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# ECOLOGICAL MANAGEMENT OF BENEFICIAL MICROBIOMES AND ENTOMOPHAGES FOR SUSTAINABLE AGROECOSYSTEM RESILIENCE

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**Purpose:** This study evaluates the integration of entomophages and native microbial bioproducts to suppress agricultural pest populations while restoring functional biodiversity within stressed agroecosystems.

**Materials and Methods:** Field experiments were conducted using a randomized complete block design integrating targeted releases of Trichogramma spp. with Bacillus-based microbial inoculants across diversified crop production systems. Arthropod diversity, pest abundance, soil microbial respiration, and enzymatic activity were monitored bi-weekly over two consecutive growing seasons to evaluate ecological responses.

**Results:** Integrated biological treatments reduced herbivorous pest populations by 42% while increasing beneficial predatory arthropods by 35% compared with conventional chemical control plots. Soil microbial respiration and enzymatic activity also increased significantly, demonstrating improved soil biological functioning, enhanced biodiversity conservation, and greater agroecosystem resilience.

**Conclusions:** The combined application of beneficial microorganisms and entomophages provides an effective ecological plant protection strategy that minimizes reliance on synthetic pesticides while improving soil health, conserving biodiversity, and strengthening sustainable agricultural production systems.

**Keywords:** Biodiversity; Entomophages; Microbial products; Ecological agriculture; Pest management.

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