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Traditional pest management practices of Assam

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The paper describes the Indigenous Technical Knowledge (ITK) of pest management prevalent among the farmers of Golaghat, Jorhat and Sivasagar districts of Assam. The information was collected on the basis of personal interview to each of the farmers through a questionnaire. Mosaic of ITKs appeared from the farmer's practices and many of them may serve as the input for valid scientific investigation for large scale use of insect pest management.

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More than 70% of the people of the Assam are engaged in agriculture. Among the various agricultural crops, rice is the most dominant crop occupying 80% of the total agricultural land of the region[1]. The farmers from different ethnic diversity of the region have developed their own systems in cultivation of various crops[2]. These practices, commonly known as indigenous technical knowledge (ITK) are therefore, quite endemic to this region which may be true for other regions of the country as well.

Recently, the organic agriculture is emphasized, particularly in rich biodiversity areas like North East India. The ITKs are ecofriendly and compatible to other pest management practices. Further, due to rapid urbanization, the ethnic groups are promptly reducing their conservative attitude for which the long earned ITK that they are carrying from generation to generation are quickly disappearing. In this context, collection, compilation and scientific evaluation of the ITKs are very important. The present paper catalogues such ITKs practiced by the farmers of North East India.

Methodology

Four hundred fifty farmers of 20 different villages of Jorhat, Sivasagar and Golaghat districts of Assam were interviewed during 2001-2004 by supplying following questionnaire:

1. Are you aware about ITK?
2. Where from you have come to know about these ITKs?
3. What are the crops that are generally selected for ITKs use?
4. What are the pests that are targeted?
5. Do you follow any dose?
6. What are the reasons that you are not using them in spite of knowing all those ITKs?
7. Do you think those will be effective against any crop pests?

Results and Discussion

After going through the questionnaire filled up by the farmers it was revealed that about 90% were aware about the ITKs and these are known to them from the seniors. Small holding farmers have regularly been using ITKs. However, medium and large farm holdings farmers often rely on chemicals for suppression of the pests. It was also observed that most of the ITKs were related to the management of rice pests. Rice is the most dominant crop of Assam and cultivated by the people since time immemorial. Therefore, wide use of ITKs for suppression of rice pests was observed. The ITKs were used against most of the important crop pests; however, the farmers targeted soft-bodied insects more frequently. Doses of ITKs were found variable among the farmers. This heterogeneity of doses was due to lack of any published information regarding ITKs. They applied the dose from their experience. Botheration of preparation of indigenous formulations and delayed results of most of the ITKs were reasons of unpopularization of the ITKs among the farmers.

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Table 1—Distribution of respondents on selected dimensions of using ITKs

Dimension	Response category	Percentage
Regularity of use	Use regularly	44.44
	Use sometimes	33.33
	Use rarely	22.00
Extent of use	Use full package	30.23
	Use specific package	51.12
	Know but no use	18.65
Crop selected for use	Rice	40.00
	Vegetables	20.00
	Plantation crop	15.00
	Stored grain	20.00
	Others	5.00
Target pests	Soft bodied	50.32
	Hard bodied	40.18
Reason for not using regularly	Botheration of use	44.34
	Not quick in action	30.35
	Less efficient	20.12

However, the farmers reported that use of ITKs has great role in the management of pests of crops (Table 1).

The remark on each traditional agricultural pest management practices drawn from their experience is presented (Table 2). It is interesting to know that the component of most of the traditional practices are of biological origin such as neem, pumalo (*Citrus grandis*), phutuka (*Melastoma malabathricum*), drumstick (*Moringa oleifera*), fern, bamboo, duck, cow dung, etc. However, only a few components, such as kerosene and tyre are derived from synthetic sources. It is due to the fact that the origin of the ITKs represents the era of pre-synthetic period and it is much older than the development of synthetic compounds.

Conclusion

It can be concluded that the ITKs, which are prevalent among the farmers from the time

