



## Occurrence of sugarcane yellow leaf virus in southern Punjab

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### Abstract

Sugarcane Yellow Leaf disease was first recognized as Yellow Leaf Syndrome during the 1980s in Hawaii. Later it was reportedly associated with yield losses of 25% or more in the cultivar SP 71-6163 in Brazil. In Pakistan occurrence of the disease was neglected up to a specific period of time by agricultural extension worker and growers due to low level of losses. Secondly the disease was attributed to nitrogen deficiency factor commonly as indicated by agricultural extension workers. However when disease spread in many parts of the south Punjab beyond the economic threshold level, research workers chalked out a program for the comprehensive survey. The data was recorded on basis of total number of leaf showing symptoms on individual clone as well in the whole field. Visual observation was taken into consideration for the assessment percentage of the disease in the most places, where the disease occurs in patches. The disease has been noted in the central Punjab also. It is concluded that losses due to disease ranged from 10% to 75%

**Keywords:** disease, rust, observation, losses, sugarcane

### Introduction

Sugarcane is grown as a major crop in Pakistan. Sugar is the main product in the sugar mills of Pakistan derived mostly from sugarcane. The fungal diseases are reported to attack on the crop. However a mysterious disease was noted by farmers from last few years in the various regions of south Punjab. Sugarcane Yellow Leaf disease was first recognized as Yellow Leaf Syndrome during the 1980s in Hawaii. Later it was reportedly associated with yield losses of 25% or more in the cultivar SP 71-6163 in Brazil. (Comstock, 2013) [3]. Anyhow, Ewald, *et al.*, 2010 tested the volunteer sugarcane plants from closed Hawaiian plantations and from previous sites of the Hawaiian Sugarcane Planters' Association breeding and suggested that SCYLV appeared in the breeding station between 1960 and 1970, whereas the plantations became infested after 1980. Later on similar symptoms were reported from mainland of United States. (Comstock *et al.*, 1994) [4]. With the passage of time the disease spread very rapidly in the other countries of the world.

Vega *et al.*, 1997 reported the disease from Brazil, Moutia and Sauntally(1999), noted SCYL from Mauritius. Baily *et al.*, 1996, Victoria *et al.*, 1998, Lockhart and Cronje 2000 reported from many countries of the world.

The exact time of SCYLV penetration and introduction into the plantation is unknown, because the infection mostly remains symptomless and unnoticed during early stages. Symptoms of SCYLV are a yellowing of the leaf midrib on the underside of the leaf. The attack of the disease starts from September-October to harvesting of the crop until end of March. The symptoms are more prominent on mature cane.

### Symptoms

The yellowing appears on the leaves. It expands out from the leaf midrib into the leaf blade during the growth development stages of the plant. Fig.1. Then the tip of the leaf turned yellow with necrotic tissues. Fig.2.



**Fig 1:** Yellowing is expanding from midrib to margins of the leaves.



**Fig 2:** Tips of the leaves showing necrotic symptoms.



**Fig 3:** Whole of the field is infected.

As the disease progresses a general yellowing of the leaves can be observed from a distance. In most of the fields the disease appears in patches. (Figure 2a). However completely yellowing of the whole field has been noted. Fig-2b. The yellowing first appears on leaves 3 to 6 counting down from the top expanding spindle leaf. Eventually, almost all leaves of the plant turn yellowish. Initially the yellowing start from the midrib on leaves 3 to 6 counting down from the top expanding spindle leaf (Figure 3). It has been observed that cold and nutrient deficiency promotes the symptoms rapidly. Other characteristic symptoms of the disease are accumulation of sucrose in the leaf and shorting of terminal internodes resulting a fan like appearance. Water stress, biotic and other abiotic factors expedite the disease appearance. Initially the young leaves are more affected by showing the yellowing symptoms. Crops cultivated in both seasons (September sowing and Feb. sowing) show the yellowing symptoms.



**Fig 4:** Yellowing of the leaves expanding from midrib to outward in spindle leaves in a whorl.

**Material and Method**

A compressive survey was conducted in southern Punjab from 1<sup>st</sup> week of September 2011 to end of March 2012 with possible, reasonable and convenient interval of time in the various sugarcane growing areas of south Punjab. The complaints submitted by sugarcane growers indicated the apprehension of fungal disease. Therefore a comprehensive survey was conducted by the research workers of Regional Agricultural Research Institute Bahawalpur in the leadership of plant pathologist. Sugarcane samples were collected from Bahawalpur, Multan and Dera Ghazi Khan Divisions. These samples were analyzed in the plant pathology laboratory of the institute. The samples were brought into Plant Pathology section Regional Agricultural Research Institute Bahawalpur. Later on these samples were taken into the plant pathological lab. Sugarcane Research Institute Faisalabad.

