

Status of Biological Control of Crop Pests in India

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SUMMARY

Biological control or bio-control constitutes a deliberate attempt to use natural enemies (NEs) either by introducing new species into the environment of a pest or by increasing the effectiveness of those already present bio-controls came into prominence in recent times owing to some spectacular success achieved in various parts of the world. Many practices of biological control have no doubt been passed down from times immemorial. In the years ahead, workers in biological control of insects, mites and seed pest suppression must continue to deepen and broaden their efforts, as this field has received great enthusiastic acclaim during past century.

INTRODUCTION

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1. Promoting Basic Research: There is lot of scope to intensify the studies which can improve and synergize the biological control. Basic research areas in the field of biology, ecology, biosystematics, behaviour, biochemistry, population dynamics etc. have great contributing value to biological suppression which needs to be studied.

2. Scope to Exploit the Bio agent on Crop Pest: About 98% of the insects pests are regulated naturally through natural enemies. However, it is reported that only 5% of the world insect pest species have ever been the subject of entomophage introduction (DeBach, 1974). It is estimated that 70% of parasitic hymenoptera are still undescribed species.

3. Help to Reduce Pollution Hazards: Utilization of bio agent can help in establishment of population regulation process of serious pests by reducing the load of toxic insecticides and their side effects.

4. Necessity to Intensify of New Horizons of Biological Control

Importation and use of parasitoids and predators is popular concept of biological control, which gave good success in several cases. Similarly new trends such as use of biotypes, strains, hybrids of parasites, use of novel bio pesticides like entomogenous fungi, viruses are to be search properly and its harmonious use in pest suppression needs to be exploited.

5. Adoption of Biological Control Methods in Agro Industries

Although use of bio agent has many benefits but there is need to adjust with other methods like chemical control of pest. The pesticides should be less toxic to natural enemies and needs to be identified and employed in pest control suppression. Biological control helps in maintaining 'Balance of Nature' as it is the phase of natural control.

Present Status of Bio-Control in India

National Bureau of Agricultural Insect Resources (NBAIR), formerly National Bureau of Agriculturally Important Insects (NBAIL) is located in Bangalore, Hebbal in the same premises at which the commonwealth institute of biological control (CIBC), Indian Station was established in 1957.

- The advent of CIBC marked the beginning of organized and systematic biological control research in India. During this period, our knowledge of natural enemies of crop pests and weeds increased manifold.
- CIBC Indian station was closed during 1987 and All India Coordinated Research Project on Biological Control of Crop Pests and Weeds (AICRP-BC&W), which was launched in 1977 under the aegis of the Indian Council of Agricultural Research was shifted to the same campus in 1988.
- The centre was named as Biological Control Centre and the entire programme functioned under the administrative/financial control of the National Centre for Integrated Pest Management (ICAR).
- In the eighth five-year plan, the project was elevated to an independent Project Directorate of Biological Control, with its headquarters in Bangalore during 1993.

- PDBC was the nodal agency in the country that organizes biological control research at the national level with 16 centres spread across the country.
- The Directorate at Bangalore carried out basic research on the biosystematics of important groups of insect bioagents.
- The reference collection maintained at PDBC was catalogued in the form of a technical bulletin on and also available in a retrievable, electronic format.
- Besides, work on strain development, molecular characterization, mass production technologies, semiochemicals, biopesticides work for insect and disease management was intensified.
- During XIth plan, PDBC was upgraded as National Bureau of Agriculturally Important Insects (NBAII) to act as a nodal agency for collection, characterization, documentation, conservation, exchange and utilization of agriculturally important insect resources (including mites and spiders) for sustainable agriculture. In the twelfth five year plan the Bureau is now re-named as National Bureau of Agricultural Insect Resources (NBAIR) and the bureau's activities are divided in three divisions.

1.Division of Insect Systematics

Mandate

- Augmentation of collections and maintenance of a national repository.
- Biosystematic studies on insects, spiders and mites using traditional and molecular approaches and DNA barcoding.
- Generation of checklists, catalogues, illustrated field identification guides and digitization of collections, networking of institutions and individuals working on biosystematics and identification services.
- Classical biological control, biosecurity, threat perception with action-plan for alien pests.

2. Division of Molecular Entomology

Mandate

- Whole genome sequencing of some important insects and entomopathogenic nematodes.
- Gene and allele mining for the selection of genes of specific interest and their utilization.
- RNAi technology for IPM.
- Genome sequence repository for useful genes.
- Endosymbionts and determination of their functional role.
- Use of bioinformatics tools and development of genomic databases.

3. Division of Insect Ecology

Mandate

- Utilization of agriculturally important arthropods for the management of insect pests.
- Development of protocols and designs for the establishment of state of art mass production units for beneficial.
- Introduction of beneficial quarantine and post-release monitoring.
- Effect of climate change.
- Role of pollinators in crop productivity.
- Role of semio-chemicals for insect pest management.
- Studies on virus-vector dynamics.

Future Needs of Biological Pest Suppression

In future, Non-Government Organizations (NGOs) should to expedite the pilot projects on mass production of same biotic agents like Trichogramma which have great potential to control pest like sugarcane borers, maize, sorghum, paddy cotton bollworms moths etc. predators such as Chrysopid and Coccinellids for aphids, mealy bugs on cotton, tobacco, grape guava and citrus guava and citrus similarly pathogens like NPV and saprophytic fungi and produce toxins (Gliotoxin and Varadin) which will the root rot disease of pulses and oilseeds.

Government may also consider the following suggestions for future works which may help farmers in adopting bio control technology:

- Popularization of literature through local languages.
- Increasing finance to other bio control projects sanctioned by ICAR, New Delhi, and Department of Science and Technology and DBT, Government of India.
- Judicious as well as restricted import of biotic agents from other countries.
- Emphasis on exploration of indigenous biotic agents.
- Preparation of 'Field guide for biotic agents' along with their visible stages and natural hosts.
- Establishment of commercial factories to ensure supply of potential biotic agents.
- Establishment of National Institute on Conservation of Biotic Agents along with network at district level.
- Studies on biotic agents in relation to intercropping, cultural practices and other forms of organic farming.

CONCLUSION

Current problems with the use of chemical insecticides and emphasis on low impact sustainable agricultural have pushed the microbial agents to the fore front for use in pest management. However, microbial pesticide has not been economically competitive with chemical insecticides, primarily due to their host specificity. The relatively slow speed with which microorganism kill their hosts has hampered their effectiveness as well as acceptance by potential users. A wide range of environmental factors affects the efficacy of microbial pesticides. Development of resistance to viruses and *Bt* is a matter of serious concern. However, the use of both naturally occurring and genetically engineered microorganisms may increase the effectiveness against the less susceptible species.

REFERENCES

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