

Recent Invasive Alien Insect Pests in India and Its Management

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ARTICLE ID: 48

Abstract

The effect of climate change and increased movement of human beings, transportation, urbanization, deforestation, trade, goods and services are the reasons to introduce alien insect pests in to the India, in spite of strict quarantine measures at the entry points/quarantine stations through various modes. Total 37 different insect species were introduced in to the India till date 2023. Recently four insects are introduced and caused economical damage to its host plants which leads to the yield lose to the farmers. Hence strict quarantine measures should be implemented/followed and have to bring awareness among individuals and farmers to avoid introduction of new insect pests in to our country and to manage the introduced pests by proper early identification before its multiplication and causing economical damage.

Keywords: Alien insects, invasive, quarantine and integrated pest management.

Introduction

Recently introduced cassava mealybug, *Phenacoccus manihoti* Matile-Ferrero (Hemiptera: Pseudococcidae) in the year 2020, mango soft scales, *Fistulococcus pokfulamensis* Hodgson & Martin (Coccidae: Hemiptera) in the year 2023, apple leaf blotch miner, *Leucoptera malifoliella* O. Costa (Lyonetiidae: Lepidoptera) and bagworm, *Capulopsyche keralensis* (Psychidae: Lepidoptera) introduced in to the India in 2023. Immediately after introduction they will acclimatize to the local environmental conditions, multiply its population, spread and causes sever economical loss/damage to the host plants. It will be very difficult to manage these kind of insect pests because of unaware of proper identification at early stage by the farmers and lack of specific natural enemies like predators and parasitoids. There is an option for introduction of their specific natural enemy, mass production and release. But it will be a time-consuming process. Management practices such as cultural, mechanical, physical methods, botanicals, biocontrol agents and finally chemical insecticides/pesticides



which is last option, but farmers will choose this as first option which they need immediate control of pest problem and face their consequences later like (pollution of natural resources, death of natural enemies & pollinators, residue problem, human health issues, resistance development and resurgence). To avoid this farmer must and should follow integrated pest management practice (Gopi *et al.*, 2019). Hence it is the responsibility of every individual of the India to create awareness among individuals/society and to follow strict quarantine measures to avoid/stop the entry of foreign insect pests in to the India.

Cassava mealybug: *Phenacoccus manihoti* (Hemiptera: Pseudococcidae)

Cassava mealybug introduced from South America to India and in India first time reported from Thrissur, Kerala in the year 2020. Mealy bugs are small, soft-bodied, plant sap sucking insects and they are so called due to the thin to thick mealy/cottony wax secretion covering the insects. They feed by sucking the sap of plant parts like stems, petioles and leaves, causing damage directly by sucking the sap and contaminating the plant with its toxic saliva that causes leaf curling, shriveling, slow shoot growth and eventual leaf withering and indirectly by favoring the development of sooty molds (Barilli *et al.*, 2014).

Insect reproduce sexually and adult female secretes an egg sac of white waxy substance in which eggs were laid. Fecundity exceeds 240 eggs per female. Egg stage lasted for 7.7 days on average and three nymphal stages identified and their average durations indicated as 6.9, 4.9 and 5.7 days respectively, with additional pupal stage for male while female instar molted directly in to adult female without undergoing complete metamorphosis. Insect completes its life cycle in approximately 45 days.

The Indian Council Agricultural Research – National Bureau of Agricultural Insect Resources, Bengaluru imported the parasitoid wasp, *Anagyrus lopezi* De Santis (Hymenoptera: Encyrtidae) from the International Institute of Tropical Agriculture sub center located in Republic of Benin, West Africa. The parasitoid cocoons from second consignment which was received on 13th August 2021 and emerged parasitoids are being maintained, mass multiplied and used against mealybug (200,000/10 hectares). Ploughing and drying soil to destroy pupae, soil application/incorporation of *Metarhizium anisopliae* bio-control agent in to the soil around the plant to kill the egg mass, soaking stalk cuttings in systemic insecticides before planting, pruning and burning of infested plant parts and avoid planting of infested plant materials. Conservation of general natural enemies like green and brown lacewing, ladybird beetles and

wasp predators. Swabbing of grease to the stem to avoid the movement. Spraying of neem oil, neem seed kernel extract and bio-control agent *Lecanicillium lecanii* 5g/l but have to ensure that climatic conditions should be (below 25⁰C temperature and more than 85% relative humidity) which is suitable for spore germination and systemic insecticides like Imidacloprid 17.85 SC 0.25 ml/l, Thiomethozam 25 WG 0.2 g/l and Acetamiprid 20 SP 0.3 g/l was recommended. However, waxy coating of mealybugs reduces the effectiveness of contact insecticides. Besides, the habit of aggregating in hidden locations makes mealybugs control by insecticides difficult.

