JUST AGRICULTURE
multidisciplinary e-Newsletter

Indigenous Technical Knowledge (ITK): A Biointensive Integrated Pest Management of Rice (BIPM)

Dharanikota Lalithambica Devi[1], Sanhita Chowdhury[1]* and Sunil Kumar Mandal[2]

[1]M.Sc. Research Scholar, Department of Entomology, Post Graduate College of Agriculture,Dr. Rajendra Prasad Central Agricultural University, Pusa (Samastipur) 848125, Bihar, India

[2]Assistant Professor, Department of Entomology, Post Graduate College of Agriculture,Dr.Rajendra Prasad Central Agricultural University, Pusa (Samastipur) 848125, Bihar, India

ARTICLE ID: 48

Abstract:

Indigenous technical knowledge is research and developed by farmers of traditional society and it is embedded in the culture of society. The researchers on such traditional knowledge are practiced by the common farmers based on their own need, without cost involvement and without any theories to support them. Indigenous technical knowledge is also such traditional knowledge which is developed by many farmers in order to minimise the insect pest and disease incidence in their fields. These ITKs are location specific, dynamic, non-chemical and eco-friendly practices for the management of insect pest and diseases of rice crops. The techniques developed by farmers are based on their yearlong experiences with the farming situation, understanding on environment and social ecological situations. This knowledge is disseminated free without any cost and it spread spontaneously by traditional oral means of communication.

Now a day agricultural, where synthetic chemical pesticides pose a threat to the environment as well as human health, the traditional method of pest and disease control maybe contributed as an important component of bio intensive integrated pest management. As the indigenous technical knowledge is socially acceptable appropriate and sustainable hence the studies has been under taken and discussed as under following.

Key words: Rice, ITKs, Insect-Pests, Disease, Management

Introduction:

The indiscriminate application of synthetic chemical pesticides has been reported to contaminate the environment and causing serious health related issues. The UN awareness

JUST AGRICULTURE
multidisciplinary e-Newsletter

about the use of chemical pesticides for their proper dosages, handling, time of application, label claims, risk related with their use in crop protection has been creating havoc in society. There has always been demanded to divert from synthetics to bio pesticides and to organic farming for the pest management in crop protection. Many farmers are practicing their indigenous knowledge in crop protection since ages without any scientific validation for the pest management. The scientifically validated indigenous practices could be considered as an integrated component of bio intensive integrated pest management programme in crop protection. Adopting these factories will not only help in reduce in the synthetic chemical pesticides load on environment, but also shall appreciate in encouraging the age-old wisdom of our country, practiced by farmers. These indigenous technical knowledge may help in conserving our biodiversity and sustainable agriculture, bring an alternative to pesticides. There for focuses on prominent and useful indigenous technical knowledge, practice by farmers and also validated scientifically by researchers, there after as to make them available to farmers and researchers' community.

Indigenous knowledge of agriculture is the result of commerce 1000 years of experience with nature. Indigenous practices are known to the farmers and our helpful in maintaining and enhancing the quality of environment. With the dissemination of modern agricultural practices, the indigenous practices have started losing their ground ground and have been eroded to a large extent. It is the information base for a society, which facilitates communication and decision-making. Indigenous information systems are dynamic and are continually influenced by internal creativity and experimentation as well as by contact with external systems.

Indigenous technical knowledge for crop and soil health:

Status of soil organic matter regulates the available nutrients status of soil not only as source, but also by buffering the soil reaction. Nearly 95% of nitrogen and sulphur are contained in soil organic matter. Bulk of zinc and copper are also in organic form. Therefore, decline in soil organic matter limits due to soil erosion by Run of or poor digital cover also multiply the nutrient deficiencies. Therefore, these one of the four most challenges of resource management in arid and semi-arid tropics.

This indigenous technical knowledge (ITK) is not only low-priced and evolved by incorporating local and easily available materials, but environment friendly for crop and soil

JUST AGRICULTURE
multidisciplinary e-Newsletter

health. Such technologies are important and meaningful in providing alternative means of crop protection in the country and elsewhere, at the scientific community in the search of alternative ways to manage and control pest problems. Using ITK tactics, the quality of natural resources is maintained and vitality of entire agro-ecosystem from humans, crop and animals to soil organism is enhanced. This is best ensured when the soil is managed and health of crops animals and people is maintained through biological processes (self-regulation). Local resources are used in such a way that it minimises losses of nutrients biomass and energy, as well as avoid pollution.

