PREFERENCE OF WHITEFLY, *BEMISIA TABACI* (GENNADIUS) TO TOMATO CULTIVARS

JAMUNA, B.,BHEEMANNA, M, HOSAMANI, A. C, LATHA,H. C,SHWETHA SURPUR,GEETHA, S.

Abstract: The study has been carried out to know the preference of tomato whitefly, *Bemisia tabaci* (Genn.) to six tomato cultivars (hybrids/ varieties) under cage condition during 2012-13 cropping season. Preliminary studies were conducted at bio-control lab, Main Agriculture Research Station Raichur Karnataka on the tomato cultivars *viz.,* PTR6, PTR4, Araka Ananya, Arka Rakshaka, Arka Samrat and Vybhav. In caged condition, based on the whitefly population build up on different cultivars (hybrids/ varieties), their tolerance and susceptibility was evaluated. Total number of adult emergence was significantly high on varieties like PTR 6 (8.30 eggs, 3.07 nymphs, and 3.04 adults/ three leaves) followed by PTR 4 (7.20 eggs, 3.30 nymphs and 2.97 adults/ three leaves). In Araka Ananya (6.20 eggs, 2.53 nymphs and 2.43 adults/ three leaves), Arka Rakshaka (5.93 eggs, 2.50 nymphs and 2.43 adults/ three leaves) and Arka Samrat (5.73 eggs, 2.40 nymphs and 2.40 adults/ three leaves) recorded least number of adult emergences and were on par with each other. Significantly least adult whitefly emergence was observed on variety Vybhav (3.43 eggs, 2.13 nymphs and 2.07 adults/ three leaves) which was least preferred variety to whitefly.

Keywords: *B. tabaci, L. esculentum,* Biology, cultivars, preference.,

Introduction: Tomato (*Lycopersicon esculentum* Mill.) is one of the important and widely grown vegetable crop of both tropics and sub-tropics of the world, belonging to the family *Solanaceae* and ranks second in importance among vegetables. Tomato can be grown throughout the year. Globally tomato is cultivated over an area of 45.82 lakh hectares with an annual production of 1505.13 lakh tonnes with a productivity of 32.8t/ ha (Anon., 2011). In India it is cultivated in 9.33 lakh hectares with a production of 193.77 lakh tonnes. In Karnataka, tomato is cultivated on an area of 0.59 hectares with a production of 20.70 lakh tonnes and occupies second position in production (2069.70 ton) after Andhra Pradesh (6195.56 ton), (Anon., 2012). Though, the area under tomato cultivation is high, the productivity (15 t/ ha) is low, this is attributed to the potential loss in yield due to various biotic and abiotic factors. Among biotic factors, Insect pest, like fruit borer, *Helicoverpa armigera* (Hab.) serpentine leafminer, (*Liriomyza trifolii)* aphids (*Myzus persicae* or *Aphis gossypii),* mites (*Tetranychus* spp.), thrips (*Thrips tabaci)* armyworm, *Spodoptera litura* (Fab.), mealybugs, *(Maconellicoccus* sp.), nematodes and diseases like fungal, bacterial, phytoplasma infections and also crop is affected by large number of viral diseases (Anon., 2011). Of all these, the whitefly, *Bemisia tabaci* (Genn.) transmitting many deadly diseases in solanaceous, cucurbitaceous vegetable crops and pulse crops. Tomato Leaf Curl Virus Disease (ToLCVD) having a greater negative impact on production of tomato.

Tomato whitefly, *Bemisia tabaci* (Gennadius) was described over 100 years ago as a pest of tobacco in Greece. It is a phloem-feeding insect. It rose to international prominence in the mid to late 1970's and since then it has risen to the status as one of the most damaging and globally known pests of open field and protected crops.

Both adults and nymphs of *B. tabaci* suck plant sap from the underside of leaves causing chlorotic spots. Continuous feeding affects the physiology of plant leading to detrimental effect on all stages of the crop. Important role of *B.tabaci* as a vector of several Gemini viruses such as leaf curl virus of tomato and okra, yellow mosaic virus of beans, tobacco leaf curl virus, etc. Tomato leaf curl virus (ToLCV) is a geminivirus (Geminiviridae: subgroup – III) which is the most important and destructive viral pathogen in many parts of India. The incidence of ToLCV in tomato growing areas of Karnataka ranged from 17 to 100 per cent in different seasons and 50 to 70 per cent yield loss was observed in tomato Cv. Pusa Ruby grown in February to May whereas yield loss was above 90 per cent, when infection occurred within four weeks after transplanting in the field (Vasudeva and Samraj, 1948: Sastry and Singh, 1973; Saikia and Muniyappa, 1989).

