

Pest Status of Thrips (Thysanoptera) in India

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Thrips are also called as thunderflies, consists of two suborders Terebrantia and Tubulifera with 754 described species from 260 genera (Chandra *et al.*, 2020). They are recognized for causing harm through sucking the sap from soft plant tissue with rasping and sucking mouthparts (Raghavendra *et al.*, 2023). They cause significant economic loss due to the damage they cause to crops during feeding. It serves as vector of Tospoviruses. They successfully invade crop plants because of their diminutive size, hidden life stages, secretive behavior, and varied diet. They are rapid fliers with two pairs of fringed wings. The egg-laying behavior differs between Terebrantia and Tubulifera; the former lays eggs inside, while the latter lays them outside. The predominant pest genera are *Frankliniella*, *Scirtothrips*, and *Thrips*.

Invasive species reported in India

Thrips parvispinus

Thrips parvispinus is recognized as a newly invasive species of thrips across India. It was initially reported in papaya in Karnataka during 2015 (Tyagi *et al.* 2015). Later, a significant crop loss (1 lakh per acre) was reported by chili farmers in Andhra Pradesh (Anon, 2021). Similar occurrences were also documented in Kerala, Tamil Nadu, and Chhattisgarh. Its notable characteristic is its ability to adapt to any agroecosystem. During severe infestations, there was noticeable heavy flower drop. (Rachana *et al.* 2022).



Stereo zoom microscopic image of adult *Thrips parvispinus*

When a species is introduced to a new region, it poses a threat to native species. The absence of natural enemies exacerbates this threat. Ultimately, this can lead to the extinction of existing species in the area while the introduced species establishes itself. Polyphagous species have a greater chance of successfully invading a new area. Cryptic nature of thrips enhances their invasiveness. Thorough investigations are essential during quarantine inspections to prevent the inadvertent introduction of these invasive species.

Thrips species	Host	1 st reported state	Reference
<i>Thrips parvispinus</i>	Papaya (<i>Carica papaya</i>)	Karnataka, 2015	(Tyagi <i>et al.</i> 2015)

Factors favouring thrips population

Thrips are characterized by their small size, rapid flight, ability to feed on multiple hosts, and obscured life stages. It enables them to evade natural predators. Many countries have experienced the unintentional introduction of thrips through commodities and human assistance. Adults and nymphs conceal themselves under buds, bracts, and folds of the commodity.

Nature of damage

Adults and nymphs extract sap from the soft tissues of plants, including leaves, stems, flowers, and pods, using their rasping and sucking mouthparts, resulting in curling and malformation. Crop yield decreases significantly during severe infestations.

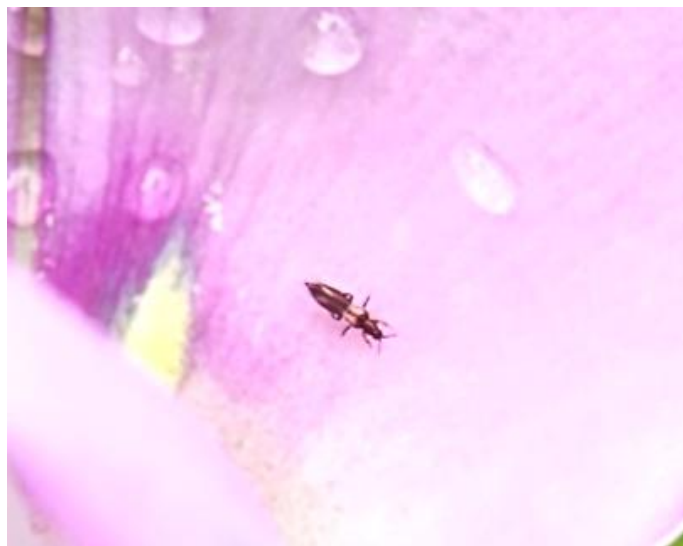
Morphological characters

Adults are varied in color ranging from yellowish white to black, with pigmented eyes and antennae consisting of 6-9 segments. They possess rasping and sucking mouthparts. Their wings are adorned with long, hair-like fringes. Spiracles are

present on the first and eighth abdominal segments. In the suborder Terebrantia, the terminal abdominal segment is rounded in males and split ventrally in females. Conversely, in Tubulifera, the terminal abdominal segment is tube-like in structure (Stannard, 2024).

Life cycle

Thrips has a 15 days life cycle including egg, 2 nymphal instars, prepupa and pupa.



Economic importance

Thrips infestations often lead to significant flower shedding, which is a primary consequence of their attack. This flower shedding can have a drastic impact on yield, resulting in considerable reductions in crop productivity.

Management (Thorat *et al.* 2022)

Cultural control

- Choosing resistant cultivars
- Planting early in the season
- Prompt detection of the pest
- Employing plastic mulch (Haerul *et al.*, 2020)

- Applying 25-30 t/ha of Farm Yard Manure, vermicompost, and neem cake as a basal dose.
- Limiting the use of nitrogen fertilizers to prevent excessive succulence in plants and adhering to recommended fertilizer doses (Sireesha *et al.*, 2021).
- Administering foliar nutrient sprays to address micronutrient deficiencies.

