Analyzing the impact of pesticides on important parasitoids in integrated pest management practices of cabbage plant

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Abstract

The enhancement of hosts and parasitoid concentrations is one of the elements involved in the mass breeding of advantageous life forms for biological control programs of the predatory insects. Depending on the treatment options, the parasitoids that developed from the decks are dispersed in the chosen experimental fields at intervals of 5 to 10 days. The incidence of emerging parasitoids was determined. Sustainable farming can benefit from the usage of regulating molecules produced by parasitoids or ectoparasites themselves. We examined the results of insecticides that are frequently applied to traditional and/or organic farming systems. One needs to be aware of how secondary plants influence effect on the actual associations in crop systems in order to maximise biological management in agricultural systems with their help. Despite the extensive use of insecticides in the habitat surrounding cabbage, minimal control is exercised. Our knowledge of the biological management of insect pests has recently advanced due to recent advances in the field of myco-biocontrol of predatory insects and their potential action mechanism.

Index terms – *Insecticides, Parasitoids, Integrated pest management, Cabbage, Biopesticides, P. xylostella, Fertilisation*

Introduction:

Cabbage (Brassica oleracea var. capitata L.), the most extensively grown wintertime vegetable crop in Bangladesh, is referred to locally as "Bhadha Kopi" or "Pata Kopi." Cabbage is a green vegetable that is rich in vitamins C and E as well as tryptophan, an amino acid that is necessary for human bodies. The cabbage plants have been employed as a source of food during the raising process and biochemical assays. Cabbage is a vegetable that is frequently grown across the world and is picked due to its economically valuable. Armyworm and cabbage looper populations were also decreased in the nearby patch. Various sorts of insects damage cabbage. All around cabbage plant pot on the cage flooring, fresh cabbage leaves were arranged. It was discovered that retreat or sheltering crops will play a crucial role in the management of DBM since they provide parasitoids with food for survival, especially while avoiding overuse of insecticides.

It is suggested that parasitoids could offer more effective pest control if nectar subsidies reduced the time spent searching for food. “Larval parasitoids are the most effective natural enemies of P. xylostella” (Bahar et al., 2013). As an alternative, crop boundaries or other areas with minimal value for crop production could be

turned into protected areas for helpful predators and parasitoids (Ratnadass et al., 2012). Additionally, compared to pharmacological or natural controls, the parasitoids and predators that led to population reduction were more substantial in the trap crop with a potential biocontrol management scheme (Zhou et al., 2011). P. xylostella and the parasitoid moth were both raised at 25°C on the host's larvae and cabbage leaves, correspondingly. Individual parasitoid-attacked larvae were gathered, and they were fed on fresh cabbage leaves (Etebari et al., 2011).

Fig.1. By parasitic insect, fresh cabbage and the cabbage plant are harmed.

It is suggested that parasitoids could offer more effective pest control if nectar subsidies reduced time spent searching for food. Larval parasitoids are the most effective natural enemies of P. xylostella (Syed et al., 2012). As an alternative, field boundaries or other areas with minimal value for agricultural production could be turned into emergency shelters for helpful parasites and predators (Flint & Bosch, 2012). Additionally, compared to conventional or biological controls, the parasitoid wasps and predators that led to population reduction were more substantial in the trap crop combined biological control management scheme (Zhou et al., 2011). Such pesticides treatments of the predatory insects of cabbage are not only inexpensive, but the residual compounds on the crops' treated surfaces or in the soil, as well as the destruction of natural enemies, have raised serious concerns about human safety and the environment degradation.

Pesticides are therefore commonly used on cabbage to yield marketable plants (Cobblah et al., 2012). Additionally, they are used to treat disease-carrying insects like bugs and mosquitoes that feed on blood (Sandhu et al., 2012). Local farmers still rely largely on conventional insecticides to control insects in cabbage, despite the fact that their use is linked to a number of unfavorable and occasionally fatal consequences (Phoofolo et al., 2013).

Fig.2. Cabbage webworm mature larva and a cabbage plant's head that has been harmed by the larva

Literature review:

Leena A. Irshaid et.al 2011 elaborated by to effectively manage this pest, an IPM programme that integrates the use of parasitoids and non-persistent chemical spraying must be devised. The right pesticide must be used in an IPM programmes to choose an effective dose against aphids while yet allowing any remaining aphid larvae to be attacked later by adult parasitoids. When choosing an insecticide, consideration of an insecticide's subchronic effects on insect pests and their parasitoids is crucial. Cypermethrin causes a significant percentage of parasite death (Irshaid & Hasan, 2011).

