

***Sphaeropsis* Tumor of Avocado**

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Abstract. Tumor formation on branches of old or young trees and stems of *Persea americana* Mill, and on grafted nursery plants has been observed in the States of Mexico and Veracruz for many years. The tumors vary in shapes and sizes and may reach up to 8 cm in diameter. Affected twigs die. Freshly grafted plants under diseased avocado shade trees develop tumors up to 50%. In unattended criollo orchards infections reach 80%, but in attended 'Fuerte' and 'Hass' orchards infection is low or absent. Collected tumors presented black 10 to 15 μm size pycnidia on their cracked and varied surface. From these pycnidia hyaline, ellipsoid microconidia 4 x 1.5 μm in size were isolated and grown on potato dextrose agar medium. After six to seven months, symptoms were reproduced and Koch's postulates were completed and the fungus was identified as *Sphaeropsis tumefaciens* Hedges, probably a special form on avocado, since Hedges and Tenny (1912), described this fungus on lime, but producing conidia of larger size, but also microconidia of size found on avocado. As far as known, this is the first report of its kind. It is suggested that young nursery trees should not be placed under old affected trees with tumors and that adequate spraying and sanitation be observed in orchards and nurseries.

Since 1965 the author has observed tumors on branches of old or young trees and stems of grafted nursery avocados in the State of Mexico. More recently the same tumors have been observed in the State of Veracruz. Both "criollo" trees and Fuerte and Hass varieties have been affected in the State of Mexico, but only criollo in the State of Veracruz. The etiology of this disease has been unknown and for this reason a study has been undertaken on this aspect. Assessment of the damage was carried out and description of the disease is presented. A suggestion is made on the integrated management of the avocado trees to prevent this disease.

Materials and Methods

Tumors of different shapes and sizes on branches and young stems of avocado trees were collected from the area of Villa Guerrero in the States of Mexico and from the Xalapa area in the State of Veracruz and observed in the laboratory at the Center of Plant Pathology of the Postgraduate College.

Isolates were made from the surface of these tumors on potato dextrose agar (PDA) medium. Pure isolates of bacteria and fungi (mycelium) were inoculated in the

greenhouse on young stems and branches of avocados with and without wounding the superficial tissues. In some cases transverse stem cuts were made and the inoculum deposited on the surface. Inoculated tissues *in situ* were maintained in high humidity in plastic bags for three to four days.

Nursery material was inspected to observe the frequency of the tumors. Likewise unattended and attended "criollo", 'Fuerte' and 'Hass' orchards were observed and percentage incidence of tumors and their distribution was registered.

Results and Discussion

The tumors from the two localities presented various shapes, semicircular to irregular and sizes varied from very small up to 8 cm in diameter (Fig. 1).

The surface of the young tumors was light brown in color and as tumors became older, this surface became fissured and darker with many small black pycnidia. These fructifications were semi-immersed in the cortex, globose in shape, with walls several cells thick, ostiolate and in certain parts of the tumor solitary or gregarious in others. The microconidia were hyaline, ellipsoid, rounded at both ends, with two vacuoles at each pole, nonseptate and measuring 4 x 1.5 μ m as described by Holliday and Punithalingam (1970). These microconidia germinate easily on PDA medium, and greenish-gray colony development is observed on PDA after several months growth.

The tumors were irregularly distributed in the crown of the tree giving rise eventually to dead branches. Young grafted trees left under old trees with tumors exhibited up to 50% gall-like growth at the union area or at the stem decapitation (Fig. 2).

Distortion of cortical and woody tissue was observed on young branches with tumors cut in longitudinal sections. This tissue turns yellow and in some areas became necrotic (Fig. 3). When tumors are young the tissue is soft, but quickly hardens.

In unattended "criollo" orchards infections (galls) reach up to 80%, but in attended 'Fuerte' and 'Hass' orchards infection is very low or absent. In both geographic areas the relative humidity during the growing period is very high with very frequent rains which may aid in dissemination and infection processes of the fungus. Blazquez *et al.* (1966) consider that similar gall disease on lime in Jamaica is of economic importance as many lime groves have been destroyed, but this is not so in Florida.

Although various bacteria and fungi were inoculated as indicated, only one pure culture of the slow growing fungus reproduced the gall-like growth with small black pycnidia on its surface after six to seven months and then only when the tissue was wounded. Reisolation was done and the fungus was compared with the original one, thus completing Koch's postulates. The fungus was identified as *Sphaeropsis tumefaciens* Hedges, probably a special form on avocado, since Hedges and Tenny in 1912 described this fungus on lime where it produced conidia and also microconidia. The microconidia on avocado are of the size found on lime. As far as known, this is a first

report of its kind on avocado. Evidently the fungus needs a mechanical wound in order to penetrate and form tumorous tissue; without it infection does not take place, at least through artificial infection. In nature wounds, may be easily produced by grafting operations, birds, various insects, hail or blowing sand.

