

SUSCEPTIBILITY OF SOME TOMATO VARIETIES AND HYBRIDS TO WHITEFLY *BEMISIA TABACI* (GENN.) INFESTATION IN RELATION TO RATE OF TYLCV INFECTION AND THE YIELD

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Abstract

Eight tomato varieties were investigated to evaluate the mean numbers of *Bemisia tabaci* adults coincident to the occurrence of TYLCV and yield. Tomato hybrids of Dora, Jakal and Facolta were the lower susceptible to *B. tabaci* adult infestation, while TY-20 and Sheva variety were moderately infested. The most susceptible to the insect infestation were Strain-B, Edkawy, and Castle Rock varieties (Doss, 1982).

TYLCV symptoms infection occurred coincident with the mean numbers of *B. tabaci* adult infestation (Rosset *et al.*, 1990). Meanwhile, yield per plots (1/16 Feddan) showed the highest yield in case of the lower infection of TYLCV as well as the insect adult mean numbers, viz. Facolta, Jakal and Dora hybrids. While the lower yield was given in case of the highest infection of TYLCV and insect adult means, viz. Castle Rock, Edkawy and Strain-B.

INTRODUCTION

In Egypt, tomato is considered to be one of the most important vegetable crop. *Bemisia tabaci* is a destructive pest on tomato plants (Shahin, 1977). Damage of this insect is not only direct effect viz. sucking the plant sap, but also the indirect effect in transmission of the tomato yellow leaf curl virus (TYLCV) (Abdel-Salam, 1991). Abu-Gharbieha *et al.* (1978) found that 6 of 108 tomato tested varieties, showed slightly tolerance to TYLCV.

Present study, which extended over two years of investigations, was undertaken to throw light on the susceptibility of some tomato varieties and hybrids to *Bemisia tabaci* infestation.

MATERIALS AND METHODS

In an applied study to evaluate the sensitivity of 8 tomato cultivars viz. Castle Rock, Edkawy, Super strain-B varieties and Sheva, TY-20, Dora, Jakal, and

Facolta hybrids, were tested at Nobareia district during Nili plantation of 1995 & 1996. Studies were conducted in an area of about 2 feddans, divided into 32 plots (1/16 feddan each) and distributed in a complete randomized block design with 4 replicates.

Transplantations were located in the second week of August in the two successive seasons of 1995 and 1996. One week after transplantation, weekly inspections were carried out in early morning. Samples size were 30 randomized leaves collected from 330 plants per plot, on which number of adult insects were counted and recorded.

To determine percentages of tomato yellow leaf curl virus infection at the different treatments, two inspections were carried out. First inspection was conducted about 30 days after transplanting, where the second one was carried out after 60 days. Meanwhile, 100 plants per plot were randomizedly taken for inspection to estimate TYLCV infection. At harvest time, yield of each replicate was determined as kg/plot.

At the end of the two successive seasons, statistical analysis was worked out by "F" test to get the differences between treatments. Duncan's multiple ranges were worked out to arrange the tested varieties and hybrids in groups according to their susceptibility to whitefly infestation.

RESULTS AND DISCUSSION

As shown in Table 1, data indicated that Super-strain, Edkawy, Castle Rock varieties were more susceptible to *B.tabaci* infestation, comparing with the other tested hybrids and varieties. Mean number of *B.tabaci* adults on these varieties were 58.25, 79.85 and 81.25 in 1995 season; and 59.45, 78.70 and 79.88 in 1996 season per sample, respectively. However, TY-20 and Sheva tomato hybrids were moderately infested. The mean number of adults were 33.45, 31.82 and 32.53 in 1995 season; and 31.25, 31.38 and 32.22 in 1996 season per sample, respectively. Meanwhile, the lowest of adult insects numbers were recorded on hybrids of Dora, Jakal and Facolta, where there were 41.25, 41.38 and 41.22 adults per sample, respectively. Meanwhile, statistical analysis by "F" test showed significant difference at 8.07 (Doss, 1982).

By working out F test and L.S.D. value (11.64), the tested varieties could be

divided into three categories as follows:

- a. First group: having a low *B. tabaci* infestation, like Dora, Jakal and Facolta hybrids.
- b. Second group : having moderate infestation, viz. TY-20 and Sheva hybrids.
- c- Third group : having high level of infestation, viz. Super strain-B, Edkawy and Castle Rock varieties.