Mechanical control

- Employing blue or yellow adhesive traps (Sireesha *et al.*, 2021).
- Ensuring timely weed management
- Implementing intercultivation to eliminate pupal stages present in the soil

Biological control

Employing Ladybird beetle (*Menochilus sexmaculatus*) as a biological control agent. Utilizing entomopathogenic fungus, *Lecanicillium lecanii*, as a pest management strategy (Prabaningrum *et al.*, 2008)

Chemical control

Fipronil 80 WG at a concentration of 0.2 g per liter, or cyantraniliprole 10.26 OD at 1.25 ml per liter, or acetamiprid 20 SP at 0.2 g per liter, or spirotetramat 150 OD at 0.8 ml per liter, or spinosad 45 SC at 0.3 ml per liter of water can be applied as sequential sprays at weekly intervals to manage *T. parvispinus* in chili (Sireesha *et al.*, 2021).

Recent research highlights

- *T. parvispinus* has undergone rapid expansion in three regions of Tamil Nadu: North Western, Western, and Cauvery delta.
- Fifteen associated crops in regions cultivating chilli/capsicum have been identified as host plants for *T. parvispinus*. Additionally, the shrub species Littleleaf boxwood (*Buxus microphylla* Siebold & Zucc.) has been recognized as a host plant for the first time (Aishwarya Palanisamy *et al.*, 2023).
- *Thrips parvispinus* (Karny), a South East Asian thrips species, was observed for the first-time infesting onion (*Allium cepa*) crops in Haryana, India (Shubham Saini *et al.*, 2023).

Conclusion

Thrips are one of the most widely distributed species, infesting various crops worldwide. The rapid spread of thrips to new areas is a cause for concern. Its host range continues to expand. The notorious species *Thrips parvispinus* is known to be present in France,

Greece, Hawaii, Mauritius, Spain, Tanzania, the Netherlands, and India. An integrated pest management approach can easily reduce this alarming pest population with various sustainable control measures like resistant varieties, biological control with natural enemies and entomopathogen, and use of recommended and effective insecticides. No pest is alarming until it gains a huge population above economic threshold level.

References

- Chandra, K. (2020, September 28). Entomofauna, ecosystem and economics. XII Dr. S. Pradhan Memorial Lecture. Retrieved from https://www.iari.res.in/files/Divisions/Entomology/FinalDrKailashChandra_28092020.pdf
- Raghavendra, K. V., Ramesh, K. B., Rachana, R. R., Mahendra, C., Singh, S. K., & Chander, S. (2023). Genetic diversity analysis of severely infesting invasive thrips, *Thrips parvispinus* (Karny) in chilli (*Capsicum annuum* L.) in India. *Phytoparasitica*, 51(2), 227-239. <https://doi.org/10.1007/s12600-023-01054-1>
- Tyagi, K., Kumar, V., Singha, D., & Chakraborty, R. (2015). Morphological and DNA barcoding evidence for invasive pest thrips, *Thrips parvispinus* (Thripidae: Thysanoptera), newly recorded from India. *Journal of Insect Science*, 15(1), 10.
- Anon. (2021, November 16). Thrips infestation threatens chilli production in 12,000 acres in Guntur district. *The New Indian Express*, p. 7.
- Rachana, R. R., Roselin, P., Amutha, M., Sireesha, K., & Reddy, G. N. (2022). Invasive pest, *Thrips parvispinus* (Karny) (Thysanoptera: Thripidae) – a looming threat to Indian agriculture. *Current Science*, 122(2), 25 January 2022.
- Stannard, L. J. (2024, March 19). *Thrips*. *Encyclopedia Britannica*. <https://www.britannica.com/animal/thrips>
- Thorat, S. S., Sisodiya, D. B., & Gangwar, R. K. (2022). Invasive Thrips, *Thrips parvispinus* (Karny) an Invasive Threat: A Review. *Environment and Ecology*, 40(4A), 2170-2175.
- Haerul, A., Agus, N., Nasruddin, A., & Gassa, A. (2020). The role of planting patterns to control thrips from red chili pepper plants. *International Journal of Recent Technology and Engineering*, 8(5), 674-679.
- Sireesha, K., Prasanna, B. V. L., Vijaya Lakshmi, T., & Reddy, R. V. S. K. (2021). Outbreak of invasive thrips species *Thrips parvispinus* in chilli growing areas of Andhra Pradesh. *Insect Environment*, 24(4), 514-519.
- Prabaningrum, L., Moekasan, T. K., Udiarto, B. K., Den Belder, E., & Elings, A. (2008). Integrated pest management on sweet pepper in Indonesia: Biological control and control thresholds for thrips. *Acta horticulturae*.
- Palanisamy, A., Marimuthu, M., Narayanasamy, C., Venkatasamy, B., Gandhi, K., & Lakshmanan, P. (2023). Invasive flower thrips, *Thrips parvispinus* (Karny) occurrence, host expansion and genetic diversification in a tropical poly crop ecosystem. *Molecular Biology Reports*, 50, 9909-9923. <https://doi.org/10.1007/s11033-023-08831-5>
- Saini, S. (2023). Expanding host range and geographical distribution of *Thrips parvispinus* (Karny): Onion as new host from Northern India. *CCS Haryana Agricultural University*.