To protect the young nursery trees, it is suggested that grafting be done on trees previously protected by fungicides and that they should not be placed under old affected trees with tumors, that shade be provided by other means, and that adequate spraying and sanitation be observed in orchards and nurseries.

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Literature Cited

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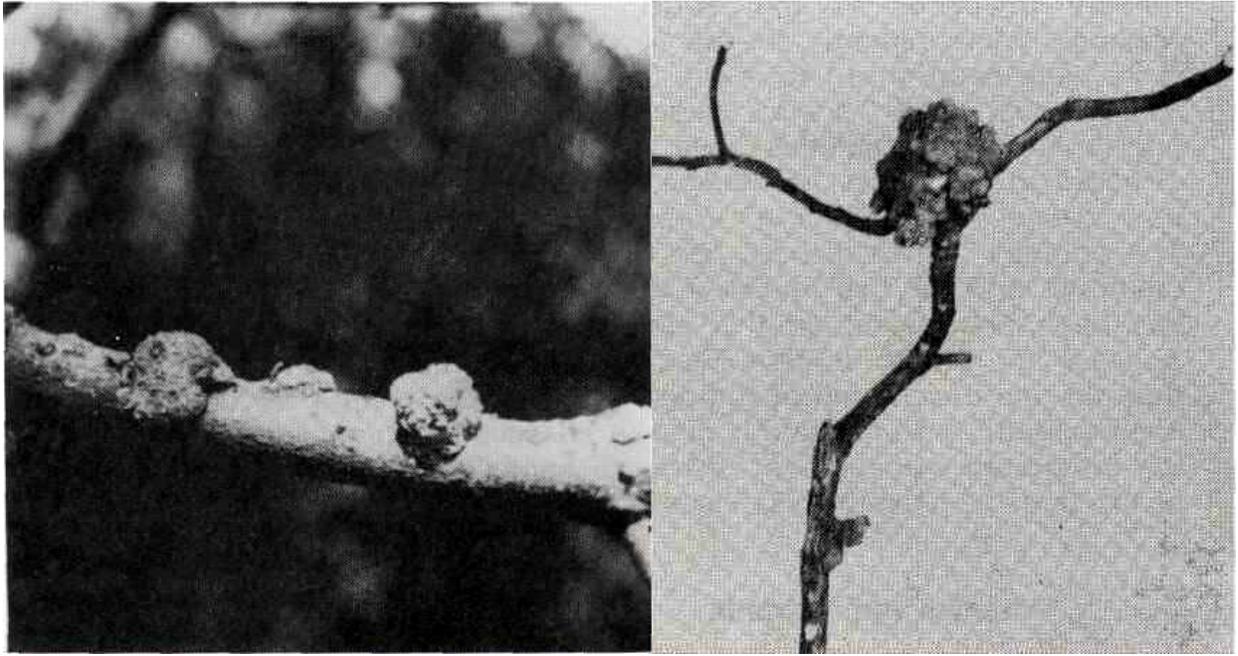


Fig. 1. Tumors on avocado branches from State of Mexico (left) and from State of Veracruz (right).

