

Traditional Indigenous Practice in different States of India: A Solution for Increasing Pollution of chemical Pesticide

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ABSTRACT

This review paper is an compilation of various ecofriendly indigenous practice used by few community in different state of country. It is found that these traditional practice use biological material and effective on pest of crop and vegetables. There are many disadvantages associated with the use of chemical pesticides like genetic variation in beneficial species, damage to the environment or water bodies, poisoning of food and health problems such as cancer. These chemical pesticides are costly and cannot afford by all farmer and force us to turn back these eco-friendly traditional method, not harm plant and animal, and affordable by all farmer. If standarization set for components of these indigenous method, will give good result and popularise these method among farmers.

KEYWORDS : traditional, pesticide, standardization, ecofriendly,

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INTRODUCTION

Today productivity in agriculture increase due to chemical, and new technology. But excess use of chemically made pesticide add toxicity in nature. These chemicals protect crop at cost of polluting soil, water, crop, killing soil microbes, birds, animals and human being. Now the times to go back to use traditional method made by interaction with nature by our ancestors. Which not only protect crop but also eco-friendly not harmful for nature. Our veda like Rigveda and Atharvaveda , some other old documents and books like Kautilya's Artha-sastra , Amarsimha's, Krishi-Parashara, Amarkosha, Sangam, Patanjali's Mahabhasya , literature of Tamilians, Surpala's Vrikshayurveda, Agnipurana, Someshwara Deva's Manasollasa Kashyapiyakrishisukti, Varahmihira's Brhat Samhita, etc also mention the method for controlling insect and pest in agriculture. Kautilya's Arthasastra suggest organic materials for control of crop diseases [21]. The use of milk, ghee, and cow dung for dressing the seeds and turmeric before sowing suggested by varamhira [4]. Milk and its product like ghee, cow dung cow urine also suggested by Surpala's Vrikshayurveda for protection of crop. surpala also suggest plant species like *Acorus calamus L.*, *Oroxylum indicum*, *Solanum indicum L.*, *Piper nigrum L.*, *Embelia ribes Burm. F.*, *Brassica alba L.* *Sinapis alba l.* (white mustard), *Curcuma longa*, *Piper nigrum*, *Seasum indicum*, *Madhuca(mahua)*, *Ficus benghalensis* in a test Cow milk is found effective against powdery mildew diseases caused by fungus [5]. Milk contain 40% proline and One research found that amino acid proline develop resistance power in plant against fungal diseases powdery mildew [19]. Raw Milk is found effective against leaf curl in chilli [1].

HARMFUL EFFECT

A study shows that chlorpyrifos cause DNA damage in earthworm. Glyphosates responsible for short viability of earthworms, and both chemically made pesticide affect feeding habit of earthworm [8]. Pesticides enter into water via drift by spraying, by runoff from treated area, leaching through the soil. Water contamination depends mainly on water solubility and hydrophobicity of pesticide, properties of soil, and also on the distance from an application site to a water source. Recently a study in punjab reveal that Pesticide also responsible for loss of micronutrient, [14] Another study by the Central Pollution Control Board on the quality of groundwater in India, show that contamination by pesticides leaching in groundwater is low in comparison to others states. Today, this may not look like a problem but in future it will effect, if contamination will continued. [22]. A report of central ground water in haryana reveal contamination of ground water in many district due to high fluoride and chloride make water unfit for drinking [2]. Excess use of pesticide and use of many banned pesticide responsible for increasing cancer patient in Malwa region of punjab, described as cancer capital.

In few area of country farmers who aware of harmful effect of these chemicals and small poor farmers still practice traditional method for field and post harvest management. Few method having plant and some organic non plant material used by people of kanyakumari Meghalaya Manipur Punjab, Tamilnadu, Assam, Sikkim listed here.

In southern peninsular of India study was conducted on traditional practices including plant and non plant material against the pest of paddy and coconut [15] table 1.

