

## Biocontrol in Controlled Environment Agriculture

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### Summary

Biocontrol, a fundamental approach within integrated pest management (IPM), utilizes living organisms to manage pest populations while minimizing environmental and economic impacts. This method involves predators, parasitoids, and pathogens, including beneficial organisms like ladybugs, parasitic wasps, and nematodes. Biocontrol agents are released through three main strategies: inoculation, inundation, and conservation. While inoculation and inundation

focus on introducing organisms in response to pest levels, conservation creates habitats that sustain beneficial organisms. Effective against pests like aphids, biocontrol provides an alternative to chemical controls. However, challenges such as incomplete pest eradication and the need for precise monitoring demand careful implementation and ongoing adaptation.

## INTRODUCTION

Biocontrol, the use of living organisms to manage pest populations, is a crucial aspect of integrated pest management (IPM). Unlike chemical controls, biocontrol does not strive for complete eradication of pests, but aims to limit or reduce their populations. This approach fits well within the IPM model, balancing environmental, economic, and efficacy considerations.

Biocontrol methods include the use of predators, parasitoids, and pathogens. Predators such as ladybugs, big eye bug, minute pirate bug, lacewings, and predatory mites are effective in controlling various pests. Parasitoids, particularly wasps, play a significant role in managing pest populations. Pathogens like viruses, bacteria, and nematodes are also utilized in biocontrol strategies.

There are three primary strategies for releasing biocontrol agents: inoculation, inundation, and conservation. Inoculation involves introducing a small number of beneficial organisms strategically to establish populations before pest levels become critical. Inundation entails releasing a large number of beneficial organisms quickly to overwhelm the pest population. Conservation focuses on creating refuges within the greenhouse to harbor beneficial organisms during non-pest times.

Aphids are common greenhouse pests that cause significant damage to plants. Parasitic wasps, particularly those in the Aphidinae subfamily, are natural predators of aphids. These wasps lay eggs inside aphids, and the larvae consume the aphids from the inside, eventually killing them. This method is effective in controlling aphid populations and maintaining healthy crops.

Implementing biocontrol methods comes with challenges, such as the impossibility of complete pest eradication and the need for precise timing and monitoring. Overcoming these obstacles requires careful planning, resource management, and adapting strategies as needed.