Study on Integrated pest management to Cabbage leaf Webber (Crocidolomia binotalis) on cabbage plants

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Abstract:

Crocidolomia binotalis, a cabbage head caterpillar, was studied for its behavior, morphing, reproduction, and responsiveness to novel molecular insecticides in lab settings on cabbage. The mitigation of predatory insects in cabbage using agronomic measures may be taken into consideration in light of the aforementioned factors as possible potential alternatives. In comparison to other interventions, the use of white and yellow nets significantly enhanced the number of leaflets, fresh and dried weight, and load of the cabbage crop. Environmentally innovative approaches are necessary because the use of regular synthetic pesticides has induced the beginnings of pesticide-resistant insect pests, environmental degradation, and adverse effects on natural predators, which have led to an environmental destruction of the predator-prey ratio and risks to human health. IPM is an experience and understanding, farmer-based strategy that promotes natural pest population control by foreseeing pest issues and halting the pest from reaching levels that are detrimental to the economy.

Index Terms – *Integrated Pest Management (IPM), Crocidolomia binotalis, Insecticides, Biological Control, Chemical Control, Cabbage head, Crop pest*

Introduction:

Vegetables are well known for their value as preventive foods and as sources of sufficient amounts of vitamins, proteins, carbs, and minerals. Even during winter, cabbage crops serve as crop rotation to help keep the soil fertile, boost the amount of organic matter present in the soil, and help reduce weed growth. During in the dry season, the secondary pest of cauliflower, C. binotalis, produces significant financial losses. Early season cabbage pests include long - term damage, imported cabbage parasites, cabbage loppers, diamondback moth caterpillars, and cross-striped cabbage insects. Identifying of something like the pest, timing of insecticide implementations, and pesticide visibility are all necessary for effective control of cabbage pests, especially the leaf-eating caterpillars. Even though various species of caterpillars may respond differently to distinct insecticides, it is crucial to identify the species that is causing the infestation (Committee, 2010).

Whenever a plant's development of a heads was completed, cabbage was harvested. Concerning the high cost of pesticides programme in the open field conditions, the cost of manufacturing cabbage crops underneath

the net cover is lower than that of the open field (Abul-Soud et al., 2014). The primary habitat of the cabbage white butterfly Pieris brassicae and its relatives is cole crops. The larvae were isolated and raised on cabbage leaves grown in greenhouses without the use of insecticides after being obtained from the contaminated fields of cabbage (Nethravathi et al., 2009). Since massive raising on the native environment is time-consuming and labor-intensive, a semi-synthetic diet was created for the cultivation of cabbage leaf webber (Jalali et al., 2005). In order to control diseases in plants, one appealing alternative technique is biological disease prevention (Nega, 2014).

Fig.1. Basic structure of Leaf webber: Crocidolomia binotalis

Damaged cabbage leaves were sliced into discs of 6 cm in diameter, including the midrib on either side. These discs were submerged in the test isolates' aqueous solution for around 30 seconds. There are several reasons why cabbage production is significantly less than it could be, but insect pests are a significant one. Several different insect pests affect the cabbage crop (Mekuaninte et al., 2011). “Numerous insect pests, such as the diamondback moth, aphids, black cutworm, cabbage borer, leaf webber, cabbage semi-looper, etc., primarily target these crops” (Premalatha et al., 2011). One of these significant pests, the cabbage stem flea beetles, is the only one to deposit its eggs in the ground near or on the lower portions of rape plants. Although oviposition can persist during warm winter and spring months, most eggs are laid in the autumn (Williams, 2010). For knowing how periodic frequency of caterpillars on cabbage in various agroclimatic zones is influenced by environmental factors including temperatures, humidity levels (RH), rainfall, and wind direction (Hervé et al., 2014).

Fig.2. Fresh cabbage plants and damaged cabbage crop because of Crocidolomia binotalis

Literature Review:

C. Vijayaraghavan et.al 2010 explained bythe recent report was carried out to examine the effects of the these excerpts on the protein, carbohydrate, and lipid contents of the leaf Webber larva because the cabbage leaf webber, Crocidolomia binotalis, is one of the infamously pest species of cabbage, cauliflower, and other cole vegetables and may result in yield loss. The mature larvae were then moved into plastic buckets with cabbage leaves and muslin cloth coverings. These secondary lepidopterans, which also seriously harm vegetable brassicas, include the cabbage head caterpillar (Crocidolomia binotalis) and the cabbage web worm (Hellula undalis)(Vijayaraghavan et al., 2010)(Srinivasan, 2012).

Uma Shankar et.al 2012 explained by in the industrialized regions, whereby organizations of government have taken control of and relinquished control over this subject, the political implications of the agricultural issue of food and nutritional security are increasingly pronounced. IPM can be crucial to reducing crop losses in sustainable food production, boosting output while reducing risks to the environment and human health. An IPM programme should analyse the potential interactions between various control measures, cultural practices, weather, other pests, and the crops to be safeguarded. It should also take into account all available pest-management options, including doing nothing. IPM is a conceptual framework for the design, use, and ongoing evaluation of pest-management techniques that have positive impacts on the environment and the socio-economic systems. Leaf extract from C. officinalis' aerial portions had antifeedant effects on the cabbage butterfly (Shankar & Abrol, 2012)(Medhini et al., 2012).