Table: 1 Traditional practices for pest control by tribes of kanyakumari

Plant materials	Non-plant material	Used against Pest of paddy	Used against Pest of coconut
1. Leaves of <i>Aloe vera</i>	Fly ash, lime and trap	Leaf folder, green beetle,	Rhinoceros
2. Leaves and seed of <i>Azadiracta indica</i>	1.Fire trap made up of wash cloth, fire, wooden stand for moth and insect	ear head bug, green horned caterpillar, brown plant hopper,	beetle, red palm weevil, black headed caterpillar
3. Whole plant of <i>Coleus aromaticus</i>	2.Pot fire made up of pot, stick, coconut shell for rodent	grasshopper, yellow hairy caterpillar, yellow stem borer, swarming caterpillar, striped bug,	
4. Leaves of <i>Pongamia glabra</i>	3.Plant trap made by cycas sp for plant bugs . 4. sand trap for Rhinoceros beetles.	black rat, cattle egret	

A study was conducted on three site (Mainbond, Sonai and Rajwari) for encouraging traditional agricultural practice of Manipuri (meitheis) community a separate ethnic group. After the interview of experienced farmer it is found that due to high education of sonai people use more insecticide than other two sites but maximum farmers of Rajwari did not use insecticides due to harmful effect on human health and rest other farmer use some indigenous method beside chemical method for insect –pest management in barak valley. Only few farmers of rajwari use chemicals. Study of selected farmers response in sonai also reveal that initially the production was higher than other site due to use of chemical but a group of educated farmers and old farmer prefer traditional method for long term. [6] table 2.

Table : 2 Traditional practices of pest control (Meitheis) Manipuri in barak valley of Assam

Method for Rice	Pest
Twigs of Nishinda plant (<i>Vitex negundo</i>) placed in the infected rice fields	<i>Dicladyspa armigera</i>
<i>Utongthangmei</i> (clothes burn in four corner on the bamboo sticks).	<i>Leptocoryza sp</i>
Heigri (<i>Dillenia indica L.</i>) leaves kept over the stored rice.	Rice weevil (<i>Sitophilus oryzae</i>).
Tezpata, (<i>Cinnamomum tamala</i> Nees & Eberm.) placed leaves on storage grains.	stored grain pests
Chawai sabi (<i>Polygonum hydropiper</i>) kept leaves over the stored rice.	Rice moth (<i>Sitotroga cerealella</i>)
Kuthap (<i>Clerodendrum viscosum</i>) twigs randomly placed in the infected rice field.	<i>Leptocoryza sp</i>
neem leaves and branches kept over the stored rice	Rice weevil (<i>Sitophilus oryzae</i>)

A Study of indigenous practices was conducted in 6 communities in three hill districts (Garo in WGH of Meghalaya, Mao, Maram, Poumai, Thadou in senapati and Tangkhul in ukhrul of Manipur) of Northeast India, on post harvest management of crops and a higher proportion of which are carried with plant materials and few other methods are based on miscellaneous substances. It is observed that these methods are 50-70% effective in reducing pest. Also opinion of farmers on effectiveness and frequency of use of some method vary in communities) [16] Table,3.

Table: 3 Traditional post harvest control of pest in Meghalaya and Manipur

Method	Pest
1. Put fresh or dried branches/leaves <i>Artemisia vulgaris</i> (Maharna), <i>Azadirachta indica</i> (neem), <i>Cannabis sativa</i> (bhang), <i>Cymbopogon khasianus</i> (Shupuh, Harvashe), <i>Elsholtzia blanda</i> (Kholo), <i>Melia composite</i> (Thoso) in and around granaries.	Insect and rat
2. Branches with inflorescences of <i>Cyathula tomentosa</i> (Changha kakhra) are put in and around granaries.	Rat
3. Place fresh leaves of <i>Dendrocnide sinuate</i> (Gilmat) in between two layers of boiled rice; after 24 hrs, put treated rice in possible rat runways as rodenticide.	Rat
4. Mix equal amount of ground seed kernel of <i>Entada pursaetha</i> (Kah, sui) and ground rice and put in possible rat runways as rodenticide	Rat
5. Prepare gum from the fruits of <i>Scorulla parasitica</i> (Chothi thou)fix in sticks and put in possible rat runways for trapping.	Rat
Miscellaneous method	
6. Different types of indigenous traps, placing pulse, maize and onion little 2-3 nearer to smoke of chullah, grain stored in special granries, outside house for proper aeration	Rat, Insect and pest

Pest management study of Assam by indigenous practices in 3 district(Golaghat, jorhat and sivasagar) reveal that farmers learn these methods from their ancestors. Small farmer use these methods on soft bodied insect. But medium and large farmers use chemicals pesticide for pest. Most of methods used for rice because rice is dominant crop in Assam. Dosage applied by farmers by their own understanding and experience due to lack of published data of these methods. These methods are unpopularized among farmers due to difficulty in preparation and delay of result. Most of the components of these methods are plants like neem, pumalo, phutuka, moringa, fern, bamboo, duck cow dung [9] table,4.

