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Invasion, Damage and Management of *Thrips parvispinus* in Chilli

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Abstract:

Chilli, *Capsicum annuum* L. (F: Solanaceae) is regarded as a significant commercial spice and vegetable crop in India. Insect pests are particularly detrimental, causing yield losses ranging from 50 to 90 percent. The *Scirtothrips dorsalis* (Hood) was found infesting chilli and causing economic loss but during the year 2021 another invasive thrips, *Thrips parvispinus* (Karny) causing serious damage to flowers and fruits of chilli. The outbreak has caused an estimated loss of 3000-5000 crores of Indian rupees. The infestation of thrips on leaves causes deep punctures and scratches on under-side of the leaves due to sucking of sap. While on floral parts scraping on petals using mouth parts results in brownish streaks on petals. By using a holistic approach to pest management, growers can reduce the impact of *Thrips parvispinus* on chilli crops and ensure sustainable production.

Key words: *Biocontrol, Chilli, Invasion, Management, Outbreak, Thrips parvispinus.*

Introduction:

Chilli, *Capsicum annuum* L. (F: Solanaceae) is regarded as a significant commercial spice and vegetable crop, often referred to as the "wonder spice" due to its widespread use as a universal spice. It is cultivated across the country in both the *kharif* and *rabi* seasons. In the year 2020-21, the chilli crop covered an area of 38,000 hectares, producing 563 MT with a

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productivity of 14.82 MT per hectare (Zamljen *et al*., 2021). Several factors contribute to low chilli yields, including adverse climate, poor-quality seeds, diseases, and infestations of insects and mites. These issues have a significant impact on both the quality and overall production of chilli. Insect pests are particularly detrimental, causing yield losses ranging from 50 to 90 percent. Among the key sucking pests responsible for reduced crop yield are thrips (*Scirtothrips dorsalis* Hood), whiteflies (*Bemisia tabaci* Genn.), aphids (*Aphis gossypii* Glover), and mites (*Polyphagotarsonemus latus* Banks). The combined damage caused by mites and thrips alone has been estimated to account for around 50 percent of the overall yield reduction (Chintkuntlawar *et al*., 2015).

Earlier only one major species of thrips i.e., *Scirtothrips dorsalis* (Hood) was found infesting chilli and causing economic loss but during the year 2021 another invasive thrips, *Thrips parvispinus* (Karny) causing serious damage to flowers and fruits of chilli was observed. The *T. parvispinus*, a devastating insect pest that is native to Southeast Asian countries, was first reported in India in 2015 (Mound, 2005; Tyagi *et al*., 2015). Since then, the pest has established itself in southern India and is spreading toward the central and northern states. Despite the application of new molecules, the population of thrips remains difficult to manage, and many farmers have resorted to uprooting plants without harvesting the chili (Sridhar *et al*., 2021). The outbreak has caused an estimated loss of 3000-5000 crores of Indian rupees.

Invasion:

Thrips parvispinus (Karny) is native to Southeast Asian countries, but pest species found across various regions, ranging from Thailand to Australia and Europe. Over the last two decades, there has been a significant expansion in the geographical distribution of *T. parvispinus*, and it has now been identified in several countries, including France, Greece, Hawaii, Mauritius, Reunion, Spain, Tanzania, the Netherlands, and India. In India, the first report of this species was on *Carica papaya* L. (Caricaceae) in Bengaluru, followed by occurrences on *Brugmansia* sp. (Solanaceae) and *Dahlia rosea* Cav. (Asteraceae). In 2015, Tyagi *et al*. (2015) recorded this notorious pest's presence in India for the first time.

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Outbreak of *T. parvispinus*

Thrips parvispinus had been reported in India on various crops, but its presence in the chili ecosystem was not documented anywhere in the country until January 2021. Chilli flower thrips were initially observed in Chilakaloripeta and Pratipadu mandals of Guntur district, Andhra Pradesh, in January 2021. Subsequently, its spread was observed in all chili-growing areas of Andhra Pradesh. This invasive thrips was also found in chili-growing districts, including Warangal, Mahabubabad, Khammam, and Suryapet of Telangana state, in November 2021. Additionally, its occurrence was recorded in major chili-growing districts like Chitradurga, Bellary, Gadag, Koppal, and Raichur of Karnataka in November and December 2021. The attack of *T. parvispinus* on chili plantation could lead to yield losses of up to 22.8%.

Damage:

On Leaves:

1. Deep punctures and scratches on under- side of the leaves due to sucking of sap.
2. Due to scraping of chlorophyll on under side of the leaf and sucking of cell sap corresponding portion on upper side of the leaf looks yellowish.
3. Under- side of the leaf turns reddish brown.
4. Distorted leaf lamina with necrotic areas and yellow streaking was also observed.
5. If the infestation is severe on newly emerging leaves, such leaves are dried/ blighted.
6. Portions adjacent to veins are preferred.

On floral parts:

1. Scraping on petals using mouth parts results in brownish streaks on petals.
2. Thrips feeds on pollen which may affect pollination.
3. Drying and withering of flower.
4. Fruit set gets affected.

Management:

To manage Thrips parvispinus, a combination of cultural, physical, and chemical control measures can be employed. Here are some management practices that can be used (DPPQS, 2021):

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Fig 1. Adult *Thrips parvispinus* Infested leaf Stunted plant

1. **Cultural Control**: Cultural practices like regular monitoring, planting resistant varieties of crops, rotating crops, removing and destroying plant debris, and practicing good sanitation. Soil application of 200 Kg of Neem cake and 500 Kg of vermicompost per acre to induce resistance against thrips. Balanced fertilization with enhanced potash application along with nitrogen and phosphorous fertilizers to induce plant resistance against the pest.
2. **Physical Control**: Use of yellow or blue sticky traps (25-30 per acre) that can capture adult thrips, the use of reflective mulches to repel thrips, and the use of insect-proof netting to exclude thrips from plants.
3. **Botanicals**: Spraying of botanical based pesticides like Neem Seed Kernel Extract (NSKE) 5% or Neem oil 3% @ 2 ml/L, Pongamia oil @ 3 ml/L, *Vitex negundo* extract @ 50-80 ml/L.
4. **Biological Control**: Biological control measures involve the use of natural enemies, such as predatory mites (*Amblyseius swirskii*) and insects (*Orius insidiosus*), to control *Thrips parvispinus*. These natural enemies can be released into the environment or encouraged to establish populations through habitat management practices. Application of *Beauveria bassiana* @ 4.00 g or ml/L (spore load - $1x10^8$ cfu/g or ml), *Pseudomonas fluorescence* – @ 20g/L or *Bacillus albus* @ 20 g/L uniformly covering whole plant.
5. **Chemical Control**: Chemical control measures can be used when populations of *Thrips parvispinus* exceed economic thresholds. Insecticides should be rotated on a regular basis like Fipronil 80WG @ 40g/acre, Fipronil 40% + Imidacloprid 40% @

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40g/acre, Cyananiliprole 10 percent @ 240ml/acre, Acetamiprid 20SP at a rate of 40 g/acre, Spirotetramat 150 OD @ 160 ml/acre.

Conclusion:

In summary, *Thrips parvispinus* is a serious pest of chilli crops, but its populations can be managed through a combination of non-chemical and chemical control methods. By using a holistic approach to pest management, growers can reduce the impact of *Thrips parvispinus* on chilli crops and ensure sustainable production.

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