

SUGAR-CANE LEAF SPOTS IN PORTO RICO

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The leaf-spot diseases of sugar cane are very abundant and conspicuous and undoubtedly cause far more losses than are attributed to them. In fact, they are so common that we have neglected to give them the proper attention.

These spots, with the exception of the mosaic, are very generally caused by fungi, and the most abundant leaf spots in Porto Rico are caused by *Leptosphaeria sacchari* and *Helminthosporium sacchari*.

When the writer first came to Porto Rico in July 1923, his attention was called to two apparently new leaf-spot diseases which were causing considerable alarm among the sugar-cane growers. One which was found at Manatí and later at other points along the north coast was temporarily designated as the "Manatí disease". It was most severe on D-109 but has also been found on D-117, B-3412, F. C. 214, D-433, P. R. 260, P. R. 430, S. C. (12) 4, P. R. 561, P. R. 412. The other was found at Santa Rita only and on B. H. 10(12). It was temporarily designated as the "Santa Rita disease". It has since been found on some other varieties. Their disease may be described as follows:

MANATÍ DISEASE

This disease starts as very small reddish, occasionally black spots. If red, a black centre develops very quickly. The spot becomes very much elongated but usually remains narrow. The centre is surrounded by a yellowish zone which may be light green or almost white. These colors grade or blend into each other and vary greatly in relative amounts. Some of the spot remains red until one-fourth inch in length before showing the black center. Any one of the three colors may predominate. When the spots grow old, they usually develop ashy-colored centers. They vary greatly in length from one-fourth inch to 3 inches or more. Occasionally they form reddish or dark-reddish stripes extending from base to tip of leaf, but these are probably the results of the unions of two or more spots. In the young spots the colors are usually bright and clear, but as the spots grow old the colors become dull and gradually disappear with the dying of the leaf. The spots may appear on any part of the

leaf from midrib to margin but do not occur on the midrib. They are much less severe on the sheath than on the blade. In severe cases the entire leaf with exception of the midrib is practically covered with these spots. The result is the death of the infected part and checking of the growth of the plant.

The sporophores are in clusters of from four to twenty, unbranched, 3-10 septate, dark green to brown or black, only slightly geniculate, 25 to 115×5 u. spore slightly curved, 5 to 11 septate, $45-110 \times 12$ u.

SANTA RITA DISEASE

This disease starts with minute reddish spots. As they advance, they may occasionally assume the same characters as those of the Manatí disease but usually are wider, blunt with very pronounced red color which gradually becomes more or less purple. In more advanced stages the spots are large and irregular in shape. This irregularity is apparently the result of the union of both old and young spots. The result is that the spots become very large and irregular in shape and sometimes include small spots of apparently healthy tissues. They may now be more appropriately called blotches. The color varies from red to dark purple, the latter color predominating. The surrounding tissue is usually pale yellow. The amount of purple blotches increases until it is far in excess of the green on the lower half of the leaf. The upper or outer half of the leaf shows very little or no spotting, but with the advancement of the disease on the lower half it becomes yellow and ashy brown. The sheath is finally attacked but not until the disease is well advanced on the blade. The result is a checking of the growth of the cane.

The sporophores are in clusters of from 3 to 6, unbranched, 6-10 septate, dark green to brown or black, straight or geniculate, bearing a single spore at each bend, $60-300 \times 12-14$ u. spores slightly curved, 4-10 septate, $30-95 \times 12-15$ u.

The preliminary studies did not show any considerable number of spores, but later it was found possible to secure the spores in great abundance.

The Manatí disease is very similar to *H. sacchari* as described by Butler in India (1913) which is probably the same *Cercospora sacchari* which was described by J. Van Breda de Haan from Java (1892) and by Cobb from Hawaii (1909). The Santa Rita disease shows greater differences and may possibly be a new variety or a

new species. However, it may be that the peculiar blotching may be due to an entirely different cause or to a combination of causes. The studies of the speaker on the Santa Rita disease, have been carried on at considerable disadvantage.

Inoculation studies have been conducted with these two diseases on D-109 and B. H. 10(12). Both varieties are easily infected by either fungus, and in the young stages it is difficult to distinguish the two diseases, but in advanced stages the characters are more prominent.

As previously stated, the "Santa Rita disease" appears to be restricted almost entirely to the one variety and to the one locality on the Island. The "Manatí disease" varies in severity, locality, variety and humidity. In some cases it is no doubt the cause of heavy losses. It is very important that we make more extensive studies on these and other leaf spots to determine the susceptibility of varieties and the influence of environmental factors. In recognition of the importance of this work the Commissioner and the Director have authorized the installation of a small overhead irrigation system which will make it possible to pursue these studies.

These leaf-spot diseases may be taken as an index of what we are to expect in the way of plant diseases. The introduction of varieties of sugar cane from one part of the world to other parts means the carrying of diseases. A disease which may be of no importance in one part of the world may become virulent in another part. In the development of new varieties these diseases must be taken into consideration. New varieties which possess the characters desired by the grower may not be resistant to disease. Finally, it must be remembered that the same laws which make possible the development of new varieties of sugar cane may also lead to the development of new strains of injurious fungi.