

Occurrence of mealybug, *Phenacoccus solenopsis* Tinsley on transgenic cotton in Marathwada region of Maharashtra

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ABSTRACT : Survey conducted during 2008-2009 to 2011-2012 showed that *Phenacoccus solenopsis* Tinsley was the predominant mealybug species found in Marathwada region of Maharashtra State. The mealybug infestation was observed in grade I (1 to 10 mealybugs scattered on plant) in all the farmer fields surveyed with few exceptions. Scattered infestation of mealybugs was also recorded in other host plants namely *Parthenium*, fig, pomegranate, marigold, soybean and *Hibiscus*. The highest (33.18%) percentage of infested plants was recorded in the village Markand and lowest (6.67%) in Ardhapur of Nanded district during 2008-2009 and 2009-2010, respectively. The maximum intensity (1.12) of mealybug infestation was recorded in the villages Sonkhed and Dabhad of Nanded district during 2011-2012. The maximum number of plants in grade IV (whole plant infested) were observed during 2011-2012. So, mealybug, *P. solenopsis* is the emerging pest on *Bt* cotton in the region.

Key words : Emerging pest, infested plants, intensity, mealybug, *Phenacoccus solenopsis*

Cotton the 'White Gold' enjoys a predominant position among all cash crops in India. After introduction of bollguard technology (*Bt*) in 2002, the productivity of cotton is increased from 308 kg/ha in 2001 to 496.16 kg/ha in 2013 (Anonymous, 2013). The cotton production is stagnant over the years due to many biotic and abiotic constraints. Among the biotic problems, insect pests are major in India. However, the problem of sucking pests has increased considerably in most of the *Bt* cotton hybrids. Mealybugs are sucking pests which were recorded earlier in cotton as minor pest. The cotton belt of Maharashtra was seriously threatened by the exotic species of mealybug, *Phenacoccus solenopsis* Tinsley (Homoptera : Pseudococcidae) covering larger areas and causing huge losses during 2006-2007 (Bhosle *et al.*, 2009). The same pest has emerged as threat to cotton cultivation in Pakistan during 2005 (Abbas *et al.*, 2005).

In India the first incidence of *P. solenopsis* in cotton has been reported from the fields of Baroda district during 2003-2004 (Jhala *et al.*, 2008). Five species of mealybugs *viz.*,

Phenacoccus solenopsis, *Maconellicoccus hirsutus*, *Pseudococcus longispinus*, *Phenacoccus solani* and *Ferrisia malvastra* have been reported from different parts of the country. Presently, *P. solenopsis* is the only major species in almost all cotton growing areas of the country. The infestation of mealybug have been reported on more than 300 plant species including ornamental and fruit trees.

MATERIALS AND METHODS

The studies were conducted in 20 villages of Nanded and Hingoli districts of Marathwada region of Maharashtra State during 2008-2009 to 2011-2012 by Cotton Research Station, Nanded of Marathwada Agricultural University, Parbhani. Observations on occurrence of mealybugs were recorded fortnightly from August to December from first fortnight during 2008-2009 and from July to December first fortnight during 2009-2010 to 2011-2012 from 5 cotton fields of different villages. During 2008-2009, was sowing delayed due to late monsoon and therefore nine observations were recorded and from 2009-

2010 to 2011-2012, eleven observations were recorded.

The data on incidence of mealybugs were recorded from randomly selected 100 plants/field/village and per cent infestation was calculated. The intensity of infested plants was worked out for each observation on the basis of cumulative total of mealybug grades divided by the number of infested plants observed. The grading of mealybug infestation was done (Dharajyoti *et al.*, 2008) in '0-4' scales ('0' for no mealybug, '1' for 1-10 mealybugs scattered on plant, '2' for one branch infested, '3' for two or more branches infested or up to 50 per cent plant infested and '4' for whole plant infested).

Data on mean of per cent infested plants and intensity of infested plants were compiled and used for determining the results. Mealybugs were collected from various *Bt* cotton fields as well as other host plants and preserved in ethanol containing vials. Mealybugs collected were identified from Division of Entomology IARI, New Delhi.

RESULTS AND DISCUSSION

The villagewise data (Table 1) of incidence of mealybug revealed that during 2008-2009 highest per cent of mealybug infested plants were observed in Pimpalgaon (11.56) and Dongarkada

Table 1. Occurrence of mealybug on *Bt* cotton in different villages of Nanded and Hingoli districts of Maharashtra (2008-2011).

