Scientia Review, Vol. 02(03), March 2026, pp. 1-4 ISSN: 3107-7919

Scientia Review

Website: www.scientiafoundation.in

POPULAR SCIENCE ARTICLE

Old Practices, New Hope: Indigenous traditional knowledge for Sustainable Farming

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Received: 27 February 2026
Revised: 01 February 2026
Accepted: 09 March 2026
Published online: 11 March 2026

Article ID: SR01092

Citation: Bindu, K. R., & Chethan, M. N. (2026). Old Practices, New Hope: Indigenous traditional knowledge for Sustainable Farming. *Scientia Review*, 2(3), 1-4

Abstract

Indigenous Traditional Knowledge (ITKs) plays a vital role in promoting sustainable agriculture by integrating ecological principles with locally adapted farming practices. In the context of increasing environmental degradation caused by intensive agricultural methods, ITKs provide low-cost, eco-friendly alternatives for soil fertility, pest management and crop protection. Practices such as Beejamrutha, Panchagavya, Jeevamrutha and botanical extracts enhance soil health, conserve biodiversity and reduce dependence on chemical inputs. Integrating indigenous knowledge into modern agriculture provides sustainable solutions for long-term environmental and economic stability.

Keywords: Indigenous Traditional Knowledge, Sustainable agriculture, Eco-friendly

Introduction

Environmental sustainability and food security remain critical concerns of the twenty-first century. Meeting the food and nutritional needs of a rapidly increasing global population poses a serious challenge. Rising consumption patterns have intensified pressure on agriculture and natural resources (Foley *et al*., 2011). Green revolution, however, achieved the targets of high food productivity, but at the cost of environmental degradation such as water pollution, soil contamination, climate change and biodiversity loss. Feeding the growing population and sustaining the quality of the environment are the two major challenges of Indian agriculture system. Traditional agriculture has adaptive and mitigation ability towards these anthropogenic threats that can provide sustainable production and environmental safety. It is a dynamic tool for the conservation of natural resources such as water and agro-ecosystem from landscape to family farms. The traditional farming system is based on the ecological principle and the interaction between human environment and existing natural resources.

Indigenous traditional knowledge: Indigenous traditional knowledge is the knowledge, practices and innovations of indigenous communities that are passed down through generations. It is a central part of indigenous culture and identity. Wang *et al.*, (2010), defined Indigenous traditional knowledge as sum total knowledge and practices which are based on people's accumulated experiences in dealing with situations and problems in various aspects of life and such knowledge and practices are special to a particular culture.

Importance of ITKs in maintaining sustainable agriculture:

- ✓ Promotes ecological balance: ITKs use natural resources wisely, maintaining soil, water and biodiversity.
- ✓ Improves soil health: Encourages organic inputs like compost, farmyard manure and bio-formulations that enhance soil fertility and microbial activity.
- ✓ Eco-friendly pest management: Uses plant-based and traditional formulations, reducing chemical pesticide dependency.
- ✓ Climate resilience: Locally adapted practices help farmers cope with droughts, floods and climatic variability.
- ✓ Low cost and accessible: Relies on locally available materials, making it affordable for small and marginal farmers.
- ✓ Supports biodiversity conservation: Conserves indigenous crop varieties and traditional seed systems.

Indigenous traditional knowledge in seed treatment

Beejamrutha: Beejamrutha is prepared by using cow dung, cow urine, water and lime. Cow dung (5 kg) tied in a cloth was dipped in a bucket containing 200 litres of water overnight. To the resultant liquid, five litres of cow urine, a handful of soil and 250g of calcium chloride was added to make the final product. It can be used for seed treatment at the rate of 200ml per kg of seeds.

Panchagavya: It is prepared by adding 1kg of cow ghee to 7 kgs of fresh cow dung and incubate it for 2days. Later, add 3 litres of cow urine and 10 litres of water, stir the mixture twice (morning and evening) in a day for 1 week and then add 3kg of jaggery, 3 litres of cow milk , 3 litres of coconut water, 2kgs of curd and 12 bananas allowed it for 3 weeks for fermentation. It can be used for seed treatment and seedling treatment (3 litres diluted in 100 litres of water).

Indigenous traditional knowledge in nutrient management

Jeevamrutha: Jeevamrutha is prepared by mixing 10 kg desi cow dung, 10 liters of cow urine, 2 kg jaggery, 2 kg pulse flour and a hand full of soil collected from the field near the bund. All these were put in a 200 liters plastic or cement drum and mixed thoroughly by adding water until the volume was made up to 200 liters. The mixture was stirred well in a clockwise direction thrice a day using a wooden stick until the mixture becomes homogeneous. The plastic drum was kept under shade and covered with a wet gunny bag. Well-fermented jeevamrutha was applied uniformly to the soil through manual or sprinkling. Applied at 200ltrs per acre.

