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Screening of Tomato Cultivars (Hybrids/Varieties) for Whitefly, *B. tabaci* in Field Condition

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A B S T R A C T

The Screening of tomato cultivars (hybrids/ varieties) for whiteflies in field condition was carried out during 2012-13. All the experimental studies were conducted at Main Agriculture Research Station Raichur Karnataka. The results revealed that, 15 Days after transplanting Vybhav recorded least number of adult (1.00/ three leaves) followed by Arka Samrat, PTR 4 was significantly preferred variety with highest (4.50) number of adult whitefly population. 30 Days after transplanting the variety Vybhav maintained its superiority over other cultivars (hybrids/varieties) with significantly least (1.25) number of adult whitefly per three leaves. Adult whitefly preference was more on PTR 6 and PTR 4 and least preference was observed in Vybhav, Arka Samrat, Arka Rakshaka and Arka Ananya. 45 Days after transplanting wherein Vybhav recorded least (1.50/ three leaves) adult whitefly population followed by Arka Samrat and Arka Rakshaka which recorded 3.25 and 3.50 adult whitefly per three leaves respectively. PTR 4, PTR 6 and Arka Ananya, recorded 6.25, 6.00 and 4.00 adult whitefly per three leaves respectively. Vybhav variety recorded least per cent ToLCV disease incidence (7.79%) whereas, Arka Samrat, Arka Rakshaka and Arka Ananya recorded 14.98, 18.57 and 20.7 per cent disease incidence respectively and were on par with each other. PTR 4 and PTR 6 recorded the maximum per cent disease incidence of 27.14 and 28.58 per cent respectively and were on par with each other.

Introduction

Tomato (*Lycopersicon esculentum* Mill.) is one of the important and widely grown vegetable crops 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 (Anonymous, 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), Arka Ananya, Arka Rakshak and Arka Samrat (IIHR), PTR 6 and PTR 4 from UAS Raichur collected. These collected cultivars were sown separately in raised nursery bed and protected by using nylon net (40 mesh). Recommended agronomic practices were followed (watering, weeding, and fertilizer application) to raise healthy seedlings. Twenty five days after sowing the seedlings were transplanted to main field with spacing of 90 X 60cm. For each cultivar a plot size of 1.8 m X 4.2 m was maintained and in each cultivar 21 plants with four replications comprised and no pesticides were applied to these plots.

In each cultivar randomly three plants were selected and tagged to examine adult whitefly population at 15, 30 and 45 days after transplanting (DAT), and finally tomato leaf curl virus disease incidence was also recorded in each cultivar (hybrids/ varieties) to know the susceptibility of cultivar to disease.

Results and Discussion

15 Days after transplanting there was significant difference in the adult whitefly, *B. tabaci* population on different cultivars (hybrids/ varieties). Vybhav recorded least number of adult (1.00/ three leaves) followed by Arka Samrat, Arka Rakshaka, Arka Ananya and PTR 6 which recorded 2.50, 2.63, 2.73 and 4.25 adult whiteflies respectively and were on par with each other. PTR 4 was significantly preferred variety with highest (4.50) number of adult whitefly population.

30 Days after transplanting the variety Vybhav maintained its superiority over other cultivars (hybrids/ varieties) with significantly least (1.25) number of adult whitefly per three leaves. Arka Samrat, Arka Rakshaka and Arka

Ananya cultivars recorded 3.00, 3.25 and 3.63 adult *B. tabaci* per three leaves respectively and were on par with each other. Both PTR 6 and PTR 4 recorded 5.25 and 4.88 adult whitefly per thee leaves respectively. Adult whitefly preference was more on PTR 6 and PTR 4 and least preference was observed in Vybhav, Arka Samrat, Arka Rakshaka and Arka Ananya (Table 1).

Table.1 Screening of tomato cultivars (hybrids/ varieties) for whitefly, *Bemisia tabaci* in field condition

Sl. No.	Tomato cultivar	Whitefly population per three leaves*		
		15DAT	**30DAT**	**45DAT**
1.	PTR6	4.25 (2.90)^{c}	5.25 (3.18)^{c}	6.00 (2.54)^{c}
2.	PTR4	4.50 (2.98)^{c}	4.88 (3.08)^{c}	6.25 (2.59)^{c}
3.	ARKA ANANYA	2.75 (2.40)^{b}	3.63 (2.70)^{b}	4.00 (2.12)^{b}
4.	ARKA RAKSHAKA	2.63 (2.34)^{b}	3.25 (2.58)^{b}	3.50 (2.00)^{b}
5.	ARKA SAMRAT	2.50 (2.30)^{b}	3.00 (2.49)^{b}	3.25 (1.93)^{b}
6.	VYBHAV	1.00 (1.63)^{a}	1.25 (1.75)^{a}	1.50 (1.40)^{a}
SEm±		**0.07**	**0.10**	**0.09**
CD(0.05)		**0.22**	**0.29**	**0.28**

DAT-Days after transplanting, Figures in the parenthesis are √x+0.5 transformed values; Mean followed by same letter in the column do not differ significantly by DMRT (P = 0.05), *Means of four replications.

