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RESEARCH NOTE

First report of occurrence of leaf beetle, *Madurasia undulatovittata* Motschulsky, (Coleoptera: Chrysomelidae) on Indian bean from Gujarat

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ABSTRACT: A field study was conducted to document the newly reported insect pests of Indian bean, *Madurasia undulatovittata* Motschulsky, (Coleoptera: Chrysomelidae) in South Gujarat during 2024. Infestation of this pest commenced from the seedling stage of the crop coincides 2nd to 4th week of October when plants have 3 to 5 leaves. Infestation was found in sporadic nature. Adults were observed to feed solitary as well as gregariously (2 to 7 adults with average of 4.3 per leaf). Extensive feeding can lead to visible damage from a distance due to the numerous small holes and glistening appearance of the leaves due to chlorophyll scraping. Adults were also scraped the stem of young plants. This is the first report of *M. undulatovittata* infestation on Indian bean from Gujarat.

Keywords: Leaf beetle, *Madurasia undulatovittat,* Indian bean, small holes

Indian beans [*Lablab pupureus* (L.) Sweet is one of the most ancient pulse crops among cultivated pulses. *Lablab* is an Arabic-Egyptin name indicating the dull rattle of the seed inside the dry pod. It is a perennial herbaceous plant that occupies an important place among the fruit and vegetable crops grown in the field as well as in kitchen gardens. It is a multipurpose crop grown for pulse, vegetables and forage. Unlike other leguminous crops, it has also the capacity to fix atmospheric nitrogen in the soil. Dried seeds are a suitable source of protein concentrates. Green seeds and green immature pods are especially used in the preparation of a very famous Gujarati dish named '*Undhiyu'* and in South Gujarat as '*Ubadiyu'*. In Gujarat, the Indian beans is one of the most important vegetable crops grown in the Middle and South Gujarat regions during the *kharif* and *rabi* seasons after the harvest of paddy. In Gujarat, it is one of the important pulse crops widely grown in South Gujarat, particularly in Navsari, Surat and Valsad districts (Shewale *et al.*, 2010).

The high incidence of insect pests in Indian beans is considered the primary biotic constraint to Indian beans in achieving potential productivity and yield instability over the years in South Gujarat. The different pests show vital fluctuations in Indian beans under natural environmental situations. Among various insect pests, *Aphis craccivora* Koch , *Empoasca kerri* Pruthi, *Bemisia tabaci* Gennadius, and *Helicoverpa armigera* (Hubner) are potential pests causing considerable damage to Indian beans by attacking various plant parts *viz.,* buds, flowers, fruits and leaves of Indian beans (Adipala *et al.*, 1999). Other minor pests recorded are sap sucking bugs or lablab bug (*Captosoma cribraria* Fab.), leaf miner (*Cosmoptery mimetis* Mey.), pulse beetles (*Callosobruchus* spp.), leaf eating caterpillars, various beetles and weevils, which cause minor losses in crop. This paper is the report of the occurrence of a new Coleopteran insect pest.

During the surveying pests and diseases of mangoes, it was noted that certain farmers who established new mango orchards practice intercropping to generate income. In *rabi* season of 2024, a farmer intercropped Indian bean (variety GNIB-21) in mango orchards of 2 years old. He saw the numerous small circular holes on the leaves. Immediately collected the infested samples and brought to the Agriculture Experimental Station, Navsari Agriculture University, Paria. We examined the leaf samples and also noticed the tiny adults on the underside of the leaves. Observe the specimens using a stereo microscope equipped with the ScopeTek DCM130E microscope-camera and and capture images. Subsequently Preserved the specimens in 70% alcohol and sent them to Dr. K. D. Prathapan, Kerala Agricultural University, Vellayani (India).

Afterward, we arranged a survey to inspect the infested field alongside several other adjacent fields of Indian bean. We observed critically all other life stages of the insects, their behavior, nature and extent of damage

