Pest Management in Horticultural Ecosystems
Vol. 27, No.2 pp 286-290 (2021)

# Status of the outbreak of *Thrips parvispinus* (Karny) on chilli in Karnataka

**N. R. PRASANNAKUMAR*, V. VENKATARAVANAPPA[#], R.R. RACHANA[1], V. SRIDHAR, M.R. GOVINDAPPA[2], M.P. BASAVARAJAPPA[3], K.J. HEMALATHA[4], D.S. ASWATHNARAYANA[5], M. KRISHNA REDDY[#] and D.K. SAMUEL[#]**

[#]Division of Crop Protection, ICAR-Indian Institute of Horticultural Research, Hessaraghatta Lake, Bengaluru-560089, India

[1]ICAR-National Bureau of Agricultural Insect Resources, Hebbal, Bengaluru-560024

[2]KVK, and ARS Hagari, UAS, Raichur, Karnataka- 584104

[3]Department of Plant Pathology, UHS, Bagalkot Karnataka- 587104

[4]KVK, UAS, Raichur, Karnataka- 584104

[5]Department of Plant Pathology, UAS, Raichur, Karnataka-584104

**E-mail:** prasannakumar.nr@icar.gov.in

**ABSTRACT:** Surveys were conducted in major chilli growing regions (nine districts) of Karnataka, India to assess the outbreak of thrips during November – December, 2021. The predominant thrips species identified in the surveyed fields was *Thrips parvispinus,* mainly observed on flowers, flower buds and leaves. In the surveyed areas, more than 75% of the chilli was infested by *T. parvispinus* that resulted in loss of more than 85% of the crop yield. Despite repeated applications of the insecticides, control failures were noticed. Hence there is an urgent need to bring management strategies to save the crop from *T. parvispinus* menace in future.

**Keywords:** Chilli, *Thrips parvispinus*, management, outbreaks, yield loss

## INTRODUCTION

Chilli (*Capsicum annuum* L.) is one of the important commercial vegetable crops cultivated in different parts of the India, but majorly grown in Telangana, Andhra Pradesh and Karnataka for both green and red chillies. India is a major producer, exporter and consumer of chillies in the world and contributes about 42.60 % to the total world production with a production of 17.02 lakh tones (Horticulture Statics at Glance, 2018). It has immense export potential of different chillies meeting the needs of various markets around the world. The market outlay of India from exporting chilli accounts for 4.84 lakh tonnes in 2019-20 with worth of nearly Rs.6211.70 crores but the average productivity is very low in comparison to that of other countries because insect pests and diseases are the major biotic constraints for chilli production. About 25 to 26 insect and non-insect pests have been recorded infesting chilli leaves and fruits, of which, thrips, *Scirtothrips dorsalis* Hood is so far considered as the most serious and important pest (Butani, 1976; Dey *et al*., 2001; Girish, 2012). However, crinkling and curling of leaves and yield loss despite insecticidal sprays has been observed recently in Telangana, Andhra Pradesh and Karnataka by the farmers. Hence, a survey was conducted in Karnataka, India to diagnose and understand the problem of thrips out break and yield loss on chilli.

## MATERIALS AND METHODS

### Survey and collection of thrips samples

The survey was carried out for chilli thrips in major chilli growing areas from nine districts of Karnataka (Chitradurga, Haveri, Bellary, Raichur, Vijapura, Bagalkot, Dharwad, Gadag, Vijaynagar) and one district of Andhra Pradesh (Kurnool) (Table 1). In each location thrips incidence was observed in five fields and an isolation of 4-5 km maintained between each field. Minimum 10 plants/acre were randomly selected for observation at each location. Uniformly the upper most portions of the plants were tapped three times on a white card board sheet placed on a tray. The number of thrips on card board sheet was counted visually through a binocular field glass. The thrips were collected in eppendorf tube containing 70% alcohol. Wherever flowers were infested (Fig.1), entire flowers were plucked and put them in vial containing 70% alcohol. The -chilli plants exhibiting different symptoms (leaf curl, mosaic, mottling) were also collected from the same field to study the associated viruses in the infected samples. Total genomic DNA from infected leaves was extracted using CTAB method and pcar carried out using gene specific primers as per Venkataravanappa *et al.* (2012). Meanwhile, thrips were also collected from other crops nearby fields. Information about the variety/hybrid, farmer details wherever possible were also document. The collected samples were segregated in the Division of

