International Journal of Economic Plants

https://ojs.pphouse.org/index.php/IJEP

IJEP November 2025, 12(6): 01-04

Crossref

Article IJEP6467a

Full Research

Stress Management

Doi: HTTPS://DOI.ORG/10.23910/2/2025.6467a

An Experimental Study on Indigenous Pest Management of White Grub Pest in Ginger Fields

A. Dympep[1*], B. Kharbamon[2] and L. L. Challam[3]

[1]Dept. of Agri.Extension, [2]Dept. of Horticulture, [3]Dept. of Soil Science, KVK, Jaintia Hills, Meghalaya (793 151), India

Corresponding Author

A. Dympep
e-mail: kvkjaintiahills@gmail.com

Article History

Received on 27th June, 2025
Received in revised form on 20th October, 2025
Accepted in final form on 04th November, 2025
Published on 10th November, 2025

Abstract

The current study was conducted during April, 2024–November, 2024, at West Jaintia Hills district of Meghalaya with the aim of documenting and validating the ITKs followed by the tribal farmers for pest management in ginger fields. Indigenous Technical Knowledge (ITK) derived from traditional wisdom was an asset of farmers in developing countries. However, many of these ITKs were lostdue to lack of documentation and no validation for further improvement with modern scientific technologies. Present-day circumstances made it imperative for indigenous innovations to be evaluated and popularized. Documentation and preservation of Indigenous Technical Knowledge (ITK) was urgently required for a number of different communities, many of which were on the verge of extinction. Many of the farmers practiced the application of soaked tobacco leaves and creation of scarecrows in paddy fields. Further, on validation of ITK method using salt to prevent white grub pest in ginger fields, it was found that percentage of pest infestation was about 5.8% while infestation was lesser in experimental plots using recommended scientific method (4.5%). However, the percentage for pest infestation was highest in case of farmers' field where no pest control measure was taken. Remarkably, there was not much difference in the yield of ginger in case of both the controlled and experimental plots. Therefore, it could be concluded that the ITKs, which have been used by farmers for centuries, if organized and used scientifically, could also be effective in the creation of eco-friendly, location-specific, economically viable and socially acceptable technologies.

Keywords: Ginger, indigenous pest management, pest incidence, white grub

1. Introduction

Indigenous Technical Knowledge (ITK) has enormous innovative potential. ITK is local information that differs among particular communities and is passed on from one generation to the next (Naharki et al., 2020). It serves as the framework for decision-making at the local level in crop and soil management, pest and disease management, health care and other natural resource management (NRM) and a basis of different activities in tribal societies (Warren, 1991). ITKs are based on experience tested over the centuries and are given the best flexibility in the local environment in the context of agricultural sustainability (Ponnusamy et al., 2017). The ITKs can contribute greatly to the overall socioeconomic development of the communities (Vineetha et al., 2023). Anonymous (2015b) highlighted that integrating indigenous knowledge with contemporary science and technology can lead to innovative solutions that address pressing global challenges while respecting local traditions and wisdom.

ITK is an important resource for sustainable development, particularly in the areas of agriculture and natural resource management (Krujia, 2020). However, many of the useful ITKs has been lost over the time as this vital knowledge is passed on from generation to generation by word. Therefore, there is a need for documenting traditional knowledge which can act as foundation for creation of modern technology (Ansari et al., 2021). The responsibility of documentation centre is to identify the information sources and acquire the details of each knowledge entity, classify them, prepare metadata, develop databases to preserve that information for further use (Pramanik, 2019). Documentation has great practical utility, it provides useful clue in planning projects for conservation of biological diversity, sustainable uses of natural resources, indigenous health practices etc (Pandey et al., 2017).

Although indigenous peoples' contributions to the world's biological and cultural variety as well as sustainable development are widely acknowledged, there are still many obstacles in the way of traditional knowledge and technology (Borthakur and Singh, 2012). Thus, there is a need for validation of these ITKs as by linking the ITKs with farmer, research and extension, the output of researches can be made

more fertile and usable. The participatory technologies that are developed through ITK integration will provide diversified technological options (Pandey et al., 2017). Promoting well-established validated ITKs through extension efforts or awareness initiatives can assist other farmers in reaping their benefits (Saurav et al., 2023) and would be highly effective for diminishing the future consequences in agriculture (Chamling et al., 2024).