Table:4 Traditional pest control practice of Assam

Practice (a) Rice	Insect & pest
Suspended solution Raw cow dung and water sprayed in field. Mixing of cow dung with water in field.	Trips (<i>Thrips oryzae</i>) <i>Di cladispa armigera</i>
Bamboo (<i>Bambusa indica</i>) branches or top or other stick erected in rice field.	Rice stem borer (<i>Scirpophaga incertulus</i>) and swarming caterpillar
Sprinkling Steam decoction of neem seeds and leaves and the extract in the rice crop. The extract is prepared by mixing 1 to 3 gm of ground neem seed/leaf in 1Ltr of water for 24 hrs.	Rice stem borer (<i>Scirpophaga incertulus</i>)
Raw cow dung spread in the field water.	Rice case worm (<i>Nymphula depunctalis</i>)
Removal of grassy weeds from bunds around the Paddy field.	Rice leaf folder (<i>cnaphlocrocis medinalis</i>)
slice of pumalo (<i>citrus grandis</i> osbeck) kept in the paddy field @1trap/6m ²	Rice stem borer (<i>Scirpophaga incertulus</i>)
chopped leaves of Indian rhododendron <i>Melastoma malabathricum</i> placed in paddy field	Rice stem borer (<i>Scirpophaga incertulus</i>)
Grounded bark of drumstick and branches of (<i>Moringa oleifera</i>), fern(<i>cybotium</i> sp.) placed in the field	Rice stem borer (<i>Scirpophaga incertulus</i>)
Goat dung spread in the rice field.	Insect pests

(b) Citrus Smoking in the pumpkin field.	Fruit fly (<i>Bactocera cucurbitae</i>)
(c) Stored pest Keeping a pot of water over the stored rice grain.	Rice moth (<i>Sitotroga cerealella</i>)
neem or ber (<i>Ziziphus jujube</i>) branch kept over the stored rice.	Rice weevil (<i>sitophilus oryzae</i>)
curry leaves (<i>Murraya koenigii</i> spreng.) placed in grain storage.	Store grain pest
Mustard oil mixed with stored grain.	Store grain pest
Sand cover (2-5 cm depth) over store potato.	Potato tuber moth (<i>Pthorimaea operculella</i>)

Farmer protect stored product using 11 plants biologically and physio-chemically by solarisation [17] table,5.

TABLE 5: Traditional practice of pest in stored products - Tirunelveli District (TAMIL NAIDU).

Crop	Pests on crops	Plant used against pest
Rice (<i>Oryza sativa</i>)	<i>Sitophilous oryzae</i> , <i>Tribolium castaneum</i> , <i>Corcyra cephalonica</i> , <i>Sitotroga cerealella</i> , <i>Rhyzopertha dominica</i>	<i>Azadirachta indica</i> (neem), <i>Pongamia glabra</i> (Indian beach)
Maize (<i>Zea mays</i>)	<i>S. oryzae</i> , <i>T. castaneum</i> , <i>C. cephalonica</i> , <i>R. dominica</i>	<i>A. indica</i> , <i>P. glabra</i> , <i>Vitex negundo</i> L.(negundo)
Pulses (<i>Vigna unguiculata</i>) (V. mungo) (V. radiata)	<i>Callosobruchus maculates</i> , <i>Callosobruchus chinensis</i> , <i>S. oryzae</i> , <i>T. castaneum</i>	<i>A. indica</i> , <i>P. glabra</i> , <i>Cymbopogon citratus</i> Stapf.(lemon grass), <i>Cympopogn nardus</i> Rendl.(Malabar lemon grass), <i>Annona Squamosa</i> , <i>V. negundo</i> <i>Erythrina indica</i> , <i>Erythrina variegata</i> (Indian coral), <i>Eucalyptus globules</i> (blue gum), <i>Tephrosia purpurea</i> Pers.(wild indigo), <i>Psidium guajava</i> L(guava)

Traditional practice in Punjab discussed with scientist and found effective but need more standardization [10].

