Effect of Mosaic on the Yield of Sweet Potatoes in Uganda

J. Mukiibi[1]

The sweet potato mosaic virus disease caused a 57% reduction in yield, both in terms of the weight and the number of root tubers produced by the sweet potato variety Kyebandula. The sample plots were grown at the Makerere University farm in Uganda.

Sweet potato mosaic was first recorded in Uganda by Hansford (1944a) who noted that it was very severe in some areas. Later he published an account of his observations (Hansford 1944b) on a trial of sweet potatoes at Kawanda Research Station in which he noted that the effect of the disease was probably high judging by the appearance of affected plots. However he gave no data on the effect of the disease on yield.

Sheffield (1953) surveyed the incidence of the disease in Kenya, Uganda, Tanzania, Rwanda, and Zaïre. While on this survey she was informed that the disease was probably responsible for the degeneration of sweet potato varieties on peasant farms. This view was also expressed by Macdonald (1965) who thought that the rapid turnover of sweet potato varieties in Uganda was probably due to virus diseases.

Sheffield (1953) also learned that on a farm in Eastern Zaïre, where sweet potatoes were grown to feed mine workers, yields had declined from 30 to 4 metric tons per hectare. The growing of sweet potatoes on that farm was later abandoned, apparently because of virus diseases.

Yet, despite these observations, some extension workers feel that sweet potato virus diseases did not cause much loss in Uganda. An experiment was therefore conducted at the Makerere University farm to establish the loss likely to result from sweet potato virus infections.

Materials and Methods

The sweet potato variety Kyebandula was planted on ridges 90 cm apart and 30 cm between plants. The experiment consisted of five treatments as follows: plots were planted (a) with all vines apparently healthy, (b) 25%, (c) 50%, (d) 75% of the vines infected by mosaic, and (e) plots planted with all infected vines. The vines chosen for planting were 20–30 cm long with 4–5 fully expanded leaves. All the leaves on infected vines had clear symptoms of mosaic.

The experiment consisted of four replicates and the plots were assigned within replicates in a latin square design. The plots consisted of five rows 4.5 m long. The planting of the vines was performed as follows: to obtain a proportion of 25% infected plants, one diseased plant was planted for every three healthy plants, for 50% every alternate plant was diseased, for 75% three infected plants were planted, for every one healthy plant. The vines were buried about 10 cm deep.

The potatoes were harvested 150 days after planting. During this period there was some secondary spread by the virus ranging from 11% for all healthy and 25% diseased, 16% for the 50% diseased, and 23% for 75% diseased plantings.

Results and Discussion

The results are summarized in Table 1, which shows that the average yield per plot was, as expected, lowest in those planted with only infected vines and highest in plots planted with only healthy vines. The disease caused a reduction in weight yield and number of tubers of 57.1 and 57.3% respectively, in the totally affected vines. The yield was progressively reduced as the proportion of the diseased vines increased in the planting material.

The fact that the percentage loss is about equal both for weight of potatoes and number of potatoes per plot indicates that the effect of the disease is to reduce the number of roots which form tubers.

At the time of harvest, the incidence of the disease had reached 11% in plots planted with healthy vines alone. This level of disease must have depressed the yield in those plots. This

[1]Department of Crop Science, Makerere University, P.O. Box 7062, Kampala, Uganda.

Table 1. Effect of planting various proportions of healthy and mosaic-infected sweet potato vines on the yield of sweet potatoes.

% of mosaic vines per plot	Average weight of potatoes per plot (kg)	Average number of tubers/plot	% loss in weight yield	% loss in tuber number
0	20.6	141.4	—	—
25	18.6	128.7	9.8	11.7
50	16.2	110.3	21.3	22.0
75	13.9	89.5	47.3	36.7
100	8.9	60.4	57.1	57.3

means that the true loss due to the disease was probably higher than 57%, perhaps about 60%.

Hansford, C. G. *Report by plant pathologist.* In Annual report for July 1943–June 1944, 1944a, 5–7.

A probable virus disease of sweet potatoes. East African Agricultural Journal, 10, 1944b, 126–127.

Macdonald, A. S. *Variation in open pollinated sweet potato seedlings in Buganda, East Africa.* East African Agriculture and Forestry Journal, 31, 1965, 183–188.

Sheffield, F. M. L. *Virus diseases of sweet potato in parts of Africa.* Empire Journal of Experimental Agriculture, 21, 1953, 184–190.

Incidence, Symptomatology, and Transmission of a Yam Virus in Nigeria

E. R. Terry[1]

A Dioscorea spp. virus disease incidence was highest in field planting in Ibadan on *D. rotundata* Ihobia variety. Field symptoms included green vein-banding, shoestring, and distortion. The virus was transmitted mechanically, and by nymphs and winged adults of the cotton aphid *Aphis gossypii* to seedlings of *D. rotundata*. Test plants in mechanical and vector transmission studies exhibited mainly green vein-banding. The role of *A. gossypii* in field spread of this disease is discussed.

Virus diseases of *Dioscorea* spp. have been reported mainly from West Africa and the Caribbean, but may probably occur in all yam-growing areas of the world (Coursey 1967).

In Nigeria, reports by Chant (1957) and Robertson (1961) reported localized incidences of a virus disease of *D. alata, cayenensis,* and *rotundata.* Infected plants appeared stunted, with proliferation of lateral buds giving the plant a bushy form. Foliar symptoms consisted of mottling, vein-clearing, and sometimes lanceolation and distortion (Robertson 1961).

Robertson's (1961) attempts to transmit the agent by mechanical inoculation were unsuccessful and he suggested that the disease was caused by a physiological imbalance in the plant.

Some preliminary results on the incidence, symptomatology, and transmission of a *Dioscorea* spp. virus disease in Nigeria are presented.

Disease Incidence

Tubers harvested in 1974 from six varieties of *D. rotundata* (Laoko, Boki, Ihobia, Okumado, Iwo, and Umudike) were planted at IITA in April–May 1975. Virus disease incidence was highest in Ihobia, with 51.9, 8.1 and 2.8% of the plants manifesting green vein-banding, shoestring, and distortion respectively. There was considerable variation in varietal susceptibility to the virus but it appeared that all varieties were susceptible (Table 1).

[1]International Institute of Tropical Agriculture, P.M.B. 5320, Ibadan, Nigeria.