ITK holds significant importance in Northeast India and has evolved over generations to adapt to its specific ecosystem, topography, etc. The pest and disease management of agricultural and horticultural crops were carried efficiently using locally available inputs (Chandola, 2011). Ginger is one of the important cash crops in the state of Meghalaya and the ethnic farming community highly depends on enhancing the productivity with sustainable utilization of available natural resources. Ginger is grown in almost all the states of the northeastern region (Rymbai et al., 2018) with Meghalaya ranking 2nd in ginger production (Anonymous, 2015a). However, Sharma et al. (2023) in his study revealed that the major constraints faced by the ginger farmers of Meghalaya was soft rot disease and attack of white grub insect pest.

Since the ITKs are precious cum value added assets, a systematic investigation and refinement of the ITKs with appropriate documentation are the need of present day so as to execute them in the right direction for a sustainable agricultural system. Therefore, the study endeavours to document the ITKs adopted by the farmers for pest management and validation of an ITK method for control of white grub pest in ginger field.

2. Materials and Methods

The study was conducted during April, 2024–November, 2024 in the northeastern state of India, Meghalaya. West Jaintia Hills district of Meghalaya state was selected for the study being one of the agricultural dominant districts in the state. The community and rural development block (CRDB) -Thadlaskein CRDB were selected for the study as ginger crop was one of the major commercial crop of the block. Participatory rural appraisal (PRA) and group discussions were conducted with the farmer groups of the block to identify and document the different indigenous technical knowledge (ITK) used by the farmers for pest management. Three trials were conducted for the study at different locations in the block.

2.1. Experimental design and treatment details

2.1.1. Experimental plot 1 (TO_1)

The first experimental plot was carried out using the indigenous technical knowledge (ITK) method in which a solution of 1 kg common salt was mixed in 5 l of water and sprayed about 200 msq after ploughing and before sowing.

2.1.2. Experimental plot 2 (TO_2)

The second experimental plot was carried out using the scientific recommended package of practices. The method comprises of soil application of *Beauveria bassiana+Metarhizium anisopliae* at 5 kg ha^{-1} during planting time+drenching of *Beauveria bassiana+Metarhizium anisopliae* at 7 g l^{-1} at 15 days interval.

2.1.3. Experimental plot 3 (TO_3)

In the third experimental plot, no control measures were taken for pest management.

The parameters like percentage of pest infestation, yield and economic returns were analysed for the experimental study.

3. Results and Discussion

3.1. Identification and documentation of ITKs practiced by farmers for pest management

Some ITKs were exclusive to a specific region and there was a constant need to document and preserve these ITKs of different communities which were at the brink of extinction. It represented the knowledge of a particular community that has developed over an extended period of time spanning multiple generations and continues to evolve over time (Lenka and Satpathy, 2020). All possible ITK on pest management practiced by the farmers of the selected district of West Jaintia Hills, Meghalaya has been collected and documented in details as presented in Table 1.

Table 1: Identification and documentation of Indigenous Pest Management

Sl. No.	Indigenous technical knowledge	Percentage of farmers practicing the ITK (%)
1.	Overnight soaking of tobacco leaves water and application of diluted solution on vegetable crops.	72.50
2.	Application of salt before sowing	75.00
3.	Application of ash on paddy fields before sowing	61.67
4.	Application of egg shells on the soil	37.50
5.	Spraying of grinded turmeric water	51.67
6.	Application of grinded potato peels water	26.67
7.	Application of lantana extract water	22.50
8.	Erection of scare crow on rice fields	62.50
9.	Tying of yellow thread around the field	40.00
10.	Bamboo+garlic+turmeric extract	17.50
11.	Hanging of dead frogs/flesh of snail on stick and placed in the rice field during milky stage of grain	28.33

