

# YELLOW LEAF DISEASE OF SUGARCANE AND ITS MANAGEMENT



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**Y**ellow leaf disease (YLD) is a recently identified disease of sugarcane, affecting sugarcane production significantly. The disease was first noticed during 1999 in the country and assumed its severity on different sugarcane varieties. Currently severe disease incidence is observed in all the sugarcane growing states in the country.

### Symptoms

The affected sugarcane exhibits a characteristic yellowing of leaves hence the disease is called as 'yellow leaf disease'. Usually the disease is noticed as yellowish midrib on leaves of three to five from top (Fig. 1). Such symptoms are clear during five to six month stage of the crop. The characteristic mid rib yellowing due to the disease appears initially on the lower surface of leaves. The yellowing may be confined to midrib region or the yellow discolouration may spread laterally to adjoining laminar region parallel to midrib upto a distance of 2.0 cm (Fig. 2). This midrib yellowing with adjoining laminar discolouration is the typical symptom noticed on many varieties under cultivation. In most susceptible varieties, typical yellowing of midribs and laminar region is noticed on upper surface of the leaves. Reddish discolouration of midrib and laminar region is also noticed in certain varieties. Gradually the infected canes show shortening of internodes in the crown which leads bunching of leaves there. In the affected crops such clear cut 'bunchy-top' symptoms with yellowing of the top leaves can be noticed from a distance. These symptoms

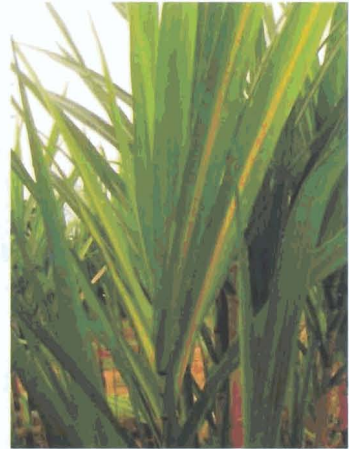


Fig.1. Characteristic yellowing of mid ribs in YLD affected sugarcane



Fig.2. Yellowing of mid rib and adjoining laminar region

may be confined to a few clumps in the field or spread over larger areas depending on the severity of the disease. In the next phase of disease development, the discoloured laminar region dries from leaf tip downwards along the mid rib. This type of symptoms indicates the severity of the disease in the affected crop (Fig. 3, 4). However this disease does not cause marginal drying of leaves and the canopy of the affected crop will show a sick appearance with yellowish foliage and drying of leaves at varying intensities in the field. If the crop experiences drought or other stress conditions, crop growth affected significantly and drying of entire foliage in the crown occurs.

The sugarcane varieties showing mild symptoms of midrib yellowing usually record normal cane growth. In severely infected fields, cane growth



will not be uniform and reduced crop vigour will be seen. Large patches of cane drying due to this disease in different sugarcane growing regions are noticed during the past four years in different states. This drying is more in over matured crops as well as in severe internode borer infested crops. Overall, the disease infection results in loss of vigour in the crop and due to that the crop shows premature drying (Fig.5).

Ratoon crops record more intense symptoms of the disease and suffer more due to the disease. This disease occurs initially in patches and its intensity goes up to 100% in the field. Poor maintenance of the crop combined with drought increases the severity of the affected sugarcane. Most of the varieties under cultivation in the field such as Co 86010, Co 86032, Co 94003, CoV92102, CoV94101 etc. recorded varying intensities of the disease.

### Pathogen

Before the clear-cut establishment of etiology and epidemiology, it has been reported that part of YLD symptom expression could be related to



Fig. 4. YLD infected sugarcane exhibiting typical mid rib yellowing/drying and bunching of leaves in the crown.

### Disease spread

Like grassy shoot phytoplasmas here also the causative virus or phytoplasmas are confined to phloem tissues of sugarcane. When disease-infected setts are planted, disease readily spreads to the new crop from the setts. We have found that planting of infected setts results in cent per cent expression of the disease in the field. Build up of high virus titre in most susceptible varieties causes drying of all canes by 10-12 months. Secondary



Fig.3. Drying of discoloured laminar region from leaf tip downwards along the mid rib

other biotic or abiotic factors such as water logging, drought and cool winters. Now it is established that no nutritional, environmental or field factor could be identified which clearly influence such symptom expression. Detailed studies conducted at SBI and elsewhere clearly revealed the association of sugarcane yellow leaf virus (SCYLV) with the disease. The virus colonizes the sugarcane plant systemically i.e. all the plant parts. However in some countries there are reports that sugarcane yellow leaf phytoplasmas (ScYP) cause the disease.



transmission of the disease reported to occur through aphid vectors. When severely affected plant crop is ratooned, the ratoon establishment will be poor. Since disease expression is advanced to 3 to 4 month stage in ratoons, the ratoon performance will be drastically reduced.

### Impact of the disease on cane growth and yield



Fig.5. Premature drying of foliage in sugarcane field due to severe YLD

Although the crop with mild symptoms record normal cane growth in the plant crop, ratoons from such fields show severe disease and ultimately cane yield reduced. In case of severe infections, cane thickness and stalk height are significantly reduced. The diseased crop always record reduced cane yield due to retardation of cane thickness and height. Although the number of internodes is same in the infected plant as in the healthy plant they are shorter and lighter in weight. Fresh weights of comparable internodes of the infected plants are only 20-65% the weight of healthy plants. It is estimated that severe infection of the disease reduces cane yield by 30 to 50 % and sugar yield is reduced significantly in the mills. Since the loss caused by the disease is phenomenal in the field as well as in the mills, efforts should be made to reduce the disease severity and sustain sugarcane productivity.

### Management

Since the disease spreads through infected setts, planting of disease-free seed materials is required to prevent disease introduction in the field. The widely recommended heat treatment to inactivate other systemic pathogens of sugarcane is not effective in eliminating the virus from seed cane. Hence it is advised to go for disease-free clean seed for planting. Fresh disease-free sugarcane nurseries are to be raised by obtaining healthy nucleus seed from research institutes. Such nursery plots are needed to be monitored periodically for the disease at regular intervals and further seed canes should be selected only from such carefully monitored fields. Alternatively, going for tissue culture seedlings derived through meristem culture ensures virus free planting materials. Failing to take seed management practices would result in serious decline varietal performances. Proper supply of disease free seed would ensure increased productivity and enhanced sugar recovery in the mills. Additionally avoiding different stresses which influence disease development would result in a healthy crop.

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