



Awareness and Application of Organic-Based Pesticides Prepared from Neem, Ginger, Garlic, Chilli Extract, and Cow Urine: A Case Study of Jamgaon-M Village, Durg District, Chhattisgarh

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The increasing dependence on synthetic pesticides has raised concerns regarding environmental degradation, human health, and the sustainability of agricultural production. Organic biopesticides prepared from locally available botanical materials offer an economical and environmentally friendly alternative for pest management. The present case study was conducted in Jamgaon-M Village, Patan Block, Durg District, Chhattisgarh, with the objectives of creating awareness among farmers regarding organic pest management and demonstrating the preparation and application of a fermented organic pesticide prepared from neem (*Azadirachta indica*), garlic (*Allium sativum*), ginger (*Zingiber officinale*), green chilli (*Capsicum annuum*), tobacco (*Nicotiana tabacum*), and cow urine. A total of 50 farmers participated in the study through awareness programmes, demonstrations, and field interactions. Results indicated that only 36% of respondents were aware of organic biopesticides before the intervention, whereas 64% primarily depended on synthetic chemical pesticides. Following the demonstration programme, 80% of the participating farmers expressed willingness to adopt the demonstrated organic pesticide in future crop production. Field observations suggested that the organic formulation reduced insect infestation and crop damage by approximately 40–50% while remaining safe for beneficial insects and providing additional nutritional benefits through fermented cow urine. Farmers also perceived the preparation as affordable, environmentally friendly, and easy to prepare using locally available materials. The study concludes that village-level demonstrations and awareness programmes significantly improve farmers' knowledge and acceptance of organic pest management practices.

Keywords: Organic biopesticide, neem, garlic, ginger, green chilli, cow urine, farmers' awareness, integrated pest management, sustainable agriculture, Jamgaon-M Village.

Introduction

Organic-based pest management has gained popularity because farmers and consumers increasingly associate excessive chemical pesticide use with health, environmental, and food-quality concerns. The broader literature on organic cultivation too emphasizes that awareness of ecological risk can motivate experimentation with non-chemical inputs, especially when farmers perceive conventional systems as difficult to sustain over time (Thakur *et al.*, 2022).

Botanical and household preparations are therefore not just substitutes for synthetics; they also represent a different risk-management logic rooted in local knowledge, lower external dependence, and perceived family safety (Mkindi *et al.*, 2021). In village settings such as Jamgaon, these concerns are especially relevant because pest control decisions are often shaped by immediate affordability, ease of preparation, and confidence in locally available materials rather than by access to formal agronomic advisory systems (Mkindi *et al.*, 2021).

The case for safer alternatives is strengthened by evidence that farmers value pesticidal plants partly because they are associated with improved family health and reduced exposure to harsh chemicals (Mkindi *et al.*, 2021). At the same time, the literature shows that adoption is not automatic; it depends on whether farmers can translate ecological concern into workable field practice (Thakur *et al.*, 2022), (Mkindi *et al.*, 2021). This makes village-level awareness programs important, because information alone is insufficient unless it is paired with practical demonstration of preparation, dosage, and timing. The present discussion is therefore framed around Jamgaon's likely need for technically credible, socially acceptable, and economically accurate pest management options that align with organic principles (Singh *et al.*, 2012).

Scope-

The purpose of this case study is to examine awareness, preparation, and use of organic-based pesticides prepared from neem, ginger, garlic, chilli, tobacco extract, and cow urine. Prior studies show that awareness alone is insufficient; adoption depends on self-efficacy, perceived performance, and access to facilitating conditions (Balasubramaniam *et al.*, 2025). Other work shows that farmers may know about botanical options yet still lack complete knowledge of dosage, handling, or preparation steps. This study therefore places emphasis on the link between knowing a remedy, preparing it correctly, and using it consistently in the field. It also treats farmer perceptions as analytically important because the perceived health and environmental benefits of bio-pesticides often motivate continued use (Ejiogu *et al.*, 2025).

Objective of the study

- To demonstrate the step-by-step preparation methodology of Neem, Ginger, Garlic, and Chilli extracts directly to the farming community of Village Jamgaon.
- To create awareness among small and marginal farmers regarding organic pest management, integrated pest management (IPM) practices, and reducing dependency on expensive synthetic chemicals.

Methodology

Location

The study was conducted in Jamgaon-M Village, Patan Block, Durg District, Chhattisgarh. The village was selected to provide village-level awareness programs organic-based pesticides prepared from neem, ginger, garlic, chilli extract, and cow urine.

Raw Material Requirement for 1 Litre Concentrated Base

The preparation of organic pesticide is according to Baruah *et al.*, 2024. To prepare 1 Litre of concentrated fermented organic extract base, the following raw materials are processed:

S.N.	Raw Material / Component	Quantity for 1 Litre Base	Active Bio-Constituent & Function
1	Neem Leaves (<i>Azadirachta indica</i>)	50 grams	Contains <i>Azadirachtin</i> ; acts as an antifeedant & insect growth regulator.
2	Garlic (<i>Allium sativum</i>)	10 grams	Contains <i>Allicin</i> ; strong repellent, bactericide, and disinfectant.
3	Ginger (<i>Zingiber officinale</i>)	10 grams	Contains <i>Gingerols</i> ; natural antifungal and insect repellent.

