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Host preference of the South American tomato Moth, *Tuta absoluta* (Povolny) (Lepidoptera: Gelechiidae) among few tested Solanaceous crops

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Abstract
Studies on host preference of the South American tomato moth, *Tuta absoluta* (Povolny) (Lepidoptera; Gelechiidae) on the basis of free choice test, conducted under laboratory conditions on few Solanaceous crops viz., tomato, brinjal, chilli and potato revealed that the results varied significantly with each other. Tomato leaves harbored maximum (2.58) number of larvae showing maximum preference, followed by brinjal leaves (1.86) and tomato fruit 1.76. Least number of larvae was observed in chilli leaves *i. e.* (1.08) which depicted least preference by *T. absoluta*.

Keywords: *Tuta absoluta*, choice test, Solanaceous crops

Introduction
Tomato (*Solanum lycopersicum* Mill.), belongs to the nightshade family Solanaceae and is one of the most widely cultivated and consumed food crops among vegetables in the world. It is consumed as fresh table tomato and also as an essential raw material for a variety of food recipes and processing industries [7]. Total tomato growing area and production all over the world is 53051 h. and 886104 MT. respectively. In India it is 882.0 h., with a production of 18735.9 MT., while in Chhattisgarh it is 50.38 h. and 814.22 MT. respectively.
In Chhattisgarh, major tomato producing districts are, Raipur, Baloda- Bazar, Gariyaband, Mahasamund, Durg, Balod, Dhamtari, Bemetara, Rajnandgaon, Janjgir-Champa, Kanker, Bilaspur, Mungeli, Korba, Raigarh, Jashpur, Surguja, Surajpur, Balrampur, Koriya, Kondagaon, Bijapur, Kabirdham, Dantewada, Sukma and Narayanpur [8].
The tomato leaf miner, *T. absoluta* (Povolny), also known as South American tomato moth, tomato borer and South American tomato pinworm, is a neotropical oligophagous moth from the family Gelechiidae (Lepidoptera). Since 1960s, this moth has become one of the key pests of tomato crops in South America [12]. As indicated in its local name, this important tomato pest, is native to South America. *T. absoluta* as a South American species was first described in 1917 by Meyrick under the name *Phthorimaea absoluta*. The currently accepted name of *T. absoluta* assigned by Povolny in 1994 following a number of earlier changes in nomenclature [1].
In India, the incidence of the tomato leaf miner, *T. absoluta* (Povolny) (Lepidoptera: Gelechiidae) was recorded for the first time on tomato at the Indian Institute of Horticultural Research (IIHR), Hessaraghatta, Bengaluru (13°8.12"N 77°29.45"E, altitude 890 m), Karnataka, India during the *rabi* season of 2014 [10].
Since the initial detection, tomato leaf miner has become the most serious pest causing severe damage on tomato in invaded areas. Conspicuous economic losses and rapid spreading along the areas of traditional tomato production, project this pest as the most serious agricultural threat to tomato production [5].
In early infestation, newly emerged neonates (first instar) penetrate the leaf into the mesophyll layer and feed between the lower and upper surfaces of the leaf to form small and transparent mines. As a result of continuous feeding by the larvae, the irregular mines combine together and eventually form galleries. Except for the roots, the larvae attack all other parts of the tomato plant *viz*, leaves, flowers, stems, both green and red fruits. *T. absoluta* infestation may cause 50-100% losses in the tomato crop. It has the capability to cross borders and devastate the crops either in open field or in protected greenhouse [6].
The adult moth of *T. absoluta* is grayish -brown in colour, approximately 6.00 mm in size and has a wingspan of about 10.00 mm.

It has long filiform antennae, silverfish-grey scales and black spots on anterior wings. The pest is multivoltine having nearly 12 generations per year.

Intensive spreading and dissemination of tomato leaf miner could be correlated with fruit importation and commercialization. The most relevant pathways for entry of *T. absoluta* are, import of tomato fruits intended for consumption from countries where the pest is present, on packing materials [2].

Keeping this in view, the present investigation on host preference of the South American tomato moth, *Tuta absoluta* (Povolny) (Lepidoptera, Gelechiidae) among few Solanaceous crops was conducted at laboratory conditions , in the Biocontrol laboratory, department of Entomology IGKV, Raipur, (C.G.) during 2015-16.