Materials and Methods: Six tomato cultivars (hybrids/ varieties) *viz*., Vybhav (UAS Bengaluru), Ark Ananya, Arka Rakshak and Arka Samrat (IIHR), PTR 6 and PTR 4 from UAS Raichur were collected to study the preference of whitefly to different cultivars. The experiments were carried out in laboratory under temperature of 15.6 to 34.6° C and relative humidity of 34 to 76.33 per cent. Seeds of each cultivar were sown in earthen pots and each pot containing four plants were kept in insect cages separately of having size four feet height and two feet width with an opening one side to release whiteflies. Four replication were maintained for each cultivar (Plate I).

Adult whiteflies of 20 mating pairs were collected from stock culture with the help of aspirator and

released for oviposition. After three days, adults were removed, eggs on the abaxial surface of leaves were counted with help of 20X lens on randomly selected three leaves (one from top, middle and bottom) such selected leaves were tagged for further daily observations, on developmental stages and adults. Per cent survival was calculated using formula

Per cent survival rate = No. of Adults /No. of eggs X 100

Result and discussion: The egg number ranged from 3.43 to 8.30 in different cultivars (hybrids/ varieties). Vybhav variety was least preferred which recorded significantly least (3.43eggs/ per three leaves) number of eggs followed by Arka Samrat with 5.73 eggs per three leaves. Arka Rakshaka and Arka Ananya recorded 5.93 and 6.20 eggs per three leaves respectively and were on par with each other. It was observed that *B. tabaci* oviposition preference was more on PTR 4 and PTR 6 which recorded 7.20 and 8.30 eggs respectively and they were highly preferred varieties for oviposition to *B. tabaci* compared to other cultivars (Table I).

On the preferred cultivars (hybrids/ varieties), duration of first instar nymphs of *B. tabaci* ranged between 5.30 and 6.10 per three leaves, whereas in least preferred cultivars (hybrids/ varieties) it ranged from 3.3 to 3.67 per three leaves. It was observed that *B. tabaci* preference was more on PTR 6, PTR 4 and Arka Ananya. Arka Rakshaka, Arka Samrat and Vybhav were the least preferred cultivars (Table I).

Population of second instar nymphs ranged from 3.70 to 5.10 per three leaves on preferred cultivars whereas on least preferred cultivars it ranged between 2.67 and 2.97 nymphs per three leaves. It was observed that *B. tabaci* in the order of preference was on PTR 6, PTR 4 and Arka Ananya. Arka Rakshaka, Arka Samrat and Vybhav were the least preferred cultivars (Table I).

Population of third instar whitefly nymphs ranged from 2.87 to 4.07 per three leaves on preferred cultivars, whereas on least preferred cultivars it was only 2.13 to 2.80, same trend of preference of cultivars was continued (Table I).

Population of fourth instar whitefly nymphs ranged from 2.53 to 3.70 per three leaves on preferred cultivars, whereas on least preferred cultivars (hybrids/ varieties) nymphs ranged from 2.07 to 2.50 per thee leaves (Table I).

Among six cultivars (hybrids/varieties), Vybhav was least preferred which recorded least (2.07) number of adult whitefly population per three leaves (Plate 1) Arka Samrat, Arka Rakshaka and Arka Ananya recorded 2.40, 2.43 and 2.43 whiteflies per three leaves respectively and were on par with each other. PTR 4 and PTR 6 cultivars recorded significantly high (2.97 and 3.40 adult whitefly per three leaves respectively) population and they were highly preferred varieties (Table I).

Among the six cultivars, highest per cent survival was recorded in Vybhav (60.30) followed by Arka Samrat and PTR 4 recorded 41.80 and 41.25 per cent survival respectively. PTR6, Arka Rakshaka, and Arka Ananya were recorded 40.97, 40.96 and 39.19 per cent survival respectively (Plate II).

