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ITK: Non chemical practices followed by farmers of Assam against rice insect pests

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Abstract

The indigenous technical knowledge (ITK) is an ecofriendly, cost effective and mostly suited practices for marginal and poor farmers. These practices are crop, pests and location specific. The practices are quite fit to the ecological conditions and make use of local available resources. With the advent of modern agricultural practices, after the green revolution, chemical driven agriculture drove away some of the practices from the farmers field. The present changing trend of agriculture demands the use of such ITK as a component of integrated pest management in the farmers' field with scientific interventions. Documentation of these practices and their rationale is considered as a need of the time.

Keywords: traditional practices, ITK, rice pests, eco-friendly practices for pest management

Introduction

Traditional knowledge, frequently termed as indigenous knowledge, are generally develops within a particular community based on long term observations, personal experience through trial and error method or the information gained from ancestors over a long period of time, which are eco-friendly, time bound, socially accepted, cost-effective, environmentally sound, and suited to the specific local and ecological conditions. They are generally maintains a non-formal means of dissemination, generation after generation and mostly imbedded in their culture. The development of traditional knowledge, which helps in managing natural environment and health of people, has been a matter of survival of people ^[1]. Generally, ITKs are developed based on locally available material, leads to become location specific and form a basis for livelihood. Rice, being the staple food, has been cultivated in area of the state. It was stated that Indigenous Technical Knowledge (ITK) was the actual knowledge of a given population that reflects the experiences based on tradition and includes more recent experiences with modern technologies ^[2]. Rice growing farmers developed a good number of indigenous practices to grow this crop successfully, particularly to manage different insect-pests and diseases. With the increasing demand for yield to feed the overgrowing population, farmers are bound to apply chemical fertilizers and pesticides. Indiscriminate uses to chemicals in the field pose a serious threat to the environment and therefore, present day agriculture tends to demand for organic inputs. Under the changing agricultural scenario, ITKs developed and used by the age old ancestors may play a vital role in combating pest problem in rice cultivation. Many of these knowledge and practices are at par with the modern knowledge and technologies and it has been providing the indigenous communities self sufficiency ^[3]. The world summit on Sustainable Development held during 2002 at Johannesburg (South Africa) also urged the use of ITKs in crop husbandry package ^[4]. Keeping the importance of the ITKs in present day agriculture in mind, attempt has been made to collect and document different indigenous practices used by rice growing farmers of Jorhat district of Assam for the management of rice pests.

Materials and methods

The present study was conducted in two districts of Assam *viz.*, Jorhat (coordinates: 26.75° N, 94.22°E) and Dhemaji (Coordinates: 27.6087° N, 94.7692° E). These districts are inhabited by large number of tribal communities and are considered to have a rich culture to follow the ITKs. They are mostly poor to marginal farmers and follow traditional means of agricultural practices. A total of 100 farmers (50 numbers from each district) were purposively selected for this study and information were collected either following a semi structured interview schedule and / or group discussion.

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The rationale of following these practices and present status of such practices were also tried to explore. However, the study was purposively undertaken to collect and document the age old traditional practices followed in rice cultivation.

Results

The results obtained from the present study are presented hereunder:

Important Pests of Rice: Present study revealed that rice stem borer (*Scipophaga incertulas* and *S. innotata*), rice case worm (*Nymphula depunctalis*), green leaf hopper (*Nephotix nigropictus*), thrips (*Stenchaetothrips biformis*), gundhi bug (*Leptocoris acuta*), grass hoppers (*Hieroglyphus banian*) and leaf folder (*Cnaphalocrocis medinalis*) are common insect pests of rice, while rice stem borer, rice yellow stem borer is the major insect pest of rice. Among the diseases brown spot, rice blast, bacterial leaf blight, sheath blight and false smut are the common diseases encountered by the rice growing farmers of Jorhat district.

Indigenous Technical Knowledge used for managing insect-pests of rice:

A. Practices used during field preparation: Deep summer ploughing, during the month of April-May is commonly followed by most of the farmers. They feel that this practice is most effective in reducing the infestation of rice stem borer. They also advocated that this practice should invariably be followed in stem borer endemic areas. Moreover, this practice holds good for soil moisture conservation.

Burning and/or ploughing down of rice stubbles are another common practice to reduce rice stem borer infestation. In Assam, the anterior portion of the rice is cut leaving the entire stubbles on the field. Pupation of rice stem borer takes place in these stubbles. Burning and/or ploughing down of rice stubbles reduce the population of rice stem borer in the next crop.

B. Practices followed during seed sowing: A group of farmers used to soak their seeds before sowing in clean, plain water to select healthy, disease free seeds. The healthy seeds will settle down the container, while empty, diseased seeds will float on water which is carefully removed. A small section of farmers informed that soaking of seeds with *maha neem* (*Azadirachta indica*) leaf may protect the rice seedlings from many insect pests.

C. Practices followed in nursery beds: It was revealed that rice stem borer and rice thrips are the major insect pests in rice field, while brown spot disease is the common disease of rice in nursery beds. Both the insect pests and disease can be effectively managed by spraying raw cow dung mixed with water. Alternatively, dusting of crushed goat excreta over the leaves also effective in managing rice thrips, rice stem borer and brown spot disease of rice.

Some farmers place bamboo post or twigs of locally available plants (nearly 4-5 feet high) inside the nursery beds. This practice will facilitate the predatory birds to sit on it, which will feed on the stem borer present in the nursery beds.

Maintenance of proper water (not letting the nursery to dry) level is another practice to reduce rice thrips infestation.

Use of tobacco water is effective to manage many pests of nursery beds. Tobacco leaves are dipped in water for overnight and then mixed thoroughly to have a dark tanned

mixture, which is sprayed over the seedling to manage insect pests of rice in nursery beds.

