Use of Tulsi, Neem and Tobacco as a pest control measure of an aphid population

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Abstract:

Useful plants can be employed at the agricultural, farmer, and landscapes scales to improve pest control when they benefit natural enemies. In order to learn whether non-crop plants might assist biological pest management, it is important to assess the use of basil, neem, and tobacco as functional plants. Aphids can be a problem in the home's yard, vegetable garden, or fruits garden. They can spread a variety of viral diseases and, if the aphid population is not controlled, they can seriously harm desired plants. In South Carolina, colonies of several aphid species can be seen at any time from spring through fall. The most effective way to control aphids is to use integrated pest management (IPM). In relation to different types of crops and regional conditions, the repellent properties of basil and its potential use as an aphid-repellent plant are examined. The aphids' fertility is similarly impacted by the neem pesticide. Aphid management and control heavily rely on natural enemies. Insect pathogenic fungi have been used in pest management in a number of different ways.

Keywords – *Tulsi, Neem, Tobacco, Pest Control, Aphid Population, Integrated Pest Management (IPM), Parasitoids, Predators*

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Introduction:

Pests can affect both the amount and quality of the farm products you generate. They are always recognised to be harmful insects. Aphids have been identified as a major offender among the pests that infest farms. In India, basil is a household plant that is commonly grown. The biological control was mediated via basil planting density. Insecticides made from neem are generally seen to be compatible with maintaining insect natural enemies. Because they contain a wealth of bioactive substances, including flavonoids, proteins, and aromatic hydrocarbons, tobacco leaves are economically beneficial.IPM, or Integrated Pest Management, is the employment of a variety of control techniques in a thorough and proactive manner to lessen pest populations, preserve plant health, and reduce the use and environmental effects of pesticides. Economic, environmental, behavioral, social, and chemical controls are a part of these management techniques. Tropical basil growing next to cabbage plots considerably reduced the number of insect pests that attack cabbage. An effective and popular natural pesticide is neem oil.

The aphid pertains to the aphidoidea family. Although aphids are sap-sucking insects that come in a variety of colours, their females are typically thought to be wingless, with their main function being to generate new aphids called as nymphs without the help of the male aphids. Aphids provide a greater hazard to farmers because of their constant population growth, which is one of the main causes. Neem spraying was used as a natural pesticide in the hunt for environmentally friendly pest control strategies, as oppose to them(Satti et al., 2010).“Alternatively, if the impacts of the pesticides are attributed to aggregation over time rather than being as particular to each age class, the aphid-pesticide system can be modelled with a straightforward partial differential equation” (Banks et al., 2008).An extremely crucial factor is the examination of the effectiveness of predators in the presence of natural pesticides (such as neem or diatomaceous earth). The only insecticide that worked well against aphids before World War II was "natural" nicotine, which was taken from tobacco leaves and sold as sulphate. As a result, active parasitoids are present right when pest aphid populations are just starting to expand(Dedryver et al., 2010).

Fig.1. Basic structure of Aphid population on plants

The pesticidal module had the lowest aphid population, according to several results. Though regulated herbicides like neem are occasionally used to minimise harmful pest populations, biological management is primarily used in organic agriculture to combat insect pests(O Duke & B Powles, 2008).In many crop production, helpful organisms (predators and parasitoids) can significantly contribute to the reduction of insect pest populations (Holloway et al., 2008).Neem compounds tested significantly harmful to adults and nymphs when employed as systemically pesticides through root cells (Ahmed et al., 2007).Insects samples were used to compare the outcomes of treating insects with neem oil and B. bassiana together to treatments with either of them separately(Mohan et al., 2007).The possibility of microbial pest control is shown by the effects of natural epidemics, particularly those brought on by fungal and viral infections, on insect populations (Charnley, 2007).The value of tobacco extracts as botanical pesticides is well acknowledged in the world of agriculture; they are affordable, risk-free, safe, non-hazardous, and extremely effective against a variety of insect pests. The use of integrated pest management (IPM) is beneficial while growing vegetables in greenhouses. The maintenance of insects and mites can be accomplished using many of the general IPM ideas and techniques that are applicable to the control of plant diseases. Aphid populations grow, sucking the plant's nutritious fluids (sap) and causing stress issues including stunting (Webb & Hochmuth, 2010).