**Results and Discussion**

Expertise services rendered by sugarcane virologist provided the strong and confirmatory evidences of sugarcane yellow leaf syndrome caused by virus. Sugarcane Yellow Leaf virus (SCYLV) belongs to the genus polerovirus of family Luteoviridae (D. Arcy 2005) [1].

Losses in the different countries varied in different sugarcane plants. J. C. Comstock *et al.*, (2001), stated that in United States incidence of the disease ranged among the five *Saccharum* spp., 7.0% in *S. spontaneum*, 75.8% in *S. officinarum*, 62.5% in *S. Robustum*, 46.2% in *S. sinense*, and 13.6 % in *S. barberi*. respectively. *S. spontaneum* as a group was found to be most resistant and *S. officinarum* was the most susceptible. In Brazil yield losses in SP71-6163 has been noted upto 20%. Various studies has shown that SCYLV is a quite varies (Abu Ahmad *et al.*, 2006a) [1], (Moon and mirkov 2002) [7].

In Pakistan occurrence of the disease was neglected up to a specific period of time by agricultural extension worker and growers due to low level of losses. Secondly the disease was attributed to nitrogen deficiency factor commonly as indicated by agricultural extension workers. However when disease spread in many parts of the south Punjab beyond the economic threshold level, research workers chalked out a program for the comprehensive survey by the order of higher authorities. The data was recorded on basis of total number of leaf showing symptoms on individual clone as well in the whole field. Visual observation was taken into consideration for the assessment percentage of the disease in the most places, where the disease occurs in patches. The disease has been noted in the central Punjab also. From the table, 1 it is clear that losses due to disease ranged from 10% to 75%.

**Conclusion**

It is concluded from the study that the disease was attributed to nitrogen deficiency factor and results in losses ranged from 10% to 75%.

**Table 1:** Sugarcane yellow leaf virus data from south Punjab recorded from 12-10-2013 to 24-2-2014

| Sr. No | Growers, name        | Address   | Name of variety | % loses |
|--------|----------------------|---|-----------------|---------|
| 1      | Muhammad Arif Ansari | Mauza Habib Missan Teh. Ahmadpur                      | Unknown         | 45      |
| 2      | Akhtar Khan          | Mauza Channigoath Teh. Liaquatpur                     | S2006-us.658    | 40      |
| 3      | Jam Mushtaq Ahmad    | Addah Zafarabad near Dera Jam Mushtaq Teh. Liaquatpur | CPF-246         | 65      |

|                |                                |  |                |    |
|----------------|--------------------------------|--|----------------|----|
| 4              | Amjad Khan                     | ChaukZahir peer Teh. Khanpur                         | HSF-242        | 24 |
| 5              | Muhammad AsadBaloch            | MianwaliQuarashianTeh. And Distt. R. Y. Khan         | SPF-234        | 45 |
| 6              | Malik HabeebullahBhutta        | Chak No.149 Tehsil Sadiqabad                         | SPF-234        | 75 |
| 7              | Malik Tahir akhokhar           | MauzaBalala district Multan                          | CPF-246        | 35 |
| 8              | Dr. Khalid Khokhar             | PulBalala Farm district Multan                       | NARC-1         | 30 |
| 9              | Dr. M. Ajmal                   | MauzaKasbaMarhal District Multan                     | S-2007-AUS-384 | 40 |
| 10             | Rana Jamil                     | Thadathaheem district Lodhran                        | unknown        | 25 |
| 11             | M. Iqbal                       | Mauzajudywala district Ludhran                       | YTТА-55        | 65 |
| 12             | Allah Ditta                    | MauzaChaukimosti district Lodhran                    | HSF-242        | 35 |
| 13             | Muhammad Rafiq                 | Dairahdeenpanah district Muzaffargarh                | SPF-234        | 45 |
| 14             | Khizirhayat khan               | Khairpursadat Tehsil AlipurDistrict Muzaffargarh     | S-2007-AUS-384 | 35 |
| 15             | Abdul Rauf                     | Mauza Belay wala tehsil Jattoi District Muzaffargarh | CSSG-33        | 15 |
| 16             | Muhammad Akram Khan            | YarruBatil district Dera ghazi Khan                  | unknown        | 35 |
| 17             | Muhammad Hussain               | MauzaDajal Tehsil Jampur District Dera ghazi Khan    | SPF-234        | 45 |
| 18             | Director Ranazulufqar Ali khan | Experimental area Sugarcane Res. Instt. Faisalabad   | YTТА-55        | 75 |
|                |                                |  | CPSG-33        | 50 |
|                |                                |  | HOSG-31        | 25 |
|                |                                |  | CPSG-24        | 20 |
|                |                                |  | NARC-1         | 25 |
|                |                                |  | CSSG-33        | 10 |
|                |                                |  | NARC-1         | 10 |
|                |                                |  | CPF-246        | 30 |
| S-2007-AUS-384 | 40                             |  |                |    |

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