Effectiveness of ITKs for Sustainable Production of Horticultural Crops in North Lakhimpur Districts of Assam

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ABSTRACT

Integrated crop management strategy is inadequate without involvement of indigenous technical knowledge (ITK). Horticulture is one of the important enterprises of this region. The management practices of tribal farmers are ancient, indigenous and traditional in nature. Therefore, it is important to explore the indigenous knowledge base associated with the horticultural enterprise in the North Eastern region for sustainable development. Keeping the above consideration in view, the present study is conducted to document the utilization of Indigenous Knowledge System by farmers in the production of horticultural enterprise in North Lakhimpur district of Assam. The participatory methodology was followed to construct and conduct the whole research study. The key informant methods and focus group discussion methods were followed to collect the information. The documented ITKs will serve as a ready reference for the agricultural scientists for further study to determine their scientific rationality and effectiveness. This will also be helpful in technology blending programme to generate eco-friendly, location specific, economically viable and socially acceptable technologies.

***Key words**: Indigenous technology knowhow; Horticulture crops; Sustainable development;*

Local or autochthonic knowledge refers to the accumulative and sophisticated bodies of knowledge, know-how, practices and representations that are maintained and developed by native communities, who have long histories of interaction with the natural environment (*UNFCCC, 2012*). Integrated Crop Management considered as ultimate challenge for sustaining the high level agricultural production. However, one desirable missing link in this strategy is inadvertence involvement of indigenous technological knowledge (ITK). The dissemination of contemporary practices has led to loss of indigenous practices and has eroded to a large extent over the years however the advent of the concept of sustainable agriculture in late eighties in Indian agriculture has elicited interest in ITK. It varies between countries, regions and even between farms to farm. *Chandola et al. (2011)* have rightly mentioned that sustainable agriculture strives to integrate modern sciences with traditional farming wisdom. The indigenous technologies are free from use of chemicals and therefore these are considered to be eco-friendly. As a matter of fact, the traditional societies in North East India have a rich Traditional Ecological Knowledge (TEK) and Indigenous Technical Knowledge (ITK). ITK is developed and adapted unendingly to gradually changing environments *(Sanjay-Swami, 2019*).

In Assam, horticulture crops cover an area of 5.75 lakh hectares which account for 14.04 percent of the total cultivable area of 40.99 lakh hectares in the state in the year 2015-16 (DES, 2015). The important fruit crops in the state are banana, pineapple, citrus, guava; plantation crops are coconut, areca-nut and vegetable crops are potato, cucurbits, peas and beans (*DHFP, 2015*). Therefore, there is an indispensable need for sustainable agriculture. Today, several ITKs are at risk of becoming extinct because of rapidly changing natural environments. Many traditional agricultural systems need

to be redeveloped through incremental, rather than quantum modification, based on TEK; anything drastic may not find acceptance by the local communities (*Dean, 1993*). Problems associated with indigenous people and indigenous knowledge had extensive or serious impacts on development endeavours. Largely in India and specifically in Assam where majority of farmers are small and marginal managing little production system with a lot of difficulty in ignoring profitability, the ITK finds its larger relevancy.

MATERIALS AND METHODS

The study was conducted with a sample of 120 farmers of North Lakhimpur district of Assam. A multistage purposive cum random sampling design was followed for selection of the respondents. The information was collected by personal interview methodology with the help of pre-tested structured research schedule. Perceived effectiveness implies the degree to which the farmers perceive that a positive outcome is obtainable by using a particular ITK practice in solving the field problems. The effectiveness score were collected by using the scale developed by *Supe and Singh (1969)*. It was measured using the mean perceived effectiveness index methodology which is depend on the perception of the farmer about the attribute of the indigenous technology like relative advantage, compatibility, trail-ability, sustainability and observability which was based on socio economic status scale developed by *Trivedi and Pareek (1963)*.