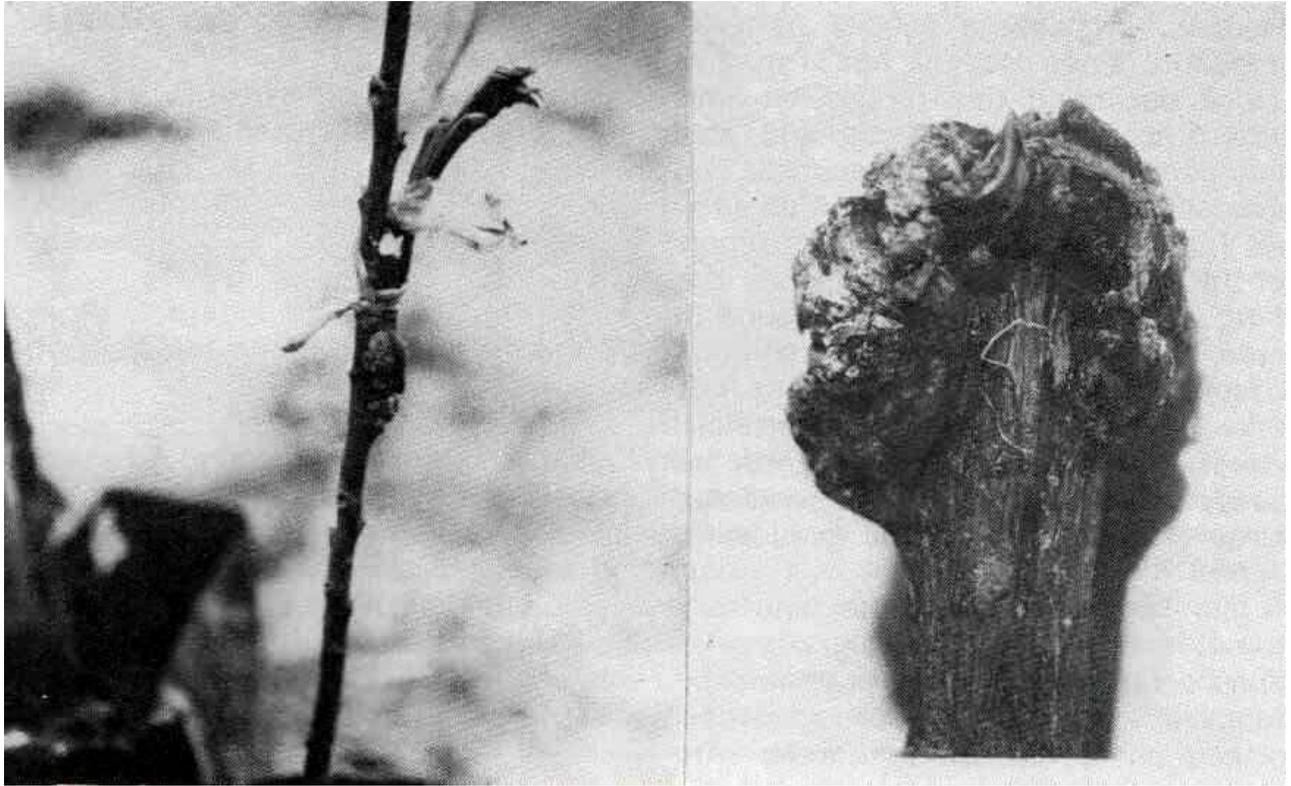
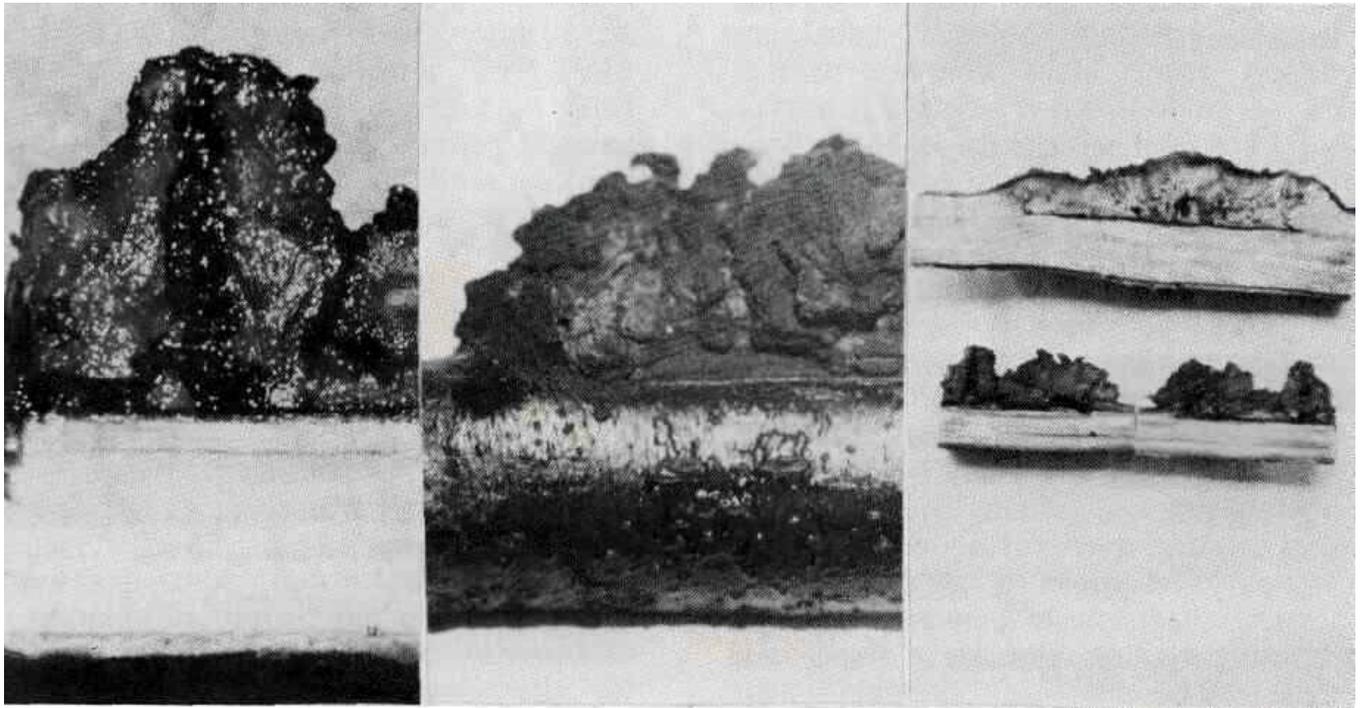


Fig. 2. Young grafted tree with tumor growth at the junction (left). Stem cut transversally with tumor growth (right). Dark pycnidia are present on the tumor surface.



Figs 3. Tumors on twigs sectioned longitudinally. Observe distortion and yellow and black coloring of the diseased tissue. Internal and external view of cut tumor (left). Internal view of cut diseased twigs (right).