Prevalence of Mosaic and Chlorotic Streak Diseases in the Sugarcane of Puerto Rico

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INTRODUCTION

Such sugarcane diseases as mosaic and chlorotic streak constitute one of the main problems in sugarcane-growing in Puerto Rico. These diseases, especially mosaic, have at times in the past been a hindrance and are always a menace to the successful cultivation of this crop in Puerto Rico.

According to Chardón (*3*)[2] mosaic was first observed in Puerto Rico in 1915, by Stevenson in the Arecibo Valley. In a few years it covered practically the whole Island excluding probably the valley of Yabucoa. The industry suffered heavy losses because of the then mysterious disease. At that time, the sugar industry was on the verge of destruction. The introduction and propagation of mosaic-resistant varieties in Puerto Rico and the continuous "rogueing" of infected stools at that time preserved sugarcane-growing as a commercial farm enterprise.

It should not be assumed, however, that Puerto Rico is free from the disease, since the virus has been present all the time, ready to strike whenever a susceptible variety is propagated. Nevertheless, from the time of the original large-scale outbreak up to few years ago our sugarcane fields were almost free from mosaic disease.

SYMPTOMS

The outstanding feature that characterizes mosaic is a unique mottled pattern on the leaves of diseased plants, caused by a contrast of blotches changing in color from light-green to yellow against the normal green color of the remaining parts of the leaf. These blotches are irregular in size and shape, but generally appear along the length of the leaf which presents a somewhat striped appearance. The symptoms of the disease are more pronounced in the younger leaves. This condition causes a reduction in growth and sometimes death of the plant. The causal agent of the mosaic disease is a virus.

On the other hand, chlorotic streak disease was first observed in 1932 in Puerto Rico by Willbrink, Bell, and Martin (*5*). They regarded it as identical with a disease occurring in Java, Australia, and Hawaii. This disease is

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[2] Italic numbers in parentheses refer to Literature Cited p. 206.

characterized by the appearance of chlorotic streaks on the leaves which may vary in length from a few millimeters to the length of the entire leaf.

PROCEDURE

Considering the importance of the above-mentioned diseases on the sugarcane production of Puerto Rico, a general survey of their prevalence on sugarcane fields in the Island was conducted in 1955. All sugarcane areas in Puerto Rico were visited. This paper describes the actual abundance and distribution of both mosaic and chlorotic streak in sugarcane fields in Puerto Rico at the time of the survey.

MOSAIC

With the introduction of B. 34014, a very susceptible variety, mosaic infestation in the areas where it was grown became generally abundant. Increased acreage of this variety entails increased mosaic infestation in any area. However, because of its other good agronomic characteristics it soon became a favorite of a large number of farmers, especially in the eastern and southeastern regions of the Island. These geographical areas cover primarily the municipalities of Caguas, Gurabo, Juncos, Las Piedras, Humacao, Naguabo, Yabucoa, Maunabo, Patillas, Arroyo, Guayama, Aguirre, Salinas, Santa Isabel, and part of Ponce. Among these, mosaic is more predominant in Humacao, Yabucoa, Arroyo, and Santa Isabel where 100-percent infestation was observed in a plantation of B. 34104.

It is a fact that the mosaic-susceptible variety B. 34104 is being eliminated rapidly, but it is also true that some of the new varieties being planted are susceptible to the disease and, in many instances, the seed used for propagation comes from diseased fields. New plantings of B. 37161, also a susceptible variety, were observed at Barrio Tejas, Humacao, with about an 80-percent infection. The same situation was prevalent in other areas such as Aguirre and Santa Isabel in southern Puerto Rico.

Besides the infected fields of B. 34104 and B. 37161, plantings of other varieties, such as H. 328560 and B.H. 10–12 were found affected by the disease during the course of the survey. Although variety B. 34104, the extreme susceptibility of which undoubtedly has been the cause of the outbreak of mosaic in the above-mentioned areas, is in process of elimination, its scattered acreage still presents a menace as a source of infection, the virus being present and ready to strike other susceptible varieties of desirable agronomic characteristics. Such a situation was observed near Gurabo in a field of variety M. 336, planted near one of B. 34104 with 100-percent infestation, where many stools of M. 336 were already affected by mosaic.

Besides the badly affected areas in the east-central and southeastern

parts of the Island, isolated spots where the disease was present were also observed. In these places scattered stools of B. 34104 or other susceptible varieties like P.O.J. 36 were harboring the virus. This situation was observed near Carolina, Mañatí, and in Central Soller in the vicinity of San Sebastián.

