushed bark of *moringa* (*Moringa oleifera*) mixed in orange juice is given for indigestion in cattle (HMFS-35)
- Administration of *changalampparanda (Cissus quadrangularis)* ground to a paste is effective for indigestion (HMFS-38)

- Boil 120 g of crushed *thazhuthama* (*Boerhavia diffusa*), *njerinjil* (*Tribulus terrestris*) in 6 L of water and make to 3 L and given one litre of the solution daily to cattle against mastitis (HMFS-45)
- Black tea without sugar is given for eight days against worm trouble in cattle (HMFS-51)
- Powdered naphthalene balls are applied on the body of animals against ticks and lice (HMFS-62)
- A paste made of turmeric *(Curcuma longa*) and pepper (*Piper nigrum*) and salt is given for ranikhet disease (HMFS-66)
- Use twigs of castor (*Ricinus communis*) plants to clean and remove the waste from poultry house against ticks and lice (HMFS-69)
- Dip the hen in a solution made of *vayambu* (*Acorus calamus*) rhizomes (HMFS-71)

The possible reasons for such discrimination have been discussed elsewhere in this chapter.

5.6.4 Discrimination of ESS and RSS on Scientific Rationality of Animal Husbandry Related ITK Items

A cursory glance at the table 41 points to the practices that discriminated the ESS and RSS on their scientific rationality of indigenous practices. The ITK's that showed closer or similar agreement on perception of scientific rationality were:

- Dried leaf powder of pomegranate (*Punica granatum*) is given as feed to cattle against diarrohea (HMFS-26)
- Camphor and crushed garlic (*Allium sativum*) mixed in neem (*Azadirachta indica*) oil can be applied against ticks and lice in cattle (HMFS-60)
- Wild *thulasi* leaf extract or *Kozhippenchedi* (*Eleocharis capitata*) are kept in poultry house to ward off ticks and lice (HMFS-72)

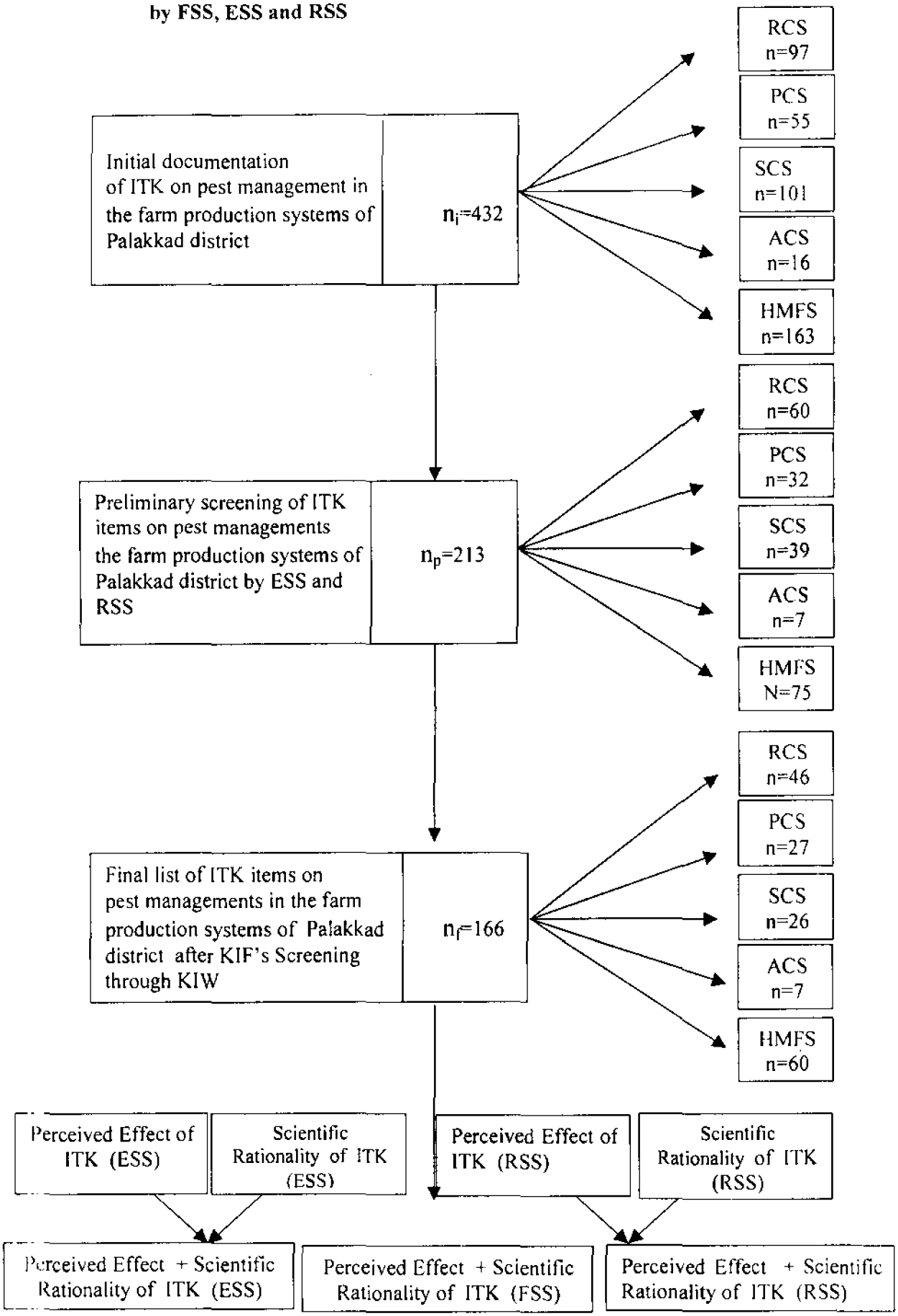
The practices showing wider difference of opinion were:

- Smear a paste made of *karpooram* (Camphor), neem (*Azadirachta indica*) oil, salt and sugar on the wounds of cattle (HMFS-20)
- The bark of *kadalavannakku* (*Jatropha curcas*) is made into a paste and applied on wounds of cattle (HMFS-16)

- Give *thippali* (*Piper longum*) mixed in toddy against fever and cough in cattle (HMFS-44)

The preceding sub-sections clearly discriminated the two expert groups namely ESS and RSS, who play a key role for the welfare of the agrarian sector of the country. Both the respondent groups showed some sort of similarity and dissimilarity in their attitude, view points, the perception on various attributes, and their mode of thinking with respect to their clients. The reasons for their dissimilarities or lack of agreement could be the nature and mode of work, the type of clientele in contact, the official set up, the work atmosphere and targets, the workload and the jurisdiction to be covered by a single individual. Besides, the 'theory-practice difference', the 'proximity-distance' from actual field conditions, difference in their research, academic and practical back ground and the like-wise might have influenced their perception. The researchers are always in touch with academic matters, researches to be carried out in the laboratories and then to the field situation and the development of appropriate technologies suited to micro-farming situations. While the extensionists who transfer the technology come in contact with the actual field conditions and the clients and possess knowledge on the field realities. A distance exists between the farmers and the researchers. Hence ESS perceives each step in empathy with the farmers, while this quality might have lacked in case of RSS. It could be concluded that ESS always think in terms of practical utility of a technology in actual farmers field situation, while the RSS think in a more scientific angle.

Fig: 5 Empirical model of preference ranking of ITK items on pest management by FSS, ESS and RSS



SUMMARY

6. SUMMARY

Farming communities have developed innumerable ways of obtaining food and fibre from plants and animals through a wide range of indigenous agricultural practices. Indigenous Technical Knowledge (ITK) refers to the unique, traditional, local knowledge and practice existing within and developed around the specific conditions people indigenous to a particular geographic area. With the growing recognition of the value of indigenous knowledge for sustainable development, there is a need to make use of this valuable resource, since donors' recognition of ITK often represent little more than lip service, seldom translating them into action. Besides, quite often there is a tendency to romanticize ITK's by mere documentation than finding out the perceived effect and scientific rationality of specific practices.

A systematic comprehensive research work in the documentation, screening, reasoning and rationalisation of ITK's on pest management have not been done so far in Kerala. Hence a pioneer effort was made, taking Palakkad district as a case. A sequential step-by-step procedure was applied in five major farm production systems viz, Rice based Cropping System (RCS), Plantation (including spices) based Cropping System (PCS), Seasonal based Cropping System (SCS), Annuals based Cropping System (ACS) and Homestead based Mixed Farming System (HMFS). Quite recently pest management with inorganic is under severe criticism due to environmental and health hazards, threatening the human environment and sustainability of the agro-ecosystems. To re-explore the potential of traditional, eco-friendly and hazard-free pest management practices, the present investigation was designed with the following objectives:

1. To compile and catalogue the Indigenous Technical Knowledge (ITK) on pest management in the five major farm production systems of Palakkad district

2. To analyse the evaluative perception of ITK items by the Farmer sub System (FSS), Extension Sub System (ESS), and Research Sub System (RSS) of Palakkad district

3. To analyse the scientific rationale behind the ITK items by the extensionists and scientists of Palakkad district

4. To present to the formal research system, a package of ITK items for further validation and recommendation

The study was conducted in five blocks of Palakkad district. A multistage sampling procedure was followed for drawing samples for the investigation. The study was conducted as a phased programme in four stages. The first objective was accomplished by the first two phases and the rest in subsequent ones. Three stake-holder systems namely the Farmer Sub System (FSS), the Extension Sub System (ESS) and the Research Sub System (RSS) were reckoned for the study.

The farmer respondents comprised 150 Key Informant Farmers (KIF's) at the rate of 30 from each farm production system. The blocks, panchayats and farmers were selected based on the criteria of 'agricultural predominance' and 'presence of atleast three farm production systems'. The ESS comprised of Agricultural officers (AO's) and Agricultural Assistants (AA's) of the concerned panchayats. Besides the agricultural extensionists, 30 veterinary doctors were selected to report the perceived effect and scientific rationality of the ITK items. The RSS comprised of 60 scientists, 30 each from agriculture and veterinary faculties of Kerala Agricultural University. The mode of data gathering was a blend of focussed group interview/discussions, Key Informant Workshops (KIW's) following the principles contained in Participatory Learning and Action (PLA), interview guides and personally administrated questionnaires. The documented traditional practices were subjected to initial screening by multidisciplinary experts to avoid incompleteness, lack of clarity, irrelevance and superfluosness. The primary screened ITK's were again subjected to further screening by FSS through a series of three KIW's. The screened ITK's were presented to extensionists and scientists for further evaluation based on 'perceived effect' and 'scientific rationality' of each practice. The collected data were analysed using statistical tools like Kendall's coefficient of concordance, Spearman's rank order correlation, Mann-whitney U test and Canonial discriminant function analysis.

The salient findings of the study are as follows:

1. A total of 432 ITK's on pest management were documented from five production systems of Palakkad district.

2. From this, 213 number of ITK's were retained after initial screening by multidisciplinary experts.

3. The screened ITK's were assigned weightages by FSS in the KIW's and the number of practices was screened to166, comprising 46 practices in RCS, 27 in PCS, 26 in SCS, seven in ACS and 60 in HMFS.

4. Examples of some of the 'high' rank orders of ITK items in Rice Based Cropping System as perceived by FSS were: RCS-29, RCS-1, RCS-26, RCS-7, RCS-30, RCS-5, RCS-39, RCS-19, RCS-6 and RCS-59.

Some of the most preferred ITK's in Plantation (including spices) based Cropping System in descending order were: PCS-2, PCS-1, PCS-3, PCS-11, PCS-26, PCS-4 PCS-7, PCS-24, PCS-9 and PCS-28.

In Seasonal based Cropping Systems, the high potential practices as perceived by FSS in descending order were: SCS-11, SCS-38, SCS-39, SCS-17, SCS-3, SCS-37, SCS-3, SCS-7, SCS-20 and SCS-34.

In Annuals based Cropping System the practices like ACS-1, ACS-3, and ACS-4 were preferred the most.

The most preferred ITK's in Homestead based Mixed Farming Systems were HMFS-48, HMFS-54, HMFS-30, HMFS-42, HMFS-64, HMFS-51, HMFS-61, HMFS-20, HMFS-1 and HMFS-58.

5. The screened ITK's as evaluated by ESS on 'perceived effect' and 'scientific rationality' were as follows:

In Rice based Cropping System on perceived effect alone, RCS-27, RCS-58, RCS-3, RCS-59, RCS-29, RCS-7, RCS-21, RCS-29, RCS-1 and RCS-26 were perceived as high potential. In terms of scientific rationality RCS-27, RCS-58, RCS-48, RCS-3, RCS-41, RCS-59, RCS-29, RCS-26, RCS-21, and RCS-7 were perceived as high ranking ITK's and on the combined effect of attributes, the most preferred ITK's in descending order were: RCS-27, RCS-58, RCS-3, RCS-59, RCS-26, RCS-7, RCS-29, RCS-21, RCS-48 and RCS-1.

In Plantation (including spices) based Cropping Systems PCS-2, PCS-10, PCS-1, PCS-26, PCS-4, PCS-18, PCS-20, PCS-11, PCS-31 and PCS-17 held high rank positions in terms of perceived effect alone, while PCS-1, PCS-31, PCS-9, PCS-2 and PCS-10, PCS-11, PCS-15, PCS-8, PCS-3 and PCS-4 occupied top positions with respect to scientific rationality of the ITK practices. While taking in to consideration the combined effects, the practices namely, PCS-1, PCS-10, PCS-31, PCS-20 and PCS-11, PCS-3, PCS-18, PCS-15, PCS-26 and PCS-20 were perceived as high potential.

On Seasonal based Cropping System, the ESS perceived SCS-11, SCS-7, SCS-3, SCS-17, SCS-37, SCS-15, SCS-29, SCS-5, SCS-35 and SCS-34 as high potential ITK's in terms of perceived effect. The high potential ITK's in terms of scientific rationality were: SCS-38, SCS-11, SCS-37, SCS-7, SCS-15, SCS-3, SCS-5, SCS-17, SCS-8 and SCS-29. The practices SCS-11, SCS-38, SCS-7, SCS-37, SCS-3, SCS-15, SCS-17, SCS-5, SCS-29 and SCS-8 were reported as high potential ITK's in terms of their combined effect.

In Annuals based Cropping System, ESS perceived ACS-6, ACS-1 and ACS-7; ACS-6, ACS-4 and ACS-7; and ACS-6 ACS-1, ACS-7 as high potential ITK's on perceived effect, scientific rationality and on the combined effect respectively.

In Homestead based Mixed Farming System, HMFS-75, HMFS-26, HMFS-58, HMFS-43, HMFS-29, HMFS-14, HMFS-73, HMFS-13, HMFS-1 and HMFS-30 were perceived as high potential on perceived effect while, HMFS-75, HMFS-26, HMFS-58, HMFS-43, HMFS-42, HMFS-14, HMFS-52, HMFS-29, HMFS-73 and HMFS-13 were ranked high in scientific rationality. On their combined effect HMFS-75, HMFS-26, HMFS-,

8, HMFS-43, HMFS-42, HMFS-29, HMFS-14, HMFS-73, HMFS-52 and HMFS-13 were the most preferred ones.

6. The most preferred ITK's as given by RSS on perceived effect were: RCS-26, RCS-2, RCS-7, RCS-21, RCS-29, RCS-26, RCS-58, RCS-3, RCS-6 and RCS-34. High-ranking ITK's on scientific rationality were RCS-26, RCS-2, RCS-21, RCS-7, RCS-34, RCS-16, RCS-58, RCS-6, RCS-29, and RCS-50. On combined effect RCS-27, RCS-2, RCS-21, RCS-7 RCS-26, RCS-29, RCS-58, RCS-34, RCS-6 and RCS-3 occupied high ranks in Rice based Cropping System.

In Plantation (including spices) based Cropping System the ITK's, PCS-2, PCS-10, PCS-9, PCS-31, PCS-4, PCS-1, PCS-26, PCS-20, PCS-24 and PCS-17 were perceived as high potential ones in terms of perceived effect. The indigenous practices preferred in terms of scientific rationality were: PCS-1, PCS-20, PCS-31, PCS-3, PCS-9, PCS-2, PCS-8, PCS-27, PCS-25 and PCS-4, while on combined effect the ITK's were PCS-1, PCS-31, PCS-9, PCS-2, PCS-10, PCS-4, PCS-20, PCS-17, PCS-3 and PCS-13.

The traditional practices like SCS-34, SCS-11, SCS-35, SCS-36, SCS-8, SCS-17, SCS-7, SCS-3, SCS-29 and SCS-37 were perceived as high potential ITK's in Seasonal based Cropping System on perceived effect alone while practices like SCS-11, SCS-29, SCS-34, SCS-36, SCS-8, SCS-3, SCS-37, SCS-31, SCS-35 and SCS-38 were rated as the best ones. When combined effects were taken SCS-11, SCS-34, SCS-36, SCS-35, SCS-29, SCS-8, SCS-3, SCS-37, SCS-31 and SCS-17 were the most preferred ITK's.

The age old practices like ACS-6, ACS-7, ACS-4 and ACS-3 were rated as best on perceived effect. On scientific basis, the practices were: ACS-6, ACS-7, ACS-3 and ACS-4.While taking into consideration the combined effect, ACS-6, ACS-7, ACS-3 and ACS-4 were the items well preferred.

In Homestead based Mixed Farming System, HMFS-26, HMFS -20, HMFS-13, HMFS-29, HMFS-1, HMFS-52, HMFS-75, HMFS-43, HMFS-45 and HMFS-14 were perceived as high potential in terms of all the three attributes.

7. The best ITK's as perceived by both ESS and RSS together considering their combined effect of perceived effect and scientific rationality for Rice based Cropping System were as follows: RCS-27 RCS-58, RCS-3, RCS-21, RCS-2, RCS-26, RCS-7, RCS-59, RCS-29 and RCS-1.

In Plantation (including spices) based Cropping System, PCS-1, PCS-31, PCS-2, PCS-9, PCS-10, PCS-4, PCS-15, PCS-13, PCS-3 and PCS-18 were perceived as high potential ITK's.

In Seasonal based Cropping System, the high-ranking practices were: SCS-11, SCS-7, SCS-38, SCS-29, SCS-3, SCS-34, SCS-8, SCS-5, SCS-37 and SCS-35

Considering the Annuals based Cropping System, the practices viz, ACS-6, ACS-7, ACS-1, ACS-4, were perceived as high potential ITK's.