Table.2 Tomato leaf curl disease incidence in different cultivars in field condition

Sl. No.	Tomato cultivar	Disease incidence* (%)
1.	PTR6	28.58 (32.27)^{d}
2.	PTR4	27.14 (31.35)^{d}
3.	ARKA ANANYA	20.71 (26.97)^{c}
4.	ARKA RAKSHAKA	18.57 (25.44)^{bc}
5.	ARKA SAMRAT	14.98 (22.70)^{b}
6.	VYBHAV	7.79 (16.01)^{a}
SEm±		**1.30**
CD (0.05)		**3.96**

Figures in the parenthesis are arcsine transformed values, Means followed by same letter do not differ significantly by DMRT (P = 0.05) *Means of four

Fig.1 Screening of tomato cultivars for *B. tabaci* in field condition

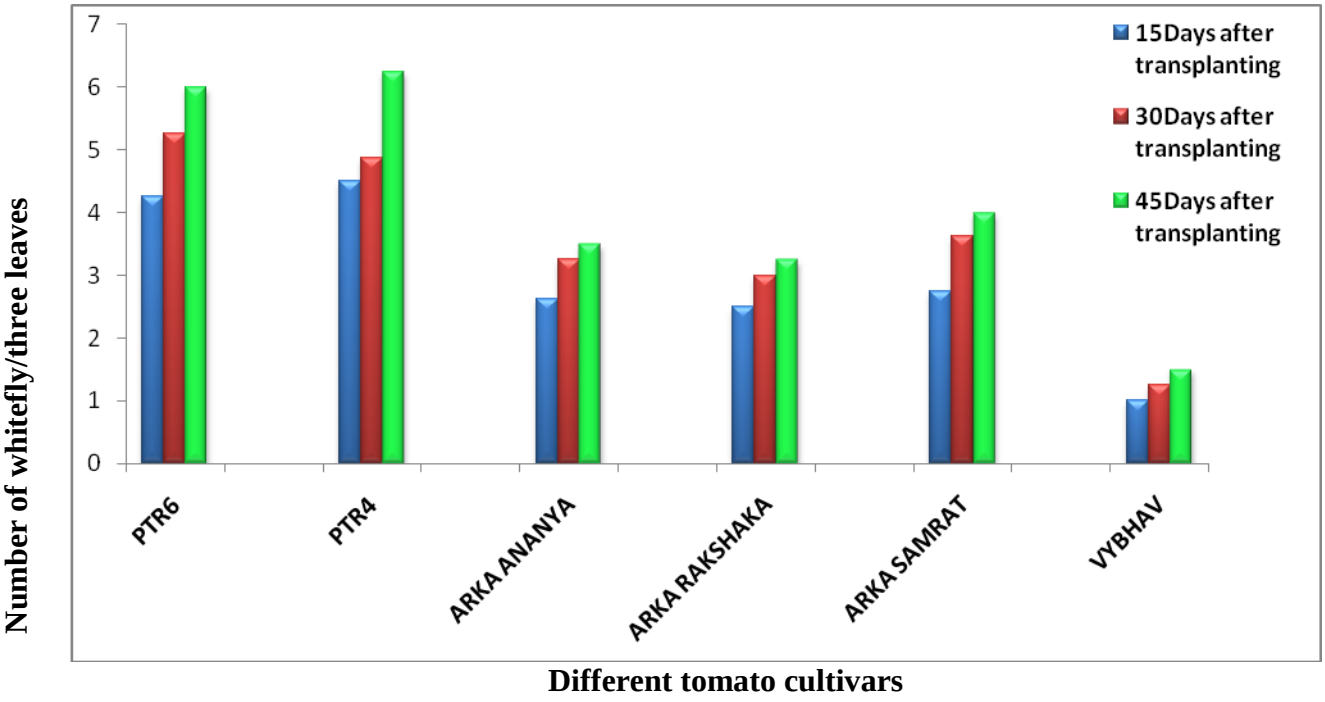

Fig.2 ToLCV disease incidence of tomato cultivars in response to whitefly, *B. tabaci* in field condition

