

**Management of Cotton Leaf Curl
Virus (CLCuV) disease by
managing its vector, the whitefly
(*Bemisia tabaci* Genn.)**

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ABSTRACT

Area, production and productivity of the cotton crop during last years has suffered a great set back in the Indian Punjab, once known as "cotton bowl" of India. One of the major factors, responsible for the reduction in cotton is the fast spread of Cotton Leaf Curl Virus disease (CLCuV) from a small area to all cotton growing belts of the state. CLCuV is a monopartite begomovirus and transmitted only by whitefly. This disease causes very serious losses in seed cotton yield if the infection occurs at early stage of crop growth. Thus, it is essential to manage the disease at the early stages of crop growth immediately after the germination, to reduce its further spread and severity. Most of the varieties of American cotton and other species and varieties presently recommended for general cultivation in the Punjab are susceptible to CLCuV. The present study was undertaken to investigate the possibility of controlling CLCuV through managing its vector whitefly with a seed treatment of systemic insecticide. Results indicated that average incidence of CLCuV 75 days after sowing was significantly lower (5.9%) with 1.6 grade severity with imidacloprid as compared to 13.2% with 3.0 grade severity in the control. The average whitefly population/3 leaves were 1.2 with imidacloprid and 2.5 in the control. For the entire cropping season there was a significantly lower incidence of CLCuV (16.6%) with 2.1 grade severity in the imidacloprid treatment compared to 42.6% incidence with 3.9 grade severity in untreated control. Seed cotton yield was significantly higher with imidacloprid (13.9 q/ha) than in the control (11.4q/ha). It is suggested that seed treatment with Imidacloprid is effective in reducing the CLCuV incidence along with its severity and vector population.

Introduction

Area, production and productivity of the cotton crop during last years has suffered a set back in the Indian Punjab, once known as "cotton bowl" of India. In Punjab during 2001, cotton was cultivated on 0.6 million ha with a total production 934 x 10⁵ kg as against 4197 x 10⁵ kg yield from 0.719 m ha area during 1991 (Anonymous, 2001). One of the major factors, responsible for the reduction in cotton production is the fast spread of the Cotton Leaf Curl Virus (CLCuV) from a small area to all cotton growing belts of the state. CLCuV is a monopartite begomovirus and transmitted only by whitefly. This malady causes very serious losses in seed cotton yield if the infection oc-

curs at early stage of crop growth. It is therefore essential to manage the disease at the early stages of crop growth, immediately after the germination, to reduce its further spread and severity. Keeping in view the importance of CLCuV and whitefly as its vector, the present study was undertaken with the aim to control CLCuV through managing its whitefly vector with a seed treatment of systemic insecticide.

Experimental procedure

The experiment was conducted during the 2001 season at Punjab Agricultural University, Regional Station, Faridkot. The cotton variety used was F 1378 and the insecticide was imidacloprid (Gaucho 70 WS) @ 5 g/kg seed (T₁), which was compared with untreated control (T₂). The experiment was conducted in a randomized block design with five replications. Each treatment was accommodated in plot size of 20 m² with spacing 67.5 cm between rows and 30 cm within the row. Observations were recorded at weekly intervals, starting from the onset of the disease from each plot and at 10 days interval for whitefly population from five randomly tagged plants in each replication. Data on incidence of CLCuV along with its severity and whitefly population was compiled up to 75 days after sowing. Recording continued of CLCuV for the whole season. Seed cotton yield were recorded at crop maturity on a whole plot basis.

Results and Discussion

Results indicated that average incidence of CLCuV 75 days after sowing was significantly lower (5.9%) with 1.6 grade severity in the imidacloprid treatment (T₁) as compared to 13.2% with 3.0 grade severity in the control (T₂). The average whitefly population/3 leaves were 1.2 in T₁ and 2.5 in T₂ after 75 days of sowing. For the entire crop season CLCuV incidence did not exceed 17% with 2.1-grade severity for the seed treatment, compared to 42.6% incidence with 3.9 grade severity in the untreated control. Seed cotton yield was significantly higher in T₁ (13.9 q/ha) than T₂ (11.4 q/ha) (Table 1). The control of whitefly, vector of CLCuV at the initial stage by seed treatment with Imidacloprid 70 WS, was therefore effective. It protected the plants from viral infection by the vector (whitefly) up to 50-60 days. Thereafter, if the infection occurred, then the yield loss was less if the symptom develops after 65-90 days, when the plants had passed the most susceptible stage by that time (Narula *et al.*, 1999). The seed treatment with imidacloprid 70 WS @ 5g kg⁻¹ seed is effective in reducing the incidence of CLCuV and whitefly population (Singh *et al.*, 2002). Therefore seed treatment practices with imidacloprid (Gaucho 70 WS) @ 5g/kg seed is the best alternative for reducing CLCuV incidence and severity through managing its vector population.

References

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Table 1. Effect of seed treatment with imidacloprid on the severity/incidence of CLCuD, whitefly population and seed cotton yield in 2001.

Treatment	75 days after sowing*		For entire crop season*		
	CLCuD (grade ¹ /%)	Whitefly popn. /3 leaves	CLCuD (grade/%)	Whitefly popn. /3 leaves	Seed cotton yield (q/ha)
(T ₁)**	1.6 /5.9 (13.9)	1.4 (1.6)	2.1/16.6 (23.9)	49.4 (7.1)	13.9
(T ₂)***	3.0/13.2 (21.1)	2.5 (1.8)	3.9/42.6 (40.6)	63.6 (8.0)	11.4
CD at 5%	2.3	0.6	2.4	0.34	2.0

*Figures in parentheses indicate Arc sine for CLCuD and Square root transformations for whitefly population

** (T₁) = Seed treatment with Imidacloprid @ 5g/kg seed

***(T₂) = Without seed treatment

¹Grades: 0: Free; 1.0: SVT type symptoms; 2.0: MVT type of symptoms; 3.0: SVT and MVT with severe curling and cupping; 4.0 Stunted type symptoms