Mango Soft scales: *Fistulococcus pokfulamensis* (Coccidae: Hemiptera)

Recently reported for the first time from Bengaluru (Karnataka), India which was known previously from Hong Kong infesting a gymnosperm. In India, it has been recorded on *Jamun*, northern highbush blueberry and mango. In the surveys conducted by *Rashvee-International Phytosanitary Research and Services* and *Insect Environment* teams, it was found that the pest has spread to several mango orchards of Jangamakote, Sidlaghatta taluk of Chikballapur district, Mandibele, Vijayapura and Devanahalli taluks in Karnataka. These are phloem-sucking insects after settling at a feeding site, the scale insects pierce the host plant tissue with modified stylets until reaching the phloem vessels, from where they suck plant sap. Phloem sap is rich in carbohydrates but poor in soluble nitrogen compounds, so phloem feeders have to ingest large quantities of sap to meet their nutritional requirements. The excess carbohydrate-rich solution, known as honeydew, is excreted through a complex anal apparatus which leads to development of sooty mold on leaf surface which reduces photosynthetic rate through shading photosynthetic cells and interfering with gas exchange through stomata, traps heat from the sunlight (scorching the leaf) Raza *et al.*, (2023).

Female life cycle consists of egg, two or three nymphal instars and adult. In bi-parental species, males have a derived form of incomplete metamorphosis, which consists of two feeding nymphal instars followed by the non-feeding “prepupal” (third-instar), “pupal” (fourth-instar) and adult.

Pruning and burning of infested plant parts immediately after harvesting is the best cultural practice. Spraying of bio-control agent like *Lecanicillium lecanii* 5g/l was recommended but have ensure that climatic conditions should be (below 25⁰C temperature and more than 85% relative humidity) which is suitable for spore germination. Spraying of systemic

insecticides like Imidacloprid 17.85 SC 0.25 ml/l, Thiomethozam 25 WG 0.2 g/l and Acetamiprid 20 SP 0.3 g/l was recommended.

Apple leaf blotch miner: *Leucoptera malifoliella* (Lyonetiidae: Lepidoptera)

Apple leaf blotch miner also called as pear leaf blister moth and ribbed apple leaf miner. Larvae mine the leaves by feeding on chlorophyll content of the leaf, the mine consists of a large, circular blotch without a trace of a preceding corridor. Around the dark center the frass, glued to the upper epidermis, is found in distinct arcs (Maier, 2001).

Eggs diameter 0.3 mm, discoid and brownish adult lay the eggs on leaf. Larval head and prothoracic shield yellow, body greenish white turning darker near pupation. Head flattened with front and adfrontal sutures extending to vertical triangle. Thoracic segments and abdominal segments A1-7 broadly rounded giving larva moniliform appearance. Prothorax with lateral setae widely separated. Thoracic legs present. Abdominal prolegs A3-6 with uniserial circle of 12- 15 crochets, anal prolegs with 10-11 crochets. Pupae are brown to dark brown, usually clustered in flattened silk cocoons. Body with appendages soldered down and no movable abdominal segments. Maxillary and labial palps absent. Wings, antennae and metathoracic legs extending to posterior margin of abdominal segment 7. Adults are shiny metallic gray. Vertex of head with tuft of hair; antenna long and filiform, scape forms eye cap, antennal segments 28-32 in female, 28-30 in male. Forewing lanceolate; outer and posterior margin fringed; at rest, apex pointed, upturned in lateral view, divergent outwards in dorsal view; fringe with 4 radiating black lines: 2 toward Costa, 3d horizontal, 4th directed posteriorly about 45° from long axis of wing; apical half, orange, enclosing 2 white, dark-edged costal spots and post ternal pale violet-golden spot strongly black-margined on both sides. Hind wing narrowly lanceolate, evenly leaden gray, fringe longer than width of wing. Removing and burning of infested leaves is the best method to control further spreading. Installation of pheromone traps and chemical management.

Bagworm: *Capulopsyche keralensis* (Psychidae: Lepidoptera)

A new genus and species of bagworm moth *C. keralensis* has been discovered from the coffee plantations of Kerala. Researchers from the Zoology Department at St. Thomas College (Autonomous), Thrissur, have discovered the bagworm moth, new to science, from Nariyampara, Idukki district and Nelliampathy, Palakkad district. Capulo means coffee and psyche means moth or butterfly. The name therefore translates as 'Coffee moth of Kerala' as it was found from coffee plantations.

Insect is a very small moths, shows case-building behavior in larvae and have sexual dimorphism. Females of many psychid species never develop into a moth and retain larval appearance. This is the first genus and species of the subfamily Taleporiinae reported from India. The females are pale yellowish, wingless, with short legs and antennae. The male moth is a small-sized brownish black moth with a wingspan 8–8.4 mm and body length of 2.9 mm. The larval cases are elongated tube-like, wrapped with an outer sheath made up of bark tissues from the trees. The larvae of this species were found scraping on the bark of trees, they seem to feed on the bark tissues and depositions (algae) on the bark. The pupal cases are attached by a thread to the branches and underside of leaves. The life span of an emerged male adult is up to 4 to 5 days. Collection and destruction of cases is best method and spraying of *Metarhizium relyi* 5 g/l and contact insecticides.

Conclusion

Early identification and its management of alien insects which is already introduced in to the country and following strict quarantine rules to avoid entry and alien insects into the country is the need of hour, for which we need to study and understand the other countries insects, their biology, behavior and management etc., before introduction. Needed active participation of farm Agricultural and Horticultural universities in this point of view. Providing required information to the farmers well in advance for identification and management of particular insects may also help to control. Hence it is the responsibility of every individuals of the India to create awareness among individuals/society and to follow strict quarantine measures to avoid/stop the entry of foreign insect pests in to the India.

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