In the case of Homestead based Mixed Farming systems, HMFS-26, HMFS-75, HMFS-52, HMFS-1, HMFS-29, HMFS-58, HMFS-42, HMFS-13, HMFS-14 and HMFS-43 occupied top positions.

8. In Rice based Cropping System, all the ITK's except four practices, showed high correlation between perceived effect and scientific rationality by RSS. Similarly the perceived effect and scientific rationality of all practices except two were highly correlated and significant as perceived by ESS.

In Plantation (including spices) based Cropping System, 23 ITK's were found to have correlation on their perceived effect and scientific rationality as perceived by ESS, whereas on perception by RSS, 22 ITK's were correlated between the perceived effect and scientific rationality.

In Seasonal based Cropping System, all the practices except one showed positive and high significant correlation between the attributes as perceived by RSS.

The ESS perceived 24 ITK's as correlated between the perceived effect and scientific rationality.

In the case of Annuals based Cropping System, all ITK's showed high correlation between the perceived effect and scientific rationality as pointed out by both ESS and RSS.

Similar trends were observed in Homestead based Mixed Farming System also.

9. There were a few ITK's, which discriminated either widely, or agreed closely by both the ESS and RSS based on their responses made on perceived effect and scientific rationality. In crops-related practices, RCS-26, PCS-1 and SCS-8 were the ITK's that actually discriminated the two respondent groups in terms of perceived effect of practices, while RCS-5, PCS-20, PCS-26, SCS-1 and SCS-18 discriminated the respondents based on scientific rationality of practices. Similarly, in animal - husbandry related ITK's, HMFS-10, HMFS-7, HMFS-20, HMFS-28, HMFS-35, HMFS-38, HMFS-45, HMFS-51, HMFS-54, HMFS-57, HMFS-62, HMFS-66, HMFS-69 and HMFS-71 discriminated the respondents based on perceived effect. The practices HMFS-20, HMFS-16, HMFS-26, HMFS-25, HMFS-44, HMFS-61 and HMFS-72 discriminated the ITK's based on scientific rationality of the practices.

10. The results of the study indicated the need for further research and validation of many ITK's in the laboratories, research stations and farmers' fields through on-farm trials and technology assessments and refinement attempts.

Implications of the study

1. The present study has attempted to respect and recognize the heritage, folk knowledge, diversity of techniques and biodiversity of nature and people, thereby making humble contribution to farming, extension and research.

2. The study has documented a vast list of indigenous practices on pest management covering all the five major farm production systems. The awareness on the plethora and potential of indigenous practice may prove beneficial to the present and future generation of farmers, extensionists and researchers. Many of these age-old practices are hiding in literature and memory banks of rural folk. Still the farmers are enthusiastic to help the documentation and rationalization works.

3. Though some of the ITK's were very clear, many of them lacked clarity, correct dosages, mode of use and reasoning, establishing the fact that all the ITK's cannot be romanticized.

4. Hence there is immense scope for assessing each specific ITK in sequential steps starting from research laboratories, field experimentation, farmer participatory assessment and performance evaluation on technological, social, economical, cultural and practical utility dimensions.

5. There is scope for judiciously blending the traditional wisdom, contemporary farm folk's innovations and modern packages through an ecologically sound integration to attain high productivity and sustainability, by minimising the indiscriminate use of chemicals.

6. The present study has provided a prioritized list of ITK's along with useful feedback to research system for designing research projects and on-farm trials for testing, validation, refinement and blending them with modern technologies for large-scale recommendations.

7. Workshops for discussing the potential ITK's may be organised through 'farmer-extensionist-scientist' interaction so as to recommend them to the Package of Practices at least on 'ad-hoc' basis

8. The novelty and uniqueness of present research in seeking the help of Key Informant Farmers and stakeholder workshops as research tools are first of its kind in India. The experience has provided the research system, a systematic 'modus operandi' for conducting similar stakeholder-participatory researches in any discipline.

9. The techniques and approaches for data gathering, interview guide, schedules and questionnaires, and analyses developed for the study; the empirical model and the outcome of the evaluation of ITK's could be used with suitable local modifications in the farm front of the state and elsewhere.

10. Experience gained from the study rightly posed a question: "Are all the ITK's good and adoptable"? The results obtained by step-by-step documentation, screening and rationalization has brought to light the Strength, Weakness, Opportunity and

Threat (SWOT) of ITK's in the background of the past, present and perspective future situations.

11. Documentation and rationalisation of time tested and time proven ITK's provided enough materials for further research for assessment and validation to multidisciplinary researchers.

Suggestions for future research

1. ITK's are highly location specific treasure of knowledge and skill related to the context, biodiversity, culture, heritage, people's mindset and the like wise. Efforts similar to this study may be done in all the districts of Kerala, covering all the farm production systems.

2. The ITK's that have not stood the rationalisation tests of the present study should not be discarded. They too would be the potential items for future research.

3. The ITK's selected as well as sidelined in the rationality tests of the present investigation may also be taken for further analyses by other researchers. Rural folk, local leaders, ayurvedic doctors, rural technicians and artisans may also be collaborated.

4. In-depth assessment and validation are required at laboratory levels, fields of research stations, and farmers' field levels in multiple locations.

5. The extrapolation domains of the traditional practices may be explored.

6. The technological attributes and the potential use of each ITK may be explored in detail, either by the researchers of the concerned discipline or multidisciplinary teams.

7. The potential ITK's prioritized by the present study may be used in Participatory Technology Development (PTD) either as such or blending with modern technology.

8. Based on all the above, the traditional practices or their blends may be brought into the package of practice recommendations of the research system.

9. Works to prepare biodiversity registers, specially focusing on botanicals and medicinal plants may be intensified.

10. Most of the researches and TOT endeavors on ITK may be taken as multidisciplinary teamwork and with an inter-disciplinary mindset.

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APPENDICES

APPENDIX I

Rice based Cropping System

Pest and disease control in general

1. Kundakootal- Seedling treatment practice before transplanting.The seedling bundles are arranged one above the other in a circle forming the pyramid shaped seedlings. The bundles are placed with their roots facing outside.
2. Spray the extract of garlic, asafoetida, ginger tobacco, neem oil, green chilli/birds eye chilli after mixing it with soap and water.
3. Frequent ash dusting in the fields reduces pests and diseases.
4. Deep ploughing the paddy fields during the summer periods aids to expose the soil to scorching sun. This is a good measure to reduce pest and disease occurrence in the paddy field.
5. Keep the field fallow during summer.
6. Keep a 200 watt bulb above furadan solution in the field which attracts insects.
7. Bundles of leaves and stems of *kattucheru* are kept in the water inlet of paddy field.
8. Paddy fields are ploughed with cashew leaves at the rate of 50 sacs per acre.
9. Green leaf manuring with the leaves of *kanjiram*, *venga*, *paanal*, mango and bamboo.
10. By adjusting the sowing time by *aswathy* and *bharani njattuvela.*
11. Incorporate tender banana pseudostem along with cowdung during the last ploughing.
12. Application of shell lime in the field.
13. Application of poultry manure in the field reduces pests and diseases.
14. Application of powdered fruits of *mulliyilath* mixed with ash in the field.
15. Neem leaves are bundled together and placed in the water inlet .
16. Seeds are treated before sowing by immersing seeds in salt water.
17. Seeds are treated in a solution containing cowdung and top soil.

Rice bug

18. Shading increases pest population, hence avoid shading.
19. Spray/pour cowdung slurry.

20. Wet clothes are used as net to collect bugs.

21. Adjust the sowing time to exploit wind.

22. Spray the diluted extract of lemon grass and garlic.

23. Spray the extract of garilc(Allium sativum) and asafoetida mixed with fresh cowdung.

24. Spray the leaf extract of *arootha* (Ruta graveolens) and sweet flag.

25. Leaf extract of *kanjiram (strychnos nux vomica), tulasi (Ocimum sanctum)*, and ginger grass(*Cymbopogan citratus).*

26. Burn discarded cycle tyres in the bunds so that bugs can be expelled due to the odour.

27. Fruits of palm are tied on a stick and inserted in the field.

28. Flowers of tree splash ward off the bugs.

29. Yam are kept in the field to ward off bugs.

Stem borer

30. Broadcasting lime in the field reduces stem borer attack.

31. Mango (*Mangifera indica*) leaves are incorporated in the field.

32. Leaves of *oduku* and flowers of *Naikarunam* or inforescence of palms in the field.

33. Keep neem cake sac in irrigation channel.

34. Green leaf manuring with *Calotropis gigantia* and *karpoorapacha.*

35. Nip the seedling tips.

Hoppers (Pulponthu attack)

36. Direct the hoppers towards the ends/corners of rice bunds by disturbing the plants using twigs and other plant materials. These are collected and destroyed.

37. Apply the leaf extract of *kanjiram, thulasi* and lemon grass.

38. Spray the solution containing Phenyl (1L), Neem oil(1/4L), kerosene(1/2L), and 150g soap in the field.

Leaf roller

39. Leaf tips along with the pests are collected by sweeping the field using bamboo baskets.

40. Dragging the thorny branches across the field.

41. Spray kerosene water mixture.

42. Application of cashew nutshell liquid in the field reduces the pest.

43. Manuring with *therattavalli (Trichosanthes hispida)* and ash bring down the population.

44. Swinging twigs of *therakam (Ficus asperimma)* through the field.

45. Spiny ropes are used to unroll the leaves.

46. Dusting the field with ash reduces leaf roller attack.

47. Spray neem oil mixed with soap.

48. Spray kerosene diluted with water.

49. Broadcast kerosene soaked saw dust (1L kerosene for 1acre).

Storage Pests

50. Seed storage in bamboo basket plastered with cowdung.

51. Store seeds in *pathayam* and coir bags.

52. Seeds are stored in pot made of mud and straw.

53. Leaves of *ungu (Pongamia glabra)*, neem (*Azadiracta indica*),and *karinochi (Vitex negundo)* are placed between the sacs used for storage.

54. Seeds are stored along with the dried tender stems of Clerodendron.

55. *Mampookanikal / manjukollikkal*-It is a seed drying technique where the seeds are exposed to three dews(nights) and three days continuously.

56. During storing the fruits of *karimcheru/ kattucheru(Holigarna arnottiana / H nigra)* are mixed with the seeds.

57. Seed storage along with neem leaves in *vallam.*

58. Seeds are exposed the smoke of burned neem leaves.

59. Storing seeds in a pot smoked with the leaves of mango(*Mangifera indica*), leaf stalk of jack (*Artocarpus heterophyllus*) and lemon grass (*Cymbopogan citratus*).

60. Adjust the time of storing seeds, since attack is more during the period of star ending in "mi" (All becomes *umi.*)

61. Hang leaves of bougainvilla in storage bins to ward off storage pests.

Bacterial leaf blight

62. Spray the supernatant liquid of cow dung slurry/ liquid for 40 days old seedling.

63. Application of neem cake (8 sacs) repeated every twenty five days.

Gall fly

64. Adjust the sowing time by *aswathy/ bharani njattuvela*.

Sheath rot

65. Proper drainage of paddy field.

66. Application of lime along with ash.

Weed control

67. Follow sequential cropping with gingelly.

68. Plough the field after getting second rain and add poultry / cattle manure.

69. Placing *Calotropis gigantia* at irrigation channel controls striga.

70. Application of coconut husk in paddy field control *Marselia quadrifolia*.

71. Transplantation of seedlings during *karthika njattuvela* reduces weed growth.

72. Growing and incorporating daincha in the paddy field reduces the weed in the next crop.

Rat control

73. Kerosene spraying in the bunds reduces rat attack.

74. Rat control can be done by hood winking.

75. Keep flat stones in the middle of each leg of the cottage as rat trap.

76. Insert palm leaves in the field so that the rattling sound runs the rats.

77. Use of various rats traps like *kumbam*, *adichil*, saw toothed scissor trap, earthen pot trap, box trap, burying mud pots at ground level, where field bunds meet from four sides.

78. Strong and well-plastered bunds reduces rat attack.

79. Baiting with a mixture of fried prawn shell powder and cement.

80. The borrow holes are either smoked or flooded with coir.

81. Fixing coconut petioles inverted in the field or bunds to aid owl perches.

82. Application of neem cake urea mixture at booting stage.

83. Baiting with rice powder mixed with glass piece powder.

84. Baiting with leaves, seeds or bark of *Glyricidium sepum* with cereals.

85. Insecticide boiled rice.

86. Baiting over tapioca chips or snail flesh.

87. Drum beating.

88. Fixing white flags in fields.

89. Planting *Plumbago rosea* in the fields bunds.

Crab control

90. Proper drainage in the field.
91. Trapping crabs using polythene covers at drainage points.
92. Releasing flocks of geese/ducks in puddle field.

Bird control

93. Bursting crackers.
94. Fixing human effigies or scare crows.
95. Use of plastic cover tied to long poles.
96. Old and discarded audio/video tapes used.

Nematode control

97. Chrysanthemum as decoy crop against *Meloidogyne incognita.*

II. Plantation (including spices) based Cropping System

1. Place an earthen pot in the coconut basin, filled with rice water ($3/4^{th}$ of pot) and add castor cake (250g). The odour of the solution attracts the beetle into the pot, could be killed by adding poison.
2. Frequent smoking by burning coconut husks during evening hours in the garden.
3. Application of sand and salt or *Marrotti* cakes in equal proportion in the leaf axils of coconut during August - September month.
4. Use of *Ailanthes malabaricum (prumaram/Matti)* in cowdung pit.
5. Leaves of *Vitex negundo (karinochi)* in the cowdung pit destroy grubs.
6. Beetle hooks are used.
7. Mixture of toddy and jaggery kept in earthen pot, placed in coconut garden attract beetles.
8. Application of sand and BHC powder in the leaf axils.
9. *Tung* oil mixed with jaggery can attract the beetles.
10. Cut the leaf petioles very close to the trunk.
11. Application of lime, ash and sand in the leaf axils during rainy time.
12. Application of neem oil and kerosene in equal proportion in the crown region destroys the beetle.
13. Mix one *marrotti* fruit in one litre starch water, hang it on any tree so that it get attracted to it.

14. Incorporating *oruvenchedi* along with its root in cowdung pit.

Bud rot

15. Proper drainage of the field/basin.
16. Clean the crown frequently and application of ash and salt mixture solution.
17. Application of lime burned for one day in coconut basin.

Root wilt

18. Application of *Strychnos nux vomica* leaves, (*kanjiram*) in coconut basin.
19. Application of crushed fruits of *Mahua or Marrotti* in basin.
20. Basal application of mango leaves along with cowdung or river silt.
21. Apply a mixture of crushed onion and salt in the basin.

Stem bleeding

22. Lime paste or cashew nut shell liquid application on the trunk.
23. Application of neem cake and salt in basin.

Abnormal nut fall or button shedding

24. Application of hotel wastes including the meat, tea dust and vegetable waste, food stuffs in the coconut basin along with fish meal reduces nut fall.
25. Basin application of old battery powder mixed with neem cake reduces abnormal nut fall.
26. Removal of alternate inflorescence.
27. Incorporate chopped pseudostem banana in coconut basin.
28. Ash application in basin.
29. Application of fish waste and salt mixture in the coconut basin.
30. Application of neem cake and salt in the basin.
31. Spray fresh diluted cows urine in the crown urine.
32. Application of salt in basin (4kg/basin) followed by irrigation.

Leaf eating caterpillar

33. Spray the preparation made out of garlic (*Allium sativum*), green chilli (*Capsicum annum*), moringa (*Moringa oleifera*) and kayam (*Ferula asafoetida*).

34. Spray equal proportion of kerosene and neem oil.

Mite control

35. Frequent smoking in coconut garden by coconut husks.
36. Spray concentrated solution of salt water.

Root grub

37. Plant an arrow root or turmeric (*Curcuma longa*) along with coconut seedling.

Termite control

38. Lime application for seedlings.
39. Salt and ash application in the basin.
40. Planting wild variety of arrow root in coconut basins.
41. Application of paste made of fenugreek in coconut basin.
42. Application of neemcake and salt of equal proportion in the basin.

Rodent control

43. Lime pasting on trunk.
44. Wrapping of trunk with polythene or tin sheets.
45. Baiting with powdered prawn and cement.
46. Baiting with jaggery and cotton balls.
47. Sprouted paddy seeds which are soaked in poisoned water(insecticide) are used as bait.
48. Poison in parboiled rice.
49. Rice flour mixed with dried fish and poison are kept in coconut shells placed in leaf axils.
50. Baiting with leaves or seeds of *Glyricidia* cooked in rice.

ARECANUT

Yellowing

51. Spray washing blue solution at the rate of 1kg in 50 L water.
52. Application of lime mixed with neem cake in the basin.

PEPPER

53. Sprinkle lime in the pit as well as up to1M height of the plant reduces disease attack.
54. Keep small stones in the root zone reduces Phytophthora wilt.
55. Do not disturb the soil near the root zone.

SEASONAL BASED CROPPING SYSTEM

Pests and diseases in General

1. Spray the solution containing the leaf extract of *Vitex negundo karinochi*) mixed with garlic (*Allium sativum*) paste or asafoetida powder.
2. Mustard oil mixed with soap solution and diluted with water can be sprayed to control pest.
3. Birds eye chilli (*kanthari)* and garlic crushed properly and then extract the juice. To this add washing soda solution and two folds water . Mix it properly and spray.
4. Spray leaf extract of custard apple (*Annona squamosa*), Acorus calamus diluted with water.
5. Leaf manuring with *Appa chedi (Chromelina adoratum*), neem (*Azadiracta indica*) and *Glyricidia* in plot.
6. Spray the leaf extract of *Oduku* (*Cleistanthes collinus*) leaves diluted with water.
7. Spray the solution containing mixture of asafoetida and garlic (*Allium sepa*).
8. Application of leaf extract of *thumba chedi (Leucas aspera*) mixed with soap solution.
9 Sprinkle the leaf extract of *thulasi*.
10. Dusting fine sand over vegetable leaves.
11. Application of tobacco diluted with neem oil after mixing it with soap.
12. Baiting with dried coconut leaves, jaggery and insecticide.
13. Baiting with toddy, jaggery and insecticide.
14. Light traps kept in a container containing insecticide solution.
15. Sprinkle cows urine diluted with water(4 L in 10 L of water).