References:

1. R. M. Ashirwar M. P. Gupta, and S. Banerjee, "Field efficacy of natural and indigenous products on sucking pests of sesame," *Indian J. Natural Products and Resources,* 1st ed. vol. 2, pp. 221-226.
2. L. Ramazeame, "Integrated Management of Whitefly, *Bemisia tabaci* (Gennadius) on Tomato," *Ph. D. thesis,* University of Agricultural Science, Bangalore, 2012, pp. 74.
3. B.K. Sajeed Ali, P. De, S. Nath, V. B. Yadav, L. Wangchu and S. Ali, "Tomato leaf curl virus disease on different tomato cultivars in the New Alluvial Zone of West Bengal," *Environ. Ecol,* 2002, vol. 20, pp. 908-911.
4. W. Setiawati, B. K. Udiarto and N. Gunaeni, "Preference and infestation pattern of *Bemisia tabaci* (Genn.) on some tomato varieties and its effect on Gemini virus infestation," *Indonesian J. Agric,* vol. 2, 2009, pp. 57-64.
5. S. Vennila, V. K. Biradar, M. Sabeshand O. M. Bambawale , "Know your cotton insect pest whiteflies," *Crop Protection Folder Series,* 11th ed. vol. 4 pp. 1-6.

* * *

Table I: Pheromone trap catches of *S. litura* in relation to weather parameters of preceeding week

SMW	*S. litura*	Total rainfall (mm)	No. of rainy days	Temp. (°C)		RH (%)		Sunshine (Hrs)
				Max.	Min.	Morn.	A/N	
20th – 26th Aug	1.5	2.6	0	29.0	19.4	91	46	4.6
27th – 2nd Sept	5.0	53.4	2	29.9	19.3	93	53	8.1
3nd – 9th Sept	14.0	19.6	2	26.2	19.0	92	60	1.7
10th –16th Sept	5.0	0.0	0	27.8	19.7	92	58	2.5
17th -23rd Sept	3.0	2.0	0	28.6	19.4	91	52	5.0
24th –30th Sept	33.5	0.0	0	30.4	19.2	90	46	8.5
1st – 7th Oct	69.0	27.2	3	30.3	19.4	93	49	7.4
8th – 14th Oct	5.0	9.8	1	29.3	19.2	91	49	6.2
15th – 21st Oct	5.0	0.0	0	29.8	19.4	88	48	4.0
22nd –28thOct	9.0	60.8	3	27.3	18.4	91	58	5.4
29th – 4th Nov	0.0	0.6	0	27.4	18.2	91	54	6.9
5th – 11th Nov	1.5	111.8	2	25.1	18.1	95	72	3.0
12th – 18th Nov	5.0	18.8	1	28.3	18.2	93	51	7.9
19th – 25th Nov	14.5	0.0	0	26.7	13.1	82	53	10.2
26th – 2nd Dec	11.5	19.4	1	28.3	17.0	84	45	6.5
3rd – 9th Dec	74.0	0.0	0	27.7	15.0	88	55	9.2
10th – 16th Dec	30.5	10.8	1	26.3	16.6	88	51	7.7
17th – 23rd Dec	18.5	0.0	0	28.6	14.7	87	51	9.7
24th – 31stDec.	6.0	0.0	0	27.1	15.0	89	49	7.5

SMW: Standerd Meterological Week

I: Correlation between pheromone trap catches of *S. litura* with weather parameters of preceeding week

	Tot. rainfall (mm)	No. of rainy days	Temp. (ºC)		RH (%)		Sunshine (Hrs.)
			Max.	Min.	Morn.	A/N	
S. litura moth catches	-0.059	0.404	0.420	0.053	0.022	-0.283	0.319

Table III: Regression equation of pheromone trap catches of *S. litura* with weather parameters of preceeding week

Pest	Regression equation	R^2 value
S. litura moth catches	Y^2=-714.062-0.544X_1+12.471X_2+19.213X_3-15.838X_4+4.085X_5+2.334X_6-3.454X_7	63

X_1=Total rainfall (mm)
X_2= Number of rainy days
X_3= Maximum temperature (°C)
X_4= Minimum temperature (°C)
X_5= Relative humidity (morning) (%)
X_6= Relative humidity (afternoon) (%)
X_7= Sunshine hours

SRF bio control lab,jamuna4510@gmail.com
Professor, Agricultural Entomology,MARS, UAS, bheemuent@rediffmail.com
Associate professor Agricultural Entomology,MARS, UAS, arent23@gmail.com
MARS,UAS Raichur -584104, UAS, KVK, Bengaluru, Karnataka-560065