



THE STRIPED FLEA BEETLE *PHYLLOTRETA STRIOLATA* (ILLIGER) (COLEOPTERA: CHRYSOMELIDAE) INVADES SOUTH INDIA

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ABSTRACT

The striped flea beetle *Phyllotreta striolata* (Illiger) (Coleoptera, Chrysomelidae, Galerucinae, Alticini) has been reported for the first time from south India. Heavy incidence of *P. striolata* on *Raphanus sativus*, causing 84.6 – 92.6% and 74 – 96.6% root damage in Krishnagiri (Tamil Nadu) and Kolar (Karnataka) respectively, was observed. Information on the distribution of the pest in India is provided. New state records in India include Tamil Nadu, Karnataka, Odisha, Madhya Pradesh and Uttar Pradesh.

Key words: *Phyllotreta striolata*, *Raphanus sativus*, *Brassica oleracea* var. *gongylodes*, *Phaseolus vulgaris*, south India, Karnataka, Tamil Nadu, new state records, Oriental Region, brassicaceae, cruciferous crops

The striped flea beetle, *Phyllotreta striolata* (Illiger, 1803) (Coleoptera, Chrysomelidae, Galerucinae, Alticini), a devastating pest of cruciferous crops, is one of the most widely distributed leaf beetles in the world. Eurasian in origin, it has so far been recorded across the Afrotropical, Oriental, Palearctic and Nearctic Regions (Döberl, 2010, Gikonyo et al., 2019). It is oligophagous, primarily on members of Brassicaceae and inflicts damage both in larval and adult stages. *Phyllotreta striolata* infests cruciferous crops such as Brussels sprouts, canola, cabbage, cauliflower, horseradish, kale, mustard, radish, turnip and watercresses, throughout its range of occurrence. There is no sustainable alternative to the use of chemical pesticides for controlling *P. striolata*. Tengfei et al. (2022) suggested the use of a seed-pelletized coating of spinetoram for its control in cabbage. Chen et al. (2023) has shown that seed pelletization with conidia of *Metarhizium anisopliae* effectively controlled the larvae and protected Chinese flowering cabbage seedlings, wherein a mixture formulation of *M. anisopliae* and chlorfenapyr demonstrated a synergistic effect against the adults. Maulik (1926), who published the first comprehensive study of the flea beetles of the Indian subcontinent under the Fauna of British India series, did not record *P. striolata* in India or adjoining areas. Scherer (1969) first recorded the pest in India from Darjeeling and Kolkota in West Bengal. Bhumannavar et al. (1991) reported it from the Andaman and Nicobar Islands on radish. Thakur et al. (2009) recorded the pest

from north-east India. Rather et al. (2017) and Rasool and Lone (2022) studied the seasonal occurrence of *P. striolata* on brassicaceous vegetables in Kashmir. *Phyllotreta striolata* was known only from the Andaman and Nicobar Islands, Kashmir, north-east India and West Bengal in India till Anoj et al. (2020) reported its outbreak on radish, *Raphanus sativus* L. in Delhi and Haryana. Distribution of *P. striolata* in India was so far confined to the Andaman and Nicobar Islands, north and north-eastern states. An outbreak of *P. striolata* in south India (Karnataka and Tamil Nadu), since May 2023, is reported here along with new state records.

MATERIALS AND METHODS

Outbreak of *P. striolata* since May 2023, in Krishnagiri (Tamil Nadu) and subsequently in Kolar (Karnataka) in south India on radish was observed by NVR. Observations on crop damage, especially the extent of root damage, were recorded. In each surveyed location, about 150 radish plants (in an acre area) were uprooted randomly. The root damage due to flea beetle infestation was confirmed by the presence of galleries on the tuberous roots and % of roots damaged was calculated. One of the authors (KDP) has accumulated specimens of *P. striolata* from all over its range of occurrence in India and these specimens were used for ascertaining the distribution of the pest. A survey was conducted by the authors (SSA, KDP) in March 2023, covering the states of Kerala, Goa, Madhya Pradesh, Maharashtra, Odisha and Telangana. Voucher

specimens of *P. striolata* from Karnataka and Tamil Nadu are deposited in the ICAR-National Bureau of Agricultural Insect Resources, Bengaluru (Accession nos NIM/NBAIR/COL/CHRY-2(1)/092023 to NIM/NBAIR/COL/CHRY-2(5)/092023).