Riccardo Bommarco et.al 2011 described by to evaluate the effectiveness of pesticides in controlling diamondback moth in cabbage and to learn more about how natural enemies are impacted and benefited. We also examined the impact of pesticides on the prevalence of parasitic infection, the number of parasitoid adult and larvae, and the amount of crawlers. Six farms, each with a cabbage field that was not sprayed with pesticides, and each with a field of cabbage that has been (Bommarco et al., 2011).

Antonio Biondi et.al 2012 explained by For this plan to work, it is essential to accurately measure how different herbicides interact with predator behavior. Six biological methods, three chemical insecticide, two volatile compounds, and three additives were among the pesticides chosen for the research since they are often employed in both natural and organic agriculture. The parasitoid complexes linked with T. absoluta appears to follow the traditional pattern of colonisation on exotic pests, and it was shown that native parasitoid wasps moved quickly to the new invading host (Biondi et al., 2012)(Zappalà et al., 2012).

Eve Veromann et.al 2013 described Conversely, fertiliser alters the crop's inner microenvironment and plant structure, which may have an impact on how effectively caused by insects and their multiple reasons that may cause parasitoids look for food. Generally, M. aeneus oviposition activity and larval predation levels were not very high. Insects from the family Hymenoptera, mostly, those lay their eggs on or within other insect species are known as parasitoid wasps. The host finally perishes as their larvae mature and feed on it. Because of this, their parasitic insects must have discovered a suitable host at this point. Each individual head of cabbage was taken from each area, numbered, and weighed (Veromann et al., 2013)(Martin et al., 2013).

Methodology:

Biological Control:

The use of "natural," biological insecticides and alternatives for biological control, such as The use of chemical pesticides may be required to deal with a significant pest if the aforementioned environmentally friendly approaches prove ineffective; in this case, the safeguards to be undertaken for their efficient and secure usage are described. This prompted the use of alternate pest management techniques, like biological control. Predator and parasitic insects are examples of biocontrol agents that are regarded as crucial instruments in the integrated management of commercial insect pests (Ahmad et al., 2011). Although their efficiency and recognised role in biological control, supplementary plants have not yet been utilised to their full capacity in integrated pest management. The banker plants are exposed to biological control agents which disseminate as they multiply and grow in number over the balance of the greenhouse (Parolin et al., 2012).

Integrated Pest Management (IPM):

It's possible to view integrated pest management (IPM) as a crucial element of a system that promotes sustainable farming. “IPM programmes make use of up-to-date, comprehensive data on pest life cycles and how they interact with their surroundings”. IPM is a set of evaluations, choices, and controls for insect control rather than a single approach of pest control. IPM often combines a number of tactics to produce lasting results. IPM techniques and approaches are utilised to reduce environmental blight, reduce risk from dangerous species, and maximise advantages (Uchôa, 2012).

Establishing the objective pest's socioeconomic barrier is the first step in creating an IPM strategy. According to the cropping period and phase of the insect life cycle, this can be referred to as the number of larvae per unit area or per plant over which a substantial economic reduction in crop output will happen. The agent's survival is essential to the IPM program's effectiveness (Rimaz & Valizadegan, 2013). In order to potentially extrapolate examples of effective IPM strategies used in agricultural fields to other contexts (Ahmed & Awan, 2013). The IPM fields produced more curd and had decreased insects and disease occurrence than traditional, non-IPM crops. The IPM module strengthened natural enemies, leading in a long-term and reliable pest control strategy that required the use of less pesticides (Ahuja et al., 2012).

