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## COTTON LEAF CURL DISEASE (CLCuD) AND ITS MANAGEMENT STRATEGIES

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### Abstract

Cotton is an important fibre and cash crop in Punjab after paddy. Cotton is cultivated on about 2.45 lakh hectares (lha) of South-western districts of Punjab. It is also known as “White Gold”. Cultivation of cotton poses more problems than other agricultural commodities. Yield of crop is affected by number of factors *viz.*, soil fertility, climate conditions, varieties and rainfall. For this reason, Indian farmers are facing many difficulties in cultivation of cotton. Moreover, it is attacked by a number of biotic agents causing diseases and insect-pests. Among all biotic constrains, cotton leaf curl disease (CLCuD) is considered as a major threat for the cotton production in three Northern states of country *viz.*, Punjab, Haryana and Rajasthan.

### Introduction

Cotton leaf curl disease (CLCuD) is the major disease of cotton in Northern India. Cotton production during the 1990s was severely curtailed by CLCuD across the sub-continent. Leaf curl disease is caused by complex of viral species which belongs to genus begomovirus and are popularly called as cotton associated begomoviruses (CABs). Association of satellite molecules which contains single-stranded DNA (ssDNA) and are almost half the size of major virus ~1.4kb, is of frequent occurrence. The satellite molecules play important role in symptomatology of the CLCuD. This viral disease which is transmitted by a polyphagous pest *i.e* whitefly. Whitefly can transmits the disease in plant population as well as among the different fields.

### Symptomatology of CLCuD

Infected cotton plant shows typical symptoms of disease such as upward or downward curling, vein thickening giving netted appearance, stunting of plant and twisted internodes. In severe disease conditions, a leaf outgrowth (enation) emerges on the underside of the leaves. Infected plant bears less number of fruits (balls).



(a) Upward curling of leaves



(b) Downward curling of leaves



(c) Severe vein thickening (Netted appearance)



(d) Mild vein thickening



(e) Enation formation



(f) Stunting of cotton plant

### Losses due to CLCuD

This disease can lead to devastating yield losses depending upon the stage of infection on crop plants. If crop is affected in early crop growth stage, then plants are severely stunted resulting in very low yields. CLCuD can cause the seed cotton yield loss upto 80 per cent. Further the disease also reduces the quality of cotton fibre (Arora and Singh 2019). The disease can severely debilitate susceptible cultivars thereby resulting in complete yield loss.

### Integrated Management of disease

Unavailability of chemical or physical interventions that can have curative effect on this disease, poses the major challenge to manage the disease and yield losses. Disease incidence of CLCuD can be brought down by keeping in account the following major points during the planning of cotton cultivation.

- Ensure that cotton seeds are sown before May 15.

- Sowing of susceptible varieties and hybrids should not be adopted.
- Varieties of *Desi* cotton should be cultivated as it is the best option to adopt in high infestation areas of leaf curl and whitefly. These varieties offers resistance against leaf curl disease.
- Cultivation of moderately resistance varieties should be done *i.e* PAU Bt 1
- Cotton cultivation should be avoided in/and around these crops viz., citrus, *bhindi*, or *moong* as these crops can harbour the virus as well as are host of vector of CLCuD.
- Recommended/optimum dose of the nitrogenous fertilizer should be applied. Excessive fertilizer may attract the other pests including whitefly.
- Monitor the crop regularly and if infected plants are spotted in the field, uprooting and burying of these plants should be done.
- Following clean cultivation of crop and destruction of alternate weed hosts such as *kanghi butti*, *peeli butti*, *itsit*, *puth kandha* and congress grass should be done to avoid further spread of whitefly.
- To check the vector population, installation of yellow sticky traps @ 40 per acre in the early phase of crop plantation should be done.
- Chemical control can be used in case of severe vector infestation.

**Table 1:** Insecticides (Recommended) for control of whitefly (Anonymous 2021)

Name of Insecticide	Dose/ acre
Sefina50 DC (afldopyropen)	400 ml
Osheen 20 SG	60 g
Polo/Craze/Ruby Ludo/ Shoku 50WP (diafenthiuron)	200 g
Lano/Daita 10 EC (pyriproxyfen)	500 ml
Oberon/Voltage 22.9 SC (sipromesifen)	200 ml
Ulala 50 WG	80 g
Applaud 25SC	400 ml
Dantotsu 50 WG	20 g

**Note:** Synthetic pyrethroids *viz.*, cypermethrin, fenvalrate, deltamethrin, should not be used to minimize resurgence of whitefly after September 15.

- Neem based bio pesticides *i.e* Nimbecidine or Achook @ 1 litre/acre should be sprayed on first appearance of whitefly in early growth stage of crop. These are safe for the natural enemies.
- Population of whitefly can also be managed by using homemade neem extract. To prepare that 4 kg of terminal parts of neem shoots (including leaves, green branches) and fruits should be boiled in 10 litres of water for 30 minutes. Then it should be filtered via muslin cloth and can be used @1200 ml of filtrate per acre.

### Conclusion

The disease still poses greatest threat to sustainable cotton cultivation even after almost 3 decades of its first appearance. The major challenge posed to field resistance against CLCuD in cotton varieties and hybrids is rapidly evolving CABs. Due to high rate of recombination, the viral complex offers greatest diversity. Hence, it is essential to introduce broad-spectrum resistance in the field for longstanding.

## References

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- Arora R.K and Singh P (2019) Effect of Cotton Leaf Curl Virus Disease Severity on Yield Parameter of BT Cotton Hybrids in Punjab J PI Dis Sci 14(1): 25-28