Materials and Methods

The present study on the host preference of South American tomato moth, *Tuta absoluta* on few Solanaceous crops was conducted in the Biocontrol laboratory of Department of Entomology, Indira Gandhi Krishi Vishwavidyalaya Raipur, Chhattisgarh during the period of November to March, 2016 under free choice conditions. *Tuta absoluta* was reared in cages on tomato plants. (Fig.1) A larval feeding preference experiment was set up using a thermocol sheet, having nine pockets in the form of shallow discs cut out from the sheet. All the pockets led to a central pocket (Fig.2). On the peripheral pockets, nine different host plant parts were provided as mentioned below with 20 larvae of 3rd and 4th instar of *T. absoluta* kept in the centre. The thermocol sheet was covered by a muslin clothed kept undisturbed. Their feeding preference was recorded by counting the number of larvae settled on different food materials provided in various discs after 24 hours. The experiment was repeated five times.

Number of Treatments- (09) as listed below

T1- Blank (without host)
T2- Brinjal fruit
T3- Tomato leaf
T4- Chilli fruit
T5- Tomato flower
T6- Potato leaf
T7- Brinjal leaf
T8- Tomato fruit
T9- Chilli leaf

Number of Replications (05)

Data Analysis*:* Data was analyzed with help in Completely Randomized Design (CRD).

Fig 1: Rearing cage of *T. absoluta*

Fig 2: Thermocol Host preference working disc

Results and Discussion

The result of the host preference studies conducted on few Solanaceous crops presented in Table 1 revealed significant differences among the treatments with maximum number of larvae settling on tomato leaves (2.58), depicting highest preference followed by brinjal leaf (1.86) and tomato fruit (1.76). Minimum larvae were noticed in chilli leaf and chilli fruit (1.08).

Thus, from the present studies, it can be concluded that tomato leaves were the most preferred plant part amongst the various plant parts of the four Solanaceous plants tested.

These findings are in agreement with [9], who reported *T. absoluta* as one of the most important lepidopteran pests on tomato both in greenhouses and open fields. They also mentioned that the primary host of *T.absoluta* pest was tomato (*Solanum lycopersicum* L.), although it could also attack other cultivated crops of Solanaceae, such as aubergine *i.e.* egg plant /brinjal (*Solanum melongena* L.), potato (*Solanum tuberosum* L.), pepper (*Capsicum annuum* L.), tobacco (*Nicotiana tabacum* L.), cape gooseberry (*Physalis*

peruviana L.) and goji berry (*Lycium* sp.), as well as on non-cultivated Solanaceae (*Solanum nigrum* L., *Solanum eleagnifolium* L., *Solanum bonariense* L., *Solanum sisymbriifolium* Lamarch, *Solanum saponaceum* Welwitsch, *Lycopersicum puberulum* and other naturally available host-plants such as jimson weed, *Datura ferox* L., devil's apple, *Datura stramonium* L., tree tobacco, *Nicotiana glauca* Graham and *Malva* sp.

Similar findings with the present, about *Tuta absoluta* (Meyrick, 1917) were reported by [4], stating that although the pest was originated from South America as an oligophagous pest on cultivars and weeds from Solanaceae family, but has an ovi-positional preference to tomato, pepper and eggplant.

The present studies are also agreement with [3] who also stated about the egg laying preference of *T. absoluta* to tomato in comparison to pepper and egg plant. Again [11] shared similar facts that maximum oviposition was observed on upper leaf of tomato plants which matches with the findings of [13] once again referring the preference for egg laying on tomato based on their studies for oviposition preference in tomato, potato and egg plant.

Table 1: Mean number of 3rd and 4th instar larvae settled per treatment

S. No.	Treatments	Mean no. of larvae settled
1	(without host)	1.22
2	(Brinjal fruit)	1.16
3	(Tomato leaf)	2.58
4	(Chilli fruit)	1.08
5	(Tomato flower)	1.72
6	(Potato leaf)	1.63
7	(Brinjal leaf)	1.86
8	(Tomato fruit)	1.76
9	(Chilli leaf)	1.08
	C.D.	0.37
	SE(m±)	0.13
	SE(d)	0.18
	C.V.	18.68

Conclusion

Thus, from the present studies on host preference of the South American tomato moth, *Tuta absoluta*, based on free choice test of 3rd and 4th instar larvae, it can be concluded that maximum preference was shown to tomato followed by brinjal, chilli and potato. Hence, management studies should be focused on tomato, as it is liable to cause maximum damage on it.

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