WHEAT

- Match box was put in the storage bin for protection from insect.
- Neem leaves rubbed along the walls of bukhari before storage of wheat.
- Neem leaves kept along with wheat in storage bin and Aak leaves also used for safe storage
- In bukhari ,(a square shaped structure constructed with mud and cement with an outlet at the ground level) farmer store wheat grain over the spread the layer of gram seed coat. wheat was stored over a layer of sand in bukhari
- Wheat grain to be used as seed were filled in gunny bags and these bags were stored in wheat straw and Gunny bags were kept on surface of stored grain.

MOONG

- Moong was stored after smearing it with mustard oil in bukhari.
- Moong store on a layer of ash in bukhari
- To protect from khapra beetles, Moth bean and moong bean mix with ash.
- Onion and garlic with their leaves were stored in open ventilated place.

A study of more than 125 method in 7 hills of tamil naidu (kalrayan. Kolli, pachamalai, javvadu, yelagiri,shervaryon and yercaud) found that out of the total practices most of are used for field crops and rest for stored product and household. It is found that all selected tribal practices show significant result, tested against pest of rice, pest of vegetables and also give recommendation for certain field application for rice, (Adathoda leaf + cow dung slurry, vitex leaf+butter milk extract, jatropa leaf + cow urine, agave leaf+ kerosene), for vegetables(vitex leaf extract, calotropis leaf extract + garlic + onion + chilli powder and Aloe

vera flesh +turmeric +chilli powder), for stored grain(vitex leaf powder, vitex leaf ,Neem leaf +turmeric powder and turmeric powder [19] Table, 6.

Table 6: Traditional pest control practice in 7 hills of Tamil naidu

Oryza sativa	Pest and insect
Mix <i>Lantana canara</i> leaf, fruit paste, wild tulsii leaf +50gm pepper chilli powder – boiled for 1- 2 hour and filter	Earhead bug In rice field
Scratching top leaves of 45- 50 days old rice plants with plam leaves	Leaf folder
Rice seed, dried pig dung +red earth(1 day before sowing)	Thrip
Mix <i>Agave americana</i> leaf , 2-3 drps lime juice (fermented for 4–5 days)	Leaf folder
Mix <i>Argemone</i> sp leaf , stem & fruit extract + well fermented toddy	Leaf folder
Tobacco leaf extract 200ml/L	Earhead bug
Mix <i>Calotropis</i> sp leaf broadcasting in the field	Hopper
Mix Aloe vera gel, chilli powder	Yellow stem borer
All crops Mix Lemon grass, oscimum leaf extract, butter milk , cow urine	Sap feeder, leaf feeder
Vegetables	
Grow insectivorous plant in field (<i>Utricularia</i> & <i>Napenthes</i>)	Sap feeders
Mix <i>Vetiver</i> sp extract and neem oil	Fruit and shoot borer
Cotton Spread <i>calotropis</i> sp leaf in cotton field	<i>Spodoptera litura</i>
Coffee Mix <i>Jatropha</i> sp, pig urine	Berry borer
Mango , coconut Mix <i>Nerium</i> sp , <i>cassia</i> sp , forest tulsii leaf extract	Beetles
Castor Turmeric and castor inter cropping	Capsule borer
Pulses Mix Pulse seed and red eath	Pulse beetles
Mix Pearl millet and goat urine made into pellets	Rat
Mix Dried powder of <i>Nerium</i> sp fruit and ash	Termites
Practice against store grain pest	
Mix Rice seed and <i>Annona squamosa</i> seed powder	pest of rice
Mix Pulse seed and red paste earth	Pulse beetles
Mix Rice seed and turmeric powder	pest of rice
Mix <i>Annona squamosa</i> seed powder and seeds	All storage pest
Mix Pepper powder and cereals	pest of cereals
Mix <i>Ecucalyptus</i> sp leaf and wood ash	All storage pest of cereals
Mix Maize seed and cow dung paste	pest of maize
Mix Turmeric and dried leaf of(vitex+ neem) and rice seed	pest of rice
Wild tulsii leaf paste smearing (inside storage bin)	All storage pest
Mix Ragi seed and pepper powder	Storage pest of ragi
Mix Coffee seed , castor oil, ground nut oil	Storage pest of coffee

