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Research Article

FARMERS TRADITIONAL PRACTICES FOR PRE AND POST HARVEST PEST CONTROL IN CROP PRODUCTION

DHANANIVETHA M.¹, RAGAVAN T.², GOWTHAMI R.³, RAGHAVENDRA K. V.⁴ AND GANGADHARAN S.⁵

^{1,2}Tamil Nadu Agricultural University, Coimbatore, 641003, Tamil Nadu, India

³ICAR -Indian Council of Agricultural Research, New Delhi, Delhi 110001

⁴Directorate of Plant Protection Quarantine & Storage (DPPQS), Government of India

⁵Regional Plant Quarantine Station, Meenambakkam, Chennai, 600 027 Tamil Nadu

*Corresponding Author: Email-dhananivetha@gmail.com

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Abstract- Indigenous Technical Knowledge involves practices evolved by the farmers on their own experiences, which are passed from generation to generation. Indiscriminate use of chemical fertilizers, pesticides and fungicides in present day agriculture had led to deposition of toxic residues in the food materials. However due to awareness on the health food products interest was turned towards Indigenous technological practices followed by the farmers from the ancient times. In a way to create awareness a case study was undertaken to document the ITKs adopted by the farming community of Palamangalam, Konthalam, Sivagiri, Kolathupalayam, Vellotamparapu, Kolanelli and Kulavilaku villages of Modakurichi block, Erode District, Tamil Nadu during 2016. For gathering information from the farmers extension tools like by direct interview and group discussion methods were executed. About 80 practices were followed in these villages for pre and post harvest pest management methods in various agricultural crops like rice, castor, coconut and vegetables were documented. Based on the documented practices, it was concluded that the farmers had a brilliant approach in controlling the pest and disease by utilizing the naturally available resources which paves way for residue free food materials.

Keywords- Insect management, Indigenous methods, residue free.

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Introduction

Agriculture is a way of life in our country. Indian agricultural sector plays a crucial role in the economic development of the country because of its high share in employment and livelihood creation. With the availability of fixed land and resources there is a need to produce enough food to meet the needs of our ever growing population. Cereals, pulses, oilseeds, fruits and vegetables are the major source of food materials. There are various reasons for lower production of our food crops such as insects, weeds, poor fertility and others. Among these factors pest infestation causes serious loss in yield both under pre and post-harvest stages of the crop [1]. Controlling these pests by using chemicals has been practiced indiscriminately nowadays resulted in resistance in pests and higher levels of residual toxicity resulting in environmental pollution by contaminating air, soil and water which results in health hazards and harmful effect. Indigenous Technical Knowledge is knowledge gained based on the experience and transferred from generation to generations.

Methodology

A case study was conducted to document the valuable traditional knowledge (ITKs) which are still being followed by the farmers in their day to day agricultural production practices. A special emphasis was given to the pre and post-harvest pest management knowledge by these farmers. For this study, the villages namely Palamangalam, Konthalam, Sivagiri, Kolathupalayam, Vellotamparapu, Kolanelli and kulavilaku village of Modakurichi block, Erode District, Tamil Nadu were selected. From the villages about 150 progressive farmers were identified for the study. The study was undertaken following the informal interviews/personnel

contact with the selected farmers. All the informations gathered from the informal interviews were documented and scrutinized based on the repetition of information by large members on confirmation. The documented ITKs related to pre and post harvest pest management of crops were furnished in [Table-1].

Result and Discussion

The results of the case study revealed that, the traditional knowledge gained by the farmers from decades remarkably helped to save the crop and improved the productivity and quality of the farm produce. Further, for the implementation of ITKs, the farmers effectively chose the unlimited available and renewable farm resources. Enough care taken by these farmers for execution of ITKs in following the procedures, collection and processing of inputs. The dried Notchi (*Vitex nedungi*) leaves are placed in between the grain stored gunny bags to avoid storage pests as ITK due to the presence of alkaloids in the leaves. The insecticidal, ovicidal, growth inhibition and morphological effects of the leaf materials protected the stored grains from pests [2].

Majority of the practices followed by the farmers as ITK were based on belief of the local people, though it had some scientific rationale and proven later by scientists. From the case study, among the 125 ITKs recorded 25 major ITKs followed for pest management in pre and post-harvest crop cultivation was discussed herewith scientific reasoning [Table-1]. The pulse beetle incidence in the storage of black gram and green gram was effectively managed by ITK of mixing the seeds with neem leaves (*Azadiracta indica*). Neem leaf powder protects the seeds through its bitter principles called meliacins like azadiractin,

nimbin and solanin [3].

