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To Study the Biological Control Agent and Physical Control Agent to Control the Insect Pest around the Sangamner Tahsil Ahnednagar District (MS)

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Abstract: *The biological control agent is the naturally occurring organism that control the insect pest .this agent is the part of food chain ,it included in the tropic level of food chain. In an ecosystem different organism are present in a relation eating and being eaten. In agricultural areas the crop field is affected by the large number of insect pest .this insect pest control by some naturally occurring organism , which feeds on this insect. In this area 90 percent crop field are damage by insect pest .The larva of insect is very active and voracious feeder , they feeds continuously in their life span .so to control this pest to use biological control agent and physical control agent. The physical control agent is a man made agent also used to control insect pest. This two agent used to control pest without use of any chemical or insecticides .The insecticides has large affect on the crop field as well as also show the impact on the body of other organism . This insecticides enters into the food chain and causes various diseases. The increasing prevalence of insect pests in agricultural ecosystems around Sangamner Tahsil has necessitated the exploration of sustainable pest management strategies. This study investigates the efficacy of biological and physical control agents in reducing pest populations across major crops such as sugarcane, tomato, and onion. Biological agents including Trichogramma chilonis, Beauveria bassiana, and predatory insects like ladybird beetles and green lacewings were deployed through scheduled releases and habitat management. Physical control methods such as light traps, pheromone traps, sticky barriers, and netting were integrated to monitor and suppress pest activity.*

Keywords: Biological control agent, Physical control agent ,insectisidess , diseases, etc

I. INTRODUCTION

The insect pest is a organism that damege the 90 percent of agricultural crop field .

After the damage of crop the productivity is loss and they have low economic value in maeket ,so need to control the insect pest without using insectisides . the biological and Physical control agent used to control the insect pest . Insect pests pose a major threat to agricultural productivity, especially in regions like Sangamner Tahsil, where farming is a primary livelihood. Traditional pest control methods often rely heavily on chemical pesticides, which can lead to environmental pollution, pest resistance, and harm to non-target organisms including beneficial insects. To address these challenges, sustainable and eco-friendly pest management strategies are gaining importance. Various insect pest are present in the given area they can attack on the crop field ,so this insect pest are very harmfull to the crop field . One of such oldest control measures is the biological control of insect pests, also known as bio-control (Savita &

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Sharma, 2019) [1]. . Biological control is a population phenomenon, that is obtained from the interaction of a natural enemy population with the host population (N. J. Mills & Getz, 1996). [2]. More narrowly, biological control refers to the purposeful utilization of introduced or resident living organisms, other than disease-resistant host plants, to suppress the activities and populations of one or more plant pathogens (Thomashow, 1996) [3]. The biological control agent is the organism that control it, such as Wasp ,Leady Beetle, Farmers are often in need of management strategies against insect pests to either control their population or prevent their future outbreaks. One of such oldest control measures is the biological control of insect pests, also known as bio-control (Savita & Sharma, 2019). Biological Control Agents or Biocontrol Agents (BCAs) are defined as those organisms found naturally or genetically engineered that would eliminate or control the pest population to prevent economic losses occurring due to harmful effects from the targeted pests (Mishra et al., 2020) [4]..

Biological control involves the use of natural enemies—such as predators, parasitoids, and pathogens—to suppress pest populations. Examples include Trichogramma chilonis (an egg parasitoid), ladybird beetles that feed on aphids, and entomopathogenic fungi like Beauveria bassiana that infect and kill insect pests. These agents are safe, selective, and help maintain ecological balance.

Physical pest control methods use mechanical or environmental manipulation to destroy, remove, or prevent pests. Research from Maharashtra indicates that this is a sustainable and environmentally friendly approach. There is need to reduce the negative impacts of pest control methods on the environment. Increased concerns about the potential effects of pesticides on health, the reduction in arable land per capita (Novartis, 1997) [5] and the evolution of pest complexes likely to be accelerated by climate changes also contribute to change in plant protection practices. Insecticides are still widely used; however, more than 540 insect species are resistant to synthetic insecticides (Metcalf, 1994) [6]. Other drawbacks of synthetic insecticides include resurgence and outbreaks of secondary pests and harmful effects on non-target organisms (Panneton, 2001) [7]. The two primary kinds of physical control techniques are passive and active; others that do not easily fall into one of these categories are placed under a miscellaneous category. The two primary kinds of physical control techniques are passive and active; others that do not easily fall into one of these categories are placed under a miscellaneous category. The two primary kinds of physical control techniques are passive and active; others that do not easily fall into one of these categories are placed under a miscellaneous category. The two primary kinds of physical control techniques are passive and active; others that do not easily fall into one of these categories are placed under a miscellaneous category. Physical control methods, such as cold, heat and ionizing radiation, are used extensively as postharvest quarantine treatments where disinfestations of a given pest at a predetermined level of control must be achieved (Hallman, 2001) [8,9,10]. Physical control methods use mechanical or environmental techniques to reduce pest numbers. Common approaches include light traps, sticky traps, pheromone traps, and protective netting. These tools are especially useful for monitoring pest activity and preventing infestations without harming the environment.

