First report oninfestation of invasive thrips, *Thrips parvispinus* (Karny) (Thysanoptera: Thripidae) in chilli fromAlipurduar district of West Bengal, India.

Abstract:

Chilli (*Capsicum annum* L.) is one of the important commercial crops grown in almost all the states of India.However,biotic ravages caused by insect pests limit the productivity and quality of this crop.Recently thrips infestation was recorded to cause substantial yield loss in chilli crop in Guabar Nagar village under Alipurduar district of West Bengal. Survey was conducted and thrips specimens were collected from flowers and leaves of infested plants. The thrips was identified as *Thrips parvispinus* on the basis of molecular characterization.The submission of the said sequence to National Center for Biotechnology Information (NCBI) database resulted in generation of GenBank accession numberPP338266.Upon confirmation of the pest as the invasive *T. parvispinus*, extended surveys were conducted in the neighbouring villages and this invasive thrips was also found in the farmers' fields of Harinathpur, Baganbari, Dhulagaon and Nabanagar villages of the Alipurduar district of West Bengal.

Introduction:

Liberalization of international trade and globalization has acted as a facilitator towards spread and colonization of invasive species in new geographical regions throughout the world. Invasive species are capable of causing huge economic loss in agriculture and horticulture and can pose threat to biodiversity as well as to biosecurity. Being a mega diverse country, India has also witnessed invasion of several alien species and many of them were found to have tremendous potential to cause damage to agricultural and horticultural crops. In last decade, Indian agriculture has faced challenges to combat invasive pestsamong which invasive white fly complex, fall army worm, cassava mealy bug and invasive thrips are worth mentioning. The invasive thrips,*Thripsparvispinus* (Karny) (Thysanoptera: Terebrantia: Thripidae) has been designated as one of the notorious pest species from South East Asiadamaging numerous agricultural and horticultural crops.

Thrips parvispinus (Karny) in India:

The invasive thrips,*Thripsparvispinus* (Karny) is native to Thailand and has already become a widespread menace due to its invasion in many South East Asian countries [3].In India, *T. parvispinus* was recordedfor the first time back in 2015 on papaya (*Carica papaya*) in Bengaluru, Karnataka, India [14]. Later, the pest was found to infest other hosts such as *Brugmansia sp.* (Solanaceae) and *Dahlia rosea* Cav. (Asteraceae). It has expanded its host range and has become a recognized polyphagous pest infesting beans, eggplant, pepper, potato, shallot and strawberry [4]. *T. parvispinus* has already been reported from nine host plants belonging to seven plant families covering a wide area under five Indian states, viz. Andhra Pradesh, Chhattisgarh, Karnataka, Kerala and Tamil Nadu [6]. This invasive black thrips has also reached northern parts of India. The chilli growing farmers of Haryana, Chhattisgarh and Madhya Pradesh have observed severe incidence on the flowers and leaves

of chilli [13]. The occurrence of *T. parvispinus* on different hosts throughout the different states of our country has been mentioned in the following table –

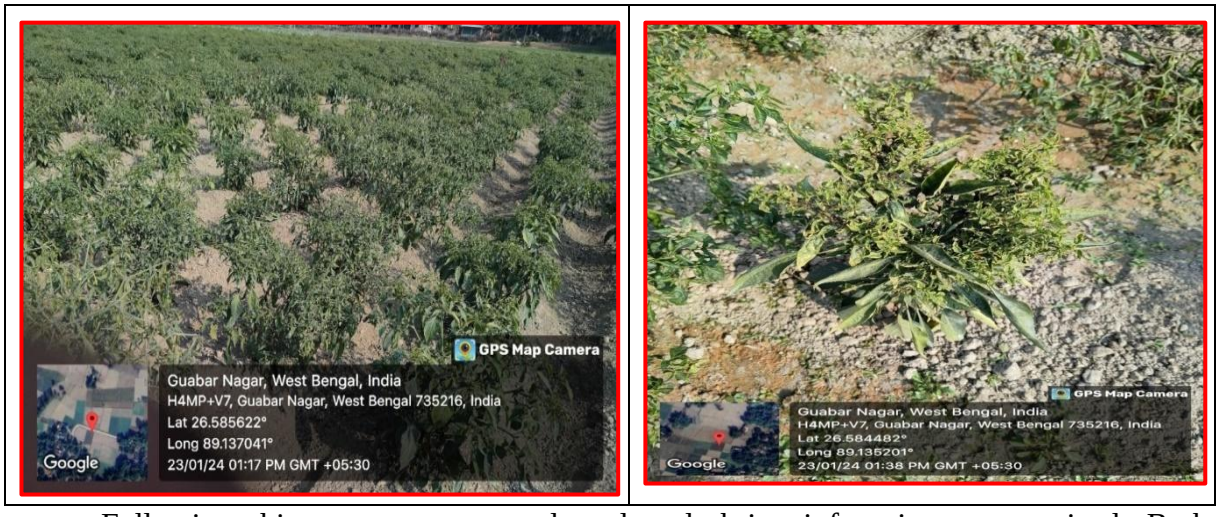
Table 1. Distribution and host range of invasive thrips*T. parvispinus*in India.