RESULTS AND DISCUSSION

During the research study in the North Lakhimpur districts of Assam, utilization of indigenous technical knowledge in every aspects of livelihood of individuals was observed. As to the effectiveness of the identified ITKs, out of 20 ITKs explored during the investigation, 8 (40%) were found to be highly effective, 7 (35%) were moderately effective and 5 (25%) less effective. The percentage of farmer adopting the different indigenous practices ranges from 19.2% to 77.5%. This has relevance with the finding of Majumdar *et al*., (2013) who reported that the percentage of farmers practicing different ITK under rain fed agriculture in Assam ranged from 12.7 to 86.4%. The practice of smudging in which smoke of straw kept under trailing structures process to repel the fruit flies was found to be adopted by highest number of farmers (77.5%) followed by practice of using tobacco solution for controlling of pests like caterpillars, beetles, borers, leaf miners, aphids, thrips, cutworms etc. (73.3%) in different vegetable crops and practice of wrapping the fruit by polythene cover (70.8%) to control sucking pest. The probable reason behind this is that during pre-harvest, fruit bagging maintain a physical separation between the environment and the produce and act as a useful approach to reduce the losses caused by insects, the control of which otherwise required the application of several insecticides. Nicotine, a key toxin has known for insecticidal properties on its own and the active components probably include a mixture of phenols with known pesticidal properties working synergistically that's why the use of tobacco solution is very effective. The rationale behind the use of these ITKs was supported by *Gogoi and Majumdar (2001)*. Using the smoke from straw or burning herbs will have antiseptic or bacteria killing properties which can also use for insect repellent. This result confirms the earlier finding of *Nath et al., (2017)* who reported the ITK for pest management in Tinsukia district of Assam. These results are similar to the findings of *Das and Baruah (2010)* who identified ITK from the farmers of different district of Assam such as painting of citrus trunk against citrus trunk borer, pouring fresh milk on crown of coconut against rhinocerous beetle, application of salt solution against crown rot of coconut, smoking in the evening under mango trees against different pest, placing banana in potato field against red ant, spraying of fish wash on vegetable crops aphid and use of mustard oil in stored grain pests were some of most commonly practices used by the farmers of different villages of Assam.

In contrast to this, the practice of using salt solution in pits at the time of planting in coconut is practiced by only few farmers (19.2%) because of very low impact and effectiveness score. This finding has a compliance with that of *Seetharam and Veluswamy (2001)* and *Talukdar et al., (2012)* who found that farmers had low awareness and adoption of ITKs. The low extent use of ITKs in the present study might be due to more inclination of the respondents towards modern scientific and high yielding technologies, low production obtained by using ITKs and scarcity or non-availability of some plant species and other materials.

Table 1. Effectiveness of different identified ITKs for sustainable production of horticultural crops and their adoption among farmers of North Lakhimpur districts of Assam

Purpose of ITK	Crop	Materials Used	How and when it's used	Effectiveness Score	No. of users (%)
To control cutworm	Brinjal, Pumpkin	Ash	Broadcast on the plant	2.48 Medium	49 (40.8)
Reduce moulds	Citrus	Water used for fish cleaning	Poured after cleaning	1.42 Low	27(22.5)
To repel insect	Coconut	Salt	Used in pits at the time of planting	1.33 Low	23(19.2)
To repel fruit flies	Dolichus bean,	Smoke cucurbits	Smoke of straw kept under trailing structures process generally called as Smudging	3.60 High	93(77.5)
To trap and kill termites	Potato	Kerosene,	Poured in the holes	3.25 High	83(69.2)
To control potato tuber moth	Potato	water cow dung	Cowdung coating in tubers of potato and shade drying	2.10 Medium	37(30.8)
To repel fruit fly	Ridge gourd	Straw, dried chilly	Tied in rows from pole to pole	2.25 Medium	43(35.8)
Controls pests like . caterpillars, beetles, borers, leaf miners, aphids, thrips, cutworms etc	Vegetable crops	Tobacco, liquid soap	Mixture of tobacco 50gm, liquid soap 30gm and 4lt of water is simmered for 30 minutes then it is diluted at 1 part tobacco solution: 4part of water.	3.5 High	89(73.3)
To reduce the damage caused by rat in . standing crops	Standing crops	Leaves of elephant apple tree	Placing the leaves of elephant apple tree in the live burrow of rate holes.	2.36 Medium	44(36.7)
To repel various vegetable pest	Vegetable crops	Neem	Shelled neem seeds are finely grated and steeped overnight in a cloth suspended in water.	2.15 Medium	42(35)
To control rhinoceros beetle	Coconut	Polythene sheet, rope	By wrapping polythene sheet around the trunk and tying it process generally called as banding	2.05 Medium	36(30)
To control over sucking pests	Banana, Pome-granate	Polythene cover, rope	By inserting or wrapping the fruit by cover and tying it.	3.44 High	85(70.8)
To prevent over bending of the fruits	Ridge gourd	Stone, rope	Tying or hanging stone at the tip portion of the gourd	2.13 Medium	40(33.3)
To control Citrus trunk borer	Citrus	Cotton, Kerosene	Cotton soaked with kerosene is put into the hole and plugged with mud.	3.22 High	77(64.2)
To control nematode	Banana	Tobacco waste and neem seed powdered	Decanted solution of neem seed and tobacco waste are mixed together in which suckers immersed before planting	3.1 High	71(59.2)
To control leaf miner	Guava	Neem seed powder	Neem seed powdered solution sprayed	1.26 Low	21(17.5)
To control leaf miner and aphid	Citrus	Smoke	Smoking near the plant at the time of flowering in Feb-March and Sept-Oct.	3.07 High	67 (55.8)
To control ants and insects	Vegetable nursery	Banana pseudo stem	Banana stems are kept near the nursery bed at the time of sowing	1.47Low	32(26.7)
To control mango stem borer and red palm weevil in coconut	Mango, Coconut	Lime	Painting of trunk with lime	3.15 High	75(62.5)
To control citrus fruit sucking moth	Citrus	Polythene	Bagging of fruits with polythene and disposing of rotten and dropped fruits	1.56Low	37(30.8)