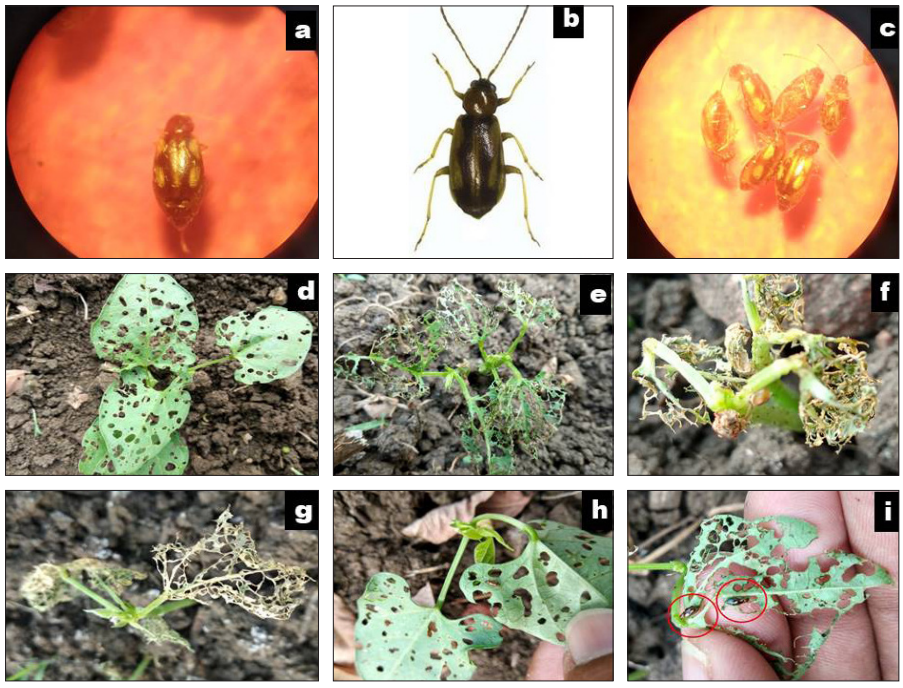

Fig. 1. a, b & c Adults of *M. undulatovittata* (microscopic view); d- nature of damage at initial stage of pest appearance; e,f,g- damaging level at moderate to severe infestation; h,i-adults hiding at lower surface of leaf during day time

caused. To verify the developmental stages of the grub, infested plants were examined by uprooting them and also inspecting the surrounding soil of these plants. The other life stages collected from the fields were brought to the laboratory for further rearing.

In the past, no any records of occurrence and damage by this pest were found on Indian bean from Gujarat, making this the first report. Adults were identified as *Madurasia undulatovittata* Motschulsky (Coleoptera: Chrysomelidae). The adult *M. undulatovittata* beetle is a small, light brown insect that ranges from 2.2 to 3.2 mm in length and 1.1 to 1.3 mm in width (Fig. 1a,b,c). Its head varies from dark brown to light brown, typically appearing darker than the pronotum. The pronotum is generally a pale brown color, usually lighter than the head. The base color of the elytron is lighter than that of the pronotum.

Infestation of this pest commenced from the seedling stage of Indian bean coincides 2nd to 4th week of October when plants have 3 to 5 leaves (Fig.1d). Infestation was found in sporadic nature (Fig.2a) and was not uniform in all the fields. Some fields are free from the infestation. Adults of *M. undulatovittata* are often found on the underside of leaves wherein they feed on foliage primarily during dusk and early morning and makes small circular holes (Fig.1h, i). Adults were observed to feed solitary as well as gregariously (range of 2 to 7 adults with average of 4.3 adults per leaf). Extensive feeding can lead to visible damage from a distance due to the numerous small holes and glistening appearance of the leaves due to chlorophyll scraping (Fig. 1d). Adults were also scraped the stem of young plants (Fig. 2c). In severe cases, this damage can weaken the plant followed by yellowing of plant and reduce its overall vigor (Fig. 2b,e). Only veins are visible in peak incidence (Fig. 1g) and subsequently plants wither and dry (Fig. 1f,g).

Grub stage was not found on leaves. They feeds on root nodules, leading to further losses. Adults were hiding in cracks and crevices of the soil during the daytime. Cent per cent loss was also observed in sporadic condition at early stage of plant when plant has 3-4 leaf stage. In some fields, the plant may not recover, and the crop may need to be resown to achieve a reasonable yield.

The *M. undulatovittata* is widely distributed in Africa (Sudan); Asia (Bangladesh, India [Andhra Pradesh, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, New Delhi, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand, West Bengal], Nepal, Sri Lanka, Yemen). Recently revised genus *Madurasia Jacoby* (Coleoptera: Chrysomelidae) and the species *Madurasia obscurella* Jacoby are synonymized with *M. undulatovittata* Motschulsky (Coleoptera: Chrysomelidae) Prathapan (2016).

Gupta and Singh (1984) were the first to document life cycle of *M. undulatovittata* on green gram. They noted that the entire life cycle ranged from 32 to 44 days and that it completes two generations each year. A subsequent, more comprehensive investigation of the life history was conducted by Oza *et al.* (1996) on cowpea. The eggs were deposited individually in the soil near the root zone of the plant. The total life cycle duration, from egg to adult death, ranged from 35 to 48 days for males and 43 to 58 days for females.

Significant damage was noted to foliage, particularly in younger plants wherein larvae reside in the soil and consume root hairs (Srivastava and Singh, 1976; Gupta and Singh, 1981; Satyanarayana *et al.* 1995). Yadav and Yadav (1983) and Faleiro *et al.* (1986) documented its sporadic presence in cowpea. Infestations begin when the plants reach the two-leaf stage, and the insects remain active until the flowering stage (Nayak *et al.* 2005). Ganapathy and Durairaj (1995) identified it as a significant pest affecting black gram and green gram in the drought-prone Pudukottai District of Tamil Nadu. Damage was more pronounced in black gram (9.78%) compared to green gram (1.45%). Sahoo and Patnaik (1994) observed the occurrence of insect pests in both green and black gram, along with their seasonal activity and damage levels in Orissa. The level of damage to black gram, green gram, and cowpea ranged from 20% to 60% (Srivastava and Singh 1976, Swaminathan, 2012). Singh and Gupta (1982) reported the damage to the leaves of green gram and black gram, noting that infestation was more severe in black gram compared to green gram. Gowda and Kaul (1982) documented adult feeding on leaves, buds, and flowers. Additionally, Gowda *et al.* (2006) reported feeding damage by adults on the buds and flowers of pigeon pea.

