Management practices adopted against *Tuta absoluta* in tomato ecosystem and its influence on natural enemies

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ABSTRACT

The survey was conducted on management practices adopted by the tomato growers against *Tuta absoluta* in tomato ecosystem and its influence on natural enemies during the year 2016-17. Forty main farmers each in Dharmapuri, Krishnagiri and Coimbatore districts were interviewed to know the pest status, organic practices followed, effective natural enemies and pesticide usage pattern in tomato crop. The results indicated that organically cultivated tomatoes were less infected by *T absoluta* compared to pesticide-treated tomatoes and the natural enemies were also more in organic fields. Among natural enemies the mirid bug, *Nesidiocoris tennius* was reported as an effective predator of *T absoluta*.

Keywords: Survey; farmers; *Tuta absoluta*; natural enemies; tomato

INTRODUCTION

Tomato is one of the most important edible and nutritious vegetable crops produced by small and medium growers. Tomato production faces problems from several causes such as seasonal weather, temperature, humidity, diseases and insect pests. There are several insect species which feed on tomato such as thrips, whiteflies, fruit borers, leaf miners, leafhoppers, aphids, mites and mealybugs. Recently the South American tomato borer, *Tuta absoluta* (Povolny) (Lepidoptera: Gelechiidae) has emerged as one of the most devastating pests of tomato crop in several parts of the world (Anon 2010). *T absoluta* (Meyrick) is one of the serious pests and invasive species originating from South America. The pest has been introduced accidentally through exchange of fresh tomato fruits and planting materials (Gray et al 2013). Incidence of *T absoluta* was recorded for the first time on tomato at the Indian Institute of Horticultural Research (IIHR), Hessaraghatta, Bengaluru, Karnataka during the rabi season of 2014. 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. Tomato leaf miner infests various plant parts including leaves, stems, flowers and fruits (Desneux et al 2011). Farmers use various pesticides as a quick and adopted control measure of the pest (Ngowi et al 2007). Lack of knowledge on pest population monitoring in tomato production has resulted into inappropriate pesticide use which lead into increased cost of production as well as build up of resistance, killing of non-target organisms and pollution of water sources (Biondi et al 2012). The results from this survey may be used by policy makers and researchers to establish sustainable control measures of *T absoluta* in tomato growing areas.

METHODOLOGY

Survey was carried out in three major tomato growing districts in which totally 120 tomato growers were interviewed. Structured questionnaire was used

to collect information on the use of natural enemies and pesticides in tomato cultivation pertaining to pest management practices adopted to manage *T absoluta*. Data collected were analysed statistically.

RESULTS and DISCUSSION

Only few farmers were found to use biological inputs for vegetable pest management. Two farmers in Dharmapuri used *Pseudomonas* and other organic methods like Panchakaviyam and in Coimbatore only one farmer had adopted organic methods and remaining all applied more pesticides to control *T absoluta*. In case of Krishnagiri, farmers depended totally on insecticides. Less incidence of *T absoluta* in organic fields compared to pesticide-treated fields and more number of natural enemies were observed in organic fields. The damage due to *T absoluta* was maximum (24.90%) in Coimbatore district followed by Dharamapuri (21.25%) and Krishnagiri (14.50%) (Table 1). The data given in Table 2 show that the natural enemies (spiders) were maximum in Dharamapuri (0.39/field) and mirids were more in Krishnagiri (1.47/field). While comparing the population of natural enemies (Table 3) in organic and inorganic fields it was found that the population of spiders or mirids was higher in organic fields. Spider population was higher in organic fields of Dharamapuri (4.4/field) and nil in Krishnagiri whereas mirid population was maximum in Coimbatore (5.2/field) and nil in Krishnagiri. In overall the natural enemies were found more in organic as compared to inorganic fields. Damage intensity (Table 4) was also higher in inorganic fields of Coimbatore (25.54%) followed by Dharamapuri (22.36%) and minimum in Krishnagiri (14.50%).

Drinkwater et al (1995) observed more number of natural enemies in organically cultivated tomato fields with minimum pest incidence. Increased yields through

Table 1. Intensity of *T absoluta* damage in surveyed districts (mean of 40 fields)

District	Damage (%)
Coimbatore	24.90 ± 2.07
Dharmapuri	21.25 ± 1.70
Krishnagiri	14.50 ± 2.38

Table 2. Natural enemies reported from surveyed areas (mean of 40 fields)

District	Natural enemies reported	
	Spiders	Mirids
Coimbatore	0.25 ± 0.08	0.98 ± 0.20
Dharmapuri	0.39 ± 0.18	1.25 ± 0.21
Krishnagiri	0.26 ± 0.04	1.47 ± 0.18

Table 3. Natural enemies population in organic and inorganic fields

District	Inorganic field		Organic field	
	Spiders	Mirids	Spiders	Mirids
Coimbatore	0.86 ± 0.18	0.18 ± 0.05	2.76 ± 2.76	5.2 ± 5.2
Dharmapuri	1.06 ± 0.16	0.17 ± 0.03	4.4 ± 1.76	4.52 ± 2.24
Krishnagiri	0.26 ± 0.04	1.47 ± 0.18	0 ± 0	0 ± 0

Mean of fields

	Inorganic	Organic
Coimbatore	39	1
Dharmapuri	38	2
Krishnagiri	40	Nil

Table 4. Damage intensity in organic and inorganic fields

District	Damage intensity (%)	
	Inorganic	Organic
Coimbatore	25.54 ± 2.01	0 ± 0
Dharmapuri	22.36 ± 1.59	0 ± 0
Krishnagiri	14.50 ± 2.38	Nil

Mean of fields

	Inorganic	Organic
Coimbatore	39	1
Dharmapuri	38	2
Krishnagiri	40	Nil

organic practices were reported by Ramesh et al (2005), Sharma (2005), Singh et al (2001) and Kler et al (2002). The findings of Mohan (2008) also confirmed that in a two-year experiment that involved 20 farmers using alternative inputs, increased yield of tomato were found as compared to their production under conventional agricultural practices. The increased yield may be a result of combination of effects of using just the required quantities of bio-fertilizers and growth promoters along with the judicious use of bio-pesticides. The soil organic matter content was marginally increased possibly due to the use of organic inputs.

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