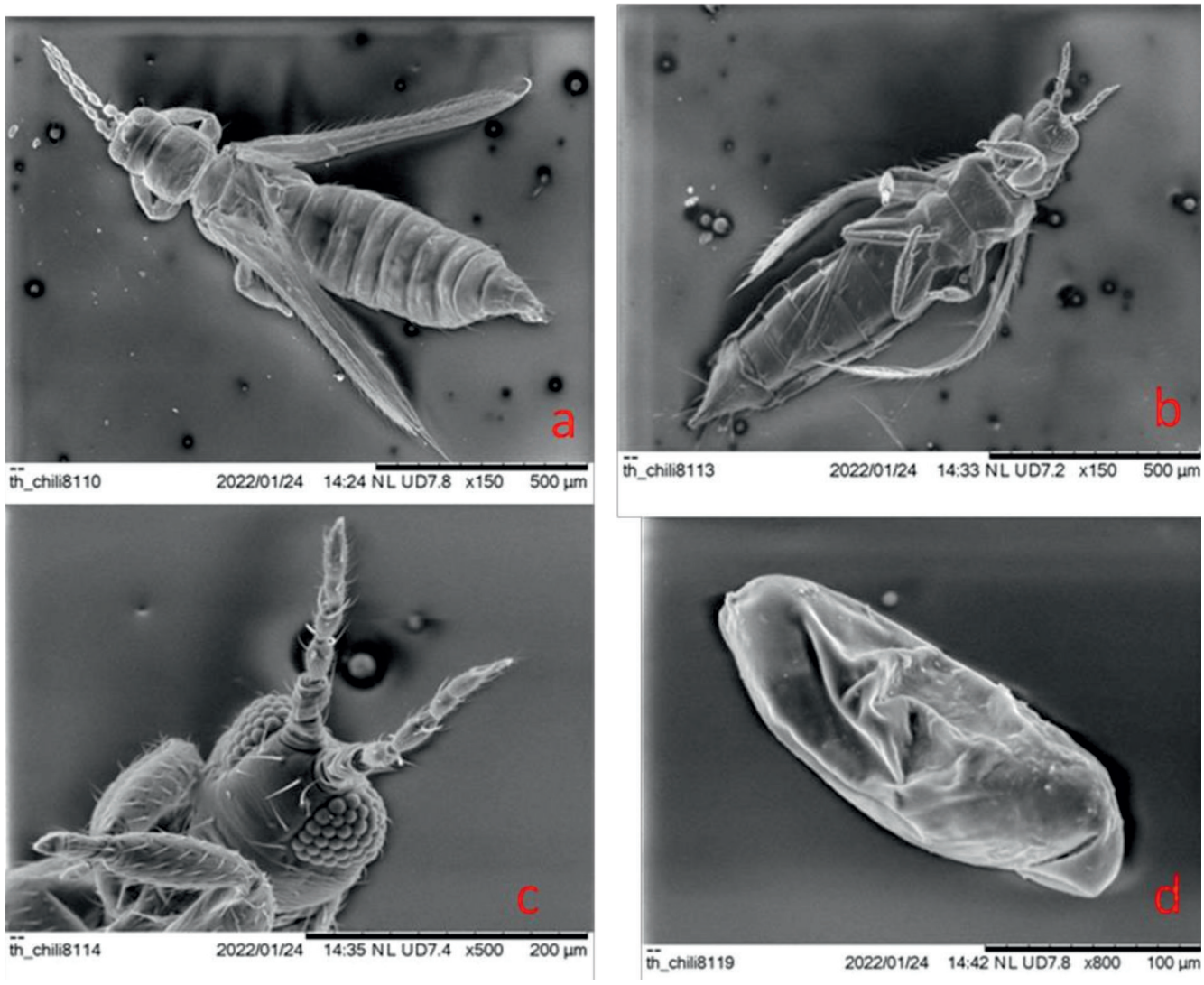


**Fig.1. TEM images of *T. parvispinus*, dorsal view (a), ventral view (b), antenna (c) and pupa (d)**

Crop Protection, ICAR-Indian Institute of Horticultural Research, Bengaluru for further process and part of the sample also sent to National Bureau of Agricultural Insect Resources (NBAIR) for identification.

**DNA isolation and PCR amplification of mt COI gene of thrips**

Total genomic DNA of eighteen *T. parvispinus* samples from nine districts of Karnataka was isolated separately by using Rapkit insect genomic DNA isolation kit (Madeuxin Pvt. Ltd, Bangalore) as per manufacturer's instructions. The quality of the DNA was checked on 1 % agarose gel and quantified by nanodrop (Thermo Fisher Scientific, USA). Further the total genomic DNA of eighteen thrips samples were subjected PCR amplification using *mt*COI gene primers as described by Glover *et al.* (2010).