Table-1 Farmers traditional practices for pre and post harvest pest control

Crop	Method	Scientific background
Paddy	Dried <i>Notchi</i> leaves (4kg/100kg of seeds) are placed in between the storage bags of paddy to avoid damage by storage insects. Application of neem cake as basal manure. Clipping off the tip of rice seedlings before transplanting Fumigating rat holes with Milagu (<i>Piper nigrum</i> and <i>Piper longum</i>)	<ul style="list-style-type: none"> Presence of alkaloids induce pesticidal property. It possesses insecticidal, ovicidal, growth inhibition and morphogenetic effects against stored pest of paddy [2]. Protect the rice crop from brown plant hopper. Facilitate uniform growth and remove insect egg mass and other major insect pests present on the leaf tips. Instantly kills the rat in the holes by its toxic fumes.
Maize	Maize cobs after harvested were dried along with the outer sheath and dried up to the required moisture under open sunlight. The sheath along with grain is stored for seed purpose by hanging. Smoking under the cobs by using neem leaves Erecting bamboo sticks tied with bird feathers or coloured polythene sheets in the field Erecting bird perches	<ul style="list-style-type: none"> It prevent the attack of rats and stored pests. Birds do not feed in the fields where bird feathers are present due to fear. Polythene sheets generate sounds in wind [4]. Attract birds which are rodent eaters.
Pulses	Seeds stored for seed purpose is mixed with neem oil at 0.5 % Dried garlic is mixed at 100g/5kg of seed during storage	<ul style="list-style-type: none"> Control seeds from all stored pests Neem oil act as repellent, Ovipositional deterrence, growth inhibition [5]. Presence of anti-microbial and anti-fungal compounds such as allylthiosulfinate and diallyl disulfide-S-monoxide prevent the attack of pulse beetle [6].
Sorghum	Seeds (1 kg) are soaked in cow dung (50 g) and urine (250 ml) for half an hour followed by sun drying them before sowing.	<ul style="list-style-type: none"> Cow urine contains 2.5% urea which is known to break dormancy and improve germination [7]. Cow dung improves the longevity of seed.
Redgram	Putting the pods of dried chilli in the red gram container to control bruchids (beetle). Bitter gourd was powdered and mixed with seeds.	<ul style="list-style-type: none"> The chili powder contains capsaicin which is known to inhibit lipid peroxidation which in turn slows down seed ageing [8]. The toxic nature of bitter gourd repel stored pests and pathogens associated with seeds [9].
Black gram Green gram	Dried neem (<i>Azadirachta indica</i>) leaf powder is mixed with black gram and green gram to avoid the attack of pulse beetle.	<ul style="list-style-type: none"> Neem leaf powder protect the seeds from through its bitter principles called Meliacins like azadirachtin, nimbin, salannin etc., [3]
Gingelly	Placing Vasambu (<i>Achorous calamus</i>) along with sesame. Spreading dried chilli over the surface of gingelly.	<ul style="list-style-type: none"> Vasambu repel the pest and safe guard the seeds.
Coconut	250 g of sand mixed with 100 g of neem seed powder is placed at the base of the leaf sheath	<ul style="list-style-type: none"> Sand mixed with neem powder will enter into the neck of the bettle and due to coarse nature, the neck will be cut off while turning its head.
Cotton	Cow urine is collected and kadukkai (<i>Terminalia chebula</i>) nuts seed which has high bitter taste is allowed to ferment for 30 days. After fermentation it is filtered and sprayed to control pests of cotton. Leaves of <i>Calotropis</i> is placed in the irrigation channels or a little quantity of castor oil is added to the irrigation water to control aphids in cotton.	<ul style="list-style-type: none"> Strong odour of pongamia leaves repels storage insects [10].
Natural insect repellent	Neem leaves, Datura leaves, Pungam leaves and <i>Calotropis</i> leaves were mixed equally by chopping into small pieces. It is allowed to soak in 10 liter cow urine for 7 days. After seven days it is mixed in a ratio of 1:10 with water and sprayed to crops. It controls sucking pest infection.	
Vegetables (Brinjal, Bendi, Peas)	Dusting ash all over the crops infected by aphids and mealy bug	<ul style="list-style-type: none"> Acts as a physical poison causing abrasion on insect's body cuticle and the insect dies due to desiccation. Interferes in the chemical signals emanating from the host plants thus obstructing the initial host location by pests [11]. Foliage further becomes unpalatable for foliage feeders.
Bitter and Ash gourd seeds	Fully ripened seeds are collected, processed by removing pulpy material and dried in shade for some time. The semisolid cow/ buffalo dung is made into balls and thrown on the old walls of villages. The dried seeds are then pasted in the cow dung slurry. After one week the dried cow dung (Varati) along with seeds are removed and stored even upto one year.	<ul style="list-style-type: none"> Pesticidal property keeps the seeds away from the stored pests. Immunostimulant properties improves the germination and viability of the seeds [5].
Rat Trap	A wooden piece having iron ring in semicircle shape with a hook (for placing feed) attached is placed in the places where the rats cause damage to stored grains.	<ul style="list-style-type: none"> Once the rats enter the place it will be attracted towards the food. When it tried to eat the food it will struck by the hook and get died.

Conclusion

From the study it could be concluded that the farmers in the study area used various traditional pest control measures which are primarily against a wide range of crops without any adverse effect on the environment. These methods have been followed for a very long time and have not changed but improved over the years. These methods were in line with ancient texts which are scientific. The methods were scientifically true and logical based on the available literature which shows the scientific base for these methods. These methods were cost-effective and viable in small farm situations and can be used as alternative ways for nonchemical seed treatment and cost-effective short-term practice.

Application of Research

Documentation of indigenous technologies will be helpful in understanding the age-old practices which will in turn helpful in forming new research strategies.

Research Category: Post harvest pest control

Abbreviations:

ITK - Indigenous Technical Knowledge

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***Chairperson of research: Dr T. Ragavan**

University: Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu 641003

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