



**Biotica
Research
Today**

Vol 2:7 **684**
2020 **685**

Biology and Management of Thrips in Watermelon

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 Open Access

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Keywords

Integrated pest management, Life cycle, Thrips, Watermelon

Article History

Received in 29th July 2020

Received in revised form 30th July 2020

Accepted in final form 31st July 2020

E-mail: bioticapublications@gmail.com

How to cite this article?

Aishwarya and Mawtham, 2020. Biology and Management of Thrips in Watermelon. Research Today 2(7): 684-685.

Abstract

Watermelon is an important fruit crop grown throughout the world which is mainly preferred for its high nutritive value. The production and productivity of crop is affected by several pest and diseases. One of the important pest which causes major economic loss in watermelon is the melon thrips [*Thrips palmi* Karny (Order: Thysanoptera, Family: Thripidae)]. The pest affects the crop both direct and indirectly. Indirectly, they transmit major viral diseases to the crop by acting as a vector. They are very minute insects with less than 1 mm size. The life stages include egg, larva, pupa and adult. Management of thrips can be done by cultural, mechanical, botanical, chemical and biological methods as a part of integrated pest management.

Introduction

Watermelon (*Citrullus lanatus*, Family: Cucurbitaceae) an important fruit crop grown throughout the world and originated from Tropical Africa. China is the leading producer of watermelon (79.2 MT) and India ranks 25th position (2.3 MT) in watermelon production (FAO STAT, 2017). The crop mainly preferred because of its high nutritive value. Citrullinine a non-essential amino acid found rich in rind of water melon it helps the athletic ability and strengthening of immune system. As a crop of economic importance pest and disease management in the field is important for sustainable production. The major pests observed in melon crop are fruit fly (*Bactrocera cucurbitae*), melon aphid (*Aphis gossypii*), melon thrips (*Thrips palmi*), whitefly (*Bemisia tabaci*), pumpkin beetle (*Rhapidopalpa foevicollis*), leaf miner (*Liriomyza sativae*). Melon thrips, *Thrips palmi* Karny (Order: Thysanoptera, Family: Thripidae;) is a polyphagous pest, has wide host range and mainly infest on Solanaceae, Cucurbitaceae and Leguminosae plants in tropical countries. It acts as direct as well as indirect pest. As direct pest, both adult and nymphs scrap and feeds on the lower surface of the leaves that leads to silvering of leaves along the midrib, stunted growth and severe cases plants show bronzed appearance. Indirectly, thrips transmits major viral diseases to the crop by acting as a vector. For example, *Watermelon bud necrosis virus* (WBNV) was transmitted by the melon thrips in watermelon which causes 60-100 percent yield loss in watermelon (Ullman *et al.*, 2002).

Identification of *Thrips palmi*

The melon thrips, *Thrips palmi* Karny belongs to the Order Thysanoptera, family Thripidae. There are no key characteristics for identification of immature stages viz., egg, larva and pupae. Observation from naked eye will result in flying dust like particles. They are very minute insects with

less than 1 mm size. Body of the thrips is yellow in colour with fringed wings. Egg stage is not seen outside. Female will lay egg inside the leaf tissue by scrapping. Larvae are minute yellow coloured without wings. The only difference between adult and larval stage is presence of wings (Bhatti, 1980).

Life Cycle

The lifecycle of *T. palmi* includes eggs, two larval stages (L1 and L2), prepupa, pupal instar and adult stage (Figure 1). Eggs are laid in any above ground plant tissues including stems, flowers, foliage and fruits which are succulent and non woody. The kidney shaped eggs where it hatches after 4 days. Larval stage consists of four instars and a prepupal stage. The larval duration is around 5-7 days and duration of prepupa is about one day. The pupal stage is not found on plants as they tend to pupate on the upper layer of soil or on the leaf litter. Pupal stage will long from 1-3 days. The adult stage is having the duration of 20-24 days. Adults will actively move on the leaf upper surface and oviposit the eggs by scrapping.

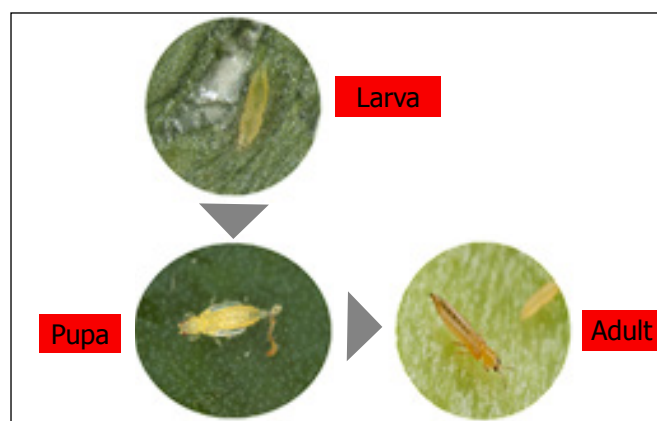


Figure 1: Life Cycle of the pest

Symptoms of the Pest

T. palmi tend to live and feed on leaves. The leaf edges curl upward after heavy thrips feeding and serious damage often occurs during the early crop stages. They feed by piercing or puncturing the cells of the host plants and sucks the cell sap, resulting in discoloration of plant tissues leading to scarring and distortion of the plant and fruit. The toxic salivary injections by adult and larval *T. palmi* resulted in silvering of plant epidermal cells and plant tissue. This

feeding behavior gives tissues a silver or bronze sheen where damaged cells coalesce and can lead to stunting, distortion and scarring of plants and produce, with marketability and yield being significantly reduced.

Management of Thrips

Keep the field well irrigated and avoid application of nitrogenous fertilizer. Remove and destroy the old flowers that harbor thrips. Use yellow sticky trap 15/ha. Clip off the dense foliage to avoid harbouring of thrips population. Using botanicals like, Neem products, achool, neemgold and neem oil, azadirachtin were effective against thrips population. Release larva of *Chrysoperla cornea* 10000/ha. Using anthocorid predators, *Orius minutus*, eulophid *Ceraninus menes*, coccinellid beetle *Curinus coeruleu* and minute pirate bug *Paratriphleps laevisculus* were seem to be promising biological control agents. Fungi known to affect melon thrips include *Beauveria bassiana*, *Neozygites parvispora*, *Verticillium lecanii*, and *Hirsutella* sp. Seed treatment with imidacloprid 70% WS (12 g/kg). Foliar spraying of Methyl demeton 25 EC 1 L/ha, imidacloprid 17.8 SL (3 ml/L), fipronil 5% SC (1.5 ml/L), acetamiprid (3 ml/L), Thiocloprid 21.7% SC (0.6 ml/L) and thiamethoxam (3 ml/L) can control the thrips (Cannon, 2007).

Conclusion

Melon thrips is a polyphagous pest, has wide host range and causes severe economic losses to the farmers. Therefore, need to overcome these pest problems, the above mentioned IPM measures applicable for the pest management in watermelon.

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