GreenariA
Go Green, Learn Green
An Agricultural Monthly e-Magazine
Volume 03, Issue 12, 2025
ISSN: 2584-153X
Article ID: G-25-1208

EMERGENCE OF *THRIPS PARVISPINUS* AS A MAJOR PEST OF CHILLI AND MANAGEMENT

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Abstract

Chilli (*Capsicum annuum* L.) is a vital spice and vegetable crop in India, facing significant yield losses due to pests, particularly *Thrips parvispinus*, which has emerged as a major threat. This pest, first identified in Bengaluru, has spread across several states, inflicting severe damage on chilli crops, with losses reported between 40% and 80%. The life cycle of *T. parvispinus* is temperature-dependent, completing in approximately 15 days, with females laying around 150 eggs. The pest causes economic losses through flower shedding and fruit malformation, with growers in Andhra Pradesh reporting losses up to ₹1 lakh per acre. Management strategies include cultural practices, physical measures, botanical treatments, biological control, and chemical interventions. An integrated pest management approach is essential for minimizing damage, sustaining yields, and reducing chemical pesticide reliance, thereby ensuring economic viability and environmental sustainability.

Introduction

Chilli (*Capsicum annuum* L.) is an important spice and vegetable crop grown throughout the country during both kharif and rabi seasons and suffer from substantial losses in yield due to abiotic and biotic stresses. Green chilli yield loss ranged from 60–75% due to low-yielding genotypes and high pest pressure especially *Aphis gossypii*, *Amrasca biguttula biguttula* and *Polyphagotarsonemus latus*. Similarly, *Thrips parvispinus*, observed on papaya in 2015 in India and became a problem to be reckoned with major pest on chilli, causing severe flower and fruit damage resulting into 70–100% losses in southern states during the year 2021.

Distribution

The insect *Thrips parvispinus* is an important pest of soybean as well as a variety of other crops, most recently expanding to Asia and Oceania within the last two decades. The pest was first spotted in Bengaluru, India and from there it spread to large chilli.' s growing regions in several states of Andhra Pradesh, Telangana, Karnataka, Kerala, Tamil Nadu Chhattisgarh and Gujarat infesting different host plants.

Life cycle

The duration of the life cycle of *T. parvispinus* depends on temperature, and it may often be completed within 15 days under favourable conditions. Both males and females take about 13 days to transition from egg-to-pre-adult stages. This species display characters in between gradual and complete metamorphosis. Egg laying and generation time are temperature-dependent with shorter development times, reduced fecundity at higher temperatures. There are five immature stages of development egg , 2 nymphal instars ,prepupa, pupa before becoming an adult. Female's adults life spans the range of 8 to 9 days and while males life span is about 6 days, each female could lay an average of 33 eggs. Population growth is moderate and conforms to a type III survivorship curve.

Biology of the pest

Adult *Thrips parvispinus* females are about 1 mm long. They have a black abdomen, yellowish-brown meso- and metathorax, a brown head and prothorax, a pale third antennal segment, and dark forewings with a pale yellow or white base. In contrast, males measure 0.6 mm and are completely golden. Each female lays around 150 eggs in leaf tissues, and these eggs hatch in 4 to 5 days. The larvae go through two stages over the next 4 to 5 days before pupating for 2 to 3 days. Females live for about 9 days, while males live for around 6 days. The entire life cycle from egg to the two nymphal stages, then prepupa, and finally pupa takes 15 to 18 days.

Adult female and male thrips

Nature of damage

T. parvispinus feeds and breeds on young leaves, flowers, and fruits. Larvae scrape chlorophyll and suck sap, causing yellow to reddish-brown patches, leaf hardening, curling, mottling, or a silvery sheen; severe attacks dry and kill new leaves. Flowers, especially white fragrant ones, develop brown streaks, wilt, and drop, reducing fruit set. Infested fruits become misshapen bell peppers turn button-shaped, others show scratches, rough skin, and deformities. Adults are most active in the morning on flowers, while nymphs remain on leaves.