Mrig and Singh (1985) found that the highest damage occurred on *D. lablab* during the third week of September, with the pest vanishing after the first week of November. Feleiro and Singh (1985) conducted studies on yield and infestation to identify the critical stages of crops that needed protection. They found that infestations during summer led to significant yield losses, whereas pest attacks in the rainy season did not notably affect yield. In summer, Gupta and Singh (1993) documented a peak population of 10.0–10.25 beetles per 10 plants, while in the rainy season, the numbers rose to 29.50–30.25 beetles per 10 plants in green gram. Babu (2017) noted the unusual occurrence of *Madurasia* Jacoby on soybean, black gram and pigeonpea in southern Rajasthan. On an average of 5-6 adult beetles per leaf was recorded on soybean plants and the population was mostly found on the lower side of the leaves.

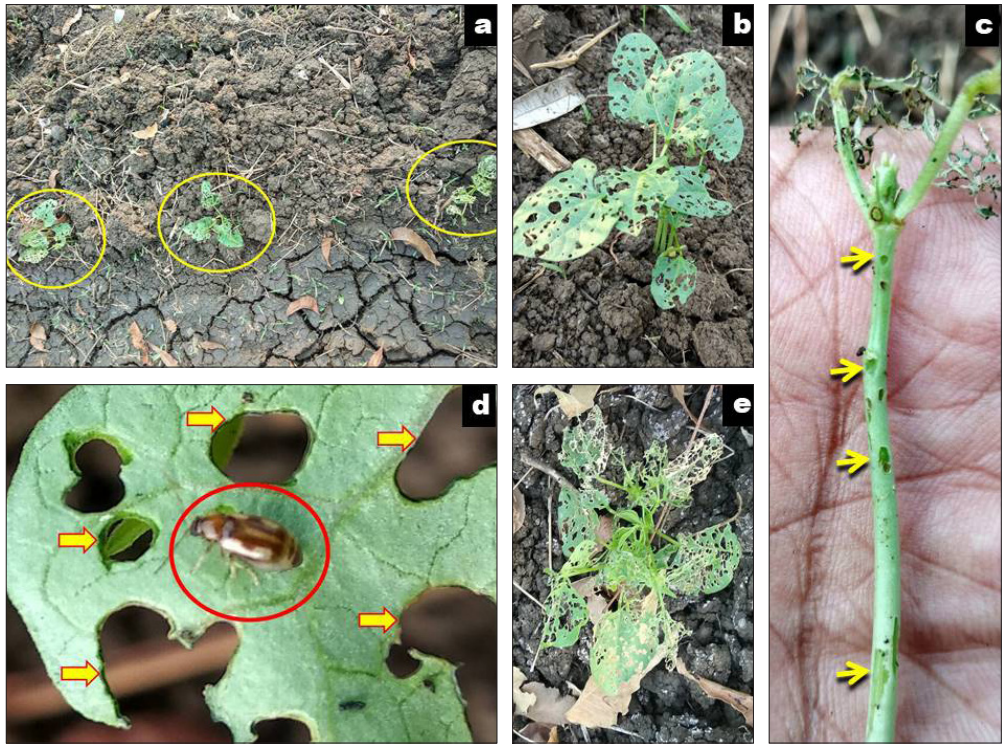

Fig. 2: a-Sporadic infestation by *M. undulatovittata* in severe form; b- yellowing of leaves, c- damage by adults on soft stem; d-Close view of small numerous irregular holes made by adults on leaf; e- Plants lose the vigour, leaves wither and dry

Nayak *et al.* (2004) indicated a significant negative relationship with minimum temperature and humidity during the population growth of black gram. Dhuri *et al.* (1984) noted that the population of *M. undulatovittata* increased under ambient temperatures of approximately 32°C, extended periods of bright sunshine, and high humidity levels along with occasional rainfall. According to Irulandi and Balasubramanian (1999), maximum temperature, minimum temperature, sunshine hours, and wind speed showed a significant negative correlation with damage. The pest infestation on soybean was correlated with high temperature prevailed after continuous dry spell in the zone during 37th Standard week (2nd week of September (Babu, 2017). Sardana and Verma (1986) found a significant negative correlation between the pest population and both maximum temperature and sunshine, whereas rainfall exhibited a significantly positive correlation. The population was not correlated with maximum temperature, humidity, or rainfall, yet it displayed a strong and significant correlation with minimum temperature (Kumar *et al.*, 2007). Pandey *et al.* (1995) found that the pest favored varieties with thicker leaves.

Recently Hadia *et al.* (2023) reported infestation by *M. undulatovittata* on green gram from Anand, Gujarat. Infestation commenced from seedling of green gram i.e., 2nd week of August to 4th week of September. A heavy infestation was also recorded before flowering.

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