RESULTS AND DISCUSSION

Outbreak of *P. striolata* was first observed on 28th May 2023 at Karappalli village, Hosur taluk, Krishnagiri district in Tamil Nadu and subsequently in Kolar district in Karnataka (Table 1). The outbreak (Fig. 1. A-I) was mainly on radish, and in its absence the beetles were also observed feeding on pole beans (Fabaceae, *Phaseolus vulgaris* L.) (Fig. 1. E) and kohlrabi (*Brassica oleracea* L. var. *gongylodes*) (Fig. 1. F). Root damage on radish was 84.6-92.6% and 74-96.6% in Krishnagiri and Kolar respectively. Farmers have tried soil application and spraying of insecticides to control the pest; however, the outcome was poor. Hence more than 60% of the radish crop was not harvested and abandoned by the farmers. Incidence of *P. striolata* was also observed at Bisanahalli village, Hoskote Taluk, Bengaluru Rural District (13.00647°N, 77.81442°E) on 6th August 2023. Large scale incidence on radish and stray incidence on cabbage and cauliflower were recorded from Odisha (Fig. 1. G-L) in Athagarh (20.51993°N, 85.59566°E), Dhirapattana (20.51474°N, 85.57681°E), Haldia Thalabasta road (20.4173°N, 85.60343°E) and Banki (20.39687°N, 85.57592°E) in March 2023. Incidence on cabbage and cauliflower was also observed in Madhya Pradesh (Jabalpur 23.173149°N, 79.928579°E) during the same period. Study of location data of specimens reveals new distribution records of the pest from Tamil Nadu (Krishnagiri), Karnataka (Bengaluru Rural, Kolar), Odisha (Cuttack), Madhya Pradesh (Jabalpur) and Uttar Pradesh (Varanasi). The pest was not observed

in Kerala, Goa, Maharashtra (Pune to Mahabaleswar) and Telangana. Evidently, occurrence of *P. striolata* in Bengaluru Rural, Kolar and Krishnagiri indicates recent invasion of the pest, as Karnataka and Tamil Nadu were thoroughly surveyed over many years in the past. The most common flea beetle pest on cruciferous crops in south India is the native *Phyllotreta chotanica* Duvivier, which hardly assumes epidemic proportions to inflict heavy crop loss. Invasion and spread of *P. striolata* in India is likely to replace *P. chotanica* with the former. The pest is also likely to spread rapidly to other areas due to the movement of tubers and other plant material over long distances as well as through wind, since it is capable of flight.

ACKNOWLEDGEMENTS

Specimens of *Phyllotreta striolata* received from M Mukhtar (Sher-e-Kashmir University of Agricultural Sciences and Technology, B A Rather (Sher-e-Kashmir University of Agricultural Sciences and Technology, Kashmir); A T Rani (Indian Institute of Vegetable Research, Varanasi); H M Yeswanth (University of Agricultural Sciences, Bengaluru); and Umesh Shelkar (Syngenta India Limited) were used in the study. K V Prakash, Department of Entomology, University of Agricultural Sciences, Bengaluru is gratefully acknowledged for support and encouragement. Ms Golive Prasanthi, Scientist, Crop Protection Division, ICAR-National Rice Research Institute, Cuttack, Odisha supported the field surveys in Odisha.

FINANCIAL SUPPORT

Fieldwork by KDP was partially supported by the erstwhile ICAR-Network Project on Insect Biosystematics. This work was partially supported by the Plan Project 2022-23 of Kerala Agricultural University.

Table 1. Extent of damage due to *Phyllotreta striolata* on radish in south India

Survey Area	Date	Location	Latitude	Longitude	% damage (root)
Hosur Taluk, Krishnagiri District, Tamil Nadu.	28/05/2023	Karapalli	12.773477°N	77.897443°E	92.6
	28/05/2023	Berigai	12.814517°N	77.971944°E	87.3
	11/06/2023	Koladasapuram	12.801358°N	77.928023°E	96
	11/06/2023	Shanamangalam	12.821118°N	77.931725°E	84.6
Malur Taluk, Kolar District, Karnataka.	29/07/2023	Chikkakallahalli	12.904537°N	78.006048°E	92
	29/07/2023	Rajenahalli	12.932742°N	78.021224°E	74
	31/07/2023	Nanjapura	12.876009°N	77.971008°E	96.6
	14/08/2023	Gangasandra	12.870696°N	77.980880°E	96



