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Virus and Virus-Like Diseases of Citrus in Nigeria

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ABSTRACT. Several virus and virus-like diseases of citrus have been found commonly in Nigeria. Most serious diseases were scaly-bark psorosis, exocortis, greening and dieback.

Citrus species, especially sweet orange, are the most popular fruits in Nigeria. The bulk of the demand is met through production by seedling trees grown, more often than not, intermixed with other species. Properly laid orchards using budded plants of improved type are rare. There are, however, numerous experimental orchards in different parts of the country. Some of these are very well kept with properly maintained records which provide useful information.

Various virus and virus-like diseases were observed in different parts of the country in the early eighties. Some of these diseases are very serious, and are briefly described here.

Scaly-bark psorosis (Psorosis A). Scaly-bark psorosis is a serious disease as it can render a tree nonproductive although rather slowly. Typical bark lesions on the main trunk and primary limbs have been observed in sweet orange plants in Kaduna, Rivers, Oyo and Ogun states (3). These lesions start as small eruptions and in time lead to scaling of bark in dry irregular flakes. The lesions usually take 10-12 yr to develop. Most serious infection was observed in an orchard at Ikenne, where 9.5% plants were found infected. The plants, however, did not show leaf symptoms usually associated with the disease, but gumming from the bark lesions was common.

Of the 16 sweet orange varieties only Campbell, Valencia, Meran and Sunny MT Washington Navel were free from the disease. Diseased trees were found on all the rootstocks, but Cleopatra mandarin was apparently most tolerant as only one plant on this rootstock was infected.

The disease spreads through infected budwood, seeds of some *Citrus*

spp. and natural root-grafts. The vector of the causal virus is not known. In extensive tests only the seeds of Carriizo citrange, Troyer citrange and lemon are shown to carry the different strains of psorosis, but not the seeds of sweet orange. In the Ikenne orchard, infection might have come through seeds of Troyer citrange and rough lemon, but as the infection on Agege-1 rootstock - seeds of which are unlikely to carry the virus - is maximum, infection must have come through budwood. In the absence of definite information about source(s) of rootstock and budwood, actual source of infection is difficult to determine.

As there is no natural spread of the disease it can be easily avoided by using psorosis-free budwood and rootstock. The life of already infected trees can be increased by scrapping the bark lesions and treating with 1% dinitro-o-cyclohexyphenol in kerosene (5).

To avoid perpetuation of the disease, no budwood should be used from the Ikenne orchard. It is possible that even those plants showing no symptoms are infected through root-grafts due to close spacing between the plants.

Blind-pocket. Blind pocket disease, characterized by deep concavities in the stem, is caused by a strain of psorosis virus. It is not very common. Only six plants, mostly of the orange variety Hamlin, were found infected at the Ikenne orchard. Blind pocket strain is known to cross-protect with scaly bark strain. In conformity with this finding, none of the plants showing blind-pocket had scaly-bark psorosis and vice versa.

Exocortis. Exocortis is also a destructive disease and causes considerable losses in yield. This disease has been observed in Rivers and Ogun

states. Aboveground portions of rootstocks of affected plants develop cracks and vertical bark scaling (3). Growth of the scion is restricted resulting in bunching effect and the plants remain stunted. In the Ikenne orchard, 6.0% plants were found affected. There was a prominent effect of stionic combination. Except for one plant on Cleopatra mandarin, all other exocortis-affected plants were on Troyer citrange. Most susceptible stionic combinations were Meran or Parson Brown and Troyer citrange.

Although use of exocortis-free budwood cannot ensure freedom from the disease as it is so easily spread mechanically, and there is no evidence for seed transmission of exocortis, it is better to use budwood and seeds from exocortis-free trees.

Greening. Greening is a very serious disease of sweet orange, mandarins, lemons, grapefruit, etc. The affected plants are sparsely foliated, remain stunted, have a poor root system and produce small and poor quality fruits. Leaves develop a variety of symptoms which resemble those caused by zinc deficiency. Symptoms characteristic of greening disease have been observed all over Nigeria. At Ikenne this is a serious disease, with 53.3% plants showing foliar symptoms which should be confirmed by laboratory tests, indexing and chemotherapy.

Dieback and decline. Southwest Nigeria is an important citrus producing area, but in this area the citrus industry is threatened by widespread decline. There must be several factors responsible for this situation but the

most important is lack of management, which becomes obvious when even orchids like *Aerangis bilola* start damaging citrus plants.

Four stages of decline were recognized in sweet orange seedling trees:

- 1) Mottling, vein clearing and green vein banding of leaves; general appearance normal;
- 2) Leaf drop and more fruiting on some branches than on normal looking branches;
- 3) a few parched leaves and heavy fruiting; dieback; secondary pests; showing a slight recovery under favourable conditions;
- 4) no leaves and fruits; dead.

The time taken between the first and last stages is approximately 7 yr, which is very serious considering that healthy trees are difficult to find.

The symptoms resemble those of tristeza which can cause collapse in certain conditions. Under the present situation, however, this is not expected as sweet orange seedlings are generally resistant to tristeza. But occurrence of some atypical strain is possible.

The general picture of dieback recorded at Ikene is different from the dieback described under decline above. For example, the dieback at Ikene was not accompanied by heavy fruiting and the leaves showed typical greening symptoms. The difference between the two situations could be due to use of budded plants at Ikene and seedling trees in the other orchard. The cause(s) for the two situations may be the same.

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