

## Traditional Pest Management Practices and Beliefs of Different Ethnic Tribes of Meghalaya, North Eastern Himalaya

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### INTRODUCTION

Meghalaya state is a part of North Eastern Himalayas and it is a land-locked territory with a geographical area of 22 429 km<sup>2</sup>, lying between 25° 47' and 26° 10' N latitude, and 89° 45' and 92° 47' E longitude. It is exceptionally rich in biodiversity of insect pests and their natural enemies (Firake et al. 2012a; 2012b), the Khasi and Jaintia hill districts of the state are one of the richest botanical habitats of Asia. The region is inhabited by three main tribal groups, the Khasi (42%), the Jaintia (12%) and the Garo (32%), which together comprise 86% of the state's total population of 2.3 million. Besides, frequent dynamics in food grain production, climate of the region is highly conducive for the occurrence and multiplication of several insect pests. These insect pests cause enormous damage to the crops resulting into shortage of food production in the region. Stored grain pests of worldwide importance including rodents also cause huge losses.

The state is rich in traditional knowledge, thus different tribal groups of the region preferred to use their own traditional practices based on local resources, which they inherited from their forefathers. The traditional practices are important element in local life and are found to be excellent for the management of several pests. Moreover, these practices facilitate proper utilization of available bio-resources ethnologically for various socio-economic and developmental purposes. Though, some important traditional pest management practices from different regions have been reported (Sinha 2010; Sinha et al. 2004); still there is huge scope to document common traditional practices of the region. Therefore, in this study we

aim to collect important pest management practices used by farmers of the region. This comprehensive information would be further useful for other farmers of the country and also to the researchers for its proper scientific evaluation and validation.

About 14 villages of two districts (Ri-bhoi and East Khasi hills) of state were visited during various training/awareness programmes, demonstrations and survey conducted either by ICAR institute or state government (during 2010 to 2012). Additionally, three main villages of Jaintia hill district were also surveyed during various cropping seasons. Information on different pest management practices was collected through informal discussion with the group of 35-40 farmers (comprising both male and females), gathered for the programmes and adaptability of practices was also confirmed. Headmen (chief) of villages were informed prior to discussion and target was successfully achieved with the help of local language translator. Attempts were also made to understand the belief/logic behind each common practice.

### RESULTS AND DISCUSSION

All the available efficient traditional pest management practices commonly used by the tribal farmers of the region are presented in Table 1. Overall study indicated that, farmers intelligently use locally available natural resources for the management of noxious pests. Majority of practices were based on specific mechanisms or beliefs of the different tribes, which was either gained through years of experiences or from their preceding generations. Plants or products mentioned in the study (viz., neem, jayur, tobacco, jackfruit, bamboo,

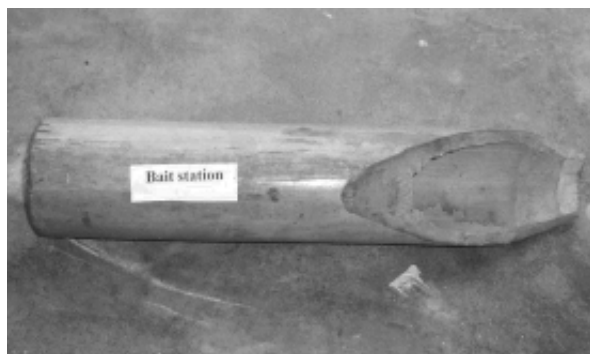
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**Table 1: Traditional pest management practices commonly used by the tribal farmers of the region**

SN	Traditional practices	Target	Belief/Remark
1	Placing tin or wooden plate containing rice grains and latex of jackfruit ( <i>Artocarpus heterophyllus</i> ) into the paddy field	Birds	Birds attracts to feed on rice grains and stuck to the plate surface
2	Use of gummy sticks in paddy field: Rolling of gummy thread (of latex) over the bamboo sticks and fix it in the field	Birds	When bird rest and/ or sit on the stick for feeding the rice grains, get stuck to the gummy portion. After that, farmers remove the captured birds.
3	Placing bird perches in paddy and vegetable field	Birds	Predation: while resting on the sticks bird predate on insect pests
4	Placing cow blood inside wooden containers (mostly bamboo pipe) into the paddy field	Birds	Repellent: foul smell coming out form rotten blood repels the birds
5	Sprinkling of domestic ash on vegetables	Defoliators and soft bodied insects	Ash acts as a corrosive materials and helps in desiccation or water loss from insect body
6	Placing green bamboo sticks into the irrigation source of paddy field	Stem borers, leaf folder and birds	Bamboo serves as a bird perches Sap of raw bamboo shoot contain insecticidal principle
7	Burning of crop residue after harvesting of paddy and maize	Hibernating stages of insects, mostly stem borers	Resting stages of insect pests get eradicated due to burning
8	Placing of rotten crab/frog on sticks in paddy field	Gundhi bug	Fault smell attract gundhi bugs and destroy the bugs after collection
9	Crushing of Jaiur-blai ( <i>Zanthoxylum oxyphyllum</i> Egde) fruits on the body parts before working in the paddy field	Parasites	Smell of jayur repels the parasites like leech, nematodes, worms etc.
10	Placing of dried neem ( <i>Azadirachta indica</i> ) leaves into the stored seeds	Rice weevil and moths	Neem leaves are both repellent and antifeedent
11	Placing of small pine branches into the paddy field	Stem borer, leaf folder and case worm	Pine exudates contain toxic principle that kills the insects. Moreover, it reduces the green algae in rice field and also acts as a bird perches
12	Use of local (bamboo made) rat bait station (Figure 1), traditional bamboo made traps (Figure 2) and few conventional traps utilizing local techniques	Rodents	Wooden bamboo bait stations/ containers protect the poison baits from weather calamities and non target poisoning. It also increases the efficacy of the bait. Traditional bamboo made rat traps are highly efficient, easily available and cheaper also, therefore these traps are also popular in addition to some commercial traps.
13	Spraying of aqueous excreta of silkworm on paddy and vegetables	Leaf folder and rice blast disease	Killing action and repellents for leaf folder Some people believe that it also cure blast disease
14	Placing of citrus/orange peels into the paddy field	Stem borer, leaf folder and skippers	Smell of orange peels repels the insects
15	Keeping slices of pumalo ( <i>Citrus grandis</i> Osbeck) in the paddy field	Stem borer and leaf folder	Smell of pumalo repels the insects
16	Use of iron wire for removal of grub from infested areca nut trees	Red palm weevil	It kills the grubs (Mechanical control)
17	Smoking below the hanging maize cobs in the kitchen	Rice weevil	Smokes repels the stored grain pests
18	Covering of banana bunch by polythene or cloth bags	Flea beetle	Insects cant reach to the fruit surface
19	Spraying of boiled tobacco ( <i>Nicotiana tobacum</i> ) extract on vegetables	Lepido-pteran pests	It kills the pests. Moreover, tobacco contains insecticidal alkaloid, nicotine.