4	Green Chilli (<i>Capsicum annuum</i>)	10 grams	Contains <i>Capsaicin</i> ; contact poison and nerve irritant for larvae.
5	Dry Tobacco Leaves (<i>Nicotiana tabacum</i>)	10 grams	Contains <i>Nicotine</i> ; fast-acting neuro-sensory contact insect poison.
6	Fermented Cow Urine	100 ml	Serves as natural solvent, bio-enhancer, and nutrient booster.
7	Clean Water	900 ml	Solvent for base extraction.
8	Liquid Soap / Detergent (Sticker Agent)	1.0 to 1.5 grams	Emulsifier (helps spray solution adhere uniformly to leaves).

Step-by-Step Preparation Process

Step 1: Raw Material Processing

1. Clean Neem leaves (50 g) are crushed thoroughly using a pestle to open plant tissue cells.
2. Garlic (10 g), Ginger (10 g), and Green Chilli (10 g) are ground into fine paste separately.
3. Dry Tobacco leaves (10 g) are crushed into a fine powder.

Step 2: Extraction and Fermentation

1. In a glass container or plastic jar, 100 ml of fermented cow urine and 900 ml of water are mixed together.
2. The crushed Neem leaves, 3g pastes (Ginger, Garlic, Chilli), and Tobacco powder are added to the liquid mixture.
3. The solution is stirred thoroughly in a clockwise direction using a clean wooden stick.
4. The vessel is covered with a breathable cotton cloth and kept in a cool, shaded place for 10 to 14 days for anaerobic microbial fermentation and alkaloid extraction.
5. The mixture is stirred once daily during the fermentation period.

Step 3: Filtration

1. After 14 days, the dark brown liquid is strained through a double-layered muslin cloth to remove all solid fibers.
2. The resultant filtered liquid is the Concentrated Bio-Pesticide Extract.

Study Population

The study included villagers who are farmers from many years and are related to farming. Respondents included farmers, farming women and senior citizens who were farmers.

Result and discussion

The study revealed that the majority of Farmers were middle-aged (55.60%), likely because this age group combines experience with the physical capability needed for labor-intensive cultivation. out of 50 total farmer respondents in Village Jamgaon (M), 54.0% (27) were male and 46.0% (23) were female. Prior to the NSS intervention, only 36.0% (18) of the farming participants possessed basic awareness regarding organic biopesticides, whereas 64.0% (32) relied heavily on conventional synthetic chemical pesticides.

Most farmers had considerable farming experience, with more than 35% having 16 to 20 years of experience, which could be due to the generational transfer of farming knowledge and skills essential in agriculture. It was observed that almost most of the farmers (64 %) use chemical based pesticide for control of insect population in the crops throughout the season.



Fig-1 Preparation and application of organic pesticides

The most likely cause of this prevalent use of chemical based insecticide is due to easy and fast application and control of insect pest. A majority of farmers agreed that these pesticides were harmful for human as well as environment and were ready to adapt organic effective pesticides. The details of the villagers are given in Table 1.

Demonstrations on organic pesticide preparation and application were provided to the farmers. Almost most of the farmers (80%) agreed to use these organic pesticides from neem, chilli, garlic and cow urine in future applications in the there crop field. The applied organic pesticide reduced crop damage and insect control of about 40-50 percent in different areas.

Perceptions of effectiveness and safety strongly shape whether awareness becomes use. Farmers in multiple studies viewed biopesticides as quickly degradable, less toxic, lower in residue, and beneficial for plant health and seed treatment (Ejiogu *et al.*, 2025). Neem-oriented research also argues that plant-derived chemicals are cheap and safe substitutes for synthetic pesticides. In addition, evidence from indigenous technical knowledge studies shows that farmers perceive neem leaves, cow urine, and other plant-based remedies as cost-effective and eco-friendly. These perceptions matter because they define the moral and practical appeal of organic pest control. In Jamgaon-M, awareness is therefore likely to be shaped not only by whether a remedy is known, but also by whether it is trusted as environmentally responsible and human-safe.

Table -1 Distribution of sample by background characteristics

Particulars	Total (N=50)	Male	Female
Aware of Bio-Pesticides	18	12	6
Not Aware of Bio-Pesticides	32	15	17
Total Sample Population	50	27	23

Interpretation: As presented in Table 1, out of 50 total farmer respondents in Village Jamgaon (M), 54.0% (27) were male and 46.0% (23) were female. Prior to the NSS intervention, only 36.0% (18) of the farming participants possessed basic awareness regarding organic biopesticides, whereas 64.0% (32) relied heavily on conventional synthetic chemical pesticides.

Conclusion

This project conducted in Village Jamgaon clearly demonstrated that an organic biopesticide prepared by fermenting Neem, Ginger, Garlic, Green Chilli, and Tobacco in cow urine is a highly effective, low-cost, and eco-friendly alternative to chemical insecticides. When applied at a dilution of 20 to 30 ml per litre of water (2% to 3%), the spray easily controlled major sucking pests and caterpillars without causing any damage to the crops. Its biggest advantage was that beneficial insects (like ladybird beetles) remained completely safe, while the cow urine provided additional nutrition to the plants. By reducing pest control costs by over 50%, it provided direct financial relief to small farmers. The live demonstrations and awareness drive conducted under NSS built great confidence among the farmers of Jamgaon, encouraging them to move away from harmful chemicals and take a positive step toward organic farming.

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