Thrips infestation in leaves, flowers and fruit.

Economic importance

T. parvispinus causes significant flower shedding, fruit malformation, and fruit drop in chilli, resulting in severe yield losses. In Andhra Pradesh, growers report economic losses of up to ₹1 lakh per acre. Field observations in Andhra Pradesh and Telangana show damage levels between 40% and 80%. In Indonesia, yield losses of 23 to 60% have been noted in field conditions. Although mainly a pest, *T. parvispinus* also helps with pollination in some tropical and subtropical crops.

Management

Cultural Control

- Plant bell pepper early to reduce *T. parvispinus* incidence and damage.
- Use resistant chilli cultivars (*Capsicum annuum*, *C. baccatum*).
- Grow chilli with plastic mulch and without intercropping.
- Apply pesticides timely during the vegetative stage.

- Utilize resistant genotypes like Mayang Ratih chrysanthemum for breeding programs.
- Avoid excessive nitrogen application.
- Maintain balanced nutrient management to prevent pest outbreaks.

Physical Measures

- Exposing thrips to a 60% carbon dioxide atmosphere at 30 °C results in complete mortality.
- Effective against multiple species, including *Frankliniella occidentalis*, *F. intonsa*, *Thrips tabaci*, *T. palmi*, and *T. parvispinus*.

Mechanical Measures

- *T. parvispinus* is most attracted to white traps, though blue and yellow sticky traps also effectively capture adults.
- Collect and destroy infested crop residues and remove off-season host weeds (e.g., *Parthenium* spp., *Abutilon* spp.) from fields.
- Install 25–35 blue sticky traps per acre immediately after transplanting for effective mass trapping.

Botanical Measures

- Apply neem oil, pongamia oil, or soap solutions in heavily infested areas.
- Use plant-based extracts such as fish poison bean (*Tephrosia vogelii*), Indonesian mahogany (*Toona sureni*), and eucalyptus oil, which show >30% efficacy during the vegetative stage.
- These treatments can reduce pest incidence for up to 75 days after planting and improve marketable yields in chrysanthemum crops.

Biological Control

- Predatory insects like ladybird beetles (*Menochilus sexmaculatus*) and the entomopathogenic fungus *Lecanicillium lecanii* are effective biopesticides against *T. parvispinus*.
- Sprays of *Pseudomonas fluorescens* or *Bacillus albus* formulations, especially on flowers and fruits in chilli crops, significantly reduce pest populations.
- Among tested biopesticides, azadirachtin-based products and *Pseudomonas fluorescens* have shown the highest effectiveness against this invasive thrips.

Chemical Control

- Laboratory studies confirm susceptibility of *T. parvispinus* to various insecticides.
- Phosphine (liquefied formulation) at 200 ppm for 1 hour causes complete mortality.
- Effective field treatments include sequential weekly sprays of:
    - Fipronil 80 WG @ 0.2 g/L
    - Cyantraniliprole 10.26 OD @ 1.25 ml/L
    - Acetamiprid 20 SP @ 0.2 g/L
    - Spirotetramat 150 OD @ 0.8 ml/L
    - Spinosad 45 SC @ 0.3 ml/L
- Spinetoram 11.7 SC @ 1 ml/L and Tolfenpyrad 15 EC @ 2 ml/L recorded low thrips counts (2.39 and 2.67 per flower, respectively) in chilli.

Conclusion

Thrips parvispinus has rapidly emerged as a major pest of chilli in India, capable of causing severe economic losses through its feeding on leaves, flowers, and fruits. Its short life cycle, high reproductive potential, and broad host range

facilitate rapid spread and infestation. Effective management requires an integrated approach combining cultural, mechanical, physical, botanical, biological, and chemical measures, with emphasis on resistant cultivars, early detection, and timely intervention. Adoption of such integrated pest management strategies can minimize crop damage, sustain yields, and reduce reliance on chemical pesticides, ensuring both economic and environmental benefits.

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