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Surveillance for South American Tomato Leaf Miner *Tuta absoluta* Meyrick in Kolar and Chikkaballapur Districts of Karnataka

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ABSTRACT

Tuta absoluta Meyrick, commonly known as the South American tomato leaf miner (SATLM), has emerged as a highly destructive insect pest of potato (*Solanum tuberosum* L.) across the globe, including in India. Field studies were conducted against SATLM in two districts of Karnataka during *Rabi* 2019-20 to understand the extent of damage potato foliage. Mean percent infestation of SATLM and number of mined leaves per plant (4.47% and 8.31) in Kolar district and 2.51 percent with 2.95 mined leaves per plant was observed in Chikkaballapur district. Number of mines per plant was observed lowest (5.09) in Kolar and highest of 5.24 mines per plant was witnessed in Chikkaballapur district. The observed damage parameters showed no significant variation across the surveyed villages and taluks of the Kolar district whereas; it was significantly differed in percent SATLM incidence and all the damage parameters in Chikkaballapur district. In recent years, rising temperatures caused by climate change have led to an increase in the occurrence of SATLM, a trend expected to continue. As a result, developing control technologies and strengthening intensive monitoring will be essential to ensure stable potato production and maintain quality after harvest.

Keywords: Potato, South American tomato leaf miner, temperature, *Tuta absoluta*,Survey, Surveillance**,**

INTRODUCTION

Potato (*Solanum tuberosum* L.) is a starchy tuberous crop native to the South Americas and a perennial member of the Solanaceae family. Ranked among the top four crops globally, it serves as a vital food source in developing countries, following rice, wheat, and maize (Douches *et al,* 2004). Potatoes are naturally fat-free and rich in proteins, vitamins, and minerals. However, significant post-harvest losses often occur during storage, particularly in developing regions where low-income farmers lack access to cold storage facilities. One of the major challenges farmers face today is the global spread of pests, especially as they intensify production to meet the rising demands of international markets. Among these pests, the South American tomato leaf miner (SATLM), *Tuta absoluta* Meyrick (Lepidoptera: Gelechiidae), stands out as a serious threat to potato crops worldwide. This oligophagous insect primarily feeds on solanaceous plants, including tomato, brinjal (eggplant), potato, and various related weeds.

The South American tomato leaf miner (SATLM) is considered the most economically damaging potato pest across Europe, Africa, western Asia, and South and Central America, capable of causing up to 100% yield losses if not properly managed. Even when infestations are less severe, they still lead to additional costs for postharvest inspections and financial losses due to unmarketable produce (Biondi *et al,* 2018). SATLM is also known by several other names, including South American tomato pinworm, tomato leaf miner, tomato pinworm, and South American tomato moth. To mitigate storage losses caused by this pest, farmers often rely heavily on broad-spectrum pesticide applications. However, there is growing concern about reducing pesticide dependency and the need to develop and integrate alternative pest management strategies. Temperature plays a crucial role in the survival and development of SATLM, which is why it predominantly inhabits warmer regions, thriving in subtropical and tropical climates. Hence, the present research was conducted with the objective to assess the extent of infestation and

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damage caused by *Tuta absoluta* on potato foliage in different regions of Karnataka to support effective monitoring and management strategies.

MATERIALS AND METHODS

The taluks chosen for the survey were selected based on their significance in potato cultivation. A total of 16 potato fields were surveyed across two taluks each in the Kolar and Chikkaballapur districts of Karnataka during 2019–20. The level of damage caused by SATLM was assessed by recording the percentage incidence. In each taluk, two villages were randomly selected, and within each village, two plots were randomly chosen. From each plot, 10 plants were randomly observed to assess pest infestation. Damage caused by SATLM was measured by recording the number of mined leaves, bored shoots, and damaged tubers.

Percent incidence was calculated by using the formula:

$$\text{Percent incidence} = \frac{\text{Number of plants infested}}{\text{Total number of plants observed}} \times 100$$

For observations on tuber moth at each location, one meter row was randomly selected at three different sites in the field and observed for number of shoots showing mining symptoms and later calculated the percent incidence.

Statistical analysis

All collected data were compiled and subjected to analysis of variance (ANOVA) following a Completely Randomized Block Design (CRBD) using OPSTAT software, with a 5% level of significance, applying necessary data transformations where required..

RESULTS AND DISCUSSION

SATLM infestation in Kolar district during *Rabi* 2019-20

The findings of the survey revealed that the percent mean foliage infestation by *Tuta absoluta* in Kolar district during *Rabi* 2019-20 differed significantly among villages (Table 1). It was lowest in Ekambahalli village (2.50%) with 2.67 mined leaves and 7.50 mines per plant. Infestation and number of mined leaves per plant was highest in Tamaka village (15.00% and 6.50 per plant) (both in Kolar taluk). Highest number of mines per plant (14.00) was recorded in Marakalaghatta village of Mulbagal taluk. But there was no statistical difference among the two taluks (Kolar, 7.97% and Mulbagal, 8.87%).