Table 2—Indigenous agricultural pest management practices of Assam

Practice	Purpose/use	Remarks
(a) Rice (*Oryza sativa*):		
Raw cow dung is mixed with water to prepare a suspended solution, which is sprayed in the rice field.	Control the thrips (*Thrips oryzae*) infestations.	Odour of the cow dung repels the pests.
Erection of bamboo (*Bambusa indica*) branches or top, or other stick in the rice field.	Control rice stem borer (*Scirpophaga incertulus*) population.	Attract birds to take rest on the bamboo stick. The birds feed the adult moths of stem borer and swarming caterpillars. Sap of raw bamboo shoot contain hydrocyanic acid and possesses antiseptic and larvicidal properties[3].
	Control of swarming caterpillars.	
Steam decoction of neem (*Azadirachta indica* A. Juss.) seeds and leaves, and the extract is sprinkled in the rice crop. The extract is prepared by mixing 1 to 3 gm of ground neem seed/leaf in 1 l of water (0.1-0.3% concentration) for 12 hrs[4].	Control of *Scirpophaga incertulus* population.	The azadirachtin present in the neem seed and leaf act as antifeedant and growth retardant to insect[5].
Rope, dipped in kerosene stirred in the water of rice field.	Control of rice case worm (*Nymphula depunctalis*).	Kerosene act as toxicant to case worm [6].
Spreading of raw cow dung in the field water.	Control rice case worm (*Nymphula depunctalis*).	Water in the rice field mixed with cow dung has oxygen deficiency.
Removal of grassy weeds from bunds around the paddy field.	Control of rice leaf folder (*Cnaphalocrocis medinalis*).	The grassy weeds may provide suitable microhabitats.
Keeping slices of pumalo (*Citrus grandis* Osbeck) in the paddy field @1 trap/6m^2.	Control of *Scirpophaga incertulus* population.	The essential oils of pumalo repel stem borer [7].
Placing chopped leaves of Indian rhododendron or phutuka (*Melastoma malabathricum* Linn.) in paddy field.	Control of *Scirpophaga incertulus* population.	The chopped leaves emit foul smell, which drive away the insect from field.
Rearing duck near the paddy field.	Control of rice hispa (*Dicladispa armigera*).	Ducks voraciously feed on adult rice hispa.
Mixing cow dung with water in the rice field	Control of *Dicladispa. armigera*	Cow dung contains Nitrogen, helps to revive the damage caused by rice hispa.
Placing of grounded bark of drumstick (*Moringa oleifera* Lam.) in the field.	Control of *Scirpophaga incertulus* population.	Bark may contain insecticidal principles. Drumstick has been reported to have medicinal properties [8].

Contd—

Table 2—Indigenous agricultural pest management practices of Assam—*Contd*

Practice	Purpose/use	Remarks
Placing few branches of fern (*Cybotium* sp).	Control of *Scirpophaga incertulus* population.	Fern has insecticidal activity[9].
Burying the puthi or barb fish (*Puntius* sp.) in the soil for 15-20 days and spraying water extract in the rice field.	Control of *Scirpophaga incertulus* population.	The fermented fish extract repels stem borer.
Spreading of goat dung in the rice field.	Control of rice insect pests.	Smell of goat dung may repel insects.
Burning of bicycle tyres near the rice field before panicle initiation.	Control of rice *Gundhi* bug (*Leptocorisa acuta*).	The foul smell of burned tyres repel *Gundhi* bug.
Placing citrus or *Sakala* tenga (*Citrus sinensis* Osbeck) peels in the rice field @ 1 trap/6m^2.	Control of *Scirpophaga incertulus* population.	The citrus peels have insect repellent properties[7, 10].
Putting of cycle tyre tube in the mouth of the rodent burrow.	Control of rodent.	The black cycle tube act as a rat scarer due to its snake like appearance.
Pouring of vermilion water in the trapped rodent and releasing in the field.	Control of rodent.	Due to the red colour appearance of the released rodent, the other rodent of the field runs away.
(b) Citrus (*Citrus* sp.)		
Smoking in the pumpkin field.	Control of fruit fly *Bactocera cucurbitae*.	Smoke often act as repellent to various insect-pests.
Application of fish water on the base of citrus plant.	Control of citrus trunk borer (*Anoplophora verstegii*).	The fish water attract predatory red tree ant (*Oecophyla* sp.).
Smoking below the citrus plant at the time of flowering.	Control of citrus insect pests.	Smoke repels insect pests.
Placing of red tree ant (*Oecophylla smoragdina*) nest on the citrus plant.	Control of citrus pests.	Red tree ant is a predator of citrus pests.
(c) Coconut (*Cocos nucifera* Linn.)		
Placing of long hair of women in the crown portion of coconut tree.	Control of rhinoceros beetle (*Oryctes rhinoceros*).	The beetle engulfed with long hair due to which they cannot move.
Placing of a dead frog at the base of the coconut plant @ 1 trap/m^2.	Control of *Oryctes rhinoceros*.	The dead frog repels insect [7].
The fragmented human hair and dry fish mixture are kept in the crown.	Control of squirrel.	Along with the fish the fragmented hairs are also consumed, which produces adverse effects to the squirrel.
(d) Stored pests		
Keeping a pot of water over the stored rice grain.	Control of rice moth (*Sitotroga cerealella*).	The moth falls on the water surface and thus killed.
Keeping of *neem* (*Azadirachta indica*) leaf, or *ber* (*Ziziphus jujuba* Mill.) branch over the stored rice.	Control rice weevil (*Sitophilus oryzae*).	The *neem* and *ber* leaf repel the weevil.
Placing of curry leaves (*Murraya koenigii* Spreng.) in grain storage.	Control of stored grain pests.	Odour of curry leaves repels many stored grain pests.
Mixing of mustard oil with stored grains.	Control of stored grain pests.	The mustard oil repels stored grain pests.
Sand cover (2-5 cm depth) over the stored potato.	Control of potato tuber moth (*Pthorimaea operculella*).	The female moth can not lay egg on the potato

immemorial, if organized and used scientifically would go a long away in the management of crop pests.

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