From a sample of 120 farmers from the selected block, more than 70% (72.50%) of the farmers practiced the ITK of soaking tobacco leaves overnight in water and applying it on vegetable crops to prevent from pest like aphids, etc. Similarly, more than 60% of the farmers practice the application of ash on paddy fields and erection of scare crow on fields to scare away birds. Very few of the farmers applied the solution made from extract of bamboo, garlic and turmeric and application of lantana extract water for pest management. This might be due to lack of knowledge of the ITKs, as most ITKs have been conveyed orally from generation to generation and during this usual practice there was every chance of arising gaps in proper communication at different levels and also misrepresentation of the actual facts. It was also often observed that some people tried to hide the ITKs practicing in their own communities or do not like to share their ITKs with others (Borkakati, 2023). Thus, implied the need and urgency for proper documentation of ITKs.

3.2. Validation of ITK for control of white grub in ginger fields

White grub pest in the ginger fields of the selected block was a great menace. Many of the farmers loss in yield was due to this soil borne pest. From the experimental plots carried out, the results as depicted in Table 2, it can be concluded that the pest infestation on plot TO_1 which was controlled using ITK method of application of salt, percentage of pest infestation was about 15.8% which was higher than the controlled plot (TO_2) using the recommended scientific method (14.5%). However, the percentage of pest infestation was found to be highest at the experimental plot TO_3 in which no pest management practices was done. It has been rationale by experts that the salt acts as a pesticide and by exosmosis, salt may kill the grubs (Rathore et al., 2021). Thus, in absence of the recommended scientific method, farmers can opt for the ITK method of applying salt on their fields to reduce white grub pest.

Table 2: Controlled of white grub in ginger field using ITK method

Particulars	T_1 (Controlled with ITK method)	T_2 (Controlled with scientific method)	TO_3 (Farmers' practice)
% of pest infestation	15.8%	14.5%	27.9%
Avg. weight of rhizome (g)	580	620	500
Yield (t ha^{-1})	10. 03	10.42	8.28
Gross cost (₹)	170000	182000	234400
Gross return (₹)	620000	625200	616800
Net return (₹)	450000	443200	382400
B:C ratio	3.64:1	3.44:1	2.63:1

Further yield, gross cost and gross return was found to be highest for TO_2 however, net return was highest in the case of TO_1 being cost effective for the inputs with a greater yield return. Thus, this ITK method was highly successful and needs to popularise as it was economically viable.

Similarly, many ITKs can be recommended for a sustainable organic farming practice however, prior to their recommendation, pre-requisite information like appropriate doses and time of application were needed to be worked out and standardized through scientific analysis of the more potent ITKs. These indigenous knowledge and technologies have provided the indigenous communities with comfort and self-sufficiency and are usually at the level of modern knowledge and technology.

Figures 1: Experimental plots for validation of ITK of white grub

4. Conclusion

To ensure the continuity of ITK practices for future generations, we need to understand the scientific rationality and their communication patterns. The paper has highlighted the significance impact of using ITKs for pest management. ITK had positive social implications was financially accessible, sustainable and emphasized the efficient use of eco-friendly resources. In practice, a possibility that traditional knowledge experts might be able to create more effective solutions for contemporary problems through flexibility and modification with scientific institutions.

5. Acknowledgement

The authors acknowledge the farmers of West Jaintia Hills district involved in the study for their valuable inputs. The authors are also thankful to ICAR-ATARI ZONE VII for support to carry out the research.

6. References

Anonymous, 2015a. Horticultural Statistics at a Glance, 2015. Government of India. Available from https://agriwelfare.

gov.in/Documents/hortstat_glance.pdf. Accessed on September, 2024.

Anonymous, 2015b. United Nation's Sustainable Development Goals, 2015b. Integrating indigenous knowledge systems in 2030 un sustainable development goals. Available from : https://sdgs.un.org/partnerships/integratingindigenous-knowledge-systems-2030-un-sustainabledevelopment-goals. Accessed on: September, 2024.

Ansari, M.A., Sharma, S.K., Roy, S.S., Ramakrishna, Y., Datt, S., 2021. Documenting the agriculture based indigenous traditional knowledge in Manipur State of North Eastern India. Indian Journal of Traditional Knowledge 20(4), 1065–1074.