District / Village	Infested plants (%)	Intensity of infested plants	Number of plants in grade II	Number of plants in grade IV
2008-2009				
Nanded				
Pimpalgaon	11.56	1.00	00	-
Choramba	8.78	1.00	00	-
Ardhapur	6.67	1.00	00	-
Pardi	7.78	1.00	00	-
Hingoli				
Dongarkada	11.14	1.02	03	-
2009-2010				
Nanded				
Dabhad	18.64	1.00	00	-
Markand	33.18	1.09	07	-
Sawargaon	19.64	1.07	04	-
Hingoli				
Bhategaon	10.00	1.00	00	-
Varud	17.82	1.00	00	-
2010-2011				
Nanded				
Dabhad	8.27	1.00	00	-
Kaladgaon	10.80	1.00	00	-
Barasgaon	11.09	1.07	11	-
Barad	09.45	1.06	07	-
Hingoli				
Dongarkada	09.40	1.00	00	-
2011-2012				
Nanded				
Sonkhed	12.00	1.12	00	13
Shelgaon	12.33	1.05	07	04
Dabhad	13.80	1.12	21	02
Karegaon	14.44	1.03	00	09
Jawalafata	12.27	1.03	00	07

Table 2. Identification of mealybugs on cotton and other host plants

Host plants	Identification
<i>Bt</i> cotton	<i>Phenacoccus solenopsis</i> Tinsley
<i>Parthenium</i>	<i>Phenacoccus solenopsis</i> Tinsley
Marigold	<i>Phenacoccus solenopsis</i> Tinsley
Fig	<i>Maconellicoccus hirsutus</i> (Green)
Pomogranate	<i>Rastrococcus iceryoides</i> (Green)
Soybean	<i>Phenacoccus solenopsis</i> Tinsley

(11.14) villages of Nanded and Hingoli districts respectively. However, the intensity of infested plants was 1.0 during August to November of 2008-2009 except in village Dongarkada where intensity of infested plants was 1.02.

During 2009-2010 the highest percentage of mealybug infested plants (33.18) and the maximum intensity of infested plants (1.09) were observed in the village Markand of Nanded district. Highest of 11.09 and 14.44 per cent of infested plants due to mealybugs were recorded during 2010-2011 and 2011-2012 in Barasgaon and Karegaon villages of Nanded district respectively. However, the higher intensity of infested plants (1.12) was observed in Sonkhed and Dabhad villages of Nanded district during 2011-2012. The scattered infestation of mealybugs (Grade I) was recorded in all the farmer fields. However, the total number of the plants that recorded severe incidence of mealybugs on one branch of the plant (Grade II) and on whole plant (Grade IV) were 61 and 35, respectively. During 2011-2012, in Nanded district the whole plant infested by mealybugs (IVth grade) were recorded.

Irrespective of the year of survey, the lowest per cent (6.67) of the infested plants were observed in the Ardhapur and highest (33.18) in Markand villages of Nanded district. The intensity of infested plants remained between 1.00 and 1.12 during the study.

The scattered infestation of mealybugs was observed on the host plants *viz.*, *Parthenium*, fig, pomegranate, marigold, soybean, *Hibiscus*, *Abitulon*, guava and curry leaf during survey. The identification details of specimens of insects are

given in Table 2.

Identification of mealybugs occurring on cotton collected during survey in different locations showed that *P. solenopsis* Tinsley species was found in 95 per cent of samples examined (Table 2). Among three different types of mealybugs (*P. solenopsis*, *P. solani* and *Maconellicoccus hirsutus*) *P. solenopsis* is the most prevalent in both the districts of Marathwada region of Maharashtra. Laxman *et al.*, (2009) observed the percentage infested plants due to *P. solenopsis* on *Bt* cotton ranged from 47 to 53 during September to December in 2007 and 2008.

Brar *et al.*, (2009) reported 8.06 per cent of infested plants and 1.07 per cent intensity of infested plants due to *P. solenopsis* on *Bt* cotton during intensive surveys in different villages of district Faridkot of Punjab. Bhosle *et al.*, (2009) conducted a roving survey of mealybug on cotton in Marathwada region of Maharashtra state and reported that the percentage of infested plants was highest (52.08) in Parbhani and lowest (11.14) in Hingoli districts. Monga *et al.*, (2009) recorded 5 to 44 per cent infestation of mealybug (*P. solenopsis*) on cotton at various locations in Haryana. Suresh *et al.*, (2010) recorded the level of incidence of mealybug *P. solenopsis* from 0.00 to 60 per cent on cotton, sunflower, vegetables (brinjal, tomato, bhendi, cucurbits), pulses and *Parthenium*. The present study confirmed that the *solanum* mealybug, *P. solenopsis* was predominant and has emerged as a serious sucking pest of cotton.

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