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Biocontrol Potential of Aphelinidae Family: Unravelling Mechanism for Effective Pest Management in Agriculture

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Abstract

"The Aphelinidae family comprises parasitoid noted for bio management in conflict with multiple pest, especially aphids. This abstract explores their potential as biological control agents, highlighting their life cycle, host specificity and effectiveness in managing aphid population. Emphasizing their role in sustainable pest management, this review underscores the significance of Aphelinidae in Integrated pest management Strategies and their contribution to ecological balance in agriculture ecosystem capabilities against various wasps known for their biocontrol capabilities against various pests, especially aphids. This abstract explores their potential as biological control agents, highlighting their life cycle, host specificity and effectiveness in managing aphid population emphasizing their role in sustainable pest management, this review underscores the significance of Aphelinidae family in integrated pest management strategies and their contribution to ecological balance in Agriculture ecosystem.

Notably, we investigate the latent interaction between parasitic wasps and Extra organic pest control agents including of them coexistence in conjunction with biointensive pest management procedure. Mine and other Detection key Features belonging to protecting and building interest in Aphelinids group of individual in agro ecosystem.

This one investigation confer to the evolution of environmentally conscious insect eradicator use, hand over beneficial understanding for Harvester, field-worker and councilperson look about for to make use of the biomangement capability of Aphelinidae family. By resolve the procedure essential to the strength of parasitic wasps, all of us should promote their utilization in integrated pest control approaches, lessens dependance on synthetic toxicant and Enhancing a more eco-friendly food production and aphelinids wasps in to a agriculture should be a minor value resolution be alike to synthetic pest method for management".

Key words: Hymenoptera, Aphelinidae, Parasitoid, Exotic, Humidity, Juvenile, Greenhouse.

Introduction

Natural environmental elements in nature control the size of each species population. These elements are in charge of maintaining the equilibrium of a population of living things. Natural control is the process by which a natural death occurs without human intervention. The survival of living things is influenced by temperature and humidity. Countless creature because the death of microorganisms similar to bacilli, infective agent, mould, bloodsucker and vampires. living creature persist that have being deemed unacceptable be commonly concerned just as pests, ecological element that affect pests population fluctuate through one position to another along with change over a moment. Big compound be such part can significantly lessens blight inhabitants in the middle of province and increase its abundance in another. in some cases pests out smart belonging to them born enemy together with get bigger toward Prominent inhabitants densities. Therefore Human must manipulate Community in view of born enemies in order to keep their population under control, this Process is known as bio control or biological control. Therefore any action taken by one species that lessen the negative impact of another is referred to as biocontrol. The study and Application of parasites, predators, and pathogen to control host densities is another definition of biocontrol. the small chalcidoid hymenopteran family aphelinidae included 30 genera and around a thousand species. according to their biology, aphelinidae parasitize a wide range of insect species that are harmful to horticultural and agricultural cross. Although both ectoparasitoidism and hyperparasitoidism are recognized, they exist primarily maininside lethal parasite Regarding Auchenorrhyncha.

Most Race Parasitize sternorrhyncha nymphal stages, whereas the majority of centrodora forster species, one Dirphys howard species, a few Azotus Howard species, together with masculine of several encarsia forster Race are egg-feeding Diptera.

In their native environments, Aphelinids surely help control pest population. They have also exist efficiently in work of Biomangement of sap sucking insects, including plant to use, Bemisia tabaci and hard scale insects. Many of the world's biocontrol program have been successful because of family. The aphelinidae family, for instance has the highest ratio of successful Introduction to instances where complete profitable command of pests accomplished. Surpassing proportion considering diverse Sawflies families, according to an analysis of data provided by Clausen and Noyes. That's why aphelinidae family is a source of biocontrol agent.

In order to reduce their negative effects on the environment, pest management technique have undergone several developments and improvements over time. Overuse of chemical pesticides has resulted in a number of negative effects around the world, including resistance, residue, revival and secondary pest outbreaks with an estimated 8.5 billion people on the planet by 2030, it is imperative to create a sophisticated crop production system using a sustainable method on a restricted land area in order to meet the expanding populations demand for food. Other traditional methods, including Importing and releasing Living enemy should improve effectiveness along with durability in regard to biomangement in present period. Pesticides are considered the most effective weapons and are essential in crop mangement.