State	Host	Reference
Karnataka	Papaya	Tyagi *et al.*(2015) [14]
Karnataka	Chilli	Basavaraj *et al.*(2022) [2]
Karnataka	*Brugmansia sp.* Dahlia	Rachana *et al*. (2018) [7] Roselin *et al.*(2021) [9]
Karnataka	Guava	Ranjith *et al*. (2022) [8]
Andhra Pradesh	Chilli	Sireesha *et al*. (2021) [12]
M.P, Haryana and Chattisgarh	Chilli	Timmanna *et al*. (2023) [13]
Tamil Nadu	Cotton	Amutha and Rachana (2023) [1]
Gujarat	Chilli	Patel *et al*. (2022) [5]
Uttar Pradesh	Chilli	Sethy *et al.*(2023) [11]
Haryana	Onion	Saini *et al*. (2023) [10]

Recent infestation in West Bengal, India:

Very recently, during the month of January, 2024, the invasive thrips *T. parvispinus*was found to infest chilli crops in farmers' field in the village Guabarnagar under Alipurduar district of West Bengal. Undergraduate students, conducting Rural Agricultural Work Experience (RAWE) under Student READYprogramme in that village informed about huge crop loss in chilli due to insect infestation.

Fig. 1. Infestation of Chilli Thrips (*Thrips parvispinus*) in Guabar Nagar, West Bengal



Following this, survey was conducted and thrips infestation was noticed. Both nymphs and adults were found to congregate on flowers and flower buds. Chilli plants were found to be stunted severely and leaves were curled and crinkled with reduced size. The crop suffered huge flower dropping.

Flowers, harbouring adult thrips, were collected from the infested chilli plants and these samples were carried to the laboratory of the department of Agril. Entomology, Uttar Banga Krishi Viswavidyalaya, Pundibari, Coochbehar. Thrips were collectedfrom the flowers using camel brush and were preserved in 70% alcohol. Preliminary investigation on the morphological characters was conducted under a stereo zoom microscope (Model: Stemi 508 Make: Zeiss) and images were taken through 16 MP CMOS camera (Make: Hoverlabs). Under initial investigation, the following morphological characters were observed –

a) Head wider than long
b) Body brown in colour, abdomen darker in colour than head and thorax; legs yellow.
c) Antennae 7 segmented, antennal segment III and basal half of IV and V yellow.
d) Forewing brown with pale base.

Fig. 2Images of Chilli Thrips (*Thrips parvispinus*) under stereo zoom microscope

Dorsal view

Ventral view

Molecular characterisation:

The thrips was identified as invasive *Thrips parvispinus* (Karny) on the basis of molecular characterization. Amplification of the partial mitochondrial cytochrome c oxidase sub-unit I (COI) gene was done and then sequencing process was completed. The submission of the said sequence to National Center for Biotechnology Information (NCBI) database resulted in generation of GenBank accession number **PP338266**. The sequence showed 99-100% match with species recorded or reported elsewhere and already submitted in NCBI database.

The nucleotide sequence (consensus sequence) of the submitted sample is as follows –