CONCLUSION

In spite of advancement in scientific knowledge in agriculture, ITK-based practices still remain in use by the vast majority of the farming community notably in resource poor farming situations without the knowledge of their scientific rationality. In this context blending of ITKs with modern scientific technologies is the need of the hour to support sustainable development of agriculture and allied sectors in our country. Many farmers who have a scientific approach and practical knowledge in dealing with various farming systems and technologies can hardly document their expertise. The documented ITKs serve as a ready reference for the agricultural scientists for further study to determine their scientific rationality and effectiveness. This will also be helpful in technology blending programme to generate eco-friendly, location specific, economically viable and socially acceptable technologies. Some locally available plants and plant parts are used by the farmers in traditional plant protection measures. Use of ITKs by scientific community will lead to production of new bio-pesticides in near future. Since ITKs are organic in nature the documented ITK approaches may be useful for extension personnel in planning and execution of various integrated management of nutrients, pests, diseases and weeds through their judicious integration to these systems. Proper documentation, validation and refinement of ITKs from different traditions and culture and their use different stage will help mankind for easy access of ITKs or ITK based blended technology for their farming and will also help in developing eco-friendly approaches leading to a safe and healthy environment.

REFERENCES

Chandola, M., Rathore, S. and Kumar, B. (2011). Indigenous pest management practices prevalent among hill farmers of Uttarakhand, *Indian J. Tradit. Knowle.*, **2**: 311-315.

Das, D. and Baruah, M. (2010). Sustainable practices for pest and disease management of horticultural crops. *Ann. Pl. Protec. Sci.*, **18**: 357-361.

Dean, D.L. (1993). Indigenous Knowledge Technology: Blending and Gender Implications. In: *Gender Technology and Development*, Sage Publication, New Delhi.

DES (2015). *Statistical Handbook of Assam*, Directorate of Economics and Statistics, Government of Assam, Guwahati, Assam.

DHFP (2015). *Horticulture Scenario of Assam*, Directorate of Horticulture and Food Processing: Government of Assam, Guwahati, Assam.

Gogoi, R. and Majumder, D. (2001). Traditional agricultural pest management practices followed in Assam, *Asian Agri-History*, **5** (3): 253-257.

Majumdar, D., Deka, S.N., Pujari, D. and Das, P.K. (2013). Traditional knowledge adopted by the farmers for management of rice pests in North Blank Plain Zone of Assam. *Indian J. Tradit. Knowle.*, **12**: 725-729.

Nath, R.K., Ahmed, P. and Sarmah, A.C. (2017). Indigenous technological knowledge (ITK) for pest management in Tinsukia District of Assam. *Rashtriya Krishi*, pp. 1-3.

Sanjay-Swami (2019). Innovative practices to conserve soil and water resources in highlands of Meghalaya. In: *Soil and Water Conservation Today*, **14** (3): 06-08. ISSN: 0975-4059.

Seetharam, R.N. and Veluswamy, R. (2001). Indigenous technologies for sustainable farming, *Madras Agri. J.*, **88**(4): 251-256.

Supe, S.V. and Singh, S.N. (1969). Economic motivation scale. Measurement in extension research instruments: Developed at IARI, (1963-1972). Division of Agril. Extension, IARI, New Delhi.

Talukdar, R.K., Barman, S., and Hussain, A. (2012). Documentation and perceived rationale of Indigenous Technology Knowledge (ITK) utilized in Boro Rice cultivation by farmers of Kamrup district of Assam. *J. Acad. Indus. Res.*, **1**: 412-418.

Trivedi, G. and Pareek, V. (1963). Socio-economic status scale (Rural). Measurement in extension research instruments: Developed at IARI, (1963-1972). Division of Agril. Extension, IARI, New Delhi.

UNFCCC (2012). Best practices and available tools for the use of indigenous and traditional knowledge and practices for adaptation, and the application of gender-sensitive approaches and tools for understanding and assessing impacts, vulnerability and adaptation to climate change. *Framework Convention on Climate Change*: United Nations, pp. 9-13.

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