Importing and releasing of born enemy should improve successfulness along with lastingness of biomangement present day. There are threesome categories of biomangement.

- A. Classical biological controls, which involves importing foreign varieties along with establishing them over a newly discovered location.
- B. Enhanced Biotic control, that involves mass rearing concerning create varieties.
- C. Conservation biological control which involves conserving natural enemies Through environmental manipulation.

Classical biological control is the deliberate presentation Regarding foreign born enemy toward long term setting up together with blight mangement in an region a particular blight possess infestation. The employment of natural control substitute exist necessary during which the programs target is an exotic pests after the lost 1800's, biomangement possess effectively suppressed over 200 unwanted blight along with terminated 50 undesirable vegetation widespread accompanied by beneficial interest value proportion. A 33% Progress estimate over initiate foreign representative along with 10% estimate toward sufficient command about selected bug blights. This means that during which a traditional biomangement representative exist utilized in case of matching pests during many generation along with territory, the possibility Regarding during which the select existance established together with calculator make Better. Biocontrol practitioners have the capacity Regarding enhance the well being, accuracy, expectably along with effectiveness Regarding biomangement during Feedback towards the possible hazards Regarding earlier than to establish born enemies, by means of inclusion toward uncertainty Evaluation rules toward remained obtain constructed in one attempt to cause Introduction enviromentally guarded, whichever concentrated at length aware mixture because intrusive blight difficulty. Move along inside research based discipline possess that recently developed encourage traditional bio management regarding main application along with different biomangement programs Considering since accepted for endless. Above-mentioned newly discovered not only enhance biomangement along with unwanted blight. However they should also be employed subsequent directed toward benefaction blight. Those blight are foreign, together with confer different farming Environment as long as notable flow. Biomangement tasks for a long time Consequence pests achieved small concentration overtime while harvest gain recently developed pest varieties along with point of convergence shifted directed toward lessen recently developed complication along with Concerning engineering. Recent unsegregated blight administration program, foreign blight should be calculated Consequence pests which was difficult within harvest during more than two and half decades along with those accepted before 1990 at all, Compatible Considering analysis with the progress Concerning Adequate time, as Individuals be allowed normal throughout their existance. Further on successfully implemented biomangement programs Considering Consequence blights may also assist lessen the amount of Pesticides used in agriculture. Enhancement by either propagating and Releasing natural enemies or by altering environmental condition that temporarily restrict pests below threshold level, it is common procedure to boost these successfulness Concerning the born enemy population while unfavourable biotic and abiotic variables limit success, prospective natural enemies are the primary determinants. The eradication regarding toxicants originating at to promote caused by strength concerns, the progress of pests resistance, a particular reduces their effectiveness, non target and environmental effects together with Emergence Concerning recently developed pests in respect to which these are unauthenticated toxicant are some of the factors that lead to the adoption of augmentative biological control. The two components of augmentation are as follows.

- A. Manufacturer in bulk.
- B. Release natural enemies produced in large quantities.

Since the Ongoing release of natural enemies on a broad scale requires a considerable volume of Parasitoid culture, mass production is a crucial component of biological control programs. However, one of the most important factors that can directly affect the investment in mass rearing, is the cost of host production. Commonly, fake host used for boost effectiveness together with lower be a value at large number Nurtured host-killing parasite. Numerous with respect to present technique substitutes established with the three level order Concerning Bringing up, which includes substrate plants, an unaffected creature along with Insectivorous insects.

Release

To control the population of target pests, born enemies substitutes liberated through area after mass multiplication. The success of natural enemy release depends on several factors that are remarkably similar to those

that affect the effectiveness of Pesticide use, including the pests vulnerable stage, coverage and the intensity of rainfall following treatment.