Fig. 1 A: *Phyllotreta striolata* adults on radish leaves (Gangasandra, Kolar District, Karnataka); B: surface feeding and tunnelling by grubs on radish root (Karapalli, Krishnagiri District, Tamil Nadu); C: cross section of radish root showing tunnelling and discoloration by the grub (Karapalli); D: borehole on radish root showing the grub feeding within (Karapalli); E: leaf feeding by flea beetles on pole beans, *Phaseolus vulgaris* L (Nanjapura, Kolar District, Karnataka); F: feeding of flea beetles on cotyledons of kohlrabi, *Brassica oleracea* L. var. *gongylodes* (Karapalli); G: shot holes caused by flea beetle on radish leaves (Athagad, Cuttack District, Odisha); H: flea beetles feeding on leaves of radish (Athagad); I: flea beetle alighting on the margin of radish leaf (Athagad); J: grub feeding on surface of radish root; K: grub moving out from a freshly made borehole (Athagad); L: cross section of radish root showing tunnelling (Athagad).

AUTHOR CONTRIBUTION STATEMENT

NVR first noticed the outbreak in Karnataka and Tamil Nadu and recorded observations. SSA carried out surveys in south and north India. KDP carried out fieldwork throughout the country, identified the pest and prepared the first draft of the paper. All authors read and approved the manuscript for submission.

CONFLICT OF INTEREST

No conflict of interest.

REFERENCES

- Anooj S S, Raghavendra K V, Shashank P R, Nithya C, Sardana H R, Vaibhav V. 2020. An emerging pest of radish, striped flea beetle *Phyllotreta striolata* (Fabricius), from Northern India: incidence, diagnosis and molecular analysis. *Phytoparasitica* 48: 743-753; <https://doi.org/10.1007/s12600-020-00825-4>.
- Bhumannavar B S, Mohanraj P, Ranganath H R, Jacob T K, Bandyopadhyay A K. 1991. Insects of Agricultural Importance in Andaman and Nicobar Islands. CARI Research Bulletin 6, Central Agricultural Research Institute, Port Blair. 49 pp.
- Chen W, Yuan W, He R, Pu X, Hu Q, Weng Q. 2023. Screening of Fungal Strains and Formulations of *Metarhizium anisopliae* to control *Phyllotreta striolata* in Chinese flowering cabbage. *Insects* 14: 567; <https://doi.org/10.3390/insects14060567>.
- Döberl M. 2010. Subfamily Alticinae Newman, 1835. In: Lobl I, Smetana A (eds). Catalogue of Palaearctic Coleoptera, Vol. 6. Apollo Books, Stenstrup. pp. 491-563.
- Gikonyo M W, Biondi M, Beran F. 2019. Adaptation of flea beetles to Brassicaceae: host plant associations and geographic distribution of *Psylliodes* Latreille and *Phyllotreta* Chevrolat (Coleoptera: Chrysomelidae). *ZooKeys* 856: 51-73; <https://doi.org/10.3897/zookeys.856.33724>.
- Maulik S. 1926. The Fauna of British India, including Ceylon and Burma. Coleoptera. Chrysomelidae (Chrysomelinae and Halticinae). Taylor and Francis, London. 442 pp.
- Rather B A, Hussain B, Mir G M. 2017. Seasonal incidence and biodiversity of flea beetles (Coleoptera: Alticinae) in a brassicaceous vegetable agro-ecosystem of Kashmir Valley. *Entomological News* 127(3): 252-268.
- Rasool R, Lone G M. 2022. Seasonal incidence of striped flea beetle *Phyllotreta striolata* F. on cruciferous crops in north Kashmir. *Indian Journal of Entomology*; Ref. No. e21120 DoI.: 10.55446/IJE.2021.137.
- Scherer G. 1969. Die Alticinae des indischen Subkontinentes (Coleoptera: Chrysomelidae). *Pacific Insects Monograph* 22: 1-251.
- Tengfei X, Nanda S, Fengliang J, Qingsheng L, Xia F. 2022. Control efficiency and mechanism of spinetoram seed-pelleting against the striped flea beetle *Phyllotreta striolata*. *Scientific Reports* 12, 9524; <https://doi.org/10.1038/s41598-022-13325-8>.
- Thakur N S A, Kalaishekhar A, Ngachan S V, Saikia K, Rahaman Z, Sharma S. 2009. Insect pest of crops in north east India. ICAR Research Complex for NEH region, Umiam. 360 pp.

(Manuscript Received: August, 2023; Revised: September, 2023;

Accepted: September, 2023; Online Published: October, 2023)

Online First in www.entosocindia.org and indianentomology.org Ref. No. e23584