Amrut pani (Amrut water): This liquid organic manure is prepared by adding 250gms of desi ghee, 500gm of honey and 10kgs of fresh cow dung in 200 litres of water. Applied at 200 litres per acre. (Sudha *et al*., 2022)

Sasyagavya: This liquid organic manure is prepared by mixing fresh cow dung, cow urine, chopped organic waste and water in the ratio of 1:1:1: 2 ratio. 10 days after fermentation can be used at the rate of 5% upto30 days of germination and 10% from 30 days after germination. (Sudha *et al*., 2022)

Indigenous traditional knowledge in pest & disease management:

Neemastra: Cow dung, cow urine, neem leaves and water are used for preparing the neemastra. The neem leaves are grinded into paste and added with water. The solution is directly applied to plants without any further dilution. For this, 5 kg of neem paste is added with around 2-3kg of dung, 10-20 litres of cow urine, handful of soil. The solution is fermented for about 48 hours. It was found that the farmers are making the solution ranging from 100-200 litres depending upon their usage and crops grown.

Agniastra: It is prepared by adding 5 kg of neem paste with around 1 kg of tobacco leaves, 0.5 kg of chillies and 0.5 kilo of garlic paste. These are added in about 25- 30 litres of cow urine and are cooled down for about 24 hours. The solution is then filtered and used. The solution is diluted before applying in the field for every half litre of agniastra about 15 litres of water is added. agniastra is considered to be effective against insects like leaf roller, stem borer, fruit borer, pod borer. 2-3 lit extract diluted to 100 lit is used for one acre.

Brahmastra: It is prepared from five types of bitter leaves. Neem leaves are used along with the other bitter-tasting leaves, like custard apple, chillies, etc. Around 20-30 litres of cow urine is used and is boiled for about 2- 3 hours. The solution is cooled for about 12 hours and is filtered using fine cloths. The solution is further diluted with about 15 litres of water for every 1 litre of brahamastra.

- ✓ A mixture of 2 kg of turmeric powder and 8 kg wood ash is used as dust over leaves for treatment against powdery mildew. Alkalinity of ash makes unfavourable for fungi growth.
- ✓ Ginger powder at 20 gm/lit of water and sprayed thrice at interval of 15 days can also effectively check the incidence of powdery mildew and other fungal diseases.

Table. 1. ITKs for crop protection used by farmers

Sl.no	Type of ITK's	Crop and insects	Remarks
1	Application of tobacco leaf extract	Rice - caterpillars, green leaf hopper (*Nephotettix virescens*), brown plant hopper (*Nilaparvata lugens*)	Acts as anti-feedant/repellent to pests (alkaline nature of tobacco)
2	Injection of kerosene/diesel into citrus stem	Citrus - Trunk borer (Anoplophora versteegi)	Acts as toxicant
3	Application of salt	Coconut - Rhinoceros beetle (*Oryctes rhinoceros*)	Acts as repellent
4	Use of mustard oil cake	Potato - mole cricket (Gryllotalpa sp.)	Acts as repellent
5	Chili and garlic extract spray with jiggery	Cotton, red gram, chilli - Lepidopteran and sucking pests	Knockdown effect and used during high infestations; easy to prepare
6	Application of crushed naphthalene bolls solution	Mango, guava, citrus - borers	Acts as anti-feedant, oviposition deterrent
7	Mixing grains with dried leaves of neem, Lantana	Paddy, pulses - Stored grain beetles and moths	Acts as oviposition deterrent; Established household ITK throughout Telangana
8	Application of crushed naphthalene bolls solution	Mango, guava, citrus - borers	Acts as anti-feedant, oviposition deterrent

Source: Seram *et al*.,2025

Indigenous traditional knowledge in weed management

- ✓ Control of weeds in rice is achieved by placing leaves of Krada (*Cleistanthus collinus*) in the standing water of paddy fields, which turn the water blackish and alter its pH, thereby creating unfavorable conditions for weed growth.
- ✓ Cuscuta weed management in niger is achieved by soil drenching with jackfruit leaf extract at 1–25 litres, as the allelochemicals released from jackfruit inhibit seed germination and haustoria formation.
- ✓ Eucalyptus leaf leachates are used to control *Cynodon dactylon, Avena fatua* and *Datura spp*., as gallic acid, ellagic acid and ferulic acid present in eucalyptus disrupt weed growth.
- ✓ Sunflower as a green manure is used to control *Phalaris minor, Chenopodium album* and *Avena fatua*, as it releases scopoletins that inhibit weed germination and contains terpenoids that disrupt nutrient uptake (Iqbal *et al*., 2020).

Conclusion

Indigenous Traditional Knowledge continues to hold strong relevance in present-day agriculture. The traditional practices followed by farmers for seed treatment, nutrient management, weed

management and pest control show that sustainable farming can be achieved using locally available and natural resources. These methods not only reduce production costs but also protect soil health and the surrounding environment. Preserving and encouraging such knowledge can benefit small and marginal farmers. Blending traditional wisdom with modern scientific approaches will help to build a more balanced, productive and sustainable agricultural system for the future.

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