A comparison of the actual situation of the mosaic incidence in Puerto Rico with the epiphytotic of 1918, shows that the areas at present relatively free from the disease are those which were more severely affected in 1918.

CHLOROTIC STREAK

Chlorotic streak, another virus disease of sugarcane, is common in the northern part of Puerto Rico, where it can be found in almost every cane field. This disease is of great economic importance. It reduces germination and causes marked yield decreases in susceptible varieties (*1*). Chlorotic streak apparently spreads well under natural conditions. Its incidence appears to attain greatest intensity under conditions of heavy rainfall and poor drainage. Under these conditions the vector transmitting the disease (which so far has not been identified) seems to be more effective.

P.O.J. 2878, a mosaic-resistant variety, is susceptible to chlorotic streak and most of the fields planted to this variety are affected by the disease. At present this variety constitutes around 49 percent of the cultivated cane acreage in Puerto Rico (*6*). The low production of this cane can perhaps be ascribed largely to this disease. In addition to P.O.J. 2878 other varieties extensively grown in Puerto Rico are affected by the disease. Among them are M. 336, P.R. 902, P.R. 905, and H. 328560.

The presence of chlorotic streak was recorded in the rainy regions of the Island north of the divide from Mayagüez to Humacao. Throughout this area there were some spots that appeared to be more affected than others. In the areas near Canóvanas, Toa Baja, Vega Baja, Arecibo, Aguadilla, and Añasco the presence of the disease was more noticeable. Generally it was more prevalent and severe on heavy, poorly drained soils, where it helps to reduce germination, ratooning, and the total yield of the plantations.

SUMMARY

One of the problems facing sugarcane growers in Puerto Rico is the presence of sugarcane diseases such as mosaic and chlorotic streak. A general survey of the cane fields was conducted to determine the abundance of these diseases in Puerto Rico.

It was observed that mosaic was abundant in the east-central as well as the southeastern part of the Island. The abundance of mosaic in that por-

tion of the Island can be attributed to an increase in the cultivation of the very susceptible variety B. 34104. Although this variety is now being replaced by others, some of those being propagated in new plantings are susceptible to the disease. B. 34104 is still a menace to effective sugarcane growth in the areas where it has not been completely eradicated. Another factor that helps distribute the disease is the transportation of diseased seed to be planted in places where the disease is not found. Comparing the present mosaic situation with that in 1918, when the industry was on the verge of a complete collapse, we find that the areas that now appear to be relatively free from the disease are the ones that were more severely affected in the past.

Chlorotic streak disease is also present in Puerto Rico, being more abundant in the northern part of the Island. Its presence is most predominant in the rainy regions of the Island north of the divide from Mayagüez to Humacao. Probably the vector transmitting the disease is more effective in this area.

RESUMEN

Uno de los problemas principales que han tenido que afrontar los agricultores de caña de azúcar en Puerto Rico ha sido la presencia en sus cañaverales de enfermedades tales como el mosaico y la raya clorótica. Con el propósito de determinar la abundancia de estas enfermedades en Puerto Rico se efectuó un catastro general de las fincas de caña de azúcar. Se observó mucho mosaico en las regiones este-central y sur-este de la Isla. La abundancia de esta enfermedad en estas áreas puede atribuírse, mayormente, a un aumento en las siembras de la variedad susceptible B. 34104. Aunque al presente esta variedad se está eliminando, substituyéndola por otras variedades, algunas de las cuales son susceptibles a la enfermedad, todavía presenta ella una amenaza para la producción eficiente de la caña de azúcar en dichas zonas. Otro factor importante en la distribución del mosaico ha sido la transportación de semilla enferma hacia lugares libres de la misma. Si se comparan las condiciones actuales con las que culminaron con la epidemia del 1918, época en que la industria azucarera se encontraba al borde de un colapso total, se puede observar que las áreas que al presente demuestran estar libres de la enfermedad, eran las más afectadas en aquel entonces.

La raya clorótica, otra enfermedad de la caña de azúcar presente en Puerto Rico, se observó prominentemente en la parte Norte de la Isla. Su presencia es más notable en la región lluviosa del país, extendiéndose a través de la parte norte desde Mayagüez hasta Humacao. Probablemente el agente transmisor de la enfermedad es más eficiente en este área.

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