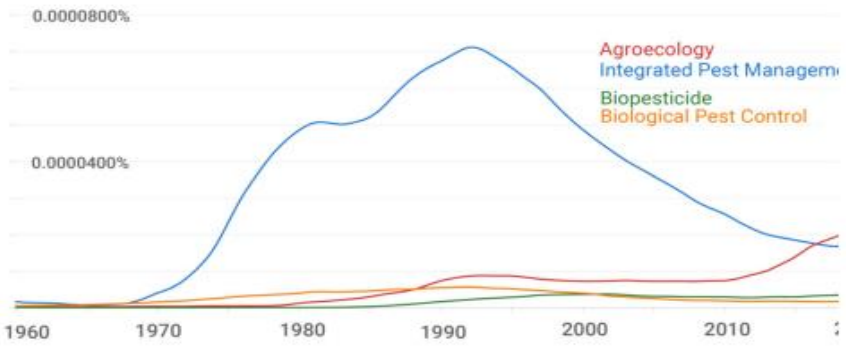

Fig.3. Frequencies of four main terms—Integrated Pest Management, Agroecology, Biopesticide, and Biological Pest Control—found in sources published between 1960 and 2010 (yearly counts, normalised to the maximum frequencies for the word "Integrated Pest Management").

Parasitoids:

A class of insects known as parasitoids grow their larvae on or inside the bodies of other species, which they subsequently eat. Insects and fly larvae (Hymenoptera and Diptera, respectively) comprise the majority of parasitoids and are crucial to almost all terrestrial ecosystems. In a very complicated environment, parasitoids—small to extremely small animals—look for hosts that are either very little or very tiny creatures. Instead of being correlated with the fertilisation method, the abundance of parasitoids for both pests was connected to the availability of hosts (Veromann et al., 2013). The families also contain around a dozen parasitoid species, such as predatory insects, ladybird caterpillars, stinkbugs, and ladybugs (MJ Naranjo, 2013).

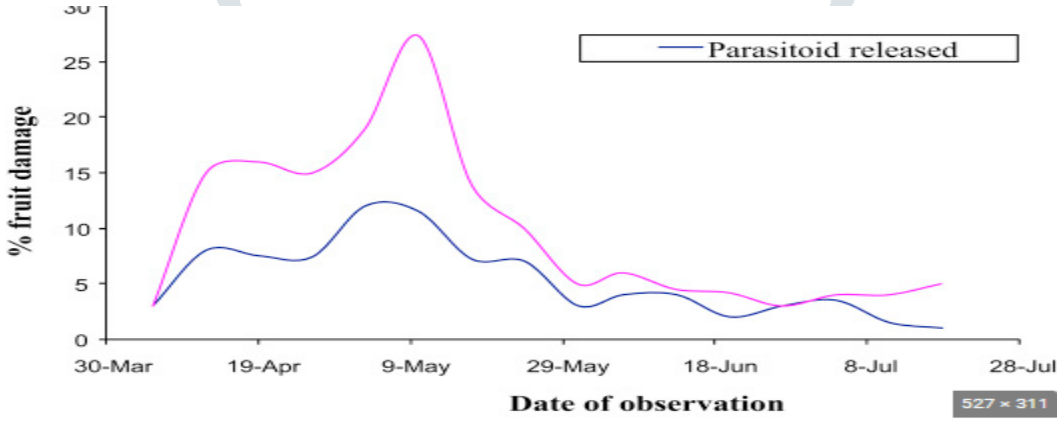

Fig.5. A wide range of insects known as parasitoids offer biological pest control.

The occurrence of pest natural predators (parasitoids) in all parts of the world and how they can be raised in labs and released in large numbers as biological control agents for crop pests are discussed. To prevent the destruction of the cabbage crop, parasitoid wasps are introduced into the habitat where cabbage grows (Bryant et al., 2013). Despite the fact that intercropping with fragrant plants had no impact on the overall parasitoid population (Tang et al., 2013). Wasps are the most common parasitoids. "Their larvae (immature stages) reside either on the host (external parasitoids) or within (internal parasitoids) (pest). On a single host, they go from egg to adult, murdering the host in the process. The natural enemies of leafminers, aphids, and the eggs and larvae of moths and butterflies include parasitic wasps (as caterpillars)" (Seif & Nyambo, 2013).

Conclusion:

Well how increase the activity of naturally occurring enemies is therefore a key factor in every IPM effort in order to limit pest infestation underneath or close to economic threshold values and, of course, to prevent any

action that would risk the activity of natural enemies. Only the first step has been taken toward a deeper comprehension of biological control strategies and how they are used. We believe that rather than variations in yearly accumulated amount of individuals, this regulation is probably maintained by the temporal changes of the highest prevalence of parasitoids.

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