The present data indicated that there are no significant difference in the mean number of whitefly adults among the three tomato tested varieties of Super-strain-B, Edkawy and castle Rock (Shaheen, 1977). On the contrary, these varieties were the most susceptible among the tested cultivars, although, there was no significant difference in the mean number of *B. tabaci* adults among hybrids in the other two tested cultivars groups, while it was significant among cultivars from group to group (Abdel-Aziz, 1979).

Table 1. Rate of tomato yellow leaf curl virus (TYLCV) infection percentage on the different tomato cultivars, and the coincident yield at Giza Governorate during 1995 and 1996 seasons.

Season Tomato cultivar	1995				1996			
	Mean no. of <i>B. tabaci</i> /sample	% of TY- LCV in- fection after 30 days	% of TY- LCV in- fection after 60 days	Yield/ plot (kg)	Mean no. of <i>B. tabaci</i> /sample	% of TY- LCV in- fection after 30 days	% of TY- LCV in- fection after 60 days	Yield/ plot (kg)
Facolta	32.53	2	7	1613	32.22	3	7	1642
Jakal	31.82	3	7	1624	31.38	3	8	1685
Dora	33.45	3	8	1612	31.25	2	8	1648
Sheva	57.75	9	21	921	58.59	10	20	897
TY-20	57.68	11	23	928	58.63	10	22	915
Castle Rock	58.25	10	22	886	59.45	9	24	892
Edkawy	79.85	18	65	379	78.70	19	67	391
Super strain-B	81.25	19	68	368	79.88	18	66	383

- Block area: 1/16 feddan Sample size : 30 leaves
 Inspections were taken at 7-day intervals early in the morning.
 "F" value for varieties (F) at 1% level = 1.52 (Sig.).
 L.S.D. between varieties at 1% level = 11.64.

Although, Super-strain-B, Edkawy and Castle Rock varieties contained the highest level of *B.tabaci* infestation, comparing with other tested hybrids, it seems to have the lowest level of infestation among tested varieties which worked by Kisha (1984), due to the resistance criteria in the new tested hybrid tomato cultivars.

On the other hand, occurrence of Tomato yellow leaves curl virus infection was determined twice at 30 and 60 days after transplanting date, where it was coincident with the *B.tabaci* adults infestation, Table 1. In the mean time, yield/plot was determined. Occurrence of TYLCV infection were 2 & 7, 3 & 7, & 3 & 8% at Facolta, Jakal and Dora hybrids during the first and second inspections, 1995, respectively. It was 9 & 21, 11 & 23 at Sheva and Ty-20 hybrids, respectively. Castle Rock, Edkawy and Super strain-B varieties were recorded the highest occurrence of TYLCV infection, with the percentage of 10 & 22, 18 & 65 and 19 & 68% in the two inspections, respectively.

Yield in 1995 season was 1613 1624 & 1612 kg/plot in Facolta, Jakal and Dora hybrids, respectively, while it was 921, 928, 886, 379 and 368 kg/plot in Sheva, TY-20, Castle Rock, Edkawy and super-strain-B, respectively.

During 1996, percentage of infection occurrence of TYLCV having nearly the same trend of 1995. It was 3 & 7, 3 & 8, 2 & 8, 10 & 20, 10 & 22, 9 & 24, 19 & 67 and 18 & 67 and 18 & 66% in the tested cultivars of Facolta, Jakal, Dora, sheva, TY-20, Castle Rock, Edkawy and Super-strain-B cultivars at the first and second inspection, respectively. Tested varieties could be arranged descendingly according to the yield (kg/plot) as follows : Jakal (1685), Dora (1648), Facolta (1642), TY-20 (915), Sheva (895), Castle Rock (892), Edkawy (391), and superstrain-B (383).

Present data indicated that the occurrence of TYLCV infection in the tested cultivars during the two inspections was coincident with the mean number of *B.tabaci* adult during two seasons. The lowest infection percentage of TYLCV occurrence (2 & 7, 3 & 7, 3 & 8%) were recorded in case of the lowest *B.tabaci* adult infestations (39.53, 31.82 and 33.45 adults/30 leaves) on Facolta, Jakal and Dora cultivars during 1995; and 3 & 7, 3 & 8, 2 & 8% against 32.22, 31.38 and 31.25 adults/30 leaves during 1996, respectively.