This research project aims to study the effectiveness of biological and physical control agents in managing insect pests across key crops grown in Sangamner Tahsil. By integrating these methods, farmers can reduce their dependence on chemical pesticides, improve crop health, and promote sustainable agriculture. The findings of this study will contribute to local pest management practices and support the adoption of Integrated Pest Management (IPM) strategies in the region.

II. MATERIAL AND METHODS

Study Area:- The research was conducted in selected agricultural fields across Sangamner Tahsil, Ahmednagar district, Maharashtra. The region is known for cultivating crops like sugarcane, tomato, onion, and cereals, which are commonly affected by insect pests.

The biological contol agent is a naturally occuring organism .This agent to atract towards the agricutural area in various ways. This ways such as to growing the more flowering plants in the crop field that means the agent as well as insect

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pest are atracted in this areas. Collecting parasites and predators from the places of their origin and releasing them in places where they are absent.

The following biological agents were selected based on crop type and pest infestation:

Parasitoids: Trichogramma chilonis (used against lepidopteran pests)

Predators: Ladybird beetles (Coccinella septempunctata) and green lacewings (Chrysoperla carnea) for aphids and whiteflies

The physical Agents are man made agents . The methods are used for to callecting the insect pest manually such as light Trap and Shaking , Sticky trap ,Odor trap ,Hand trap, Mechanical exclusion etc.

The following physical methods were used:

Light traps: Installed at field edges to attract and trap nocturnal insects.

Sticky traps: Placed at crop canopy height to capture flying pests like whiteflies and thrips.

Pheromone traps: Used for monitoring and mass trapping of male moths (e.g., Helicoverpa armigera).

Netting: Protective nets were used in nurseries and polyhouses to prevent pest entry.

Bird stop trap

Crop trap

Odor trap

Sticky trap

III. RESULT AND DISCUSSION

The way of to control the insect pest with the help biological and physical agent is very simple. The large number of insect population are control by using naturally occuring organism and some man made agents. The different methods of physical control used against crop pests have some common characteristics. Passive physical control measures have long-lasting effects although they may require periodic renewal (trap replacement) or maintenance .Although physical

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control methods are very diverse, this strategy of pest control deserves to be recognized as an area of expertise similar to the area of biological control.

Light trap

Biological agent

IV. CONCLUSION

To control the insect pest without use of any chemicals or insectidide. The avoidance of insecticides the enviroment make suitable for the growing of crop in the field .To improve the food quality and also improve the health awarness. To make a environment ecofriendly .The chemicals are not enters into food chain and food web used of these agents. The study of biological and physical control agents highlights their crucial role in sustainable pest management. Unlike chemical pesticides, which often lead to resistance, environmental contamination, and harm to non-target organisms, biological and physical methods provide eco- friendly, cost-effective, and long-term solutions.

Biological control agents such as predators, parasitoids, entomopathogenic fungi, and bacteria have proven effective in naturally regulating pest populations while maintaining ecological balance. Similarly, physical control methods—such as traps, barriers, temperature treatments, and manual removal—offer practical, non-toxic alternatives that can be easily integrated into farming systems. The integration of these approaches within Integrated Pest Management (IPM) frameworks not only reduces dependence on synthetic chemicals but also enhances crop productivity, soil health, and biodiversity. However, their success depends on proper selection of agents, local environmental conditions, and farmer awareness. Biological And Physical control agents represent a sustainable pathway for modern agriculture, ensuring food security while safeguarding human health and the environment. Future research should focus on improving mass production of biocontrol agents, developing innovative physical techniques, and promoting farmer-friendly adoption strategies

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