16. Leaf extract of *kiriyath (Andrographis paniculata)* plant (1L) is mixed with soap(60g) and garlic(*Allium sativum*,20g) . Spray the solution after diluting it ten times.
17. Application of tobacco decoction.
18. Application of ash and goat manure in the plot.
19. Application of neem cake in the plot near the root zone.
20. Small seeds are mixed with ash and covered with muslin cloth and hang to ward off storage pests.
21. Seeds are stored along with dried *kanthari mulaku.*
22. Hang the pots filled with seeds after covering its mouth with the muslin cloth.
23. Store seeds along with *kattucherinte kotte (Holigarna arnottiana*).
24. Spray the leaf extract of *adakkamaniyan (Sphearanthes indicus).*

COWPEA

25. Application of lime over the seed bed.
26. Application of asafoetida 25g mixed in water (1L) against flower shedding.
27. Releasing the colonies of red ants reduce aphids attack.
28. Dusting wood ash over leaves in early morning.
29. Application of garlic-chilli extract against sucking pests.
30. Spray rice soup mixed with ash against all fungal diseases.
31. Application of ash 25g for 100 plants three days after planting reduces flower shedding.
32. Leaf extract of *Koovalam* leaf (*Aegelos marvelo*), 250g in one litre water. Take 250 ml of the solution and mix it with fresh cowdung . Then dilute it ten times. Spray the solution against sucking pests.

Storage pests

33. Mix seeds with *vayambu (Acorus calamus)*/ rhizome, dried leaf powder of Vitex negundo/ broken chilli parts.
34. Smearing seeds with coconut oil or groundnut oil or gingelly oil.
35. Cow pea seeds are stored along with sand or clay.
36. Cowpea seeds are stored after smearing the ash made out of burning the cowpea pods.
37. Store seeds mixed with turmeric powder.
38. Keep mango leaves while storing the seeds.

39. Store seeds with in the pod itself.
40. Cow pea seeds are dried for 15 days then it is mixed with pepper powder and stored in vessels with tight lids.

AMARANTHUS

41. Seeds are sown along with the turmeric powder or rice flour.
42. Sprinkle wood ash over leaves against leaf eating caterpillar.
43. Sowing seeds of green amaranthus and red amaranthus in alternate rows reduces fungal attack.
44. Sprinkle ash or spray kerosene to reduce ant problem.

Cucurbits

45. Spray cow's urine diluted ten times in bitter gourd against pest and diseases.
46. Solution containing the leaf extract of bougainvillea and garlic extract control mosaic or yellowing diseases of pumpkin.
47. By planting pumpkin during September –October reduces mosaic incidence.
48. Bittergourd seeds are treated in cow dung slurry/cow dung solution for 12 hours before sowing.
49. Seeds are stored in cowdung cake, which is plastered on mud walls.
50. Uniform shaped matured fruits are hanged from the rooftops for two months. Then the extracted seeds are washed and mixed with ash made of dried leaves of mango and neem for drying.
51. *Pazhakkeni* against fruit fly - The over ripe *palayankodan* banana is split into two halves and is kept exposed in fields. The pests are collected and killed.
52. *Manjakkeni* (Yellow trap)- Yellow painted tin sheet coated with castor oil is placed in vegetables fields to control pests. Pests are attracted by the yellow colour and stick to the oil and are killed.
53. Cucurbits are trailed on dried banana leaves kept on coconut fronts and fruits are protected by covering with arecanut leaf stalks.
54. Application of royal brand indigo reduce yellowing and stunting in bitter gourds.
55. White clothes are hanged on snakegourd *pandals* against fruit fly attack.
56. Extract of *Chromelina odoratum* reduces stunted growth.

57. Harvested cucumber is covered with banana leaf sheath and are hanged on roof top.
58. Store cucurbits seeds along with black pepper seeds.
59. Mixing neem leaves with stored seeds.
60. The seeds of cucurbits are stored after drying it for two to three days and putting it in a vessel with tight lid. It can be stored up to six months.
61. Store vegetable seeds in hollow bamboo stem or empty coconut shell against rats and storage pests.
62. Subjecting the vegetable seeds to natural cold treatment during '*Makom*' month of the year by keeping the seeds outside at night.
63. Preservation of seeds in the hearth of home kitchen.
64. Spraying the extract of *Holoptelia integrifolia* leaves mixed with tobacco extract on bitter gourd and ash gourd against many vegetable pest (7 leaves in 1 L water).
65. Use of smoke to storage pests- After rubbing with wood ash, the seeds of bitter gourd and ashgourd stored over smoke in kitchen for checking insect attack and fungal growth on storage seeds.
66. Smoking around bitter ground pandals during evening hours to ward off fruit flies.
67. Light traps are used to attract pest and are collected in insecticide containers.
68. Apply the extract of bird pepper diluted in water and then mixed with soap solution. Using tied bundle of coconut husk, the solution is sprinkled over bitter gourd.
69. Diluted cowdung slurry is sprinkled on leaves of bittergourd planted in rainy season.
70. Spraying the extract of asafoetida and garlic on bitter gourd plant control sucking pests.
71. Mulching the basins of bittergourd with leaves of *Strychnos nux vomica* against sucking pest.
72. Application of fenugreek boiled water over bittergourd plants against sucking pests (a handful quantity of fenugreek is taken and boiled in 3 litre of water and the extract is sieved and sprayed).
73. Application of the solution prepared out of jaggery mixed with one or two days old starch water against sucking pest.

74. Use of *pandanus* fruits locally known as *Thottu kaitha* (cut into medium sized portions) in vegetable plot attract fruit flies.
75. Cut portion of psycus flower is placed in garden to attract flies.
76. Apply salt in the bitter gourd pit reduces yellowing.
77. Hanging toddy-jaggery solution in coconut shells and add 2-3 drops of insecticide.
78. Following no till system-where no ploughing at all or only minimum Ploughing, so that the soil is not disturbed and sowing could be done directly reduces yellowing.
79. Keeping ash gourd seeds with birds pepper fruits minimise insect attack on storing.
80. Spray asafoetida (25g) powder in one litre of water against flower shedding in bitter gourd /snake gourd/bottle gourd.
81. Spray one litre *karingotti* oil and 50 g soap, diluted eight times against caterpillar attack.
82. Spray the extract of neem leaf, Glyricidia / *karinochi (Vitex negundo)* and *kanjiram (Strychnos nux vomica)* leaf (one litre) in 20 litres water against grass hopper attack.
83. Intercropping with horse gram reduce pumpkin beetle attack.
84. Spray the solution containing 30g *vayambu* (*Achorus calamus*) in 4 litre water which is boiled for 45 minutes.
85. Spray *sitaphal* leaf extract mixed in water to control sucking pest.
86. Intercrop the bittergourd *pandal* with elephant yam reduces stunting.
87. Spray 20 g crushed garlic in one litre water.
88. Spray previous day's rice soup against mosaic.
89. Store seeds of snake gourd in dry place and later in cool place.

SOLANACEOUS VEGETABLES

90. Application of lime in soil before cultivation reduces incidence of bacterial wilt.
91. Seeds are mixed with ash while storing.
92. Spray solution containing 5 litre cow's urine, one kilogram cow dung and one teaspoon kerosene.

93. Application of garlic extract or neem oil mixed with starch water against chilli mosaic and leaf curling.
94. Chilli pierced through coconut leaflet and kept in kitchen.
95. Spray rice soup against chilli mosaic.
96. Mulching the seed bed with tamarind leaves control weed growth.
97. Planting marigold around vegetable plot reduces nematode incidence.
98. Baiting with grated coconut and salt powder against rabbit.
99. Application used for storing dried fish in the root zones of vegetable against termite attack.
100. Application of *palkayam* (Asafoetida,20 g), 1 litre milk in 5 litre water against flower shedding.
101. Spray tender coconut water mixed with cow's milk on 60-70 days and 90 days after planting reduces flower and fruit shedding in chilli.

ANNUAL CROPS

Banana

1. Keep/plant rhizome in a cover containing lime.
2. Put cowdung in pit against rhizome weevil.
3. Apply neem cake in pit and spray neem oil in leaf axils control bunchy top disease.
4. Curd found effective against mosaic after removing the affected part.
5. Spray cow's urine against disease.
6. Grow lemon grass in pit reduces pest and diseases.
7. Fried fenugreek application in leaf axils control pseudostem borer.
8. Dip the sucker in cowdung slurry after removing the roots.
9. Smoke treatment of suckers from burning bamboo poles.
10. Green leaf manuring with *parakam (Ficus hispida)* and *maruthu (Terminalia paniculata)* and *konginipoo (Lantana camera).*
11. Mechanical removal of dried leaves and outer sheaths control pseudostem borer.
12. Treatment of rhizome in wood ash slurry and dried in shade.
13. Ripening banana bunches are covered with plastic cover.
14. Green leaf manuring with *kanjiram (Strychnos nux vomica)* and neem repels pseudostem borer.

TAPIOCA

15. Planting *chethikoduveli (Plumbago rosea)* reduces rat or pig attack.

16. Plant turmeric in plot to scare away the rat.

HOMESTEAD BASED MIXED FARMING SYSTEM

CATTLE

Foot and Mouth disease

1. Apply boiled water of *sitaphal* leaf and tamarind leaf on leg.
2. Feed the animal with *sitaphal* leaf.
3. Smearing neem oil in the mouth is found to be effective.
4. Allow the cattle to stand and walk through the field mud.
5. *Oduku* (*Cleistanthes collinus*) leaves incorporated in the paddy field are also suitable to make the cow to walk through it.
6. Apply the mixture of neem oil and carbon of coconut shell on the affected part of the leg.
7. Apply the paste made out of paddy straw on wound.
8. Boil the water with *kanjiram* leaf *(Strychnos nux vomica)*, guava leaf, tamarind leaf and salt and pour on the leg.
9. Feed the animal with *palayamkodan* along with pig fat.
10. Smear pig fat in the mouth is found to be effective.
11. Bandage the wound with the paste of *oduku* leaf, tobacco leaf and karippodi. Sometimes lime also added.
12. Apply oil of *kattucheru (Holigarna arnottiana)* on the wound.
13. Powdered naphthalene balls are mixed in coconut oil and smeared on leg.
14. Allow the cattle to walk through hot sand.
15. Tender teak leaves are made into a paste and applied on the leg.
16. Smear kerosene on wound.
17. Allow the cattle to inhale the burned fish meal smoke.
18. Cattle is allowed to stand in the running water.
19. Small fishes are grounded together to make a paste. This is applied to the foot lesion.
20. Snake skin ground with wild pig fat and is applied with a feature.

21. Apply warm ash on the affected part of the foot.

22. Equal proportion of camphor, garlic (*Allium sativum*), turmeric (*Curcuma longa*) and *punna* are boiled together and apply on the leg.

23. Neem(*Azadiracta indica*) oil application is very effective.

24. Paste of neem (*Azadiracta indica)* leaf is made and mixed in sour curd or toddy and feed the cattle to prevent the disease.

25. Cashew nut (*Anacardium occidentale*) and coconut oil (*Cocos nucifera*) are mixed together and apply.

Wound

26. Leaf and stem of *koduvely (Plumbago zeylanica*) are made into a paste and applied.

27. The bark of *kadalavannakku (Jatropha curcas*) is made into a paste and applied.

28. Powdered bark of *velamaram(Acaccia leucophloea*) is applied.

29. The leaf of *tharali (Carmona retusa*) is made into a paste and apply.

30. Crushed bark of *kattucheru (Holigarna arnottiana*) if fed orally can expel maggots from wounds.

31. A paste made out of *punna (Dillenia pentagyna*) can be applied on maggot wound.

32. Apply the paste made from the leaves and fruits of *Ummam (Datura stramonium).*

33. A paste made from *thumba (leucas aspera*), *pukayila (Nicottiana tobaccum*), and lime can expel the maggot from wound.

34. Apply the paste made from from *naykolli* leaves for dog bite.

35. Wash the wound with the boiled neem leaf water and bandage it with crushed neem leaves and powdered neem tree bark.

36. Apply the paste made from *sitaphal (Annona Squamosa*) leaf.

37. Apply the mixture of lime and tobacco (*Nicotiana tobaccum*) on wound.

38. Apply the mixture of tobacco(*Nicotiana tobaccum*), carbon and lime.

39. Naphthalene balls are powdered and applied.

40. Smear the paste made of *karpooram* (Camphor), neem (*Azadiracta indica*) oil, addukkalakkari, salt and sugar on the wound.

41. For the evulsion of horn *karamaram (Randia dumetorum)* leaves and stem are crushed well and applied over the area.

42. Burned carbon and neem (*Azadiracta indica*) oil are bandaged in the region of broken horn.

43. Bandage the area of wound with neem oil and turmeric.

44. The paste of *karpoora paccha (Lantana camera)* leaf and lime is found to be effective.

45. Tender leaves of mimosa (*Mimosa pudica*), goat manure in equal proportion is fried together in coconut (*Cocos nucifera*) oil and paste is applied.

46. Apply the paste made out of garlic(*Allium sativum*) and turmeric (*Curcuma longa).*

47. Powdered paste of black gram (*Vigna mungo*) is mixed with egg white and bandaged at the broken area of the wound.

DIGESTIVE DISORDER

Diarrhoea

48. Mustard (*Brassica juncea)* 250ml, Water 250ml, and edible soda 100g is mixed together and given orally.

49. Feed the cattle with *idinjil* leaf.

50. Feed the cattle with tender pseudostem of banana (*Musa* sps).

51. Dried leaf powder of pomegranate is given as feed.

52. 75 gram of oral administration *puliyarila*, turmeric (*Curcuma longa*), ginger (*Zingiber officinale)*, curry leaf (*Murraya koenji*) and *muthanga (Cyperus rotundus*) mixed with curd and given twice or thrice daily.

53. *Changalapparanda (Cissus quadrangularis)* could be ground well and orally given.

54. *Palampazhythali (Sida cordata*) leaf and stem along with buttermilk is made into a paste and given orally.

55. Feed bamboo (*Bambina bambos*) leaves.

56. Feed the cattle with the leaf of *murukku (Erythrina indica).*

57. A mixture made out of 50 gram of pomegranate *(Punica granatum*), 10 g dried ginger (Zingiber officinale), pepper (*Piper nigrum*), and *thippali (Piper longum)* with curd given 4 times daily.

Indigestion

58. Pineapple ground into a paste and given orally.

59. Extract of onion (*Allium cepa*) is given.

60. Pigs fat is found to be effective.

61. Oral feeding of *kodangal (Centella asiatica)* leaf and milk is given.

62. Extract of *malayinji (Zingiber officinale)* is given.

63. Crushed bark of *moringa (Moringa oleifera)* mixed orange juice is given.

64. Hot water given for drinking.

65. Feed 75 gram of paste made of *irattimaduram (Glycyrrhiza glabra)*, appakaram, garlic (*Allium sativum*), asafetida (*Ferula asafoetida*), dried ginger (*Zingiber officicnale*), tippali (*Piper longum*), *induppu* and pepper *(Piper nigrum)*.

66. Bengal gram (*Cicer arietinum*) and nut grass is given.

67. *Dolichos biflorus* and jaggery mixture given as feed.

68. Allowing for wallowing.

69. Wild pig fat is orally given.

70. Feed the cattle with the leaf and stem of *Kuppameny (Acalypha indica)*.

71. Crushed *Lippia javanica* leaves and stem are given orally.

72. 75g of grounded dried ginger (*Zingiber officinale*), mustard (*Brassica juncea*), *ayamodakam* (*Apium graveolens*), *jeerakam* (*Cuminum cyminum*), garlic (*Allium sativum*), pepper (*Piper nigrum*), asafetida (*Ferula asafoetida*), moringa (Moringa oleifera)mixed in vinegar and given along with feed.

73. Arrack is given.

74. Oral administration of paste made of castor *(Ricinus communis)* leaf, *moringa (Moringa oleifera)*, *thumba leaf (Leucas aspera)*, *vayambu (Achorus calamus)*.

75. Dried root of wild *thippali (Piper longum)* placed in mouth.

76. Soda 25 gram mixed along with jaggery is given.

77. *Neelum* water (washing blue) is given.

78. *Velipparuthy (Pergularia daemia)* leaves are given to cattle.

79. A knot made on the tongue to cure anorexia.

80. Stomatitis (oral cavity inflammation)-A lotion containing 10 g of borax, 5 g baking soda, 15g glycerine, 350 ml of water can be prepared and applied locally at intervals.

81. Black pepper (50g), ginger (*Zingiber officale*) 75 g, asafoetida (*Ferula asafoetida*) 25 g, coriander (*Coriandrum sativum*)100 g - mix and make into powder and then given 25 g to the animal twice a week.

82. Ruminal tympany (ruminal block)- placing a small piece of wood in the mouth to stimulate the release of gas.

83. Water should not be given to the animal.

84. Bamboo leaves are fed.

85. Leaves of *Erythrina indica* are given.

Fever and cough

86. A paste made of *thulasi (Ocimum sanctum)*, coriander (*Coriandrum sativum*), *Kodumpuli (Garcinia gummiguta)*, asafetida (*Ferula asafoetida*), garlic (*Allium sativum*), dried ginger (*Zingiber officinale*), pepper (*Piper nigrum*), *Kiriyath (Andrographis paniculata)*, mixed in extract of *thumba (Leucas aspera)*, ginger (*Zingiber officinale*) and 75-100 gm administer twice daily.

87. 25 g each of *adalodakom (Adhatoda beddomii)*, tamarind leaves (*Tamarindus indicus*), inflorescence of *thulasi (Ocimum sanctum)* mixed in 5 gm camphor and jaggery is given.

88. Give *thippali (Piper longum)* mixed in toddy.

89. For curing cough in cattle *thottavady (Mimosa pudica)* and onion (*Allium cepa*) are grounded well and given orally.

90. Feed the grounded tender neem (*Azadirachta Indica*) stalk to the animal suffering from fever.

91. Cold- Give *ajwain (Trachyspermum ammi)* and dried ginger (*Zinger officinale)* mixed with jaggery to animal as electuary.

Mastitis

92. Boil 120 g of crushed *thazhuthama (Boerhavia diffusa)*, *njerinjil (Tribulus terestris)* in 6 litre water and make to 3 litre and give one litre of the solution daily.

93. Smear *malathangi (Cissampelos parcina)* thrice daily.

94. Give boiled water of *mullancheera (amaranthus spinosus)*.

95. *Appakkoovai (Coccinia grandis)* leaf and stem along with turmeric (*Curcuma longa*) is made into a paste and locally applied.