SATLM infestation in Chikkaballapur district during *Rabi* 2019-20

During *Rabi* 2019-20 in Chikkaballapur district, percent infestation, number of mined leaves per plant and number of mines per plant by *T. absoluta* was recorded lowest in Ullodu village of Gudibande taluk with no visible damage symptoms and the same was recorded highest highest in Gyadarahalli village of Gudibande taluk (16.66%, 12.50 and 16.00, respectively) (Table 2). Among the two taluks, potato foliage infestation by SATLM was least in Gudibande taluk (7.60%) and was highest in Chikkaballapur taluk (9.17%) which were significantly different from each other. At the same time, the number of mined leaves per plant was recorded lowest in Chikkaballapur taluk (5.67) and was significantly different from that in Gudibande taluk (6.37) (Table 2). Number of mines per plant was numerically more in Gudibande taluk (9.31) compared to Chikkaballapur taluk which did not differ statistically from each other. The present damage by SATLM to potato is supported by the findings of Kalleshwaraswamy *et al* (2015) who have reported 3.3 and 5.1 percent potato plants registered damage in Chikkamagaluru district during January and February months of 2015. The present incidence levels of SATLM on potato in Kolar and Chikkaballapur districts are relatively higher compared to earlier levels recorded in Chikkamagaluru district. Whereas cent percent potato plants were infested by SAPLM (South American potato leaf miner) with 30 percent mined and fed leaves at Huocheng, China (Zhang *et al,* 2020). Potato suffered economic loss in the absence of tomato in Turkey and has been recorded as a new host (Unlu, 2012). There are quite good number of laboratory studies indicating potato as a next best host to *T. absoluta* after tomato, followed by eggplant (Medigo *et al,* 2013; Vanitha, 2017; Satishchandra *et al,* 2019).

CONCLUSION

This was a clear indication that, in near future, the South American tomato leaf miner (SATLM), *Tuta absoluta* Meyrick may become a major pest of potato as a foliage feeder. Hence, warranting suitable mitigating measures on a sustainable and eco-friendly manner. The observed infestation levels in both Kolar and Chikkaballapur districts highlight its expanding geographic spread and potential to cause serious yield losses. With climate change contributing to increased pest occurrences, there is an urgent need to develop region-specific monitoring protocols and integrated pest management strategies. Proactive interventions will be crucial to safeguard potato cultivation and maintain post-harvest quality.

Table 1: Extent of damage by South American tomato leaf miner, *T. absoluta* on potato leaves in Kolar district.

Taluka	Village	Percent infestation by leaf miner*		No. of mined leaves/plant**		No. of mines/plant**	
		Per village	Per taluk	Per village	Per taluk	Per village	Per taluk
Kolar	Gaddekannur	9.38 (17.83)	7.97 (16.39)	5.50 (2.60)	4.79 (2.44)	9.42 (3.12)	10.21 (3.45)
	Tamaka	15.00 (22.78)		6.50 (2.80)		11.20 (3.60)	
	Ekambahalli	2.50 (9.09)		2.67 (1.88)		7.50 (3.00)	
	Kumbarahalli	5.00 (12.92)		4.50 (2.37)		12.70 (3.81)	
Mulbagilu	Avani	7.90 (16.32)	8.87 (17.32)	6.00 (2.70)	4.31 (2.33)	13.45 (3.92)	12.18 (3.74)
	Marakalaghatta	12.42 (20.63)		4.00 (2.25)		14.00 (3.99)	
	Badamakanahalli	7.50 (15.89)		3.50 (2.12)		10.50 (3.49)	
	Mittahalli	7.64 (16.04)		3.75 (2.19)		10.75 (3.53)	
Mean		8.42		4.55		11.20	
S.Em(±)		0.47		0.37		0.37	
CD		1.37		NS		NS	

** Figures in parentheses are arcsine transformed data** Figures in parentheses are √x ± 0.25 NS: Not significant*

Table 2: Extent of damage by South American tomato leaf miner, *T. absoluta* on potato leaves in Chikkaballapur district.

Taluka	Village	Percent infestation by leaf miner*		No. of mined leaves/plant**		No. of mines/plant**	
		Per village	Per taluk	Per village	Per taluk	Per village	Per taluk
Chikkaballapur	Gowdanahalli	12.50 (20.70)	9.17 (17.62)	9.33 (3.30)	5.67 (2.63)	10.67 (3.52)	6.00 (2.70)
	Doddapyalagurki	13.33 (21.41)		11.33 (3.62)		11.00 (3.57)	
	Perasandra	5.83 (13.97)		1.00 (1.25)		1.33 (1.40)	
	Haristhala	5.00 (12.92)		1.00 (1.25)		1.00 (1.25)	
Gudibande	Someshwara	10.00 (18.43)	7.60 (16.00)	10.50 (3.49)	6.38 (2.78)	15.00 (4.12)	9.31 (3.30)
	Gyadarahalli	16.66 (24.08)		12.50 (3.79)		16.00 (4.25)	
	Channenehalli	3.75 (11.16)		2.50 (1.83)		6.25 (2.75)	
	Ullodu	0.00 (0.05)		0.00 (0.05)		0.00 (0.05)	
Mean		8.38		6.02		7.66	
S.Em(±)		0.27		0.25		0.38	
CD		0.79		0.74		1.11	

** Figures in parentheses are arcsine transformed data** Figures in parentheses are √x ± 0.25 NS: Not significant*

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