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LOSS DUE TO LEAF CURL AND SPOTTED WILT DISEASES OF TOMATO

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ABSTRACT

Trends on incidence and losses due to leaf curl (LCD) and spotted wilt (SWD) diseases of tomato in relation to their vectors were studied at Kanpur, India. The population of whitefly and thrips on tomato was found to be maximum respectively in February and March. The incidence of LCD was found maximum in January and February while that of SWD in March. The losses due to LCD were the reduction in plant height, number of fruits and fruit weight, while SWD, in addition, killed the plants resulting in total loss. The average yield loss/ha was 163.68 q and 126.12 q or Rs. 8184 and 6306 due to LCD and SWD respectively.

KEY WORDS : Tomato, Wilt diseases, Incidence, Loss.

Tomato (*Lycopersicum esculentum* Mill.), a vegetable of great significance, is widely grown in India. In plains of Uttar Pradesh tomato is planted in 2 to 3 overlapping crops from September to February. At Kanpur this crop is infected with many diseases of which leaf curl (Singh and Singh, 1980) and spotted wilt (Singh *et al.*, 1987) diseases play vital role and inflict great losses in tomato yield and often bring up crop failure. Since these disease occur quite in high incidence at Kanpur as well as several parts of India, it was felt desirable to evaluate the degree of virulence and yield losses due to these diseases simultaneously in relation to their vectors. The results obtained are presented.

MATERIAL AND METHODS

Tomato crop was planted in the second fortnight of September in 1985 and 1986 in 30 x 15 m plot at the campus of C.S.A. University of Agric. and Tech. Kanpur. A commercial variety KT_1 of tomato susceptible to leaf curl and spotted wilt diseases was used and the plants were spaced in rows at 60 m x 40 cm. A basal dose of 40 kg/ha each of N, P and K was applied and the crop was exposed to natural infection of LCD and SWD.

Data on vector population and disease incidence with respect to LCD and SWD were recorded fortnightly from October to March each year. Disease incidence was ascertained by counting the diseased and healthy plants in one sq.m. unit area randomly at 5 places in the plot each time. The vector population, however, was determined by counting the whiteflies (*Bemisia tabaci* Gen.) and thrips (*Scirtothrips dorsalis* Hood) randomly on 5 plants each time through using a split cage made up of fine netting fitted with a glass at its slender top (Singh *et al.*, 1986). The plant was enclosed in the cage and the vectors were displaced by gently shaking the plants. After counting the cage was opened to allow the vectors to go back to the plants.

Loss estimates, however, were made on the basis of 20 paired plants (each pair had one healthy and one diseased plant) selected randomly, tagged under the field and then recording the plant height, number of fruits and weight of fruit. The fruits were removed from the plants at their maturity in three

pickings during February and March in 1986-87. Data recorded were analysed statistically using 't' test of significance.

RESULTS AND DISCUSSION

The average number of whiteflies/plant ranged from 0.4 to 9.0 in different months while that of thrips from 1.2 to 16.6 during 1985-86 and 1986-87. There was no incidence of LCD in October but thereafter it ranged from 13.33 to 40 per cent in different months during the two years. The incidence of SWD, however, was nil from October to December and then it ranged from 13.33 to 33.33 per cent in different months during the two years.

In loss assessment study the average reductions in plant height, number of fruits/plant and fruit weight/plant were 52.55 and 19.12

Table 1. Incidence of LCD and SWD and the population of their vectors respectively of whitefly and thrips on tomato (var. KT_1) during 1985-86 and 1986-87.

Months	1985-86				1986-87			
	LCD		SWD		LCD		SWD	
	Av. no. of whitefly/ plant*	Average disease incidence +	Av. no. of Thrips/ plant*	Average disease incidence +	Av. no. of whitefly/ plant*	Average disease incidence +	Av. no. of Thrips/ plant*	Average disease incidence +
October	0.6	–	–	–	0.4	–	–	–
November	4.0	13.33	–	–	3.0	16.66	–	–
December	3.0	20.00	1.4	–	2.4	23.33	1.2	–
January	3.0	33.33	5.0	13.33	2.6	33.33	4.8	10.00
February	9.2	40.00	12.8	16.66	9.4	36.66	13.6	13.33
March	9.0	40.00	16.6	30.00	8.0	36.66	15.8	33.33

* Each figure is an average of 5 plants recorded at fortnightly intervals and averaged for each month.

\+ Calculated/unit area

Table 2. Loss in yield components in tomato (var. KT_1) due to LCD and SWD during 1986-87.

Particulars	Plant height		No. of fruits/plant		Weight of fruits	
	in cm*	R%	No. of fruits*	R%	in Kg*	R%
Healthy plants	64.60	–	10.25	–	0.752	–
D_1	30.65	52.55	2.50	75.60	0.070	84.70
D_2	52.25	19.12	2.60	74.63	0.115	80.69
t value for D_1	9.97**	–	13.61**	–	22.67**	–
t value for D_2	5.89**	–	11.39**	–	17.61**	–
Table value at 5%	2.025	–	2.030	–	2.035	–
Table value at 1%	2.710	–	2.723	–	2.733	–

D_1 = Leaf curl disease, D_2 = Spotted wilt disease R = Reduction,

* = Each figure is an average of 20 plants ** = Value significant.

Table 3. Average loss in yield of tomato (var KT_1) due to LCD and SWD transformed in q/ha.

Categories	Recorded % of plants/ha	Actual yield (AY) (q/ha)	Normal yield (NY) (q/ha)	Yield loss (q/ha)	Loss in Rs./ha
Healthy	27.00	121.82	121.82	–	–
LCD infected	40.00	16.80	180.48	163.68	8184
SWD infected	33.00	22.77	148.89	126.12	6306

While considering tomato plants 60,000/ha, normal yield of 451.19 q/ha and selling price of tomato @ Rs. 50.00/q.

per cent, 75.60 and 74.63 per cent and 84.70 and 80.69 per cent respectively due to LCD and SWD. In the measured plants 15 per cent plants infected with LCD and 40 per cent infected with SWD did not produce any yield respectively due to severe curling and necrosis/mortality of plants. The actual losses calculated/ha basis are 163.68 and 126.12 q. respectively due to LCD and SWD.

The results revealed that under Kanpur conditions the incidence of whitefly on September planted tomato began from October onwards when it was very low, but it increased quite much in November, then lowered down in December and January and then reached its maximum in February, while that of thrips was nil upto December, but from January onwards it also increased with the maximum in March during 1985-86 and 1986-87.

The incidence of LCD touched its maximum in January and February, while that of SWD in March during the two years. Low incidence of LCD and SWD on tomato appeared to be due to lesser number of vectors respectively whiteflies and thrips in early part of the cropping period (Table 1) and it may be due to feeding habits of these vectors and other ecological factors.

The losses were highly significant (Table 2) but were slightly higher due to LCD than that of SWD. It was chiefly due to early occurrence of LCD which curbed the vegetative growth, flower and fruit setting resulting in low yield. Tomato crop taken earlier than before March can be safeguarded from the destructive effect of SWD in this area.

In this study with the average incidence of 40 per cent and 33 per cent respectively of LCD and SWD, the average loss/ha could be calculated as 168.68 q/ha and 126.12 q/ha or Rs. 8184 and Rs. 6306 or a total loss of Rs. 14490 due to both the diseases (Table 3). Due to continued existence of LCD and SWD inocula and their vectors in this area, it is very essential to adopt clean cultivation and protective measures in order to avoid these diseases and to save the substantial economic loss worked out in this study.

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