96. Smear the paste made of leaves of date palm and small onion.

97. Smear *bhasmam.*

98. Smear sandal on the udder.

99. Allow the cattle to stand in pond or river and then pour water forcefully on the udder using a vessel or pump.

100. Apply neem leaf (*Azadirachta indica*), turmeric (*Curcuma longa*), salt paste in equal proportion.

101. *Njerinjil* (*Tribulus terrestris*) leaves are made into a paste and fed.

Retention of placenta

102. For facilitating the expulsion of placenta well riped snakegourd *(Trychosanthes hispida)* fruit is fed.

103. *Palampalythali (Sida cordata)* is fed.

104. Bamboo leaves(*Bambina bambos*) are fed.

105. Mango leaves(*Mangifera indica*) are fed.

106. Hibiscus (*Hibiscus rosa sinensis*) leaves and flowers are fed.

107. Boiled or unboiled paddy is given.

108. Feed male bud of *kannan vazha* mixed with salt.

109. Keep wet sac on the back.

110. *Appakoovai (Coccinia grandis*) is tied around the bones and also fed.

111. Use 10 mango (*Mangifera indica)* leaves, two pieces of nutmeg (*Myristica fragrans*) for extrusion of retained placenta. All these materials are grounded and made into a paste and then warmed. The nearby area of vagina and thigh of the affected animal is then massaged with the warm paste.

Worm trouble

112. Feed the paste made of *changalamparanda* (*Cissus quadrangularis*) and salt.

113. Black tea without sugar for 8 days.

114. Neem (*Azadirachta indica*) leaf, turmeric (Curcuma longa) paste is given.

115. Neem (*Azadiracta indica*) turmeric (*Curcuma longa*), and 50 ml of concentrated milk is given.

116. Tender arecanut is ground well and orally given.

117. *Thumba leaf (Leucas aspera)* is ground well and given.

118. *Kuppameny (Acalypha indica)*, leaves and stem is ground well and given.

119. *Koduvely (Plumbago zeylanica)* leaves and stem is ground well and given.

120. Extract of pineapple is given. Grind mustard seed and mix with whey and given orally.

121. Asafoetida (*Ferula asafetida*) and garlic (*Allium sativum*), *thumba (Leucas aspera*) leaves extract and a ball is made out of it and given orally.

122. Extract of *agathy cheera (Sesbania grandiflora*) is given.

Fracture

123. The bark of *Acacia leucophloea* is bandaged over fracture to immobilize and heal fracture.

124. Cloth soaked in the sap of *thirukkally (Euphorbia thirukkalli*) can be used for bandage.

125. Bamboo (*Bambina bambos*) pieces used as splints for immobilization of fracture.

126. Egg and milk is mixed together and given orally.

Poisoning (Snake bite / rubber or tapioca leaves fed)

127. If rubber (*Heavea braziliensis*)/ tapioca (*Manihot esculenta*) leave are fed, give coconut (*Cocos nucifera*) oil or groundnut oil.

128. *Kilimmookku (Corallocorpus egigaeus*) onion (*Allium cepa*) and *keezharnelli (Phyllanthes deblis*) are ground well and given orally against snake bite.

129. Bark of *Ungu (Pongamia pinnata*) is ground well and roll as big as an egg is given orally.

130. Small cut is made at the tip of the ear and some drops of blood is squeezed out for snake bite.

131. The affected animal is drenched with the mixture of 1.5 kilo gram pure ghee, 250 gram of red soil and 200 gram of white *jeerakum (Cuminum cyminum)* powder.

Ticks and lice

132. Smear *sesamum (Sesamum indicum)* oil on body after one hour of bathing (Some times lime also added).

133. Smear the paste made of *adakkamanian (Sphearanthus indicus)* on the body.

134. Leaves of *sitaphal (Annona squamosa)* are ground in to a paste and applied on the body.

135. Neem oil application on the body is found to be very effective.

136. Smoking is found to be good.

137. A mixture of paste made of *velvelam* and azolla are smeared on the body.

138. Camphor and crushed garlic (*Allium sativum*) mixed in neem (*Azadiracta indica*) oil can be applied.

139. Extract of arecanut (*Areca catechu*) leaf is applied.

140. Powdered naphthalene balls are applied on the body surface.

141. Copper sulphate and turmeric (*Curcuma longa*) are used to wash the area of infection.

Eye ailments

142. *Aathy (Bauhinia racemosa)* leaves along with tobacco (*Nicotiana tobaccum*) is chewed well and split on to the affected eyes to cure corneal opacity.

143. Vallaraankkalu is powdered well and made into a paste with ghee and applied on the affected eyes to cure corneal opacity.

144. *Trianthema portulacastrum* is chewed and spit on to the affected eye in the case of corneal ulcers.

Abscess

145. *Theraly (Carmona retusa)* leaves are fried in oil made into paste and externally applied.

Urinary ailments

146. Yellow coloured urine - *Njerinjil (Tribulus terrestris)* leaves and stem are crushed well and is given orally.

147. Red coloured urine- *Keezharnelly (Phyllanthes deblis)* is ground well and orally given.

148. Yoke gall- ash of *Aathy (Bauhinia racemosa)* is mixed in oil and applied.

POULTRY

Ranikhet (*Kozhivasanthe*)

149. Feed them with previous days rice and small onion.

150.Neem (*Azadirachta indica)* and turmeric (*Curcuma longa)* paste is orally given.

151. Onion (Allium cepa) and coconut (*Cocos nucifera*) oil is also given

152. A paste made of turmeric (*Curcuma longa*) and pepper (*Piper nigrum*) and salt is given.

153. Grounded papaya (*Carica papaya*) leaf mixed in coconut (*Cocos nucifera*) milk.

154. Paste of *kodangal (Centella asiatica)* and turmeric (*Curcuma longa*) in equal proportion is effective.

Ticks and lice

155. Use castor (*Ricinu communis*) plants to clean and remove the waste from poultry house

156. Sprinkle tobacco (*Nicotiana tobaccum)* powder in the poultry house.

157.Dip the hen in the solution made of *vayambu* (*Achorus calamus*) roots

158. Wild thulasi leaf extract is used for sprinkling.

159. Kozhippenchedi kept in poultry house.

160. Lemon grass (*Cymbopogan citratus*) extract mixed in water is used for spraying in poultry house and also to dip the hen in the solution.

Soft shelled egg (Thodurakkatha mutta)

161. Feed *thathara* leaf

162. Feed the hen with papaya (*Carica papaya*) leaf.

163. Give supernatant liquid of lime or give powdered limestone.

Appendix ii

കാർഷിക നാട്ടറിവ് ശേഖരത്തിനുള്ള ഫോറം

I വിളകൾ

I.1 നെല്ല്

I.1.1 കീടങ്ങൾ

1) തണ്ടുതുരപ്പൻ പുഴു
2) ഗാൾ ഈച്ച
3) തവിട്ടു തുള്ളൻ (മുഞ്ഞ)
4) ഓലചുരുട്ടിപ്പുഴു
5) കുഴൽപ്പുഴു
6) പട്ടാളപ്പുഴു/കരിംകുറ്റിപ്പുഴു
7) കരിവണ്ട്
8) മിലിമൂട്ട
9) മോൾക്രിക്കറ്റ് (ഞാഞ്ഞൂൾ)
10) ക്ലൈംബിങ്ങ് കട്ട്വേം
11) മഞ്ഞ കമ്പിളിപ്പുഴു
12) കൊമ്പൻപുഴു
13) പുൽപ്പോന്തുകൾ
14) വേൾമാഗട്ട്
15) സീരിയൽ ത്രിപ്സ്
16) ചാഴി
17) ലീഫ് ഹോപ്പർ (പച്ചത്തുള്ളൻ)
18) ത്രിപ്സ്

I.1.2 രോഗങ്ങൾ

1) കുലവാട്ടം (Blast)
2) പോളരോഗം
3) പോള ചീയൽ
4) തവിട്ടുപുള്ളി രോഗം
5) ഫുട്ട്റോട്ട് രോഗം
6) ബാക്ടീരിയൽ ലീഫ് ബ്ലൈറ്റ് രോഗം

I.2 തെങ്ങ്

I.2.1 കീടങ്ങൾ

1) കൊമ്പൻ ചെല്ലി
2) ചെമ്പൻ ചെല്ലി
3) തെങ്ങോലപ്പുഴു
4) പൂങ്കുലച്ചാഴി
5) മണ്ഡരി
6) വേരുതീനിപ്പുഴുക്കൾ
7) മിലിമുട്ട (മിലിബഗ്)
8) ഓലചുരുട്ടിപ്പുഴു
9) ശൽക്ക കീടങ്ങൾ
10) ലേസ്‌വിങ്ങ് ബഗ്
11) സ്ലഗ് പുഴു

I.2.2 രോഗങ്ങൾ

1) മണ്ടചീയൽ (Bunroz)
2) മാഹാളിരോഗം
3) തഞ്ചാവൂർ വാട്ടം
4) ഓലചീയൽ
5) ഇലപ്പുള്ളി രോഗം
6) കാറ്റ് വീഴ്ച്ച (Root wilt)
7) ചെന്നീരൊലിപ്പ്

I.3 കമുക്

I.3.1 കീടങ്ങൾ

1) കൂമ്പുചാഴി
2) മണ്ഡരികൾ
3) ഇലതീനുകൾ
4) പൂങ്കുല തുരപ്പൻ
5) വേരു പുഴു

I.3.2 രോഗങ്ങൾ

1) മഹാളി/കോളിരോഗം
2) മണ്ടചീയൽ രോഗം
3) അനാബെ രോഗം

4) ബന്ത് രോഗം (ബ്രൗൺഡ്)

5) പൂകരിച്ചിലും അടയ്ക്കാപൊഴിച്ചിലും

6) മഞ്ഞളിപ്പുരോഗം

I.4 വാഴ

1) ഇലപ്പേൻ (കുറുനാമ്പുരോഗം)

2) കൊക്കാൻ/ചെകുത്താൻ രോഗം

3) സിഗാടോക്കരോഗം

4) കടചീയൽ രോഗം

5) മാണവണ്ട്

6) തടതുരപ്പൻ പുഴു

7) ഇലതീനിപ്പുഴു (കട്ടപ്പുഴു)

8) ലേസ് വിങ്ങ് ബഗ്

9) വെള്ളീച്ച

I.5 മാവ്

I.5.1 കീടങ്ങൾ

1) മാമ്പൂ ഹോപ്പറുകൾ

2) തടിതുരപ്പൻ വണ്ട്

3) കൂടുകെട്ടിപ്പുഴു

4) തണ്ടീച്ച

5) മാമ്പഴപ്പുഴു

6) തളിരിലപ്പുഴു

7) കൂമ്പു തുരപ്പൻ പുഴു

8) ചിത്രശലഭത്തിന്റെ പുഴു

9) പൂവലയപ്പുഴു

10) നീറ് (മിശിർ)

11) ശൽക്ക കീടങ്ങളും മിലിമുട്ടകളും

12) മാങ്ങ വണ്ട്

13) ഇലചുറ്റൻ വണ്ട്

14) ഇലതുരപ്പൻ വണ്ട്

I.5.2 രോഗങ്ങൾ

1) പൂർണ്ണ പൂപ്പുരോഗം

2) ആൻത്രക്നോസ് രോഗം

3) കൊമ്പുണക്കം

4) കരിംപൂപ്പ് രോഗം

I.6 കശുമാവ്

I.6.1 കീടങ്ങൾ

1) തേയിലക്കൊതുക്

2) തടി തുരപ്പൻ വണ്ട്

3) കശുഅണ്ടി ചാഴി

I.6.2 രോഗങ്ങൾ

1) പിങ്ക് രോഗം

2) മൂടുചീയൽ രോഗം

3) പൂങ്കുല കരിച്ചിൽ

4) ചെന്നീർ ഒലിപ്പു രോഗം

I.7 പേര

I.7.1 കീടങ്ങൾ

1) തേയിലക്കൊതുക്

2) കോറിഡ് ചാഴി

3) ശൽക്കകീടം

4) പട്ട തുരപ്പൻ പുഴു

5) കായ് തുരപ്പൻ

I.8 നാരകം

1) തടി തുരപ്പൻ വണ്ട്

2) നാരക ചിത്രശലഭം

3) പഴം കുത്തി ശലഭങ്ങൾ

4) നാരകസില്ല

5) ഇലതുരപ്പൻ പുഴു

6) പട്ടതുരപ്പൻ പുഴു

7) ചുവന്ന ശൽക്ക കീടം

8) നാരക ബ്ലാക്ക് ഫ്ളൈ

9) കറുത്ത മുഞ്ഞ

I.8.1 രോഗങ്ങൾ

1) ഡിക്ലൈൻ (ഡൈബാക്ക്) രോഗം

I.9 ഇഞ്ചി, മഞ്ഞൾ

I.9.1 കീടങ്ങൾ

1) മൂലകാണ്ഡ ശൽക്കകീടങ്ങൾ
2) തണ്ടു തുരപ്പൻ
3) ഇലചുരുട്ടിപ്പുഴു
4) റേന്തപത്രകീടം (Lacewing bug)
5) ഇലപ്പേൻ

I.9.2 രോഗങ്ങൾ

1) മൃദുചീയൽ രോഗം
2) ഇലപ്പുള്ളി രോഗം
3) ത്രെഡ് ബ്ലൈറ്റ് രോഗം
4) വാട്ട രോഗം
5) മൂല കാണ്ഡ ചീയൽ രോഗം

I.10 ഏലം

I.10.1 കീടങ്ങൾ

1) ഏലപ്പേൻ (Thrips)
2) കമ്പിളി പുഴുക്കൾ
3) മാണ്പുഴു
4) തണ്ടും കായും തുരക്കുന്ന പുഴു
5) ഏലം ഏഫിഡ് (മുഞ്ഞ)

I.10.2 രോഗങ്ങൾ

1) മൊസേക്ക് രോഗം (Katle)
2) അഴുകൽ രോഗം

I.11 കുരുമുളക്

I.11.1 കീടങ്ങൾ

1) പൊള്ളുവണ്ട്
2) തണ്ടുതുരപ്പൻ പുഴു
3) മിലിമുട്ട
4) ശൽക്കകീടങ്ങൾ
5) മാർജിനൽ വാൾ ത്രിപ്സ്
6) നിമ വിരകൾ

I.11.2 രോഗങ്ങൾ

1) ശുതവാട്ടം (foot rot)

2) പൊള്ളു രോഗം

3) അഴുകൽ രോഗം

I.12 വെറ്റിലക്കൊടി

ഇലപ്പുള്ളി രോഗം

I.13 എള്ള്

I.13.1 കീടങ്ങൾ

1) കായ്തുരപ്പൻ പുഴു

2) ഗാളീച്ച

I.13.2 രോഗങ്ങൾ

1) ലീഫ് കേൾ

2) ഇലപ്പുള്ളി രോഗം

I.14 നിലകടല

I.14.1 കീടങ്ങൾ

1) കമ്പിളിപ്പുഴു

2) ഇലചുരുട്ടിപ്പുഴു/സൂറുൾപൂച്ചി

3) ഇയർ വിഗ്

I.14.2 രോഗങ്ങൾ

1) ടിക്കാരോഗം (കറുത്ത പുള്ളികളും പൊള്ളലുകളും ഇലകളിൽ കാണുന്നത്)

I.15 കാപ്പി

I.15.1 കീടങ്ങൾ

1) തണ്ടുതുരപ്പൻ

2) ശിഖിരതുളപ്പൻമാർ

3) മിലിമൂട്ട

4) ഗ്രീൻ ബഗ്

5) കാപ്പിക്കുരു തുരപ്പൻ വണ്ട്

I.15.2 രോഗങ്ങൾ

1) ഇലതുരുമ്പു രോഗം

2) കരിംചീയൽ രോഗം

I.16 വള്ളിപ്പയർ

I.16.1 കീടങ്ങൾ

1) ചിത്രകീടം (American serpentine leafminor)
2) പയർ പേൻ (Pea aphid)
3) തണ്ടീച്ച
4) ചാഴികൾ
5) കായ്തുരപ്പൻ പുഴുക്കൾ
6) ഇലചുരുട്ടിപ്പുഴു
7) എപ്പിലാക്ന വണ്ട്

I.16.2 രോഗങ്ങൾ

1) കടചീയൽ
2) വള്ളിയുണക്കം, ചുവടുവീക്കം
3) കരിമ്പിൻ കേട്
4) പൊടികുമിൾ രോഗം
5) മൊസേക്ക് രോഗം

I.17 ചീര

I.17.1 കീടങ്ങൾ

1) കൂടുകെട്ടി പുഴുക്കൾ
2) ചീരവണ്ട്

I.17.2 രോഗങ്ങൾ

1) ഇലപ്പുള്ളി രോഗം

I.18 കായ്ക്കറികൾ

വഴുതന വർഗ്ഗ പച്ചക്കറികൾ

I.18.1 തക്കാളി, വഴുതന, മുളക്

1) കടചീയൽ
2) Blight (ബ്ലൈറ്റ് രോഗം ഇലയിലെ തവിട്ടുനിറത്തിലുള്ള പുള്ളി)
3) വാട്ടരോഗം
4) മൊസേക് രോഗം
5) ഇലചുരുളൽ രോഗം
6) ബാക്ടീരിയൽ വാട്ടം

7) ലിറ്റിൽ ലീഫ് രോഗം (വളർച്ച മുരടിക്കുകയും ധാരാളം ചെറിയ ഇലകൾ ഉണ്ടാവുകയും ചെയ്യുന്ന രോഗം)

I.18.2 കീടങ്ങൾ

1) തണ്ടും കായും തുരന്ന് തിന്നുന്ന പുഴു
2) എഫിഡ്
3) ജാസിഡ്
4) ഇലപ്പേൻ
5) പൂവ് കൊഴിയുന്നതിന്

മറ്റു ശത്രുക്കൾ

I.19 വെള്ളരി വർഗ്ഗ പച്ചക്കറികൾ

I.19.1 രോഗങ്ങൾ

1) ഇലപ്പുള്ളി രോഗം (ആന്ത്രാക്നോസ്)
2) പൗഡറി മിൽഡ്യൂ (ഇലയുടെ മുകളിൽ വെളുത്ത പുള്ളികൾ കാണുകയും ക്രമേണ ഇല കരിഞ്ഞുപോകുകയും ചെയ്യുന്ന രോഗം).
3) ഡൗണി മിൽഡ്യൂ (ഇലയുടെ അടിയിൽ കുമിളുകൾ കാരണം ഇല കരിഞ്ഞുപോകുകയും ചെയ്യുന്ന രോഗം).
4) മഞ്ഞളിപ്പു രോഗം (മൊസേക്ക്)
5) ശൽക്കകീടങ്ങൾ