Useful and promising indigenous technical knowledge adopted by farmers-:

1. Management of paddy insect pest and diseases

a. ITKs used before transplanting

Summer ploughing:

Deep ploughing during the month of April-May was the most common practice adopted by the farmers to reduce the infestation of stem borer endemic areas and soil borne diseases. They also obtained that this practice also help in conserving soil moisture.

Burning of rice stubbles:

It was a common practice carried out by the farmers in ufra disease area and stem borer endemic areas. The ufra disease inoculum and pupal stages of stem borer hibernate inside the rice stubbles, and hence, burning of rice stubbles before sowing or transplanting exhibited good results in reducing the ufra disease and stem borer infestation.

Seeds soaking:

A small section of farmers used to soak seeds in clean or freshwater before showing and selected healthy and disease-free seeds that settle down at the bottom of the container.

Clipping of rice seedlings:

Tip portion of rice seedlings was cut then destroyed or fed to the cattle at the time of transplanting. This practice was carried against the all major insects of rice. Viz., rice hispa, case worm and stem borer from seed bed to the transplanting field.

b. ITKs used after transplanting

Rice stem borer (*Scirpophaga incertulus*):

JUST AGRICULTURE
multidisciplinary e-Newsletter

- Bamboo post or branches of tree was placed inside the rice field (nursery as well as in the main field) to facilitate sitting of birds on them. Birds act as a predator of rice stem borer.
- Peel of robab tenga (*Citrus grandis*) was spread throughout the field on standing water. Peels of this citrus fruit acted as repellant against rice stem borer and some other insect pests of rice.
- Extract from rhizome of Keturi Halodhi (*curcuma aromatica*) was applied on standing water in rice field. Sometimes crushed rhizome was directly applied at different places of the field. The bad odour produced by the rhizome acted as repellent of rice stem borer.
- Branches of Germany bon (*Eupatorium odoratum*), Pochotia (V*itex negundo*) were placed around the rice field which act as repellent of rice stem borer.

Rice caseworm (*Nymphula depunctalis*):

- A rope made up of jute or coconut fibre was soaked in kerosene oil and then the rope was moved over the rice crop to keep off caseworm, simultaneously, water was temporarily released in the field.
- Kerosene oil was applied in the standing water of rice field.
- Water of the rice field was temporarily released.
- Twigs of Germany Bon (*Eupatorium odoratum*), Binlongoni (*Polygonum* sp.) and Pochotia (*Vitex negundo*) where placed inside the rice field.
- Wood ash was applied in the standing water of the rice field.
- Twigs and leaves of sam salakha (a locally available plant) plant was spread / placed in the standing water of the rice field. Application of leaves of this plant changed the colour of standing water inside the rice field to black and caseworm infestation was reduced.
- Bamboo post or branches of tree was placed inside the rice field to facilitate sitting of birds on them. Birds acted as a predator of rice caseworm.

Rice hispa (*Dicladispa armigera*):

- Excreta of goat and/or cow were applied in the rice field to reduce the rice hispa infestation.

JUST AGRICULTURE
multidisciplinary e-Newsletter

- Tobacco leaves were soaked in water for overnight and the solution was sprayed over the crop.
- Rice crop infested with rice hispa was beaten with thorny twigs of ber (*Ziziphus jujube*)
- Leaves of pochotia (*Vitex negundo*) was dried, grinded and then, dusted over the crop.
- Kerosene oil was applied on the standing water of the rice field.
- Solution prepared from crushed *Keturi halodhi* (*C. aromatica*) rhizome was sprayed over the crop. Alternatively, crushed rhizome of *Keturi holodhi* was placed at different places of the rice field.
- Standing water in the rice field was temporarily released to reduce the infestation of rice hispa.

Gundhi bug (*Leptocorisa acuta*):

Rice bug is another minor pest of rice crop. The attacks the standing paddy crop during the milky stage period of 10-15 days. Loss by this pest may go up to 70-80 per cent, if left unmanaged. It is encountered both under upland and lowland condition in the country.

- Dead crabs or frogs were hanged in a bamboo stick and were placed around the rice field. Gandhi bug, attracted towards the dead crabfrog due to its odor stick on them and were then, killed.
- Bonfire or use of light trap during evening hours was most commonly practiced.
- Inner portion of 'Jack fruit' (*Artocarpus heterocephylius*) was fixed on a bamboo stick and were placed at different places of the rice field. The smell of the inner portions of the jack fruit act as an attractant and gundhi bugs adhered to it, were then killed.