Farmers of Sikkim use traditional pest management practices for managing pests and diseases of various crops. Large number of Farmers interviewed from 2013 to 2015 on traditional pest and disease control measures adopted by the farmers in Sikkim. The practices adopted by people is reason behind declaring Sikkim as the organic farming state [12] table,7.

Table : 7 Traditional pest management practice in Sikkim

Plant	Used against pest in crops
Titeypati (<i>Artemisia vulgaris</i>)	(a) Ragi (<i>Eleusine coracana</i>): against birds and disease attack.
Banmara (<i>Chromolaena odorata</i>), Chilouney (<i>Schima wallichii</i>)	(b) Ginger (<i>Zingiber officinale</i>): Against soft rot, bacterial wilt, <i>Fusarium</i> dry rot.
Dried peels of mandarin (<i>Citrus reticulata</i>)	Storage Pests in rice
Hatibar (<i>Agave sissalana</i>)	Vegetables: ants
Datura (<i>Daturastramonium</i>)	Ants
Neem (<i>Azadirachta indica</i>)	Storage pest of paddy
Angeri (<i>Lyonia ovalifolia</i>)	Extract is used against Cut worm, aphid etc.
Tobacco (<i>Nicotiana tobaccum</i>)	Leech
Bakainu (<i>Melia azadirach</i>)	Storage pests in rice: Dried leaves are spread inside the granaries.
Turmeric (<i>Curcuma longa</i>)	Ant Turmeric powder mix with water and applied at the base of the ant infested plant.
Moringe (<i>Dendrocnode sinuta</i>)	Rat Some edible item or Ghee applied on both side of the moringa leaves and kept inside the grains storage room . Rat gets swelled when its tongue touches the leaves.
Fermented plant extract of titeypati (<i>Artemisia vulgaris</i>), angeri (<i>Lyonia ovalifolia</i>), banmara (<i>Chromolaena odorata</i>), piro unew (<i>Christella acuminata</i>) (fern)	Sikkim mandarin (<i>Citrus reticulate</i>): Fermentation of Extract for 21 days, prepared by crushing plant with water. After 21 days the fermented plant extract preparation is used for drenching the soil in Sikkim mandarin against bark eating caterpillar (<i>Indarbela quadrinotata</i>), trunk borer (<i>Anoplophora versteegi</i>), aphids (<i>Toxoptera citricidus</i>) and ants.
Fermented plant extracts mixture made up of titeypati (<i>Artemisia vulgaris</i>), banmara (<i>Chromolaena odorata</i>) and Lantana camara	Tomato and chilli: aphids and white flies

DISCUSSION

It is observed that traditional practices made up of natural component mainly from plants develop by nature for defending itself. Most of the plants are common used by these community in different area and easily available. Insecticidal property of most plants like neem, turmeric, tulsi [11], *Cannabis sativa* (bhong) [13], Datura, Calotropis [7] etc mention in old sculptures used by these community scientifically proved. Farmer use the dosage from their own experience and understanding. These method restricted to certain community and unpopularise due to difficulty in preparation. If these method studied as ayurvedic medicine for plant because ayurvedic medicine or any medicine effective only in appropriate amount in certain condition along with this standardization made for dosage and quantity of each component used in method just like ayurvedic medicine, give good result. If all these method compiled by digitalization in one app, which can be easily accessible by all farmer. Farmer can also be made aware about these by messaging or campaigning . In addition to this if government frame out certain policies to exercise maximum use of these traditional practices.

CONCLUSION

Traditional methods using indigenous plants with insecticidal properties in different area of country are being found to offer a safe, low cost, and more dependable method of crop protection and technically feasible. More scientific study and Digitalization of these ecofriendly method reduce extra burden of costly insecticide and pesticide on farmer, save from toxic effects on soil, water, crop, human diseases.

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