I.20 മരച്ചീനി

I.21.1 കീടങ്ങൾ

1) ശൽക്കകീടം

I.21.2 രോഗങ്ങൾ

1) മരച്ചീനി മൊസേക്ക്
2) വാട്ടരോഗം

I.22 മധുരക്കിഴങ്ങ്

I.22.1 കീടങ്ങൾ

1) മധുരക്കിഴങ്ങ് വണ്ട്

I.23 ആന്തൂറിയം

I.23.1 കീടങ്ങൾ

1) വെള്ളീച്ച
2) മണ്ഡരി

3) ആന്തൂറിയം ത്രിപ്സ്

4) കറുത്ത തുരപ്പൻ വണ്ട്

I.23.2 രോഗങ്ങൾ

1) ബ്ലൈറ്റ്

2) ബ്ലാക്ക് നോസ്/സ്പാഡിക്സ് റോട്ട്

3) ആന്തൂറിയം ഡിക്ലൈൻ

4) വേരുചീയൽ

5) ആന്തൂറിയം ബ്ലീച്ച്

6) ആന്തൂറിയം മൊസേക്ക്

7) പൊടികുമിൾ രോഗം

I.24 ഓർക്കിഡ്

I.24.1 കീടങ്ങൾ

1) ശൽക്കകീടങ്ങൾ

2) മിലിമൂട്ടകൾ

3) ത്രിപ്സ് (ഇലപ്പേനുകൾ)

4) മുഞ്ഞ

5) ചില്ലതുരപ്പൻ വണ്ട്

6) പാറ്റകൾ

7) നിശാശലഭങ്ങളുടേയും ചിത്രശലഭങ്ങളുടേയും പുഴുക്കൾ

8) ഒച്ചുകളും സ്ലഗ്ഗുകളും

9) മണ്ഡരി

I.24.2 രോഗങ്ങൾ

1) മൃദുചീയൽ രോഗം

2) ബ്ലാക്ക് റോട്ട് രോഗം

3) ബ്രൗൺ റോട്ട് രോഗം

4) ഫുസേറിയം ഉണക്കം

5) അഴുകൽ രോഗം

6) ഇലപ്പുള്ളി രോഗം

7) റസ്റ്റ് രോഗം (തുരുമ്പു രോഗം)

8) പൂ കരിച്ചിൽ

I.25 മുല്ലകുഴി

1) മൊട്ടിനെ ആക്രമിക്കുന്ന പുഴുക്കൾ (Bud worm)

2) പൂപ്പേൻ (flower thrips)

3) കൂടുകെട്ടിപ്പുഴു (Leaf web worm)

4) മണ്ഡരി

5) ഇലകളിലെ പുള്ളി രോഗം

6) വാടൽ രോഗം

7) കുരുടിപ്പ്

I.26 ഔഷധ സസ്യങ്ങൾ

1) കച്ചോലം

a) ഇലചീയൽ

2) പാൽമറോസ

a) വേരിലെ മുഞ്ഞ

കെണികൾ/അകറ്റാനുള്ള ഉപാധികൾ

1) എലി, അണ്ണാൻ, വവ്വാൽ, പക്ഷികൾ, കോഴികൾ

2) മുയൽ, പന്നി, കാട്ടാന

3) ഒച്ച്

4) ആട്, പശു, കാള

മൃഗസംരക്ഷണ നാട്ടറിവ് ശേഖരത്തിനുള്ള ഫോറം

Livestock

II.1 പശു

1) കുളമ്പുരോഗം (Foot and Mouth disease)

2) കാലിവസന്ത (Rinder pest)

3) മുടന്തൻ പനി (Ephemeral Fever)

4) ഗോവസൂരി (Cowpox)

5) കുരലടപ്പൻ (Haemorrhagic Septicalmia)

6) കരിങ്കാൽ (Black Quarter)

7) അടപ്പൻ (Anthrax)

8) ബ്രൂസല്ലാരോഗം (Brucellosis)

9) ക്ഷയരോഗം (Tuberculosis)

10) ബബീസിയോസിസ് (Babesiosis)

11) കാലിലെ പൂപ്പൽ രോഗം (Bovine phycomycosis)

12) വിരബാധ (Worm infestation)

a) ഉരുളൻ വിര (Nematodes)

b) പത്ര വിര (Flukes)

c) നാടവിര (Tape worm)

d) പണ്ടപ്പുഴു (Amphistomes)

e) രക്തവിര (Blood flukes)

13) പനി

14) വായുസ്തംഭനം (Gastrouble, Bloat)

15) വയർപെരുക്കം (ദഹനക്കേട്)

16) വയറിളക്കം

17) രക്താതിസാരം

18) പുഴുക്കടി

19) ചെള്ള്, ഈച്ച ശല്യം

20) വൃണത്തിലെ പുഴു

21) മദിയില്ലായ്മ

22) അകിടുവീക്കം (Mastitis)

23) പൊള്ളൽ

24) കൊമ്പുമുറിഞ്ഞാൽ

25) മാച്ച് (മറുപിള്ള) വീണുപോകാൻ

26) ക്ഷീരസന്നി (Milk fever (Calcium deficiency in blood)

27) കിറ്റോസിസ് (Glucose deficiency in blood)

28) പേൻ ബാധ

29) പട്ടുണ്ണി/ഉണ്ണി (Ticks)

30) മേഞ്ച് ചൊറി (Scabies)

31) Abortion (ഗർഭച്ഛിദ്രം)

32) അർബുദം (Cancer)

33) വിഷബാധ

a) കീടനാശിനി വിഷബാധ

b) കൂപ്പയില വിഷബാധ

c) മെർക്കുറി മുതലായ വിഷബാധ ((Due to heavy metals)

34) ഒടിവ് (Fracture)

35) ചതവ് (Sprain)

36) ഉളുക്ക് (Dislocation)

37) മുറിവുകൾ (Wounds)

II.2 <u>എരുമ</u>

1) കുരലടപ്പൻ

2) കുളമ്പുരോഗം

3) അകിടുവീക്കം

4) ഗർഭാശയം തള്ളിവരൽ

5) മുറിവുകൾ

ചതവ്

ഒടിവ്

6) ചെള്ള്

ഈച്ച

പേൻ ബാധ

7) വിരശല്യം

II.3 <u>ആട്</u>

1) പനി

2) കഫക്കെട്ട്

3) വിരശല്യം

4) രക്താതിസാരം (Coccedia)

5) വയറിളക്കം

6) ദഹനക്കേട്

7) അകിടുവീക്കം

8) കുളമ്പു പുഴുകൽ

9) ആടുവസൂരി

10) അകിടു ചീയൽ രോഗം (Gangrenous Mastitis)

11) ടെറ്റനസ്

12) കരളടപ്പൻ

13) കുളമ്പുരോഗം

II.4 പന്നി

1) വിളർച്ച
2) വിരശല്യം
3) വയറിളക്കം
4) കുളമ്പുരോഗം
5) വ്രണങ്ങൾ
6) സൂര്യാഘാതം
7) അകിടുവീക്കം
8) ന്യൂമോണിയ
9) ഗർഭമലസൽ
10) പന്നി
11) മുലകളിൽ കല്ലിപ്പ്
12) പാൽ കുറയുക

II.5 മുയൽ

1) ശ്വാസകോശരോഗം (Pasteurella disease)
2) കരളിനെ ബാധിക്കുന്ന രോഗം (Coccidiosis)
3) തൊലിപ്പുറത്തുണ്ടാകുന്ന വരട്ടുചൊറി (Mange)

II.6 കോഴി & കാട

1) കോഴിവസന്ത
2) കോഴി വസൂരി
3) ഗംബോറ രോഗം (IBD)
4) തോടുറയ്ക്കാത്ത മുട്ട
5) സാൽമണല്ലോസിസ്
6) Coccidia (രക്തരാതിസാരം)
7) വിരശല്യം
   a) ഉരുണ്ട വിരകൾ
   b) നാടവിരകൾ
   c) തൊണ്ടവിര
8) പൂപ്പൽ വിഷബാധ
9) ക്രോണിക് റെസ്പിറേറ്ററി ഡിസീസ് (തുടർച്ചയായ ചുമ, ശ്വാസം മുട്ടൽ, മൂക്കൊലിപ്പ്)

10) കോഴിപ്ലേൻ

II.7 താറാവ്

1) ബ്രൂഡർ ന്യൂമോണിയ (പൂപ്പൽ മൂലമുണ്ടാകുന്ന രോഗം)
2) പൂപ്പൽ വിഷബാധ
3) താറാവ് പ്ലേഗ്
4) വിരശല്യം
5) പേൻ ബാധ

II.8 തേനീച്ച

1) മണ്ഡരി ബാധ
2) തായ്സാക്ക് ബ്രൂഡ് രോഗം
3) ഉറുമ്പുശല്യം
4) മെഴുകുപുഴു (Wax moth)

II.9 നായ

1) പേവിഷബാധ
2) കനൈൻ ഡിസ്റ്റംപർ (കടുത്ത പനി, ഭക്ഷണത്തോട് വിരക്തി, കണ്ണിൽനിന്നും മൂക്കിൽ നിന്നുമുള്ള പച്ചയും മഞ്ഞയും നിറമാർന്ന കൊഴുത്ത സ്രവം)
3) പാർവോ വൈറസ് അതിസാരം
4) എലിപ്പനി (Leptospirosis)
5) കരൾവീക്കം (Canine Hepatitis)
6) വിരബാധ
7) വരട്ടുചൊറി
8) റിക്കറ്റ്സ് (Deficiency disease)

II.10 പൂച്ച

1) പാൻ ലൂക്കോ പീനിയ/ഫെലൈൻ infectious entitis (പനി, ചർദ്ദി, വയറിളക്കം)
2) Flue
3) Fungus ബാധ (Mange)

Appendix III

Rationalisation of ITK items by KIF in

Sl. No.	ശേഖരിച്ച നാട്ടറിവ് (ക്രമനമ്പർ)	വിശ്വാസ്യത			ചെയ്തിട്ടുണ്ടോ?		ചെയ്യുമോ?	
		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
1.	ഞാറ് കുണ്ട കൂട്ടുക							
2.	വെളുത്തുള്ളി, കായം, ഇഞ്ചി, പുകയില, വേപ്പെണ്ണ, പച്ചമുളക്, കാന്താരിമുളക് അരച്ച് സോപ്പ് വെള്ളത്തിൽ ചാലിച്ച് കൊടുക്കുക.							
3.	200 വാട്ട് ബൾബ് ഫ്യൂറഡാൻ ലായിനിയുടെ പാത്രത്തിനു മുകളിൽ കത്തിച്ചു വയ്ക്കുക.							
4.	കാട്ടുചേമ്പിന്റെ ഇല ചെറിയ കെട്ടുകളാക്കി ജലസേചന ചാലുകളിൽ വയ്ക്കുക.							
5.	1 ഏക്കറിൽ 50 ചാക്ക് കശുമാവിന്റെ ഇല/വേപ്പിന്റെ ഇല എന്ന തോതിൽ ഇട്ട് കിളയ്ക്കുക.							
6.	പച്ചില വളമായി കാഞ്ഞിരം, വെണ്ട, പാണൽ, മുളയില, മാവില എന്നിവ ഉപയോഗിക്കുക.							
7.	നടുന്ന സമയം അശ്വതി/തിരുവോണം ഞാറ്റുവേലയിൽ ക്രമീകരിക്കുക.							
8.	വാഴയുടെ തണ്ട് ചെറുകഷ്ണങ്ങളാക്കി ചാണകത്തോട് കൂടി പാടത്ത് നിക്ഷേപിക്കുക.							
9.	കോഴിക്കാഷ്ഠത്തിന്റെ ഉപയോഗം കീടങ്ങളെ കുറയ്ക്കും.							
10.	മുള്ളിയിലത്തിന്റെ കായ പൊടിച്ച് ചാരത്തോടൊപ്പം വയലിൽ വിതറുക.o							
11.	വിത്ത് വിതയ്ക്കുന്നതിന് 6 മണിക്കൂർ മുമ്പ് വിത്ത് ചാണക കുഴമ്പിന്റെയും മേൽമണ്ണിന്റെയും കൂടെ കുഴച്ചു വെയ്ക്കുക.							
	ചാഴിശല്യം							
12.	ചാണകക്കുഴമ്പ് തളിക്കുക.							
13.	ഇഞ്ചിപ്പുല്ല് വെളുത്തുള്ളി മിശ്രിതം തളിച്ചു കൊടുക്കുക.							
14.	ഗോമൂത്രം, പെരുംകായം, വെളുത്തുള്ളി മിശ്രിതം തളിച്ചു കൊടുക്കുക.							
15.	വയമ്പിന്റെയും അരുതയുടേയും/കാഞ്ഞിരവും തുളസിയുടേയും (ഇല) സത്ത് പിഴിഞ്ഞെടുത്ത് തളിക്കുക.							
16.	ടയർ കത്തിച്ച പുകയും മണവും ചാഴി ശല്യം കുറയ്ക്കും.							
17.	പനനൊങ്ക് കമ്പിൽ കുത്തി പാടത്ത് വയ്ക്കുക.							

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		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
	തണ്ടുതുരപ്പൻ							
18.	കടുകിന്റെ ഇല പാടത്ത് വിതറുക.							
19.	വേപ്പിൻ പിണ്ണാക്കിന്റെ ചാക്ക് ജലസേചനത്തിന്റെ ചാലിൽ വയ്ക്കുക.							
20.	പച്ചില വളമായി എരുക്കിന്റെ ഇലയും കർപ്പൂരപ്പച്ചയും ഉപയോഗിക്കുക.							
21.	നെല്ലോലയുടെ അറ്റം നുള്ളിക്കളയുക.							
	ഇലചുരുട്ടിപ്പുഴു							
22.	മുള്ളിന്റെ കമ്പുകൊണ്ട് വലിച്ചതിനുശേഷം മണ്ണെണ്ണയുടേയും വെള്ളത്തിന്റെയും മിശ്രിതം തളിക്കുക/മണ്ണെണ്ണയിൽ മുക്കിയ കയറുകൊണ്ട് വലിക്കുക.							
23.	കശുവണ്ടിയുടെ തോടിൽനിന്നുള്ള ലായിനി തളിക്കുക.							
24.	തേരട്ടവള്ളിയും ചാരവും വളമായി ഉപയോഗിക്കുക.							
25.	തേരകത്തിന്റെ കമ്പുകൊണ്ട് ആട്ടുക.							
	വിത്ത് സംഭരണം							
26.	ചാണകമെഴുതിയ വല്ലോട്ടിയിലോ, പത്തായത്തിലോ വിത്ത് സൂക്ഷിക്കുക.							
27.	വേപ്പിലയോ/കരിനൊച്ചിയോ/ഉങ്ങിന്റെ ഇലയോ വിത്തു സംഭരിച്ച ചാക്കുകളുടെ ഇടയിൽ വയ്ക്കുക.							
28.	വിത്തിനോടൊപ്പം പെരുവിലത്തിന്റെ ഉണക്കിയ കുരുന്നില കമ്പോടെ വെയ്ക്കുക.							
29.	മാമ്പൂ കത്തിക്കുക/മഞ്ഞുകൊള്ളിക്കുക.							
30.	വിത്തു സൂക്ഷിക്കാൻ കാട്ടുചേരിന്റെ കൊട്ട കലർത്തി വെയ്ക്കുക							
31.	മാവിന്റെ ഇലയും, പ്ലാവിന്റെ ഇലയുടെ തണ്ടും ഇഞ്ചിപ്പുല്ലും കൂടി മൺകുടത്തിൽ കത്തിച്ചശേഷം വിത്തു സൂക്ഷിക്കുക.							
32.	വിത്ത് വയ്ക്കുന്ന അറയിൽ കടലാസ് പൂച്ചെടി (ബൊഗൻവില്ല) ഇല കെട്ടിത്തൂക്കിയാൽ കീട ശല്യം കുറയും.							
	ബാക്ടീരിയൽ ലീഫ് ബ്ലൈറ്റ്							
33.	വേപ്പിൻ പിണ്ണാക്ക് 25 ദിവസം കൂടുമ്പോൾ വയലിൽ ഇട്ടു കൊടുക്കുക.							
	ഗാളീച്ച							
34.	അശ്വതി/ഭരണി ഞാറ്റുവേലയിൽ ഞാറ് നടുക.							