Rice leaf folder (*Cnaphalocrocis medinalis*):

- Bamboo stick or branches of tree was placed inside the rice field to peach of birds.
- Neem leave were boiled in water and sprayed.

Bacterial leaf blight disease (*Xanthomonas oryzae*):

- To manage bacterial leaf blight 1.0 kg cow dung was thoroughly mixed with 10-12 litre of water and sprayed in rice infested field.

Brown spot disease (*Bipolaris oryzae*) and root-knot nematode (*Meloidogyne graminicola*):

- Wood ash was dusted against brown spot diseases.

JUST AGRICULTURE
multidisciplinary e-Newsletter

- Against brown spot disease of rice wood ash was dusted. On the other hand, to reduce the infestation of rice root-knot nematode in the nursery, rice straw ash was applied on the seed bed before sowing of seeds.

Different disease of rice:

- Removal and proper destruction of pest- infested plant parts check the spread of diseases.
- A mixture solution of neem leaf, papaya leaf, raw turmeric along with soap (detergent) solution was reported to be effective against various disease of rice

Birds:

- Birds are the major production constraints in direct seeding rice and in some early maturing varieties.

A farmer practices various ITKs for bird management:

- Empty tin or drum was beaten to produce loud sound which derived the binds away.
- Carcass of the crow was tied to a long pole in the centre of the rice field to frighten the birds and thus crop was saved.
- Polythene bags or polythene sheets were tied to a long pole and placed inside the field. Polythene bags/sheets produced sound due to wind which frightened the birds and drive away from the field.
- The field was surrounded by the reels of audio cassettes fitted to bamboo posts. The reels reflected the light and also produced sound to drive away the birds.
- A bell made up of brass or tin, operated from long distance which the help of a rope was used to frighten the birds.

Rodents:

Rodents were the major problem at the time of maturity of the rice crop and grain during storage. Some practices adopted by farmers to control this pest are:

- Dried fish was used a bait trap.
- Burrows formed by rodent were filled with water. The rodent living in those borrows will come out after burrows were completely filled with water and they were killed.
- Farmers make bamboo sticks with pointed tip. These sticks were pushed through the burrows and in suspected places of rodents living and, thus, killed.

The indigenous technical knowledge is low cost, user friendly and safe practices used by the farmers in country since time immemorial. Maurya (1993) mentioned that farmers

JUST AGRICULTURE
multidisciplinary e-Newsletter

evolved many practices to minimize the insect pest damage in their crop field through trail and error experience. Dhaliwal and Arora (1994) stated that various indigenous cultural and mechanical practices developed by farmers helped to keep the pest population under control. Kumar and Sahgal (1998) also collected a good number of ITKs practiced by the farmers of Himachal Pradesh to check the population of different pests of cereals and pulses. It is well known that a colossal amount of traditional science and technological practices developed by a large number of farming community above diverse agro-ecological countries over the centuries, which are socially appropriate and sustainable (Sardana *et al*, 2005). Whereas Das and Saikia (2010) also emphasized the strengthening of extension activities through the indigenous farmers practices. In the contest of present day organic farming concept scientific intervention of such properties may help the earth to keep pesticide free.

Conclusions:

An escape from rich indigenous knowledge systems may not be wise by treating them outdated and unscientific just because they are being practiced by resource poor and under privileged farmers belonging to the under developed regions. Since the indigenous technical knowledge are a basket of sustainable technological options rather than fixed packages. These may be promoted to strengthen the on-going pest management programmes in the country. This would be reducing the use of synthetic chemical pesticides for further improvement in bio-intensive IPM package through protecting the agricultural environment.

References:

Das D, Saikia P (2010). Indigenous technical knowledge for management of rice pests in Assam. Ann. Pl. Protec. Sci., 18: 123-126.

Dhaliwal GS, Arora R (1994). Trends in Agricultural insect pest management (Eds). Commonwelth publisher, New Delhi, pp. 1-264.

Kumar S, Mukesh S (1998). Indigenous technical knowledge of farmers about pest management. Ann. Pl. Protec. Sci., 6: 186-188.

Maurya RP (1993). Knowledge of farmers on pest management in oilseed crops in eastern U.P. their need for extension activities. Ann. Pl. Protec. Sci., 1: 126-128.

Sardana HR, Bambawale OM, Kadu LN, Singh DK (2005). Development and validation of adoptible IPM in okra through farmers participatory approach *Ann. Pl. Protec. Sci.*, 2: 215-217