Application of rice straw ash may induce resistance to rice seedlings against insect-pests and diseases, and provide better growth of seedlings- farmers opined.

D. Practices followed before seedling transplanting: All most all the farmers use to clip the tip of the rice seedlings before transplanting and feed them to cattle. This practice seems to prevent the incidence of most of the insect pests of rice.

E. Practices followed in main field

i) Rice stem borer: Several practices are followed to reduce the infestation rice stem borer by the farmers. The most common practice is to place bamboo post or branches of the trees inside the field, facilitating the predatory birds to sit on it. Birds in turn will feed on the rice stem borer.

Twigs of Germany bon (Bitter bush: *Chromolaena odorata*), Pochotia (Chinese chaste tree : *Vitex negundo*) are placed around the bunds of the rice field. The odour of these plants will repel the stem borer. These two plants are widely used by villagers against many human diseases.

Peels of *bor tenga* (Pomelo: *Citrus grandis*) or crushed rhizome of *Keturi halodhi* (wild turmeric : *Curcuma aromatic*) or chopped *Kola Kachu* (taro : *Colocasia esculanta*) are spread over the standing water of rice field to manage rice stem borer. Both the botanicals act as repellent to rice stem borer. Raw *C. aromatic* paste is widely used as antibacterial medicine in the villages.

ii) Rice case worm: Respondents mentioned that draining out of ponding water in the rice field is the best practice to reduce the infestation of rice case worm, however many of them fail to do so due to lack of appropriate facilities to drain out the water from the field. Alternatively, kerosene oil and / or wood ash or raw cowdung is mixed with standing water in the field to reduce case worm infestation. These practices make the field water toxic to kill the larvae of case worm.

Many respondents informed about the use of jute or coconut fibre rope, dipped in kerosene oil. The rope is moved over the caseworm infested field. Kerosene dipped rope will pull down the caseworm larvae to the water and kerosene oil, being toxic will kill them.

Twigs of *germany bon* (Bitter bush: *Chromolaena odorata*), Pochotia (Chinese chaste tree: *Vitex negundo*) are placed around the bunds of the rice field to repel the case worm.

Bird perching, in the same way against rice stem borer is also very effective against case worm.

iii) Rice leaf folder: Bird perching, in the same way against rice stem borer and rice case worm is also very effective against rice leaf folder. Few farmers suggested that leaf folder infestation can be minimised by application of neem leaf extract (Neem leaves are boiled, and the water is sprayed).

iv) Rice Gandhi bug: Rice gandi bug appears from milky stage of rice, and considered as one of the major pest of rice. The most common practice suggested by farmers is use of fire (light trap). Farmers use to burn agricultural waste (dry leaf, twigs etc.) or damaged cycle tyre etc. in the field during evening hours. In Assam, lighting of lamp (commonly known as *saki*, an earthen lamp lighted using mustard oil) in the field during the month September-October is an age old practice.

Earlier, farmers used to hand dead frogs and / or crabs around the rice field on bamboo sticks. The odour of dead crab / frog attracts the bugs to stick on them, and is killed later on. This is not in practice in present day because farmers feel that this practice has a negative impact on our environment. Instead of frogs and crabs, farmers advocate using inner portion of Jack fruit (*Artocarpus heterocephyllus*) in the same manner of using crabs and frogs. The inner portion of jack fruit also attracts the gandhi bugs.

v) Against rice diseases: Application of mixture of raw turmeric and soap (liquid formulation) reported to be effective against various diseases of rice.

Spraying of raw cow dung mixed with water at 1:10 ratio can effectively manage the bacterial leaf spot of rice. Application of wood ash also reported to manage brown spot disease of rice, but collection of wood ash for a large area is a problem.

vi) Rodent: In some pockets of Jorhat district rodents are considered as major threat during ripening stage of crop. Farmers use traps with different baits such as dried fish, ripe fruits etc. to catch and to kill the rodents.

vii) Iron toxicity: Iron toxicity is another problem in few pockets. Walking down between the rows of rice or letting the ducks to move around the rice plants can significantly reduce the toxicity. Making ducks to move around the rice plants can reduce the infestation of many insect pests, as they will feed on the insects present in the field. Use of paddy weeder is also effective.

Discussion

The present study reveals that a good number of indigenous technologies are available to manage the important pests of rice. It is observed that rice growing farmers of each and every states of our country use several different indigenous technologies to increase production and productivity of rice as well as other crops ^[5,6,7,8,9,10]. Sardana *et al.* (2005) stated that traditional science and technological practices developed by the farmers over centuries on large diverse agro ecological conditions of our country are always appropriate and sustainable ^[11]. Sundramari and Ranganathan (2003) emphasised on the importance of collection, preservation, validation and adoption of ITKs to reduce dependence on external inputs, to reduce the cost of cultivation and to propagate eco-friendly agriculture ^[12]. Rajput (2018) documented several ITKs commonly used by Indian farmers crop wise with a view to disseminate the knowledge and benefit among the farmers, researchers and scientists so that the scientific reasons behind the use and efficacy of these technologies can be explored ^[13]. Being cost effective and free from environmental pollution, these technologies can be used successfully as one of the strategic components of integrated pest management for managing the pests of rice.

Conclusion

The agricultural development strategy should substantially rely in indigenous technical knowledge, because it is cost effective and environment friendly. Farmers have been using these or some of these practice from time immemorial. While present day world is looking back to the nature again, scientific interventions of such practices to incorporate them in to the integrated pest management module may help to reduce pesticide load in this planet. This makes a pressure on

the researchers of India to explore, collect, preserve, validate and to make them appropriate to adopt to reduce dependence on external inputs, to reduce the cost of cultivation and to propagate eco-friendly agriculture.

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