Meanwhile, Sheva and TY-20 hybrids showed a moderate percentage of TYLCV infection occurrence. It was 9 & 21 and 11 & 23 during 1996, respectively, against 57.75, 57.68 (1995) and 58.59, 58.63 (1996) adults/30 leaves, respectively.

On the other hand, the rest tested varieties showed the highest level of *B.tabaci* infestation and TYLCV infection during the two seasons. It was 58.25 insects with 10 & 22% infection in (1996) on Castle Rock. Where it was 79.85 insects with 18 & 65% infection (1995) and 78.70 insects with 19 & 67% infection (1996) on Edkawy cultivar, and 81.25 insects with 19 & 68% (1995) and 79.88 insects with 18 & 66% (1996) on Super strain varieties (Mazyad *et al.*, 1979).

On the other hand, yield of tested cultivars are in the opposite of the mean number of *B.tabaci* adult infestation, and occurring of TYLCV infection percentages. While Facolta, Jakal and Dora hybrids having the lower insect mean numbers and TYLCV infection percentage, they are the highest tomato yield. On the contrary, Castle Rock, Edkawy and Super strain varieties recorded the lowest tomato crops in the opposite of the higher *B.tabaci* adult infestation and TYLCV percentage infection (Rosset *et al.*, 1990).

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**حساسية بعض أصناف هجن الطماطم للإصابة بالذبابة البيضاء
وعلاقة ذلك بمعدلات الإصابة بمرض تجعد أوراق الطماطم
الفيروسي، وتأثير ذلك على المحصول**

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أجريت تجربتان فى العروة النيلية لعامى ١٩٩٥، ١٩٩٦ بمنطقة النوبارية، وذلك لدراسة حساسية ثمانية أصناف من الطماطم، منها ثلاثة أصناف وخمسة هجن وذلك للإصابة بحشرة الذبابة البيضاء، وعلاقة ذلك بمرض تجعد الأوراق الأصفر الفيروسي، وتأثير ذلك على المحصول. وقد اتضح من الدراسة الآتى:-

١. يمكن ترتيب الأصناف المختبرة فى مجموعات وذلك بالنسبة لحساسيتها للإصابة بحشرة الذبابة البيضاء كالاتى : قليلة الإصابة وهى : هجن دورا، جاكال، فاكولتا. متوسطة الإصابة وهى هجن : تى - وى - ٢٠ و شيفا. وعالية الإصابة وهى أصناف استرين بى، ادكاوى، كاسل روك. وكانت الفروق فى متوسطات درجة الإصابة بهذه الحشرة فروق معنوية بين أصناف كل مجموعة وأصناف المجموعات الأخرى، فى حين لا توجد فروق معنوية بين أصناف نفس المجموعة.

٢. اتضح من الدراسة أن هناك زيادة فى متوسط النسبة المئوية للإصابة بمرض تجعد أوراق الطماطم الأصفر الفيروسي على كل الأصناف المختبرة مع زيادة الإصابة بحشرة الذبابة البيضاء، حيث كان متوسط الإصابة بهذه الحشرة متمشيا مع تعداد الحشرة.

٣. ارتبط متوسط كمية المحصول فى القطع المنزرعة بهذه الأصناف عكسيا مع تعداد الحشرة، وكذا نسبة الإصابة بمرض التفاف الأوراق الأصفر الفيروسي، حيث سجلت أعلى محصول فى القطع الأقل فى متوسط تعداد الحشرة، وأقل نسبة إصابة فيروسية (الصنف جاكال) وفى المقابل كان الصنف (سوبر سترين ب) هو أقل الأصناف المختبرة محصولا وأعلاها إصابة بالحشرة والفيروس.

وعلى ذلك يمكن التوصية بزراعة هجن الدوار، الجاكال، الفاكولتا بهدف زيادة الانتاج وتقليل تكاليف المقاومة لحشرة الذبابة البيضاء ومرض التفاف الأوراق الأصفر الفيروسي.