

ICAR – Mahatma Gandhi Integrated Farming Research Institute

Model Write up for Background Information

1. **Title of the project:** Development of ecofriendly management for major insect pests and diseases of important crops in water congested ecosystem of North-Bihar
2. **Funding agency:** ICAR-MGIFRI, Motihari
3. **Total outlay:** 47.86 Lakh
4. **Duration:** 3 years (April 2024 to March 2027)
5. **Single/Multi-institutional:** Single
6. **Lead center if multi-institutional-** NA
7. **Cooperating center(s):** NA
8. **Principal Investigator:** Dr. Naveenkumar B. Patil Sr. Scientist, Agri. Entomology
9. **Co-Investigators:**
 - : Dr. Jadhav Amol Kailas, Scientist, Fruit science
 - : Dr. S. K. Purbey, Pr. Scientist, Fruit science
 - : Dr. V.S. Meena, Sr. Scientist, Soil science
 - : Dr. Pratapa M. G., Scientist, Fish health

10. Rationale:

North Bihar is characterized by a water-congested agro-ecosystem where seasonal flooding, prolonged waterlogging, and high humidity significantly influence crop production. Major crops such as rice, maize, wheat, pulses, oilseeds, and vegetables are frequently affected by insect pests and diseases under these conditions. Farmers often depend on repeated applications of synthetic pesticides to minimize crop losses, resulting in increased production costs, pesticide resistance, environmental pollution, destruction of beneficial organisms, and pesticide residues in food and water.

Climate variability and changing rainfall patterns have further intensified pest and disease outbreaks in waterlogged ecosystems. High soil moisture and humid conditions favor the multiplication and spread of fungal, bacterial, and insect pests, while limiting the effectiveness of conventional management practices. Therefore, there is a pressing need to develop eco-friendly, location-specific, and climate-resilient pest and disease management strategies. Pesticides and fungicides are perhaps one of the most common options used to manage pests and pathogens in the field. While pesticide application is effective, there are concerns about its ecological impact on the environment and beneficial microorganisms. Furthermore, pests and pathogens are continually developing resistance, rendering pesticides less effective following their introduction to the market.

Eco-friendly approaches such as integrated pest management (IPM), biological control, botanical pesticides, microbial bio-pesticides, resistant crop varieties, habitat management, and conservation of natural enemies offer sustainable alternatives to chemical pesticides. These approaches can improve crop productivity, maintain ecological balance, reduce environmental contamination, and enhance farmers' income. Developing integrated eco-friendly management packages specifically suited to the water-congested

ecosystems of North Bihar will contribute to sustainable agriculture and support national goals related to food security, environmental conservation, and climate resilience.

11. Research Gaps

- Insufficient documentation of major insect pests and disease complexes specific to water-congested ecosystems of North Bihar.
- Inadequate understanding of how prolonged flooding, waterlogging, and climate change alter pest population dynamics and disease epidemiology.
- Limited research on the efficacy and field performance of botanical pesticides, entomopathogenic fungi, parasitoids, predators, bioagents, and microbial biopesticides under high-moisture conditions.
- There are very few scientific studies on efficacy of botanicals based dashaparni ark in controlling various pests of major crop plants

12. Objectives

- Survey, identification and characterization of major insect pests and diseases of important crops in water congested areas of North Bihar.
- To assess the efficacy of Botanicals and biocontrol agents on different insect pests & diseases.

13. Activities

- To conduct Survey, identification and ranking of major insect pests and diseases of important crops and documentation during Kharif and Rabi season.
- To assess the efficacy of Botanicals and biocontrol agents on different insect pests & diseases of important crops during Kharif and Rabi season.

14. Details of experiments

(a) Treatment details- 7 Treatments

Sl. No.	Treatment no.	Treatment details
1	T ₁	Dashaparni ark (10%)
2	T ₂	Dashaparni ark Improved formulation
3	T ₃	<i>Trichoderma sp</i> seed treatment
4	T ₄	Neemastra spray
5	T ₅	<i>Pseudomonas/ Bt</i> spray
6	T ₆	<i>Beauveria/ Metarrhizium</i> spray
7	T ₇	Control

(b) Fertilizer doses- Varies due to multiple cropping pattern

(c) Variety- Multiple crops (Rice, Wheat, Brinjal, Cauliflower, Bhindi, Millets)

(d) Replications- 3

- (e) **Observations to be recorded:** Pest & disease incidence, Yield, growth parameters of different crops.

15. GPS Coordinates of Field:

16. Expected Output:

- This study helps in documenting the diversity of insect pests & diseases affecting major crops in the waterlogged regions of North Bihar.
- Botanical pesticides and biocontrol agent's evaluation indicates the effective dose against major insect pests and diseases of important crops from this area.

17. Expected Outcome:

- The study provides insights into pest prevalence and their ecological impact under water stagnated conditions.
- Effective botanical pesticides and biocontrol agent's can be utilized in sustainable IPM strategies for major insect pests & diseases of crops under integrated farming system.

18. History of the experimental plot

- (a) When the field was developed- 2026-27
- (b) What are crops being cultivated season-wise- Rice & wheat
- (c) Soil type- Sandy loam
- (d) Soil pH>8, EC>0.16-.34, OC- 0.15-.031
- (e) Soil depth- more than 2 m
- (f) Soil NPK and micronutrient status-
- (g) Common pests and diseases-
Rice (YSB, Leaf folder, Hoppers, Blast, False smut, Brown spot)
Wheat (Aphids, Armyworm, Termites, Rust, Blight, Smut)