

Observations on the Incidence of Tristeza Disease in Various Countries in Africa

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IN 1961, the author visited Guinea, Mali, Upper Volta, the Ivory Coast, Ghana, Dahomey, Nigeria, and the Republic of the Congo (formerly French Congo). These countries are in the western part of Africa, south of the Sahara.

In all these countries citrus is grown mostly in "backyard" plantations or mixed among other fruit trees in dense orchards. True citrus groves were encountered very rarely. The governments or governmental agencies (such as the Office du Niger in Mali) maintain horticultural experiment stations or demonstration plantations in which citrus plays a prominent part. One subject of interest was the occurrence of tristeza in the various countries visited. The presence or absence of tristeza was ascertained in discussions with local specialists and by testing lime [*Citrus aurantifolia* (Christm.) Swing.] trees of the Mexican group, which are grown mostly as seedlings in all countries visited, for vein clearing and stem pitting.

In the course of these visits, it became evident that in all countries formerly governed by France, many old trees on sour orange (*C. aurantium* L.) could be found without symptoms of decline other than the very widespread occurrence of *Phytophthora* sp. Tests on lime trees for vein clearing and stem pitting failed to reveal symptoms of tristeza in most cases.

On the other hand, in Ghana and Nigeria, two countries belonging to the British Commonwealth, no citrus trees were found on sour orange, and in one demonstration station at Asuansi, Ghana, the author was told definitely that former plots on sour orange had been destroyed by tristeza (2). In both countries vein clearing and stem pitting on limes, accompanied by decline, was frequently encountered; "Guinea lime die-back" (tristeza) was first observed in Ghana (1, 2).

This difference in the occurrence of tristeza in the various countries led to the question of the source of the budwood. Our investigations revealed that the countries formerly governed by France received their budwood almost exclusively from the Central Research Station founded by the Institut Français de Recherches Fruitières Outre Mer (IFAC) at Foulaya in Guinea (which, in turn, received its budwood from the Experiment Stations in Algiers or Morocco). The countries of the British Commonwealth, on the other hand, received their budwood from South Africa, and with it, the tristeza disease.

Proof of this assumption may be found in the former French Congo. At the Citrus Experiment Station at Loudima, 300 km west of Brazzaville, the collection of citrus varieties budded on sour orange with budwood from Foulaya declined and died after plant material from South Africa was introduced. A grapefruit plot, budded on sour orange and planned as an irrigation experiment, had to be abandoned because of the attack of tristeza in the third year after planting.

It therefore seems justified to assume that, with citrus plants from South Africa, tristeza was introduced into other countries of the British Commonwealth in Africa, whereas the formerly French governed countries seemed to have remained, for the time being, free of this disease. However, these countries too are conscious of the imminent danger, and the author found, besides the continuation of budding citrus to sour orange, a number of experiments with tristeza-tolerant rootstocks, e.g., Rough lemon [*C. limon* (L.) Burm. f.] and Cleopatra mandarin (*C. reticulata* Blanco).

The natural spread of tristeza in Africa does not seem to be as rapid as it is in the Argentine and Brazil. This is shown by the fact that, even

though the disease has been rampant for a long time in countries like Ghana and Nigeria, no undisputed case of tristeza was found in the neighboring countries of the Ivory Coast and Dahomey during my visit. In the IFAC Station at Azaguié in the Ivory Coast, about 400 km from the tristeza-infected area of Cape Coast in Ghana (1, 2), a 10-year-old collection of citrus trees budded on sour orange shows, in general, well-developed trees. No honeycombing was found in the rootstocks, even on several declining trees. Acid limes showed some indistinct leaf symptoms, but no stem pitting.* At the Agricultural Station at Niaouli, in Dahomey, a distance of about 250 km from the tristeza-affected region of Ibadan in Western Nigeria, a 30-year-old collection of citrus trees budded on sour orange consists of huge trees without any decline symptoms. On a single old acid lime tree no vein clearing occurred, but some stem pitting was observed. With *Toxoptera citricida* Kirk. present in the whole region (2), this slow spread is remarkable and deserves further investigation.

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Literature Cited

1. HUGHES, W. A., and LISTER, C. A. 1949. Lime disease in the Gold Coast. *Nature* 164(4177): 880.
2. HUGHES, W. A., and LISTER, C. A. 1959. Lime dieback in the Gold Coast, a virus disease of the lime, *Citrus aurantifolia* (Christman) Swingle. *J. Hort. Sci.* 28: 131-140.

*At the occasion of a visit to Azaguié Station in 1946, Dr. Bové of the IFAC found widespread decline of the trees budded on sour orange and strong vein clearing and stem pitting in limes.