**Fig. 1: Locally made rodent bait station/container**

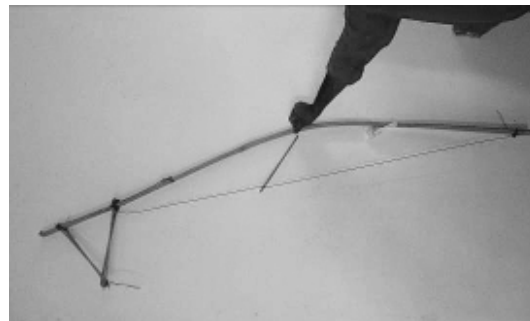
pine and citrus etc) are commonly used for the management of insect pests in different parts of the country, showing their popularity among the people (Kalaisekar et al. 2008; Bhattacharjee and Ray 2010; Das and Saikia 2010; Sharma and Borthakur 2008; Sarangi et al. 2009)

Furthermore, jackfruit (*Artocarpus heterophyllus*) latex is being used as a bird lime or for attracting and trapping the birds in different places (Elevitch and Manner 2006; Mortan 1987; Online sources as on 24.01.12: <http://www.fruitsinfo.com/Jackfruit.php>; <http://www.cropsreview.com/jackfruit.html>; <http://creole-cuisine.com/2012/01/what-is-jackfruit-in-creole-cuisine/> and <http://jackfruitlatex.blogspot.com/>). Fruits and seeds of Jaiur-blai (*Zanthoxylum oxyphyllum* Egdew) are employed as an aromatic tonic in fever, dyspepsia, and expelling roundworms (Kalia et al. 1999), besides it exhibit good antibacterial, antifungal, anthelmintic activities (Elevitch and Manner 2006) and insecticidal properties (Mehta et al. 1981; Kokate et al. 2001; Udo et al. 2004; Owusu et al. 2007). Additionally, larvicidal properties of pines (Ansari et al. 2005) and bamboo (Anonymous 1948) have also been reported.

Management of rice pests by erecting bird perches (Bhattacharjee and Ray 2010) and attracting the gundhi bugs through rotten crabs (Bhattacharjee and Ray 2010; Deka et al. 2006) have been reported from different corners of the region. Red palm weevil is the severe pest of areca nut in the state and past report suggested its management through mechanical destruction (local word 'Peit Ksain Kwai') of grubs (Umdor 2004). Moreover, some cultural and mechanical practices including local rodent traps observed in this study



A



B

**Fig. 2: Commonly used rat traps (A. Vaithang, trap, B. Hnawhtawt trap)**

are also being utilized in several places (Sinha 2010; Umdor 2004; Barooah and Pathak 2009).

Many traditional pest control practices from tribal areas have been improvised and further utilized in the country, few of them includes popular 'Remodelled rat trap' of Tamilnadu (Narayanasamy 2006), 'Improvised rotten crab trap' of Meghalaya (Sinha et al. 2007; Pathak et al. 2001) and popular 'Fermented castor solution trap' of Tamil Nadu for white grub control (Online source as on 30.12.11: [http://agritech.tnau.ac.in/itk/Inde\\_techknowledge\\_dist.html](http://agritech.tnau.ac.in/itk/Inde_techknowledge_dist.html)). Besides, several bio-pesticide products have also been developed from traditional knowledge. However, it is worth to note that, all traditional practices are not eco-friendly; few practices may harm the ecosystem by direct or indirect means *viz.* killing or destruction of birds, frogs as found in some practices resulting in disturbance to the ecosystem.

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