Basil Leaf Neem Leaf Tobacco Leaf

Fig.2. Basil, Neem and Tobacco leaf structure

Literature Review:

Aníbal F. Cóndor et.al 2007 demonstrated by because of its high azadirachtin content, neem seed oil is frequently used as the active ingredient in such pesticides. Neem-based pesticides have been promoted to synthesize new insecticides as the more practical to use in most pest management programmes since they are not poisonous to humans and many important invertebrates and the insects are uncommon to become resistance. Although choosing a farm site is not usually based primarily on factors related to pest control, many organically farms are situated in areas with adverse climatic conditions for diseases and pests(Cóndor-Golec, 2007)(Zehnder et al., 2007).

Nabil E. et.al 2009 explained by to reduce the negative impacts of aphids on artichokes plants and to promote root development and bud production, neem in association with diatomaceous earth ranked top, followed by neem alone, while diatomaceous earth alone came in practically last place. During greenhouse circumstances, neem can offer sufficient aphid control. Aphid control using natural insecticides like neem products has been the subject of numerous

studies. Natural enemies and the use of specific insecticides may contribute to a reduction of insecticide required for control (El-Wakeil & Saleh, 2009).

Ahmed Oladimeji et.al 2010 describedby Despite the fact that the yields were not as high as those observed for lambda-cyhalothrin, neem and basil leaf solutions increase in the production. Therefore, as complete insect removal is neither required nor attainable, there is a limit to how much pesticide concentrations could be raised to produce a better result. The level of economic harm caused by the insects must be determined. Planting these plants as pest deterrents in the farm may help to further test their value in pest management (Oladimeji & Kannike, 2010).

Frederick M. Fishel et.al 2010 evaluated by The use of pesticides, which offered season-long crop protection over pests and complemented the advantages of fertilisers as well as other agriculture production techniques, became the main method of pest management due to their substantial effectiveness at a relatively cheap cost. Growing worries about the risks pesticides pose to the environment and human health have also become major obstacles to pesticide use (Fishel, 2010).

E.N.A. Dormon et.al 2007 described by Development of an integrated pest management (IPM) program centered on hydrated neem with the aim of increasing cocoa production through eco-friendly pest control techniques. Furthermore, slower rates of population increase would give natural enemies more opportunity to gather later in the summer, thus further reducing aphid populations and reducing yield losses. IPM will offer a variety of strategies that the producer must combine in order to achieve financial and protection of the environment. IPM must be based on a full knowledge of the ecosystem of pests and helpful organisms and their interactions with the crop (Dormon et al., 2007)(Donaldson & Gratton, 2007)(Bergé & Ricroch, 2010).

Peter J. Gregory et.al 2009 evaluated by Pest and disease effects in crop models might be included in a more mechanistic way to produce more accurate projections of crop production at the regional level, which would help strengthen regional food security policy. Finally, it is thought about how improved food security in response to changing climates might be achieved by a greater knowledge of the roles played by pests and diseases in agricultural production

systems. Only the neem treatments had higher forest cover, which resulted in much less damage than the control, albeit not significantly less (Gregory et al., 2009)(Ayenor et al., 2007).

IPM Scheme:

A combination of two or more pest control techniques is typically more successful than using just one. The five techniques listed below manage and stop pest damage:

1. Mechanical control—the application of tools or manual labour.

2. Physical techniques—changing environmental variables like heat, light, humidity, or solarization.

3. Cultural methods, such as cultivating pest-resistant plants, crop rotation, planting times, fertiliser, irrigation, removing agricultural leftovers, or other ways that prevent pests from getting near the crop.