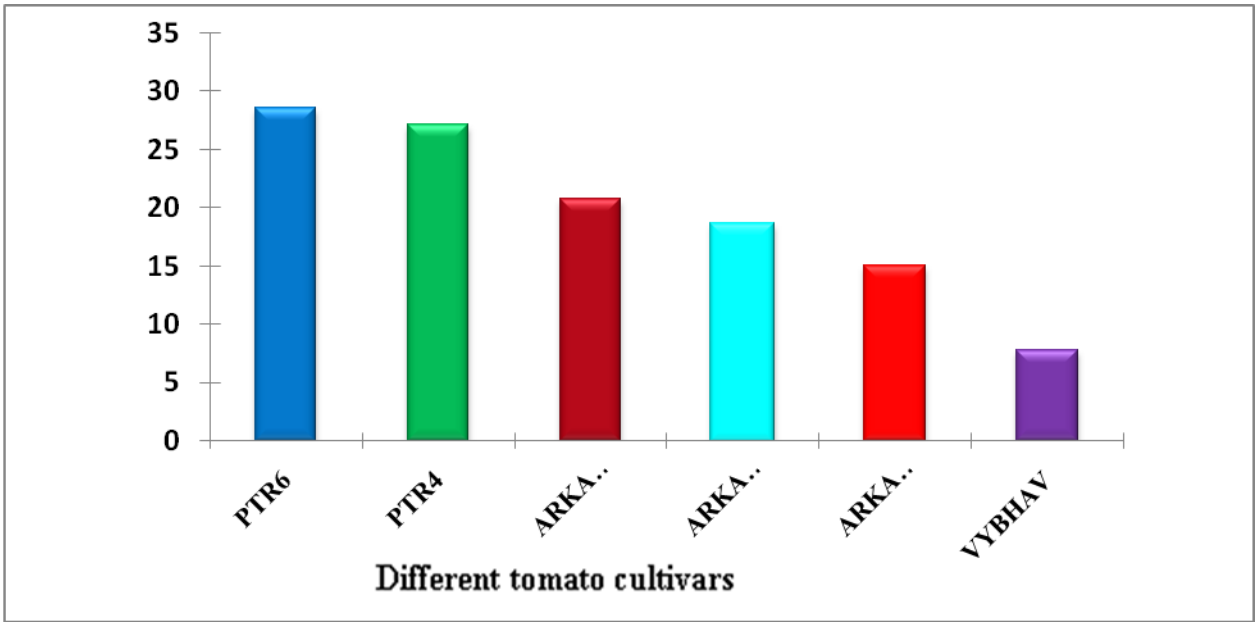

Plate.1 Highly preferred tomato cultivar PTR-6

Similar trend was observed at 45 days after transplanting wherein Vybhav recorded least (1.50/ three leaves) adult whitefly population followed by Arka Samrat and Arka Rakshaka which recorded 3.25 and 3.50 adult whitefly per three leaves respectively. PTR 4, PTR 6 and Arka Ananya, recorded 6.25, 6.00 and 4.00 adult whitefly per three leaves respectively (Fig. 1).

Tomato leaf curl disease incidence in different cultivars in response to *B. tabaci* in field condition

The data on per cent ToLCV disease incidence and yield in response to whitefly, *B. tabaci* in different cultivars under field condition is presented here Vybhav variety recorded least per cent ToLCV disease incidence (7.79%) whereas, Arka Samrat, Arka Rakshaka and Arka Ananya recorded 14.98, 18.57 and 20.7 per cent disease incidence respectively and were on par with each other. PTR 4 and PTR 6 recorded the maximum per cent disease incidence of 27.14 and 28.58 per cent respectively and were on par with each other (Table 2).

Among six cultivars (hybrids/varieties) PTR 6 and PTR 4 recorded significantly highest (28.58 and 27.14 %) disease incidence. Hybrids Arka Samrat, Arka Rakshaka and

Arka Ananya recorded least (14.98, 18.57 and 20.71 %) disease incidence compared to PTR series (Fig. 2). Variety Vybhav recorded significantly lowest (7.79 %) disease incidence and categorised as highly tolerant to ToLCV disease which is transmitted by vector whitefly (Plate 1).

These observations are in conformity with Ramazeame (2012) who reported Vybhav and Nandi were highly resistant cultivars and Arka Vikas was the most susceptible Variety. There was no literature available on remaining cultivars (hybrids/ varieties) to discuss.

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