N.S. Johansen et.al 2011 evaluated by fundamentally, although, we still have a small understanding of how the use of luminaires or greenhouses coatings and shards with various spectral qualities affects or could improve integrated pest management (IPM). The slowing of the cyclical transcription of xenobiotic-metabolizing

enzymes under continuous lighting, which results in a reduced amount and intensity in vulnerability to herbicides and detoxification enzymatic activities, is another issue that might be of relevance for IPM. Marigold-intercropped cabbage was shown to contain less cabbage aphids and cabbage butterfly larvae than monocropped cabbage (Johansen et al., 2011)(Mueke, 2014).

K. M. Kumaranag et.al 2014 defined by The crucifers, which include cabbage, cauliflower, broccoli, and radish, are significant rabbi season vegetable crops. The caterpillars go through four moultings and grow to maturity in 7–14 days while feeding in the centre of the cabbage. It exhibits insect growth regulation against the cabbage leaf webber, S. litura fifth instar larvae, and cotton stainer. Various field and laboratory research were also carried out to assess the biological activity of plants against pests that attack cabbage. One month before growing the bug larvae, cabbage seedlings were grown in pots (Seed & Techniques, 2014)(Das, 2014)(Rattan & Sharma, 2011).

Methodology:

3) Cabbage leaf webber(Crocidolomia binotalis):

It attacks cruciferous plants including mustard, cabbage, radish, and others.

Eggs: A female moth lays her eggs on the underside of leaves in clusters of 40 to 100. They erupt within 5–15 days.

Larva: Caterpillar weaves a web out of the vegetation and eats the leaves. Additionally, it consumes blossom heads from cabbage and cauliflower as well as the blooms and pods of mustard plants. The caterpillar has a brown body with rows of tubercles and a red head with brown longitudinal stripes. There is a 24-27 day larval stage.

Pupa: In a cocoon within the webbed leaves, pupation takes place. 14–40 days make up the pupal stage.

Adult: Small adult with forewings that are pale brownish.

Life cycle:

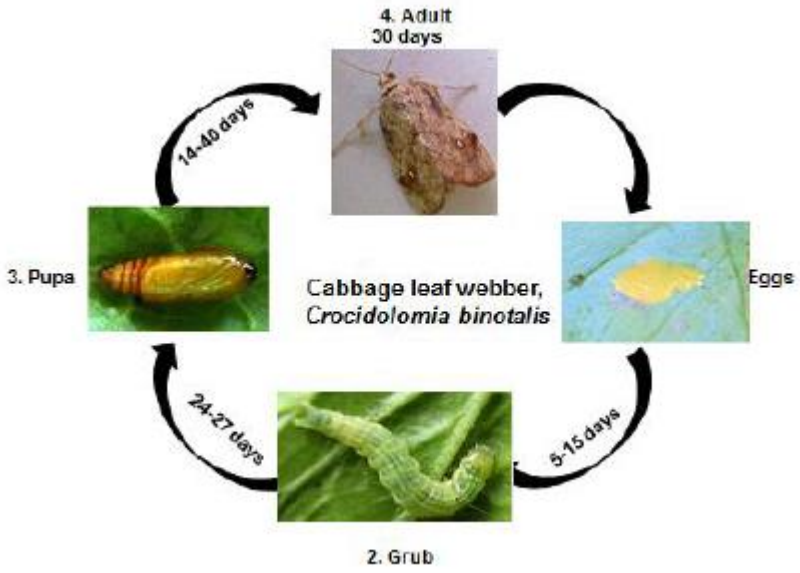

Fig.3. Life cycle of Cabbage leaf webber (Crocidolomia binotalis)

Cabbage leaf webber:

Cultural control strategies:

1. Eliminate and remove the webbed leaves that contain caterpillars.

2. Install 1/acre light traps.

Biological control strategies:

1. Protect parasitoids like Cotesia crocidolomiae and others.

Preventive Measures to control cabbage leaf webber:

1. If possible, plant cultivars those are tolerant or resistant.

2. Plant intercrops like castor or marigold.

3. Check your field frequently for webbed leaves.

4. Gather and eliminate plant parts that are infected.

5. Preserve natural parasitoids and predators that assist in controlling pest populations.

Integrated Pest Management:

IPM's idea and inspiration came from widespread dissatisfaction with the use of exclusively insecticidal methods of insect control. The challenge of controlling hazardous insects, weeds, and plant diseases is addressed holistically by this new strategy, known as integrated pest management, or IPM. An integrated pest management

strategy combines the prudent application of pesticides with biological, cultural, and other non-chemical methods of pest control.

IPM aims to keep insect populations below those that are economically detrimental while reducing the negative consequences of pest treatment on human health and natural resources. IPM technology controls the pest population in a way that prevents financial loss and minimises the negative side effects of chemical pesticides. Understanding the ecology of the cropping system, as well as the pests and their surroundings, is necessary for IPM. It efficiently manages a variety of important lepidopteran pests and has established itself as a cornerstone of integrated pest management as a highly selective type of host plant resistance (IPM) (Naranjo, 2011). IPM system is highly successful at reducing insect population and damages, especially in cabbage, which results in a 30 to 50% reduction in insecticide costs (Chuachin et al., 2006).

Conclusion:

During the winter, cabbage crops serve as cover crops to help keep the soil fertile, boost the amount of organic matter in the soil, and help reduce weed growth. By using less insecticide than in an open field, the cultivation of white and red cabbage crops under net houses increases net revenue and lowers IPM costs. The main barriers preventing agricultural communities from using IPM methods on their farms are a lack of understanding regarding biocontrol agents and a lack of accessibility to IPM tools and other inputs.

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