**RESULTS AND DISCUSSION**

From the survey, four thrips species were identified that include; *T. parvispinus* (Karny), *Haplothrips* (*Haplothrips*) *gowdeyi, Thrips palmi* Karny, *Thrips hawaiiensis* (Morgan). Of these, *T. parvispinus* was the most predominant found in all the surveyed locations. Severe incidence of *T. parvispinus* also noticed on gherkins (Chandini, Secure, Speed hybrids) in Kotur (Vijayanagar), Sira and Gubbi taluks (Tumkur dist). Some other alternate hosts from where *T. parvispinus* recorded were sunflower, pot marigold, soybean, coriander, moringa, cotton, amaranth and green gram in Ranibennuru (Haveri dist) and also on broccoli and marigold in Bagalkot (Table 1). Total genomic DNA of eighteen *T. parvispinus* samples collected from nine districts of Karnataka was amplified at 640bp size using mt COI gene specific primers, further confirms the *T. parvispinus* identity (Fig 4).

**Table 1. Status of thrips infestation on different hosts in Karnataka**

| District | Host | Thrips species documented | No. locations |
|---|---|---|---|
| Chitradurga | Chilli, gherkins | *Thrips parvispinus* (Karny)<br>*Haplothrips* (Haplothrips) *gowdeyi* (Franklin) | 4 |
| Bellary | Chilli | *Thrips parvispinus* (Karny) | 7 |
| Raichur | Chilli, Bittergourd | *Thrips parvispinus* (Karny) | 8 |
| Haveri | Chilli | *Thrips parvispinus (Karny)* | 9 |
| | Cotton | *Microcephalothrips abdominalis (D. L. Crawford)*<br>*Thrips parvispinus (Karny)* | |
| | Moringa | *Thrips parvispinus (Karny)* | |
| | Coriander | *Thrips parvispinus* (Karny)<br>*Microcephalothrips abdominalis* (D. L. Crawford) | |
| | Sorghum | *Thrips parvispinus (Karny)* | |
| | Pot marigold | *Thrips parvispinus (Karny)* | |
| | Sunflower | *Thrips orientalis (Bagnall)*<br>*Thrips florum Schmutz* | |
| | Greengram | *Thrips parvispinus* (Karny)<br>*Megalurothrips usitatus* (Bagnall) | |
| Dharwad | Chilli | *Thrips parvispinus* (Karny) | 1 |
| Bagalkot | Marigold | *Thrips parvispinus* (Karny) | 2 |
| | brocoli | *Thrips parvispinus* (Karny) | |
| | Coriander | *Thrips parvispinus* (Karny) | |
| | Chilli | *Thrips parvispinus* (Karny) | |
| Vijayapura | Coriander | *Thrips parvispinus* (Karny) | 6 |
| | Chilli | *Thrips parvispinus* (Karny) | |
| | Amaranthus | *Tubuliferan thrips* | |
| | Castor | *Thrips florum Schmutz*<br>*Thrips hawaiiensis (Morgan)* | |
| | brinjal | *Thrips parvispinus* (Karny) | |
| Gadag | Sunflower | *Thrips parvispinus* (Karny) | 1 |
| Vijayanagara | Chilli | *Thrips parvispinus* (Karny) | 1 |

Previously, *T. parvispinus* recorded on crops like chilli and papaya, *Dhalia rosea* (Tyagi *et al.,* 2015; Rachana *et al.,* 2018) and was regarded as minor pest. The other species which known to occur on chilli were *S. dorsalis* and *T. palmi* (Butani, 1976; Dey *et al*., 2001; Girish, 2012). There is a sudden outbreak of minor pest and replacing the most severe and regular pest like *S. dorsalis* on chilli needs to be studied. Further, despite repeated spraying of chemicals like imidacloprid, acephate, thiodicarb, thiamethoxam, fipronil, chlorfenapyr, diafenthiuron, clothianidin, neem oil could not save the crop. Over reliance on insecticides, indiscriminative and repeated spraying of same insecticides, spurious chemicals against major pest, *S. dorsalis* coupled with change in climate perhaps resulted in aggravation of *T. parvispinus* (Joia *et al.,* 2001). The farmers initiated management when the damage was inflicted by the pest. Besides, the favourable weather, during the cropping period might have further hastened the flare up of the pest. During the survey it was noticed that most of the fields were very larger in size (about 5-6 acres), farmers were using power sprayers and uniform sprays were not ensured while spraying might be one of the reasons for pest control failure. Many of the fields surveyed were unattended and abandoned due to outbreak of the pest. In addition, viral diseases such as *Cucumber mosaic virus* (CMV), *Chilli veinal mottle virus*


**Fig.2. *T. parvispinus* infested chilli field (a), flower (b), damaged plant (c) at Bellary, Karnataka**

(ChVMV), and *Chilli leaf curl* were found to occur in the surveyed fields but molecular confirmation revealed that all the viruses transmitted by whiteflies and aphids not thrips. The present problem thus will be a very serious threat to chilli cultivation and export value of chillies, if not dealt in time. Therefore holistic way of management of viral diseases should also be dealt meticulously in these areas. During the survey most of the farmers expressed that the fields were mulched with sheets had fewer incidences of the flower thrips. Besides, rotation with bio pesticides such as *Beauveria bassiana* or *Lecanicillium lecanii* @ 5g/l, Arka neem and pongamia soaps @ 10g/ litre, and neem oil @ 2.5ml/litre with insecticidal sprays such as spinosad 45SC @ 0.3ml/l may also reduce the pest incidence on chilli. Since coriander flowers were infested with large number of thrips, it may be used as trap crop by coinciding its flowering around chilli fields. However, incidence of the thrips and their management to be studied systematically including occurrence on capsicum, niche partition, host plant resistance and testing some newer molecules urgently needed for sustainable management.