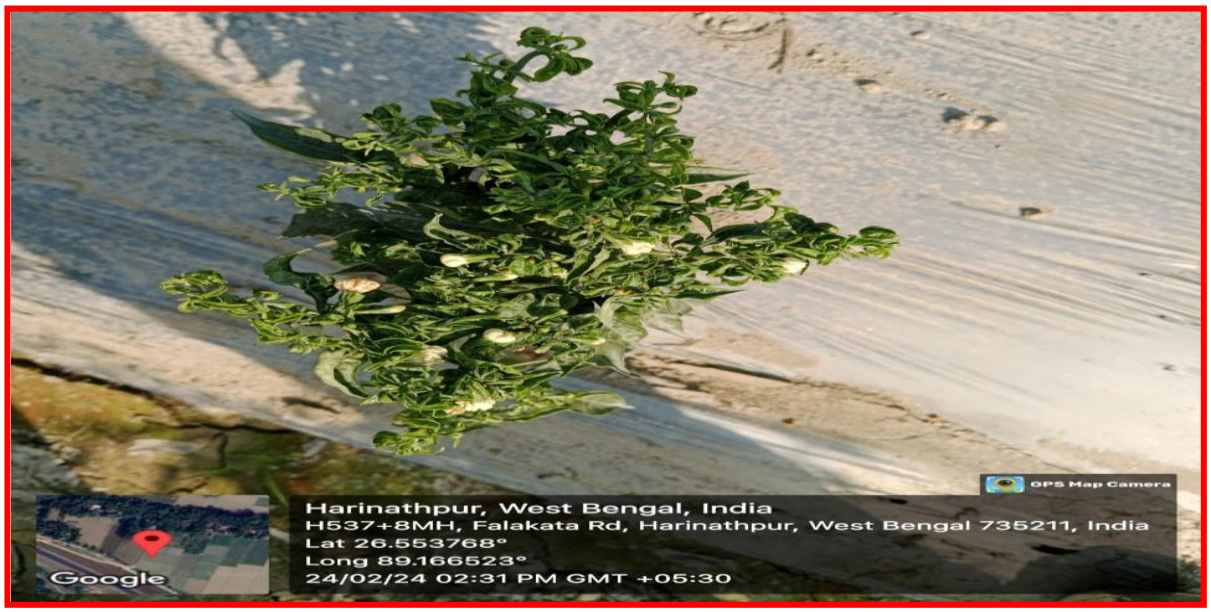
TTATCACTAAGAATAATCATTCGATTAAACCTACGAGTATCCATAAAACTATATGTA
AGAAATGATCAATTTTATAATTCAATTGTAACAGCCCATGCATTCATTATAATTTTT
TTTACAGTTATACCAATCATAATCGGTGGATTCGGAAATTGATTAGTTCCATTAATA
CTCGGAGCACCAGATATAGCATTCCCACGATTAAACAACATAAGATTTTGACTTTTA
CCTCCATCATTAATTTTATTAATTATAGGATTAATAAAAGAAGGAGCAGGAACAGG
ATGAACAGTTTATCCACCCTTATCAACATTTTATCATGCAGGAATATCAGTAGACTT
AACTATCTTTTCTTTACACTTAGCAGGAATTTCATCTATTCTAGGAGCATTAAATTTT
ATTACAACTATTCTAAATTTAAAAAATGAAAATATACCAATAGAAAAAACAAGTTT
ATTTGTTTGATCAGTATTTTTAACAGCAATTTTATTATTATTATCACTTCCAGTTTTA
GCCGGAGCCATTACAATACTTTTAACAGATCGAAATTTAAACACATCTTTT

Extended surveys:

Upon confirmation of the pest as the invasive *T. parvispinus*, extended surveys were conducted under the project AICRP on Biological Control of Crop Pest and Diseases (Contingency centre, UBKV). Presence of this deadly invasive thrips were also detected in the neighbouring areas and similar type of damage symptoms were found in the farmers' fields of Harinathpur, Baganbari, Dhulagaon and Nabanagar villages under district Alipurduar of West Bengal. The damage percentage varied from field to field depending upon the crop protection measures adopted by the farmers but the thrips were found everywhere.Upon conversation, farmers reported severe leaf curl and yield loss in both the popularly cultivated chilli varieties,

Viz. Eagle chilli and Tejaswini.They also expressed their fear of crop loss due to some unknown reason as they are not aware about this pest.

Fig. 3. Infestation of Chilli Thrips (*Thrips parvispinus*) in villages of Falakata, West Bengal



Harinathpur

Dhulagaon

Nabanagar

Baganbari

The different sites surveyed, overall,under the present investigation for recording occurrence of *T. parvispinus*are as follows –

Table 2. Location wise detail of infestation by *T. parvispinus*in chilli

Sl. No.	Site Details			Infestation status	
	Name of village	GPS Co-ordinates	Block (District)	No. of thrips/flower	Damage percentage
1.	Guabar Nagar	$26^{0}58'N89^{0}13'E$		1-7	50-60%

2.	Harinathpur	$26^0$55'N$89^0$16'E	Falakata (Alipurduar)	0-3	10-20%
3.	Baganbari	$26^0$53'N$89^0$17'E		1-4	25-30%
4.	Dhulagaon	$26^0$62'N$89^0$16'E		2-5	30-40%
5.	Nabanagar	$26^0$57'N$89^0$15'E		1-3	20-30%

Conclusion:

From the above discussion it is evident that the deadly invasive *Thrips parvispinus* (Karny) has become a cause of concern for the chilli growers in the surveyed villages mentioned above. Till date, occurrence of this pest has been reported from various parts of our country. Now, this pest is being reported for the first time from West Bengal condition (as per available records and to the best of the authors' knowledge). Considering its damage potential, extensive surveys must be conducted covering all the districts of the state.

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