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		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
	പോളച്ചിയൽ							
35.	പുണ്ണാമ്പും ചാരവും പാടത്ത് ഇട്ട് കൊടുക്കുക.							
	മുഞ്ഞ (BPH)							
36.	ഫിനൈലും (1 l) വേപ്പെണ്ണയും (¼ l) മണ്ണെണ്ണയും (½ l) സോപ്പും (150 g) ലായനിയാക്കി തളിക്കുക.							
37.	പാടത്തിൽ നിന്നും വെള്ളം വറ്റിച്ചതിനുശേഷം വേപ്പെണ്ണയുടേയും സോപ്പിന്റെയും മിശ്രിതം തളിക്കുക.							
38.	മണ്ണെണ്ണയുടേയും വെള്ളത്തിന്റെയും മിശ്രിതം തളിച്ചുകൊടുക്കുക.							
39.	മണ്ണെണ്ണയിൽ കുതിർത്ത ഈർച്ചപ്പൊടി ചെടിയുടെ കടയിലേക്ക് വിതറുക (1 l) മണ്ണെണ്ണ ഒരു ഏക്കറിന്)							
	കളനിയന്ത്രണം							
40.	എള്ളും നെല്ലും ഇടവിട്ട് കൃഷി ചെയ്യുക.							
41.	രണ്ടാം മഴ കിട്ടിയതിനുശേഷം പാടം ഉഴുതു കോഴി വളം ഇടുക.							
42.	എരുക്കിന്റെ ഇല ജലസേചനച്ചാലിൽ വെച്ചാൽ striga കളയെ നിയന്ത്രിക്കാം.							
43.	ചകിരി പാടത്ത് നിക്ഷേപിച്ചാൽ Maixlia quadlifolia തടയാം.							
44.	കാർത്തികയിൽ വിത്ത് നട്ടാൽ കളയുടെ ശല്യം കുറയും.							
45.	ഡയിഞ്ച പാകി ഉഴുതുചേർത്ത കണ്ടത്തിൽ നെല്ല് നട്ടാൽ കള ശല്യം കുറയും.							
	എലി നിയന്ത്രണം							
46.	വരമ്പിൽ മണ്ണെണ്ണ തളിക്കുക.							
47.	പനയുടെ ഇല പാടത്ത് നാട്ടുക.							
48.	വിവിധ തരത്തിലുള്ള എലിക്കെണികൾ ഉപയോഗിക്കുക.							
49.	വരുത്ത ചെമ്മീൻ തോടിന്റെ പൊടിയും, സിമന്റും ഭക്ഷണമായി വയ്ക്കുക.							
50.	എലി മാളം കയറ് കത്തിച്ചു പുകയ്ക്കുക.							
51.	വേപ്പിൻ പിണ്ണാക്കിന്റെയും യൂറിയയുടെയും മിശ്രിതം കതിര് വരുന്ന സമയത്ത് പാടത്ത് ഇട്ട് കൊടുക്കുക.							
52.	അരിപ്പൊടിയും ചില്ലിന്റെ പൊടിയും കലർത്തി ഭക്ഷണമായി വയ്ക്കുക.							
53.	ശീമകൊന്നയുടെ ഇലയോ/വിത്തോ/തൊലിയോ/ ധാന്യവുമായി കലർത്തി കൊടുക്കുക							

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		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
54.	കീടനാശിനി ചോറിൽ കലർത്തി കൊടുക്കുക.							
55.	ഒച്ചിന്റെ മാംസത്തിലോ/കപ്പ വറുത്തതിലോ ഏതെങ്കിലും വിഷം കലർത്തികൊടുക്കുക.							
56.	ചുവന്ന കൊടുവേല നട്ടാൽ എലി ശല്യം കുറയും.							
57.	പാടത്തു വെളുത്തുള്ളി നാട്ടുക.							
	ഞണ്ടുശല്യം							
58.	താറാവുകളെ പാടത്ത് ഇറക്കിവിടുക.							
	പക്ഷിശല്യം							
59.	വലിയ കമ്പുകളിൽ പ്ലാസ്റ്റിക് കവറുകൾ കെട്ടി പാടത്തു നാട്ടുക.							
60.	ഉപയോഗശൂന്യമായ ഓഡിയോ/വീഡിയോ ടേപ്പുകൾ പാടത്തിനു കുറുകെ കെട്ടിയിടുക.							

Seasonal Crops

	പച്ചക്കറി							
	പയർ							
1.	25 g പാൽകായം 1 l വെള്ളത്തിൽ ചാലിച്ച് തളിക്കുന്നത് പൂകൊഴിച്ചിൽ തടയും.							
2.	തോട്ടത്തിൽ ചുവന്ന ഉറുമ്പിന്റെ കൂട് വെച്ചാൽ മുഞ്ഞ കുറയും.							
3.	വെളുപ്പിന് ഇലകളിൽ ചാരം വിതറുക.							
4.	ചാരം കഞ്ഞിവെള്ളത്തിൽ ചാലിച്ച് തളിച്ചാൽ കുമിൾ രോഗം വരില്ല.							
5.	25 g ചാരം നൂറു ചെടിയ്ക്ക് എന്ന തോതിൽ വിതറുന്നത് പൂകൊഴിച്ചിൽ തടയും.							
6.	250 g കുവളത്തിന്റെ ഇല 1 l വെള്ളത്തിൽ തിളപ്പിക്കുക. ഇതിൽ നിന്നും 250 ml എടുത്ത് ചാണകത്തിൽ ചേർത്ത് തളിച്ചാൽ നീരൂറ്റിക്കുടിക്കുന്ന പ്രാണികളുടെ ശല്യം കുറയും.							
	ചീര							
7.	ചീര വിത്ത് കുറച്ച് മഞ്ഞൾപ്പൊടിയിലോ/ അരിപ്പൊടിയിലോ കലർത്തി പാകുക.							
8.	ചുകന്ന ചീരയും പച്ചചീരയും ഇടകലർത്തി നടുന്നത് കുമിൾ രോഗം കുറയ്ക്കും							

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		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
	വെള്ളരിവർഗ്ഗങ്ങൾ							
9.	ഗോമൂത്രം പത്തിരട്ടി വെള്ളത്തിൽ ലയിപ്പിച്ച് /ഒടുക് ഇലയുടെ സത്ത് പാവയ്ക്കയിൽ തളിക്കുക.							
10.	ബൊഗൻവില്ല (കടലാസ് പൂച്ചെടി) ഇലയുടേയും വെളുത്തുള്ളിയുടേയും സത്ത്/തുമ്പച്ചാറ് എടുത്ത് മത്തനിൽ തളിച്ചാൽ മഞ്ഞളിപ്പ് (മോസേക്ക്) രോഗം തടയാം.							
11.	പാവയ്ക്കയുടെ വിത്ത് വിതയ്ക്കുന്നതിനുമുമ്പ് 12 മണിക്കൂർ ചാണക്കുഴമ്പിൽ ഇട്ടു വയ്ക്കുക.							
12.	പന്തലിൽ വെള്ളത്തുണികൾ കെട്ടിയാൽ ഈച്ച ശല്യം കുറയും.							
13.	അപ്പച്ചെടി (Chromelinh) യുടെ സത്ത് തളിച്ചാൽ കുരുടിപ്പ് മാറിക്കിട്ടും.							
14.	ആവൽ ഇലയുടെ സത്ത് പുകയില സത്തിനോടൊപ്പം തളിക്കുക.							
15.	പാവയ്ക്ക പന്തലിന് ചുറ്റും തീ കത്തിച്ച് പുക കൊള്ളിക്കുക.							
16.	കാന്താരിമുളക്, വെള്ളം, സോപ്പ് ഇവ ലായിനിയാക്കി പാവയ്ക്കയിൽ തളിക്കുക.							
17.	ചാണകക്കുഴമ്പ് പാവയ്ക്കച്ചെടിയിൽ തളിക്കുക.							
18.	പാവയ്ക്കത്തടത്തിൽ കാഞ്ഞിരത്തിന്റെ ഇല നടുക (Soil borne pest).							
19.	ഒരു പിടി ഉലുവ 1 l വെള്ളത്തിൽ തിളപ്പിച്ച ലായിനി തളിക്കുക.							
20.	ശർക്കര 2 ദിവസം പഴകിയ കഞ്ഞിവെള്ളത്തിൽ ലയിപ്പിച്ച് തളിക്കുന്നത് നീരൂറ്റിക്കുടിക്കുന്ന പ്രാണികളുടെ ശല്യം കുറയ്ക്കും.							
21.	പൂക്കൈതയുടെ പൂവും കായയും ഈച്ച ശല്യം കുറയ്ക്കും.							
22.	പാവയ്ക്കത്തടത്തിൽ ഉപ്പിടുന്നത് മഞ്ഞളിപ്പ് കുറയ്ക്കാൻ സഹായിക്കും.							
23.	വേപ്പില, ശീമക്കൊന്ന, കരിനൊച്ചി, കാഞ്ഞിരം ഇവയുടെ ഇലയുടെ സത്ത് 20 l വെള്ളത്തിൽ ലയിപ്പിച്ച് തളിക്കുന്നത് പച്ചതുള്ളന്റെ ശല്യം കുറയ്ക്കും.							
24.	30 g വയമ്പ് 4 l വെള്ളത്തിൽ ¾ മണിക്കൂർ തിളപ്പിച്ച് തളിക്കും.							
25.	സീതപ്പഴത്തിന്റെ ഇലയുടെ സത്ത് വെള്ളത്തിൽ കലക്കി അടിക്കുക.							
26.	പാവയ്ക്ക തോട്ടത്തിൽ ഇടവിളയായി ചേന നടുന്നത് കുരുടിപ്പ് തടയും.							
27.	പഴംകഞ്ഞിവെള്ളം തളിച്ചാൽ മഞ്ഞളിപ്പ് മാറിക്കിട്ടും.							

Sl. No.	ശേഖരിച്ച നാട്ടറിവ് (ക്രമനമ്പർ)	വിശ്വാസ്യത			ചെയ്തിട്ടുണ്ടോ?		ചെയ്യുമോ?	
		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
28.	5 l ഗോമൂത്രവും 1 kg ചാണകവും 1 ടീ സ്പൂൺ മണ്ണെണ്ണ എന്നിവയുടെ മിശ്രിതം തളിക്കുക.							
29.	വെളുത്തുള്ളി/വേപ്പെണ്ണ കഞ്ഞിവെള്ളത്തിൽ കലർത്തി തളിച്ചാൽ മുളകിന്റെ മഞ്ഞളിപ്പ് മാറിക്കിട്ടും.							
30.	ഇളനീർ വെള്ളവും പശുവിൻ പാലും കൂട്ടികലർത്തി തളിച്ചാൽ മുളകിന്റെ പൂ കൊഴിച്ചിൽ തടയാം.							
31.	വിത്തു പാകിയ തടം പുളിയില ഉപയോഗിച്ച് പുത വെച്ചാൽ കള ശല്യം ഒഴിവാക്കാം.							
32.	ഉണക്കമീൻ സൂക്ഷിക്കാനുപയോഗിച്ച ഉപ്പ് തടത്തിലിട്ടാൻ ചിതൽ ശല്യം ഒഴിവാക്കാം.							
33.	20 g പാൽകായവും 1 l പാലും 5 l വെള്ളത്തിൽ കലക്കി തളിക്കുക.							
	വിത്ത് സംഭരണം							
34.	പച്ചക്കറി വിത്തുകൾ വയമ്പിന്റെയോ/ കരിനൊച്ചിയുടേയോ/ മുളക് കഷ്ണങ്ങളുടെയോ കൂടെ സൂക്ഷിക്കുക.							
35.	വിത്തിൽ വെളിച്ചെണ്ണ/ നിലക്കടല എണ്ണ പുരട്ടി വെയ്ക്കുക.							
36.	പയർ വിത്തുകൾ മണൽ/മണ്ണ്/മഞ്ഞൾപ്പൊടി കലർത്തി സൂക്ഷിക്കുക.							
37.	വിത്തുകൾ പയർ കത്തിച്ച പാത്രത്തിൽ സൂക്ഷിക്കുക.							
38.	വിത്തുകൾ അടുക്കളയിൽ അടുപ്പിനോട് ചേർത്ത് സൂക്ഷിക്കുക.							
39.	വിത്തുകൾ ആദ്യം ഉണങ്ങിയ സ്ഥലത്തും, പിന്നീട് തണുപ്പുള്ള സ്ഥലത്തും സൂക്ഷിക്കുക.							

Plantation including spice based cropping system

Sl. No.	ശേഖരിച്ച നാട്ടറിവ് (ക്രമനമ്പർ)	വിശ്വാസ്യത			ചെയ്തിട്ടുണ്ടോ?		ചെയ്യുമോ?	
		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
	തെങ്ങ്							
	റൈനോസറസ് ബീറ്റിൽ (കണ്ടാമൃഗവണ്ട്)							
1.	ആവണക്കിന്റെ പിണ്ണാക്ക് (250 g) കഞ്ഞിവെള്ളത്തിൽ മുക്കാൽ കുടം കലക്കി തെങ്ങിൻ തോപ്പിൽ വച്ചാൽ വണ്ടിനെ ആകർഷിച്ചു പിടിക്കാം.							

Sl. No.	ശേഖരിച്ച നാട്ടറിവ് (ക്രമനമ്പർ)	വിശ്വാസ്യത			ചെയ്തിട്ടുണ്ടോ?		ചെയ്യുമോ ?	
		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
2.	തെങ്ങിൻെറ കവിളുകളിൽ മണലോ/മണലും ഉപ്പും/ ഉപ്പും മരോട്ടിപ്പിണ്ണാക്കോ സമം ചേർത്ത് വച്ചു കൊടുക്കുക.							
3.	ചാണകക്കുഴികളിൽ പെരുമരം/മട്ടി/കരിനൊച്ചി ഇട്ടുകൊടുക്കുക.							
4.	മണലും ചാരവും ചുണ്ണാമ്പും തെങ്ങിൻ കവിളുകളിൽ മഴക്കാലത്ത് ഇട്ടു കൊടുക്കുക.							
5.	വേപ്പെണ്ണയും മണ്ണെണ്ണയും സമം ചേർത്ത് തെങ്ങിൻെറ മണ്ടയിൽ തളിച്ചു കൊടുക്കുക.							
6.	മരോട്ടിക്കായ (5 എണ്ണം) കഞ്ഞിവെള്ളത്തിൽ (1 l) ലയിപ്പിച്ച് മരങ്ങളിൽ കെട്ടിതൂക്കുക.							
	കൂമ്പുചീയൽ							
7.	തെങ്ങിൻെറ മണ്ട ഇടയ്ക്കിടയ്ക്ക് വൃത്തിയാക്കി ഉപ്പും ചാരവും വെള്ളത്തിൽ കലക്കി ഒഴിച്ചുകൊടുക്കുക.							
8.	ഒരു ദിവസം കത്തിച്ച കക്ക ഒരു പിടി തെങ്ങിൻെറ തടത്തിൽ ഇട്ട് കൊടുക്കുക.							
	ചെന്നീരൊലിപ്പ്							
9.	കശുവണ്ടിത്തോടിൻെറ ലായിനി തെങ്ങിൻ തടിയിൽ തേച്ചുപിടിപ്പിക്കുക.							
10.	വേപ്പെണ്ണയും ഉപ്പും തടത്തിലിട്ടുകൊടുക്കുക.							
11.	വേപ്പിൻ പിണ്ണാക്കും പഴയ ബാറ്ററി പൊടിച്ചതും (Waste carbide) തടത്തിലിട്ട് കൊടുക്കുക.							
12.	ഒന്നിടവിട്ട് പുങ്കുലകൾ പഠിച്ചുകളയുക.							
13.	വാഴയുടെ തണ്ട്/മീൻ waste ഉം ഉപ്പും തടത്തിലിട്ടു കൊടുക്കുക.							
14.	പുതിയ ഗോമൂത്രം തളിച്ചുകൊടുക്കുക.							
	ഇലതീനിപ്പുഴു							
15.	വെളുത്തുള്ളി, പച്ചമുളക്, മുരിങ്ങയില, പെരുംകായം, എന്നീ മിശ്രിതങ്ങളുടെ ലായിനി തളിച്ചുകൊടുക്കുക.							
	മണ്ഡരി							
16.	തോട്ടത്തിൽ ചകിരി ഇടയ്ക്കിടയ്ക്ക് പുകയ്ക്കുക.							
17.	കുലയിൽ ഉപ്പുവെള്ളം തളിച്ചുകൊടുക്കുക.							

Sl. No.	ശേഖരിച്ച നാട്ടറിവ് (ക്രമനമ്പർ)	വിശ്വാസ്യത			ചെയ്തിട്ടുണ്ടോ?		ചെയ്യുമോ?	
		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
	വേരുതീനിപ്പുഴു							
18.	കുവ/മഞ്ഞൾ തെങ്ങിൻ തൈകളോടു കൂടി നടുക.							
	ചിതൽ							
19.	ഉപ്പിൻെറയും ചാരത്തിൻെറയും മിശ്രിതം തെങ്ങിൻ തടത്തിൽ ഇട്ടുകൊടുക്കുക.							
20.	കാട്ടുകുവ തടത്തിൽ നടുക.							
21.	ഉലുവ ചതച്ച് തടത്തിലിടുക.							
22.	വേപ്പിൻ പിണ്ണാക്കും ഉപ്പും സമം ചേർത്ത് തടത്തിലിടുക.							
	എലി							
23.	ശർക്കരയും പഞ്ഞിയും വയ്ക്കുക.							
	കവുങ്ങ്							
	മഞ്ഞളിപ്പ്							
24.	നീലത്തിൻെറ വെള്ളം തളിച്ചുകൊടുക്കുക.							
25.	ചുണ്ണാമ്പും വേപ്പിൻ പിണ്ണാക്കും തടത്തിലിട്ടു കൊടുക്കുക.							
	കുരുമുളക്							
26.	തടത്തിലും വള്ളിയുടെ ½ m നീളത്തിലും ചുണ്ണാമ്പ് വിതറുക.							
27.	കുഞ്ഞുകല്ലുകൾ (ഉറുമ്പ് കല്ലുകൾ) ചെടിയുടെ ചുവട്ടിൽ അടുക്കിയാൽ വാട്ടം വരില്ല.							

Homestead based mixed cropping system

	പശു							
	കുളമ്പുരോഗം							
1.	സീതപ്പഴത്തിൻെറ ഇലയും പുളിയിലയും തിളപ്പിച്ച വെള്ളം കാലിൽ ഒഴിക്കുക.							
2.	വേപ്പെണ്ണയും വൈക്കോൽ കരിയും/ വൈക്കോൽ അരച്ചു കാലിൽ പുരട്ടാവുന്നതാണ്.							
3.	പശുവിനെ പാടത്തെ ചളിയിലൂടെയോ/ ചൂടുള്ള മണലിലൂടെയോ നടത്തുക.							
4.	കാഞ്ഞിരത്തിൻെറ ഇലയും, പേരയുടെ ഇലയും പുളിയിലയും ഉപ്പും തിളപ്പിച്ച വെള്ളം കാലിൽ ഒഴിച്ചുകൊടുക്കുക.							