4. Biological control, which involves using natural enemies like parasites, predators, or bacteria (which can be reared if not present)

5. The use of pesticides for pest eradication and control. Review the most recent Pacific Northwest Insect Management Plan for a list of efficient pesticides approved for use on particular plants (Rondon et al., 2008).

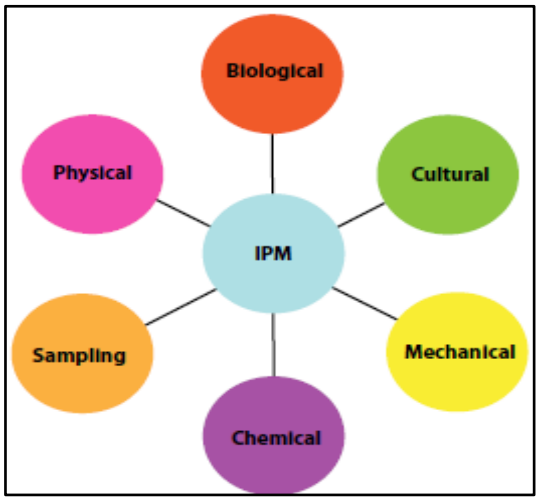

Fig.3. Integrated Pest Management (IPM) scheme

The exoskeleton of an aphid can be coated with neem oil and the surfactant that helps the insecticide stick to the leaves of the plants, which causes the aphid to drown upon contact. The primary control strategies for managing aphids in accordance with IPM guidelines are described here. "Those techniques for managing aphid populations include the utilisation of host plant resistance, biological control, and cultural techniques". All of these give potent levels of activity. It is significantly more challenging to manage aphid populations in the field through the bulk deployment of natural enemies (inundation).

There are several pest control methods for controlling aphid population:

Use of Basil (Tulsi):

1. Basil is effective at keeping insects and flies away.
2. Whether applied topically or by touch, neemix and basil oil both demonstrated an insecticidal impact on Aphis craccivora Koch.

Use of Neem oil:

1. It was noted that neem leaf, seed, and oil extracts have the ability to operate as antifeedants or as oviposition and feeding impediments for the management of brown plant hoppers and green leaf hoppers.
2. In comparison to results obtained with neem extract alone, adding sesame or linseed oil to the extract caused a larger rate of grub mortality and a greater deterrent in feeding and oviposition.
3. Neem products have been used successfully in the field to combat vegetable pests.
4. Comparing agricultural yields achieved with neem products to those obtained with advised synthetic insecticides revealed that using neem products not only reduced pest damage but also increased crop production.
5. Some research suggests that neem oil and synthetic insecticides may work in concert to manage insect infestations.
6. In numerous nations across the world, neem seed oil, a natural insecticide, is likewise used to manage various insect pests of significant agricultural crops.
7. Insecticides made from neem can be used in organic farming.

Use of tobacco leaves:

1. As directed on the label, this product should be used to control cutworms, flea beetles, the green peach aphid, and the tobacco aphid on tobacco grown in greenhouses.
2. High nitrogen fertiliser rates can postpone maturation and make tobacco a more inviting host plant for hornworms and aphids following topping.
3. For the kitchen garden, tobacco works wonders as a bug deterrent. The nicotine released in the water when a small bit of tobacco is soaked in a quart of water and left to soak overnight will produce an all-purpose insect repellent.

Conclusion:

Pests that damage crops are known to be repelled by pesticide plants like basil. To control the problem, use organic or herbal solutions like a soap-and-water solution, neem oil, or seed oil. Utilize natural predators like birds, ladybugs, and green lorises. Grow the appropriate plants that will draw predatory insects, repel aphids, and "trap" aphids. When fighting aphids, neem oil or insecticidal soap will be quite effective. Tropical basil could be utilised in integrated pest management in the context of promoting agro-ecological strategies for crop pest management, particularly for vegetable crops. It is true that the manner of virus transmission and the pattern of virus dissemination have a major impact on the effectiveness of insecticides against damage caused by viruses carried by aphids. There are currently many types that contain this source of resistance, which helps to manage aphid populations on this vegetable crop.

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