**ACKNOWLEDGEMENT**

Authors are thankful to the Director, ICAR-IIHR and Head, Division of Crop Protection, ICAR-IIHR, Bengaluru for their support and help to take up the surveys. We are also grateful to chilli growers for their cooperation while taking up the survey. The work was carried out under RKVY plant health clinic which is duly acknowledged.

**REFERENCES**

Butani, D. K. 1976. Pests and diseases of chillies and their control. *Pesticides*, **10**:38-41.

Dey, P. K., Sarkar, P. K. and Somchoudhury, A. K. 2001. Efficacy of different treatment schedules of profenofos against major pests of chilli. *Pestology,* **25**(11): 26-29.

**Thrips on gherkin flower** **Thrips on gherkin leaf**

**Fig.3. Severe *Thrips parvispinus* incidence on gherkins**

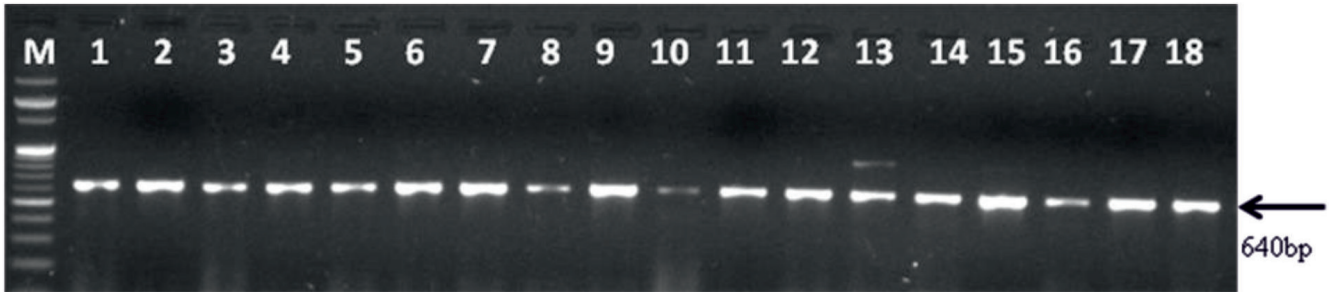


**Fig 4. PCR amplification of mtCOI of *Thrips parvispinus*. Lane 1 to 18. DNA from thrips**

Girish, R. 2012. Investigations on damage by chilli yellow mite, *Polyphagotarsonemus latus* (Banks) (Acari: Tarsonemidae) and resistance in chilli, *Capsicum annuum* L. Ph.D. thesis, University of Agricultural Sciences, Bengaluru, p. 122.

Glover, R.H., Collins, D.W., Walsh, K. and Boonham, N. 2010. Assessment of loci for DNA barcoding in the genus *Thrips* (Thysanoptera:Thripidae). *Molecular and Ecological Research,* **10**: 51–59.

Horticulture Statistics at Glance. 2018. Ministry of Agriculture and Farmer's Welfare, Department of Agriculture, Cooperation and Farmer's Welfare, New Delhi.

Joia, B. S., Jaswinder, K. and Udean, A. S. 2001. Persistence of ethion residues on/in green chilli.*Proceedings of 2nd National Symposium on Integrated Pest Management (IPM) in Horticultural Crops*, Bengaluru, 17-19 October: pp.174-175.

Rachana, R. R., Roselin, P. and Varatharajan R. 2018. Report of invasive thrips species, *Thrips parvispinus* (Karny) (Thripidae: Thysanoptera) on Dahlia rosea (Asteraceae) in Karnataka. *Pest Management in Horticultural Ecosystems,* **24 (**2):175-176

Tyagi, K., Kumar, V., Singha, D. and 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): 105; DOI: 10.1093/jisesa/iev087.

Venkataravanappa, V., Reddy, C. N. L. Jalali, S. and Reddy, M. K. 2012. Molecular characterization of distinct bipartite *Begomovirus* infecting bhendi (*Abelmoschus esculentus* L.) in India. *Virus genes*, **44**(3): 522-35.

*MS Received 09 December 2021*
*MS Accepted 15 December 2021*