Sl. No.	ശേഖരിച്ച നാട്ടറിവ് (ക്രമനമ്പർ)	വിശ്വാസ്യത			ചെയ്തിട്ടുണ്ടോ?		ചെയ്യുമോ?	
		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
5.	പന്നിനെയ്യും പാളയൻ കോടൻ പഴവും കഴിക്കാൻ കൊടുക്കുന്നതിനോടൊപ്പം, പന്നിനെയ്യ് വായിൽ തേച്ചു കൊടുക്കുക.							
6.	ഒടുകിന്റെ ഇലയും പുകയിലയും, കരിപ്പൊടിയും ചുണ്ണാമ്പും അരച്ച് കാലിലെ വ്രണത്തിൽ പൊതിഞ്ഞു കെട്ടുക.							
7.	കാട്ടുചേരിന്റെ എണ്ണ/ പാറ്റഗുളികയും വെളിച്ചെണ്ണയും കാലിൽ പുരട്ടാവുന്നതാണ്.							
8.	തേക്കിന്റെ ഇല അരച്ചു കാലിൽ പുരട്ടുക, മണ്ണെണ്ണ പുരട്ടുക.							
9.	മീൻ വളം കത്തിച്ച് പുക ശ്വസിക്കാൻ അനുവദിക്കുക.							
10.	ചെറിയ മീൻ അരച്ച് കാലിൽ തേക്കുക.							
11.	പാമ്പിൻ തോൽ അരച്ചത് കാട്ടുപന്നിയുടെ നെയ്യ് ചേർത്ത് ഒരു തൂവൽ ഉപയോഗിച്ച് കാലിൽ തേക്കുക.							
12.	ചൂടുചാരം മുറിവായിൽ ഇട്ടുകൊടുക്കുക.							
13.	കർപ്പൂരവും, വെളുത്തുള്ളിയും, മഞ്ഞളും, പുന്നയുടെ ഇലയും സമം ചേർത്ത് തിളപ്പിച്ച വെള്ളം കാലിൽ ഒഴിക്കുക.							
14.	വേപ്പില അരച്ച് പുളിച്ച തൈരിലോ/കള്ളിലോ ചേർത്ത് കൊടുക്കുക.							
15.	കശുവണ്ടി എണ്ണയും, വെളിച്ചെണ്ണയും പുരട്ടി കൊടുക്കുക.							
	മുറിവ്							
16.	കൊടുവേലിയുടെ ഇലയും തണ്ടും/ ഉമ്മത്തിന്റെ ഇലയും കായയും അരച്ച് പുരട്ടുക.							
17.	കടലാവണക്കിന്റെ തൊലി/ പുന്നയുടെ തൊലി അരച്ച് പുരട്ടുക.							
18.	കാട്ടുചേരിന്റെ തൊലി ചതച്ച് കഴിക്കാൻ കൊടുക്കുക.							
19.	തുമ്പയും/സീതപ്പഴത്തിന്റെ ഇല ചുണ്ണാമ്പും പുകയിലയും അരച്ച് പുരട്ടുക.							
20.	കർപ്പൂരവും, വേപ്പെണ്ണയും അടുക്കളക്കരിയും ഉപ്പും പഞ്ചസാരയും അരച്ച് പുരട്ടുക.							
21.	കൊമ്പ് മുറിഞ്ഞാൽ തീക്കനൽപ്പൊടിയും വേപ്പെണ്ണയും വെച്ച് കെട്ടുക.							
22.	തൊട്ടാവാടിയുടെ ഇലയും, ആട്ടിൻ കാഷ്ഠവും സമം എടുത്ത് വെളിച്ചെണ്ണയിൽ വറുത്ത് തേക്കുക.							
23.	കൊമ്പുമുറിഞ്ഞാൽ, ഉഴുന്നുപൊടിയും മുട്ടയുടെ വെള്ളയും ചേർത്ത് കെട്ടുക.							

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		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
	വയറിളക്കം							
24.	250 ml കടുക് എണ്ണ, 250 ml വെള്ളവും 100 g സോഡാപൊടിയും ചേർത്ത് കൊടുക്കുക.							
25.	ഇടിഞ്ഞിലിന്റെ ഇല/വാഴയുടെ ഉണ്ണിക്കാമ്പ് കഴിക്കാൻ കൊടുക്കുക.							
26.	മാതളത്തിന്റെ ഉണങ്ങിയ ഇല പൊടിച്ചുകൊടുക്കുക.							
27.	പലമ്പാഴിഞ്ഞാളിയുടെ ഇലയും കമ്പും പശുവിൻ നെയ്യിൽ കൊടുക്കുക.							
28.	കാട്ടുതിപ്പലി അരച്ചുകൊടുക്കുക.							
29.	പുളിയില, മഞ്ഞൾ, ഇഞ്ചി, കറിവേപ്പില, ഇവ തൈരിൽ ചാലിച്ച് 75 g വീതം 2-3 പ്രാവശ്യം കൊടുക്കുക.							
	ദഹനക്കേട്							
30.	പൈനാപ്പിൾ (കൈതച്ചക്ക) അരച്ചുകൊടുക്കുക.							
31.	കൊടങ്ങലിന്റെ ഇല പാലിൽ ചാലിച്ച് കൊടുക്കുക.							
32.	ഉള്ളി അരച്ച് അതിന്റെ സത്ത് കൊടുക്കുക.							
33.	മുളയുടെ ഇല/മുരുക്കിന്റെ ഇല തിന്നാൻ കൊടുക്കുക.							
34.	മീൻ നെയ്യ് കൊടുക്കുക.							
35.	മുരിങ്ങയുടെ തൊലി ചതച്ച് നാരങ്ങ നീരിൽ ചാലിച്ച് കൊടുക്കുക.							
36.	ഇരട്ടിമധുരം, അപ്പക്കാരം, വെള്ളുള്ളി, പാൽകായം, ചുക്ക്, തിപ്പലി, കുരുമുളക്, ഇന്തുപ്പ് അരച്ച് 75 g വീതം കഴിക്കാൻ കൊടുക്കുക.							
	വായുസ്തംഭനം							
37.	ചങ്ങലപ്പരണ്ട അരച്ച് കൊടുക്കുക.							
38.	ചാരായം കൊടുക്കുക.							
39.	കാട്ടുതിപ്പലി അരച്ചുകൊടുക്കുക.							
40.	എരുക്കിന്റെ ഇല, മുരിങ്ങയില, തുമ്പയില, വയമ്പ്, ഇവ അരച്ച് കൊടുക്കുക.							
41.	കാട്ടുപന്നിയുടെ നെയ്യ് കൊടുക്കുക.							
	പനി, ചുമ							
42.	തുളസി, മല്ലി, കൊടംപുളി, കായം, വെളുത്തുള്ളി, ചുക്ക്, കുരുമുളക്, കിരിയാത്ത്, ഇവ അരച്ച് 75-100 ഗ്രാം വീതം 2 പ്രാവശ്യം ദിവസേന കൊടുക്കുക.							

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		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
43.	25 ഗ്രാം വീതം ആടലോടകം,, പുളിയില, തുളസികതിര് ഇവ അരച്ച് 5 ഗ്രാം കർപ്പൂരം, ശർക്കര എന്നിവയിൽ ചാലിച്ച് കൊടുക്കുക.							
44.	തിപ്പലി കള്ളിൽ ചാലിച്ച് കൊടുക്കുക.							
	അകിടുവീക്കം							
45.	120 ഗ്രാം വീതം തഴുതാമ, ഞെരിഞ്ഞിൽ, 6 l വെള്ളത്തിൽ തിളപ്പിച്ച് 3 l ആക്കുക, 1 l വീതം കുടിപ്പിക്കുക.							
46.	കോവക്കയുടെ തണ്ടും ഇലയും മഞ്ഞളും ചേർത്ത് അരച്ച് കൊടുക്കുക.							
47.	ടസ്മം/ചന്ദനം തേച്ച് കൊടുക്കുക.							
48.	അകിടിൽ ശക്തിയായി വെള്ളമൊഴിക്കുക/വെള്ളം ശക്തിയായി തെറിപ്പിക്കുക.							
49.	വേപ്പില, മഞ്ഞൾ, ഉപ്പ് സമം അരച്ച് തേക്കുക.							
	വിരബാധ							
50.	ചങ്ങലപ്പരണ്ടയും ഉപ്പും അരച്ച് കൊടുക്കുക.							
51.	കട്ടൻചായ മധുരമില്ലാതെ കൊടുക്കുക.							
52.	കളിയടയ്ക്ക അരച്ച് കൊടുക്കുക.							
53.	തുമ്പ/കുപ്പമേനി/കൊടുവേലി ഇല അരച്ച് കൊടുക്കുക.							
	വിഷബാധ							
54.	റബർ/കപ്പയുടെ ഇല തിന്നാൽ വെളിച്ചെണ്ണ/ കടലഎണ്ണ കൊടുക്കുക.							
55.	കിളിമൂക്ക് കിഴങ്ങ്/ഉള്ളി, കീഴാർനെല്ലി/ഉങ്ങിന്റെ തൊലി എന്നിവ അരച്ച് പാമ്പുകടിയേറ്റ മൃഗത്തിന് കൊടുക്കുക.							
	ചെള്ള്, പേൻ ശല്യം							
56.	കുളിപ്പിച്ചശേഷം എള്ളെണ്ണ തേക്കുക.							
57.	അടയ്ക്കാമണിയൻ/സീതപ്പഴത്തിന്റെ ഇല അരച്ച് പുരട്ടുക.							
58.	വേപ്പെണ്ണ പുരട്ടുക.							
59.	പുകകൊള്ളിച്ചാൽ ഇവയുടെ ശല്യം കുറയും.							
60.	കർപ്പൂരവും വെളുത്തുള്ളി ചതച്ചതും പുരട്ടുക.							
61.	കവുങ്ങിന്റെ ഇലയുടെ സത്ത് എടുത്ത് പുരട്ടുക.							
62.	പാറ്റഗുളിക അരച്ച് പുരട്ടുക.							

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		തികച്ചും വിശ്വസിക്കുന്നു.	കുറച്ചൊക്കെ വിശ്വസിക്കുന്നു.	തീരെ വിശ്വസിക്കുന്നില്ല.	ഉവ്വ്	ഇല്ല	ഉവ്വ്	ഇല്ല
	കോഴി							
	കോഴിവസന്ത							
1.	ചെറിയ ഉള്ളിയും പഴയ ചോറും കലർത്തി കൊടുക്കുക.							
2.	വേപ്പന്റെ ഇലയും മഞ്ഞളും അരച്ച് കൊടുക്കുക.							
3.	ചെറിയ ഉള്ളിയും വെളിച്ചെണ്ണയും കൊടുക്കുക.							
4.	മഞ്ഞളും, കുരുമുളകും ഉപ്പും അരച്ചുകൊടുക്കുക.							
5.	പപ്പായയുടെ ഇല അരച്ച് തേങ്ങാപ്പാലിൽ ചാലിച്ച് കൊടുക്കുക.							
6.	കൊടുങ്ങലും മഞ്ഞളും സമം ചേർത്ത് അരച്ച് കൊടുക്കുക.							
	പേൻ							
7.	എരുക്കിന്റെ ഇല ഉപയോഗിച്ച് കോഴിക്കൂട് വൃത്തിയാക്കുക.							
8.	കോഴിക്കൂട്ടിൽ പുകയിലപ്പൊടി വിതറുക.							
9.	വയമ്പിന്റെ കിഴങ്ങ് അരച്ചുകലക്കിയ വെള്ളത്തിൽ കോഴിയെ മുക്കുക.							
10.	കാട്ടുതുളസി/കോഴിപ്പേൻ ചെടി കൂടിനുള്ളിൽ വെയ്ക്കുക.							
11.	ഇഞ്ചിപ്പുല്ലിന്റെ വെള്ളം തളിച്ചുകൊടുക്കും.							
	തോടുറയ്ക്കാത്ത മുട്ട							
12.	താതറ ഇല, പപ്പായ ഇല കൊടുക്കുക.							
13.	ചുണ്ണാമ്പിന്റെ തെളിഞ്ഞ വെള്ളം കൊടുക്കുക.							

XXVIII

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Dr. P.Ahamed, Associate Professor
Dept. *of Agrl. Extension*

Date. 17.09.2002.

Dear Sir/Madam,

Greetings!!

This is in connection with the research study entitled "Rationalization of indigenous technical knowledge on pest management in the farm production systems of Palakkad district" undertaken by Miss. Swapna T.R. (2000-11-09), PG student of this department under my guidance. One of the objectives of her study is to find out the rationality of the collected ITK items by the key informant farmers of Palakkad district; Extension personnel (AOs & AAs) from the State Department of Agriculture and scientists from agriculture & veterinary faculties. The study being conducted in four phases viz., documentation, rationalization by farmers and Extensionists (Agricultural Officers & Veterinary Doctors) and final scientific rationalization by scientists from the faculties of Agriculture & Veterinary science.

ITK items for inclusion were gathered from five production systems viz., Rice based cropping system, Plantation including spices, Homestead based cropping system (including livestock and poultry), Seasonal crops and Annual crops through key informant farmers of Palakkad district and other secondary sources. The items presented are to be judged on two aspects namely, PERCEIVED EFFECTS & SCIENTIFIC RATIONALE with respect to each ITK. Considering your high academic qualification and rich field experience, I request you to kindly function as a judge to rate these ITK items and express the probable reason for your judgment on each of these items.

The judgment is to be placed on a five-point continuum ranging from "LEAST EFFECTIVE to MOST EFFECTIVE" in case of PERCEIVED EFFECTS and from "LEAST RATIONALE to MOST RATIONALE" (scientifically) in the case of RATIONALITY. Please go through each ITK item and encircle the column to express your judgment for both PERCEIVED EFFECTS & SCIENTIFIC RATIONALE. Please express the probable reasons for your judgment in the space given. The active principles contained in certain plants used in ITK for controlling pest & disease management are provided in a separate sheet attached with this questionnaire.

I request you to kindly spare some time out of your busy schedule and give your valuable judgment. Kindly return the response sheets to Miss. Swapna in the self addressed stamped envelope enclosed herewith at your earliest convenience. Your valuable expertise will be gratefully acknowledged in the thesis.

Thanking you

With affectionate regards

Yours sincerely,

P. Ahamed

Encl. List of items

LIST OF ACTIVE PRINCIPLES OF CERTAIN PLANTS USED FOR PEST AND DISEASE MANAGEMENT

Garlic	Allicin, allinase
Asafoetida	Organic disulphide,umbelliferone,asaresinotannol
Tobacco	Nicotine, narcotine.
Neem	Nimbin,nimbinin, nimidin, margosic acid
Kanjiram	Strychnine, brucine,vomicine, icajine
Pepper	Piperine,chavicine, piperidine,piperettine
Bamboo	Glutelin,tabashur,methonine, lysine
Erikku	Akundurin, calotropin, calotoxin, calactin
Kongini poovu	Lantadine-A, lancamarone,lantanine
Karinochi	Nishindine, hydrocotylene, glucononitol, casticin
Lemon grass	Citral,citronellal,geraniol,myrcene
Turmeric	Curcumin, zingiberin
Oduku	Saponin-adivin
Tamarind	Proline, pipecoline
Vayambu	Acorin,asarone, calamenol,calamene,choline
Coconut oil	Lauric acid, myristic, phytosterol, squaline
Moringa	ascorbic acid,pterygospermin,moringine,moringinine,
Seetapazham	Annonnaine, hydrocyanic acid
Guava	Catechol,euginol,leucocyanidin,luteic acid
Ummam	Hyoscyamine,atropine, scopolanine,hyoscine
Kadalavanakku	Curcin
Mimosa	Mimosin,adrenalin like substance
Black gram	Lysine, valine, leucine,thereonine,albumin, globulin
Thippali	Piperine,piplartine,piper longinine,sesanine
Curry leaf	Koenigin,resin
Onion	Allyl propyl disulphide,protocatechic acid
Changalapparanda	Terpenoides,steroidal principles
Njerinjil	Harman,harmine,kaempferol
Arecanut	catechin,arecaine, arecaidine,arecoline,guvacine
Koduvely	Plumbagin, cyanidin,kaempferol,pelargonidin
Adakamanian	Sphaeranthine, albumin

APPENDIX IV

List of ITK items included in the final list after the rationalization exercises by the farmers

Sl no	ITK ITEMS	Perceived Effect					Scientific Rationality				
1	**Pest and diseases in general** Kundakootal- Seedling treatment practice before transplanting. The seedlings bundles are arranged one above the other in a circle forming the pyramid shaped seedlings. The bundles are placed with their roots facing outside.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
2	Paddy fields are ploughed with cashew (Anacardium occidentale) leaves at the rate of 50 sacs per acre.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
3	Green leaf manuring with the leaves of kanjiram(Strychnos nux vomica) or venga (Pterocarpus marsupium), or paanal (Glycosmis pentaphylla) or mango (Mangifera indica) or bamboo (Bambusa arundinacea) reduces pest and disease incidence.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
4	Adjust the sowing time by Aswathy and Bharani njattuvela.(April 14th to May 10th)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
5	Incorporate tender banana (Musa sps) pseudostem along with cowdung in paddy field during last ploughing.	1	2	3	4	5	1	2	3	4	
		Probable reason for your judgement:									
6	Seed treatment in a solution containing cow dung and topsoil.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

7	Spray the extract of garlic (Allium sativum), asafoetida (Ferula asafoetida), ginger (Zingiber officinale) tobacco (Nicotiana tobacum), neem (Azadiracta indica), green chilli (Capsicum annum) or buds eye chilli (Capsicum fruitiscens) after mixing it with soap and water	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
8	Keep a 200 W bulb above furadan solution in the field, which attract insects	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	RICE BUG										
9	Application of cow dung slurry reduces rice bug.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
10	Spray or pour cow dung slurry.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
11	Burn discarded cycle tyre in the bunds so that bugs can be expelled due to it's smoke and odour.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	STEM BORER										
12	Use leaves of kudaku (Centella asiatica) as green manure.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

13	Keep neem (Azadiracta indica) cake sac in irrigation channel	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
14	Green leaf manuring with *Erikku* (Calotropis gigantia) and karpoorappacha (Lantana camera).	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
15.	Nip the seedling tips	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	SEED STORAGE										
16	Seed storage in bamboo baskets (Vallams) plastered with cow dung / in Pathayams	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
17	Keep the leaves of *Ummam* (Datura stramonium) or Neem (Azadiracta indica) leaves or *Karinochi* (Vitex negundo) between the sacs used for storage.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
18	***Manpookanikkal*** or ***Manjukkollikkal***-It is a seed drying technique where the seeds are exposed to three dews (nights) and three days successively.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

19	Mix the seeds along with the fruits of *Karimcheru* or *Kuttuchcru* (Holigarna arnottiana) / (H. nigra) while storing.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
20	Leaves of mango (Mangifera indica), leaf stalk of jack (Artocarpus integrifolia) and lemon grass (Cymbopogan citratus) are burned together in a pot. Then the seeds are stored in that pot	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
21	Hang leaves of bougainvilla (Bougainvilla sps) in storage bins to ward off storage pests.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
22	**Gall Fly** Adjust the sowing time by *Aswathy* and *Bharani njattuvela*.(April 14 to May 10)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
23	**Sheath Rot** Application of lime mixed with ash	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
24	**Bacterial Leaf Blight (BLB)** Application of neem (Azadiracta indica) cake (8 sacs) repeated every twenty-five days.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	LEAF ROLLER										
25	Sweep the field using bamboo baskets to collect the leaf tips along with the pests and its life stages.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