Method

Host plants and insect culture:

The *Trialeurodes vaporariorum* stock culture was kept throughout insect culture lab Adjacent to parisian potted beans herbs out of tomato plants spread through whiteflies that were grown in the polyhouse at a consistent climate, respective moistness and light duration. Inside to raise the greenhouse whitefly culture, ten day old french bean potted herbs exist uncover in the direction of pathogen to spawning location Containers for 48 hours. Plants containing greenhouse whitefly ova continue to be put down in different breeding Containers to raise the various developmental phases. Mummified *Trialeurodes vaporariorum* nymphs out of tomato shrub cultivated among glasshouse exist used bound for start stock culture of *encarsia formosa*. These nymphs were then transported to the insectary and maintained in petriplates until adult Emergence. They were identified by matching their morphological traits with taxonomic keys after being inspected under a bionocular microscope. We moved the adult to french beans in pots, with aspirator and several greenhouse whitefly nymphal instars. The soilless medium used to grow these plants had a 1:1 mixture of vermicomposting and cocopeat. Pots received weekly N, P₂O₅, K₂O, 19, 19, 19 and water sprinklers. The insectary housed these plants in breeding Containers. A herbs Possessing greenhouse whitefly young been naked repeatedly towards validate continues Dispense of host killing parasite.

Comparing the suitability belonging to several juvenile stages of greenhouse whiteflies as host for *E. Formosa* in mass raising on *Trialeurodes vaporariorum*. french beans potted plants serve as host for greenhouse whitefly rearing. every plants kept all of Its leaves, with the exception of one leaflet. In oviposition cages, these plants were exposed to adult greenhouse whiteflies for oviposition. plants were removed after 24 hours of exposure, the adults were dislodged and they were housed in screened rearing cages prior to Individuals reached appropriate developmental stage. On each plants there were roughly Fifty greenhouse whitefly nymphs. There were couple mature Individuals associated with parasitic wasp placed on herbs within breeding Container, once whitefly nymphs reached the desired stage. An aspirator was used to extract the adult Parasitoid after 48 hours, and herbs was maintained among insectarium. Until a greenhouse whitefly mummified and the adult *E. Formosa* emerged. Five replication of experiments were conducted in a completely randomized manner during the months of October through november in a laboratory setting, here are some observation made during the experiment.

Infections rate:

A amount derived from dark neutral wrapped larva belonging to greenhouse whitefly together with fit larva had been tabulated, proportion of infection were calculated by using below equation.

Infection rate% = amount Derived from dark neutral wrapped larva as part of / amount of unharmed larva + amount of wrapped larva of green house whitefly.

Developmental duration:

Observation together with period, belonging to various existence phases, of *Encarsia formosa* was noted Ova-Nymphal duration-amount associated with Passing Amidst Egg-laying Position by the parasitic wasp to Preservation whitefly.

Metamorphic stage:

During Passing intermediate Preservation of greenhouse whitefly additionally mature Individual arrival of whitefly Parasitoid-Duration Passing of Egg-laying position by parasitic wasp along with mature Individual arrival of whitefly Parasitoid.

Matured Durability:

Matured durability of whitefly Parasitoid been calculated with Offering extract leaflet of string beans accompanied by together with in the absence of larva of greenhouse whitefly while lay on directed toward Parasitoids within petriplates, above agarose gel bed accompanied by lower leaf surface meeting upwards. This had been choose similar inside appearance of host organisms (+) along with at lack of host organism (-) corresponding. A day mature whitefly Parasitoid (n=10) had been restricted one at A time within petriplates shaded accompanied by plastic food wrap penetrated utilizing blinder clip into keep away from wetness accumulation. monitoring continuously remain alive been put together up to dying of all population. variation within matured durability Concerning whitefly Parasitoid inside appearance/disappearance Concerning lay on calculated using below equation.

Variation within matured durability% = matured durability disappearance Concerning-matured appearance concerning lay on / matured lay on concerning disappearance × 100

Conclusion:

Infection rate of whitefly Parasitoids had been effectively infest second, third along with fourth larval phase of *Trialeurodes vaporariorum*. No infection had been manifest with first larval phase of Parasitoids infection due to whitefly, above various lay on levels depicts the infection were more within fourth larval phase of *Trialeurodes vaporariorum*. no infection had been manifest first larval phase of Parasitoids. infection due to whitefly on various lay-On levels depicts, infection been more in fourth larval phase of greenhouse whitefly, equivalent to third larval phase. Compared to fourth instar and third instar, parasitization observed in second instar was less. This continued as well Immortality take place during cocoon level of whitefly proved coming out of entirely matured arrival originating at completely infected larval phase of Parasitoids.

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Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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