Borkakati, R.N., Barman, S., Saikia, D.K., Gogoi, R., 2023. Indigenous technical knowledge of Assam for pests man7agement – Exploit potential in organic agriculture. Indian Journal of Traditional Knowledge 22(1), 40–49.

Borthakur, A., Singh, P., 2012. Indigenous technical knowledge (ITK) and their Role in Sustainable Grassroots Innovations: An Illustration in Indian Context. Proceedings of International Conference on Innovation and Research in Technology for Sustainable Development (ICIRT 2012), 01–03 November 2012.

Chamling, N., Chongloi, L., Moktan, M.W., 2024. Indigenous technical knowledge (ITKs) agricultural practices in Darjeeling and Kalimpong Hill. In book: Advances in Agricultural Extension (Vol 22) Publisher: © AkiNik Publications TM, 59–68. DOI:10.22271/ed.book.2818.

Chandola, M., Rathore, S., Kumar, B., 2011. Indigenous pest management practices prevalent among hill farmers of Uttarakhand. Indian Journal of Traditional Knowledge 2(2011), 311–315.

Krujia, H., 2020. The indigenous technical knowledge (ITK) and its application for sustainability in agriculture. The Morung Express. Available from: https://morungexpress.com/the-indigenous-technicalknowledge-itk-its-application-for-sustainability-inagriculture.

Naharki, K., Jaishi, M., 2020. Documentation of indigenous technical knowledge and their application in pest management in western mid hill of Nepal. SAARC Journal of Agriculture 18(1), 251–261.

Pandey, V., Mittal, R., Sharma, P., 2017. Documentation and application of indigenous traditional knowledge (ITK) for sustainable agricultural development. Asian Journal of Agricultural Extension, Economics and Sociology 15(3), 1–9.

Ponnusamy, K., Kale, R.B., Ravi, K.N., Arulmozhi Devi, M.C., Sharma, P., 2017. Cross-regional analysis on usage of Indigenous Technical Knowledge in dairy farming. Indian Journal of Animal Research 51(3), 549–556.

Pramanik, R., 2019. Documentation and digitisation for access to traditional medicine knowledge in Southern Odisha. In book: Shifting Perspectives in Tribal Studies, 233–250. doi.10.1007/978-981-13-8090-7_12.

Rymbai, H., Jha, A.K., Talang, H., Verma, V.K., Deshmukh, N., Baiswar, P., Firake, D., Laha, R., Sinha, P., Devi, M.B., Deka, B., Prakash, N., 2018. Organic ginger cultivation in North Eastern region. Eastern Panorama Offset. ISBN: 978-93-5300-210-7. DOI-10.13140/RG.2.2.11901.64482.

Saurav, S.K., Chakravarty, R., Chandran, V., Meena, B.S., 2023. Utilization pattern and validation of indigenous technical knowledge (ITK) prevailing among the Dairy Farmers of Northern Bihar. Indian Research Journal of Extension Education 23(3), 31–38. doi : https://doi.org/10.54986/irjee/2023/jul_sep/31-38.

Sharma, V., Longkumer, J., Mary, N.O., Sentinungshi, Das, S., 2023. Constraints in ginger cultivation by Farmers of West Garo Hills District of Meghalaya. International Journal of Economic Plants 10(3), 252–255. doi: https://doi.org/10.23910/2/2023.526d.

Sumit, S., Shivani, R., 2020. Indigenous technical knowledge (ITK) for sustainable agriculture in India. Agriculture and Food E-Newsletter 1(3), 31–35.

Vineetha, P. G., Shamna, T.P., Prasoon, S., 2023. Documentation of indigenous traditional knowledge (ITKs) system prevalent among poultry farmers of Palakkad district, Kerala. Indian Journal of Traditional Knowledge 22(3), 505–513. DOI: 10.56042/ijtk.v22i3.5727.

Warren, D.M., 1991. Using ITK for agricultural development. World Bank Discussion Papers, Washington DC, World Bank, 127.