26	Dragging the thorny branches across the field and spray kerosene diluted with water.	1	2	3	4	5	1	2	3	4 5
		Probable reason for your judgement:								
27	Application of cashew (Anacardium occidentale) nutshell liquid in the field reduces the pest	1	2	3	4	5	1	2	3	4 5
		Probable reason for your judgement:								
28	Manuring with therattavalli (Trichosanthes hispida) and ash bring down the population	1	2	3	4	5	1	2	3	4 5
		Probable reason for your judgement:								
29	**GRASS HOPPER** Spray a solution containing Phenyl (1000 ml), Neem (Azadiracta indica) oil (250 ml), Kerosene (500 ml), and 150 g bar soap in the field.	1	2	3	4	5	1	2	3	4 5
		Probable reason for your judgement:								
	PLANT HOPPER									
30	Broadcast saw dust soaked in kerosene (any substance which absorbs kerosene) @ 1 litre per acre).	1	2	3	4	5	1	2	3	4 5
		Probable reason for your judgement:								
31	Drain the field and spray a solution containing neem (Azadiracta indica) oil mixed with soap.	1	2	3	4	5	1	2	3	4 5
		Probable reason for your judgement:								

32	Spray kerosene mixed with water	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	WEED CONTROL										
33	Plough the field after getting second rain and add poultry or cattle manure.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
34	Insitu ploughing of Daincha (Sesbania acculeata) in the paddy field reduces weeds in the succeeding rice crop	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	RODENT CONTROL										
35	Spraying kerosene in the bunds reduces rat attack.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
36	Use of various rats traps like *kumbam*, *odichil*,saw toothed scissor trap, earthen pot trap, box trap, burying mud pots at ground level, where field bunds meet from four sides.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
37	Baiting with a mixture of dried prawn shell powder and cement.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

38	The borrow holes are either smoked with coir or flooded	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
39	Baiting over tapioca chips or snail flesh. (ie such baits + poison)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
40	Erecting white flags in fields	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
41	Baiting with leaves, seeds or bark of glyricidia (Glyricidia sepium) with cereals.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
42	Baiting with rice powder mixed with glass piece powder.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
43	**CRAB CONTROL** Releasing flocks of geese/ducks in puddled field and in standing rice crop	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
44	**BIRD CONTROL** Use of polythene cover tied to long poles.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

45	Old and discarded audio/video tapes are tied on small pegs in the fields to scare away birds.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
46	**WEED CONTROL** Transplantation of seedlings during Karthika njattuvela reduces weed growth	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

PLANTATION INCLUDING SPICES BASED CROPPING SYSTEM

RHINOCEROS BEETLE

1	Place an earthen pot in the coconut basin, filled with rice water (Kanji water-3/4th of pot) and add castor cake (250g). The odour of the solution attracts the beetle into the pot and later killed by adding poison.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
2	Application of sand and salt or Marrotti (Hydnocarpus wittiana) cakes in equal proportion in the leaf axils of coconut during August - September month.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
3	Use of perumaram / Matti (Ailanthes malabarica) in cow dung pit kills the grubs.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
4	Application of lime, ash and sand in leaf axils during rainy reason.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

5	**LEAF EATING CATERPILLAR** Spray the preparation made out of garlic(Allium sepa), green chilli(Capsicum annum), moringa (Moringa oleifera) and kayam (Ferula asafoetida)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
6	**ROOT GRUB** Planting wild variety of arrow root (Maranda arundinacea) in coconut basins.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	BUD ROT										
7	Clean the affected palm, apply Bordeaux paste and then fill the pasted area with rice husk (*Umi*) and cover with a mud pot.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
8	Clean the crown frequently and apply ash and salt mixture solution	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
9	Application of lime burned for one day in the coconut basin.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	STEM BLEEDING										
10	Lime paste or cashew nut shell liquid application on the trunk after chipping off the affected area.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

11	Application of neem cake and salt in coconut tree basins	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
12	Cover the affected portion with dry leaves and burn after sprinkling kerosene	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	ABNORMAL NUT FALL OR BUTTON SHEDDING										
13	Removal of alternate inflorescence	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
14	Spray fresh cows urine	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
15	Incorporate chopped banana pseudostem in the coconut tree basin.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
16	Application of fish waste and salt mixture in the coconut tree basin	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	COCONUT MITE CONTROL										
17	Frequent smoking of coconut garden using coconut husks.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

18	Spray concentrated salt solution in the crown area	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
		TERMITE CONTROL									
19	Plant arrowroot (Maranda arundinacea) or turmeric (Curcuma longa) along with coconut seedling	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
20	Salt and ash application in the basin	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
21	Application of paste made of fenugreek (*Uluva*) (Trogonella foenm greecum)in coconut tree basin.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
22	Application of neem (*Azadirachta indica*) cake and salt in equal proportions in the coconut tree basin	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
23	While planting seedlings, bulbs of Aloe vera (Kattar vazha) are planted in the same pit to keep away termites from the seedlings.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
		RODENT CONTROL									
24	Baiting with jaggery and cotton balls	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

25	**ARECANUT** Spray washing blue (*Neelum*) in the crown region reduces yellowing	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
26	Application of lime mixed with neem (Azadiracta indica) cake in the coconut tree basin.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
27	**PEPPER** Sprinkle lime in the pit as well as up to1M height of the plant reduces disease attack.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	SEASONAL CROPS **VEGETABLES - Pest and diseases in General**										
1	Dusting wood ash over leaves in the early morning	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
2	Spray rice soup (Kanji water) mixed with ash against all fungal diseases.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
3	Application of ash 25g for 100 plants three days after planting reduces flower shedding.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

		AMARANTHUS									
4	Seeds are sown mixing with turmeric(Curcuma longa) powder or broken rice grains.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
5	Sowing seeds of green amaranthus and red amaranthus in alternate rows reduces fungal diseases (Leaf blight & White rust)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
		CUCURBITS									
6	Bitter gourd seeds are treated with cow dung slurry or cow dung solution for 12 hours before sowing	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
7	Smoking around bitter ground pandals during evening hours to ward off fruit flies.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
8	Spray bitter gourd with the extract of chillies (*Kandari mulaku*) diluted after mixing with soap solution.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
9	Diluted cow dung slurry is sprinkled on leaves of bitter gourd planted in *kharif* season.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

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10	Mulching the basins of bitter gourd with leaves of Strychnos nux vomica (Kanjiram) against sucking pest.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
11	Application of a solution of jaggery and one to two days old starch water (*Kanjivellam*) against sucking pest.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
12	Spray cow's urine diluted ten times in bitter gourd against pest and diseases.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
13	Extract of neem (Azadiracta indica) leaf, Glyuricidia (Glyricidia sepum) / karinochi(Vitex negundo) and kanjiram (Strychnos nux vomica) leaf one litre in 20 litre water and spray against grass hopper attack.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
14	White clothes are hanged on snake gourd pandals against fruit fly attack.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
15	Cultivate elephant yam (Amorphophallus companulatus)as an intercrop in bitter gourd plot to reduce the stunting	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
16	Extract of appa (Chromelina odoratum) chedi helps to reduce stunted growth.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

SOLANACEOUS VEGETABLES

17	Spray tender coconut water mixed with cow's milk on 60-70th and 90th days after planting against flower and fruit shedding in chillies.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
18	Mulching the seedbeds with tamarind (Tamarindus indica) leaves controls weed growth	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
19	Application of salt used for storing dried fish in the root zones of vegetable plants wards off termite attack	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
20	Application of garlic(Allium sativum) extract or neem (Azadiracta indica)oil mixed with starch water against chilli mosaic and leaf curling	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

STORAGE PESTS

21	Mix seeds with vayambu (Acorus calamus) rhizome, dried leaf powder of Karinochi (Vitex negundo) or broken chillies (Capsicum annum)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
22	Smearing seeds with coconut (Cocos nucifera) oil or groundnut (Arachis hypogea) oil or gingelly(Sesamum indica) oil.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
23	Cowpea seeds are stored along with sand or clay.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

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24	Cowpea seeds are stored after smearing the ash made out of cowpea pods	1	2	3	4	5	1	2	3	4	
		Probable reason for your judgement:									
25	Store seeds near the hearth of the kitchen.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
26	Store seeds of snake gourd in dry place and later in cool place	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	ANNUAL CROPS										
	BANANA										
1	Planting rhizome in a cover containing lime reduces pest and diseases in general.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
2	Fried fenugreek (Trigonella foenm greecum) (*Uluva*) application in leaf axils control pseudostem borer	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
3	Smoke treatment of suckers from burning dry bamboo poles.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

List of ITK items included in the final list after the rationalization exercises by the farmers

HOMESTEAD BASED MIXED FARMING SYSTEM

CATTLE

Foot and Mouth disease

1	Apply boiled water of *seethaphal* (Annona squamosa) leaf and tamarind (Tamarindus indicus) leaf on the foot	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
2	Apply the mixture of neem (Azadiracta indica) oil and charred coconut shell on the affected part of the foot	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
3	Apply a paste made of paddy straw on foot lesions	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
4	Pour the boiled water of *Kanjiram* (Strychnos nux vomica) leaves, guava (Psidium gujava) leaves, tamarind (Tamarindus indica) leaves and salt and on the affected foot.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
5	Apply oil of *kattucherinte kotta* (Holigarna arnottiana) on the foot lesion	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

6	Powdered naphthalene balls are mixed in coconut (Cocos nucifera) oil and smeared on legs and feet	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
7	Equal proportion of camphor, garlic (Allium sativum), turmeric (Curcuma longa) and punna (Dillenia pentagyna) are boiled together and applied on legs and feet	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
8	Cashew nut (Anacardium occidentale) and coconut oil are mixed together and applied on the affected parts	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
9	Smear pig fat in the mouth and feed the cattle with palayamkodan banana and pig fat.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
10	Allow the cattle to walk through the field mud or hot sand.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
11	Bandage the lesion with oduku (Cleistanthes collinus)leaf, tobacco(Nicotiana tobacum), Karippodi,and lime	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

WOUND ON THE BODY

12	The bark of *kadalavanakku* (Jatropha curcas) is made into a paste and applied	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
13	Smear the paste made of *karpooram* (Camphor), neem (Azadirachta indica) oil, *addukkalakkari*, salt and sugar on the wound.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
14	For the evulsion of horn *karamaram* (Randia dumetorum) leaves and stem are crushed well and applied over the area.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
15	Bandage the broken horn with a mixture containing egg white and powdered black gram (seed coat un removed) - '*Uzhunnu*' (Vigna mungo)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
16	The bark of *kadalavanakku* (Jatropha curcas) is made into a paste and applied.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
17	Smear the paste made of leaf and stem of koduvely (Plumbago zeylanica) or friut and leaves of ummam(Datura stramonium)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

18	Smear paste made of sitaphal (Annona squamosa) or thumba (Leucas aspera) mixed in tobacco (Nicotiana tobacum) and lime.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
19	Feed the cattle with tender chopped pseudostem of banana.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	DIGESTIVE DISORDER **DIARRHOE**										
20	Dried leaf powder of pomegranate *Mathalam* (Punica granatum) is given as feed.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
21	Oral administration of a mixture containing 75 grams each of turmeric (Curcuma longa), ginger (Zingiber officinale), curry leaf (Murraya koenji) and *muthanga* (Cyperus rotundus) mixed with curd and given twice or thrice daily.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
22	Paste made of wild *thippali* (Piper longum) is given	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

28	Arrack is given.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
29	Oral administration of paste made of castor (Ricinus communis) leaf, *moringa* (Moringa oleifera), *thumba* (Leucas aspera) leaf, *vayambu* (Acorus calamus).	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
30	Dried root of wild *thippali* (Piper longum) placed in mouth	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
31	Paste made of chagalapparanda(Cissus quadrangularis) is given.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	FEVER AND COUGH										
32	A paste made of *thulasi* (Ocimum sanctum), coriander (Coriandrum sativum),	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
33	25 g each of *adalodakom* (Adathoda zelanica), tamarind leaves (Tamarindus indicus), inflorescence	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

34	Give *thippali* (Piper longum) mixed in toddy.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	MASTITIS										
35	Boil 120 g of crushed *thazhuthama* (Boerhaavia diffusa), *njerinjil* (Tribulus terrestris) in 6 litres of water and make to 3 litres and give one litre of the solution daily.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
36	Smear *bhasmam* or sandal (Santalum album).	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
37	Allow the cattle to stand in pond or river and then pour water forcefully on the udder using a vessel or pump.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
38	Apply the paste made of neem leaf (Azadirachta indica), turmeric (Curcuma longa), salt in equal proportions.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
39	Grounded leaves and stem of Kovakka (Coccinia grandis) and turmeric is given.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

WORM TROUBLE

40	Feed the paste made of *chungalampvaranda* (Cissus quadrangularis) and salt	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
41	Give black tea without sugar for 8 days	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
42	Grounded tender arecanut (Areca catechu) is effective	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
43	Leaves of thumba (Leucas aspera)leaf or koduvely (Plumbago Zeylanica) leaf is grounded and given.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
44	*Poisoning due to eating of rubber tapioca leaves or due to snake poisoning*	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
45	If rubber (Heavea braziliensis) / tapioca (Manihot esculenta) leaves are fed, give coconut oil or groundnut oil.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

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TICKS AND LICE

45	Smear sesamum (Sesamum indicum) oil on body after one hour of bathing.(Some times lime also added).	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
46	Smear the paste made of *ukkkamanian* (Sphearanthus indicus) on the body.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
47	Leaves of seethaphal (Annona squamosa) are ground in to a paste and applied on the body.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
48	Neem oil application on the body is found to be very effective.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
49	Extract of arecanut (Areca catechu) leaf is applied.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
50	Powdered naphtahalene balls are applied on the body surface.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

POULTRY KOZHIVASANTHA RANICKET

51	Neem (Azadirachta indica) and turmeric (Curcuma longa) paste is orally given	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
52	Chopped onion(Allium cepa) mixed with coconut (Cocos nucifera)oil is given	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
53	Grounded turmeric(Curcuma longa, Pepper (Piper nigrum) and salt is mixed together and given as feed.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

TICKS AND LICE

54	Use castor (Ricinus communis) plants to clean and remove the litter from poultry shed. (Keep these leaves in the shed)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
55	Sprinkle tobacco (Nicotiana tobaccum) powder in the poultry house.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

56	Wild *thulasi* (Ocimum sanctum) leaf extract is used for sprinkling.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
57	Dip the hen in a sloution made out of vayambu (Acorus calamus)rhizome.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
58	Spray poultry house with solution made of lemon grass (Cymbopogan citratus)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
59	*Kozhippenchedi*(Eleocharis capitata)kept in poultry shed	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	THODURAKKATHA MUTTA (SOFT SHELLED EGG)										
60	Give supernatant liquid of lime or give powdered limestone.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

4	Green leaf manuring with *parakam* (Ficus hispida) and *maruthu* (Terminalia paniculata) or *kongimpoo* (Lantana camera)	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
5	Green leaf manuring with kanjiram (Strychnos nux vomica) and neem (Azadiracta indica) are believed to repel pseudostem borer.	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
	TAPIOCA										
6	Planting *chethikkoduveli* (Plumbago zeylanica) control rat or pig attack..	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									
7	Plant turmeric (Curcuma longa) in plot to scare away the rat	1	2	3	4	5	1	2	3	4	5
		Probable reason for your judgement:									

RATIONALISATION OF INDIGENOUS TECHNICAL KNOWLEDGE ON PEST MANAGEMENT IN THE FARM PRODUCTION SYSTEMS OF PALAKKAD DISTRICT

By

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ABSTRACT OF THE THESIS

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ABSTRACT

The study on "Rationalisation of Indigenous Technical Knowledge on pest management in the farm production systems of Palakkad district" was conducted with the over-riding objective of compiling and cataloguing the Indigenous Technical Knowledge (ITK) including contemporary farmers' innovations in pest management in the major production systems, and analysing the evaluative perception and rationality of ITK items. The respondents of the study comprised of 150 farmers, 84 extensionists (including agricultural and veterinary departments) and 60 scientists, from agricultural and veterinary faculties.

The study was conducted as a phased programme. The analysis of data elicited through Key Informant Workshops (KIW's) and Participatory Learning and Action (PLA) sessions were subjected to various statistical analyses. The results of the study confirmed that farmers have rich knowledge on pest management developed by their ancestors and peers. The results established that the farmers did not perceive all the traditional practices as good or sound. They defended their opinions based on multi-faceted technology evaluation attributes and field realities. The ITK's screened through KIW's when subjected to the researchers and extensionists showed high difference of opinion, though some sort of similarity was also observed, when the ITK attributes were considered separately. On combined effect of perceived effect and scientific rationality of ITK items, similarity of opinion was observed in high potential and low potential ITK's as perceived by researchers and extensionists.

The ITK's screened through Key Informant Workshops, when subjected to the researchers and extensionists, received differential perceptions in many cases and agreement on others.

Besides these, there existed high correlation and significant relationship between the perceived effect and scientific rationality of each ITK as perceived by researchers and extensionists. Hence it could be concluded that majority of the ITK items with high perceived effect were perceived to have high scientific rationality also, though a few showed no relation at all. This indicated that perceived effect of an ITK is highly influenced by its scientific rationality and *vice versa.*

While analysing the combined response of researchers and extensionists on the perceived effect and scientific rationality of ITK items, separately, majority of the items seemed to be non significant. This shows that both researchers and extensionists differed greatly in the perception of an ITK on its perceived utility. It could be further narrowed down that the attitude and viewpoints of researchers were different from the extensionists.

The critical examination of the data analysed proved that there existed some sort of agreement in response pattern given by the farmers, researchers and extensionists. There were some ITK's which showed similarity in the response of high ranking and low ranking ones as given by all the three respondents. At the same time a few ITK's clearly discriminated the perception of researchers and extensionists. This means that there were a few ITK's that discriminated the researchers and extensionists widely and a few others which exhibited agreement.

Results of the study indicated the need for indepth assessment and validation of ITK's at laboratory and field levels through multidisciplinary approach, other than mere documentation and romanticization of all traditional knowledge without reasoning. While doing so, all the dimensions related to each specific technology must be worked out.