

## Tomato leaf curl virus (ToLCV) : Impact on yield and yield attributes at different stages of infection

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Leaf curl is the most deadly viral disease of tomato causing more than 90% yield loss in autumn-winter crop and in the vegetable growing map of West Bengal raising early remunerative tomato crop became a problem due to this virus. It is very difficult to control but losses can be minimised by adjusting available indirect control measures if we know the most vulnerable period of infection. In the present investigations, three tomato cultivars were studied due to infection of ToLCV at 30 (stage-I), 50 (stage-II) and 70 (stage-III) days after transplanting for yield and yield component losses due to leaf curl virus attack. It was found that in stage-I infection yield losses were more than 90% whereas, in case of stage -III infection, losses were less than 50% in all the three varieties. Other component attributes contributing yield were also performed poor in earlier infection. So it was evident that earlier the infection greater was the loss and only early control measure could be effective to control considerable yield loss.

**Key words :** Tomato, leaf curl virus, yield attributes

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### INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) is the most important warm season fruit vegetable and tops in the consumer popularity chart for its delicacy, nutritional value and wide stretch use. Like other vegetables too, tomato is also affected by number of disease pathogens, which hamper the sustainable production process. Viral diseases are more important than others diseases of tomato, leaf curl is the most serious and deadly one in several tropical and sub-tropical countries especially in India. It proves to be an economic problem in nearly all parts of this country and sometimes it becomes a limiting factor especially in autumn-winter season for successful tomato cultivation (Som, 1973).

Yield losses due to ToLCV often crosses 90 % line and approaches towards the total washout of the crop. As viral diseases are more difficult to handle with, we have to make a balance in control strategy

to reduce yield losses in susceptible varieties. It is very interesting that in case of ToLCV, crop losses are more if the infection occurs early. Sastry and Singh (1973) revealed that when plants were infected 35 and 50 days following planting produced an average of 12 and 22 fruits and resulted 74% and 28% loss respectively. Saikia and Muniyappa (1986) reported that in summer tomato crop 94%, 90% and 78% yield losses were observed in Bangalore when tomato plants were infected 2, 4 and 6 weeks after transplanting respectively. So for better management a forehand knowledge about yield and yield component reduction with the time of infection is always important. So, an effort was made to assess and compare the yield losses in three popular tomato varieties at differential infection stages.

### MATERIALS AND METHODS

The investigations were carried out at District Seed Farm, Bidhan Chandra Krishi Viswavidyalaya

during autumn winter of 1999. Seeds of Pusa Ruby, Ratna and Swarna were shown in raised seedbed. One-month-old seedlings were transplanted in replicated plots following Randomized Block Design keeping three replications. There were 30 plants in a plot with a spacing of 60 × 60 cm. Evaluation of losses due to infection tomato leaf curl virus (ToLCV) was carried out at 30 days (stage I), 50 days (stage II) and 70 days (stage III) after transplanting. Three plants in three replications of the above stages were marked. Observations were taken on plant height (cm), number of primary branches/plant, average number of fruits/plant, average weight of a fruit (g), yield / plant (kg) at the differential infection stages. Yield losses against healthy plants were recorded to assess the actual loss due to tomato leaf curl virus (ToLCV) in all the stages of attack. The mean values for differential yield characters were analyzed as per Gomez and Gomez (1984).

## RESULTS AND DISCUSSION

Assessment of losses due to ToLCV has been presented in Table 1. It was clear from the yield loss picture that infection at early stages of growth had a pronounced effect on the growth and yield of the plant in all the three varieties. Most of the cases different yield components differed significantly among themselves at different stages of infection and also perform poorly as compare to healthy plants in all the three cultivars.

In case of stage I infection mean value of all the characters studied were drastically lower than healthy plants in all the varieties percentage of yield loss over healthy were 96.2 %, 97.8% and 92.5 % in Pusa Ruby, Ratna and Swarna respectively. But at stage-III impact was not so drastic as in earlier infection. In all the three varieties percentage yield losses over healthy were less than 50 % and in Swarna it was only 20.4 %. It was seen from the study that averages number of fruits/plant and average weight of a fruit was also drastically

reduced in early infection of stage-I. So it was evident from the study that earlier the infection greater was the loss. So if we can evade the early infection losses can be balanced in a way to have a fair cost-benefit return to farmers. Also, plant protection measures at early stage, at nursery and just after transplanting can save the crop in manner to reap more than 50% of yield potential.

**Table 1 :** Assessment of losses in three different tomato varieties by tomato leaf curl virus (ToLCV)

Variety	Stage of infection	Plant height (cm)	Number of primary branches/ plant	Average number of fruits/ plant	Average wt. of a single fruit (g)	Yield/ plant (kg)	Percent yield loss over healthy
Pusa Ruby	I	35.0	3.0	3.0	17.0	0.045	96.2
	II	58.3	5.0	16.6	29.0	0.420	63.8
	III	68.3	7.0	21.6	34.1	0.780	48.2
	Healthy	73.0	8.0	29.0	41.0	1.160	—
Ratna	I	30.6	1.0	4.6	32.0	0.050	97.3
	II	53.6	1.3	12.0	75.0	0.296	84.3
	III	55.3	2.6	14.6	89.3	1.120	40.4
	Healthy	62.6	4.0	18.0	101.0	1.881	—
Swarna	I	29.0	1.0	8.0	10.3	0.125	92.5
	II	33.3	1.3	12.0	21.3	0.225	86.6
	III	35.3	3.0	21.3	50.0	1.337	20.4
	Healthy	50.3	4.0	26.0	67.0	1.681	—
	SEm(I)	1.16	0.305	1.07	2.84	0.0639	
CD at 5%		3.48	0.917	3.21	4.91	0.191	

Stage I = 30 DAT, Stage II = 50 DAT & Stage III = 70 DAT (DAT = Days after transplanting)

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(Accepted for publication February 16 2004)