

A MYCOSPHAERELLA LEAF SPOT DISEASE ON AVOCADO AND ITS CONTROL

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Summary

Avocado trees in Huauchinango, Puebla were affected by an epiphytotic leaf spot disease in the summer of 1968. It caused extensive losses due to a severe defoliation which resulted in the sunburn of the fruit, and undoubtedly in a great reduction of the crop next year.

The causal organism was isolated and identified as *Mycosphaerella* sp. (= *Septoria* sp.). Field observations of its life cycle revealed that primary infections usually occur in May but the maximum degree of incidence takes place during the rainy season.

In order to develop a method of chemical control, two experiments with fungicides were carried out. From the results it can be concluded that with 3 sprays, at monthly intervals, of either Bordeaux Mixture, Captan, Maneb, or Tribasie Copper Sulfate the disease can be satisfactorily controlled.

Introduction

The avocado crop has become one of the most important incomes to the Mexican farmer for it is not only widely consumed in the country but also some of this fruit is exported.

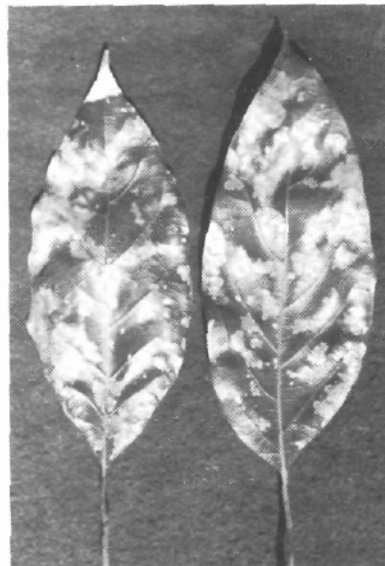
Of the 21 avocado growing States, Puebla is second in production with two principal areas, Atlixco and Huauchinango (7).

In the Summer of 1968, all the avocado trees, including criollos, grown in Huauchinango were severely defoliated by a leaf spot disease, causing considerable losses due to sunburn of the fruits and weakening of the trees which next year had a very poor yield. In the order mentioned the commercial varieties more affected were, Hass, Fuerte and Zutano. Figure 1.



A tree of the Hass variety severely defoliated by the disease. Note that most of the fruits are sunburned.

This leaf spot disease was confined only to older leaves. On these, the first symptoms appeared as small yellowish green spots, which later extended into approximately circular, gray reddish to brown lesions 0.5-1.5 mm in diameter, slightly depressed and irregularly distributed all over the leaf surface. Elongated necrotic areas were also frequently formed by coalescence of several spots. Scattered on the lesions small black dots could be observed by the naked eye. Figure 2.



Avocado leaves showing the characteristic contour and distribution

Objectives and Methodology

The present work was undertaken in an effort to identify the causal organism of the disease and to develop a method for its control with fungicides. Thus, we proceeded to make microscopic observations of the causal agent, then to isolate it in pure culture and prove its pathogenicity. Simultaneously, several chemical compounds were tested in the field, including Bordeaux Mixture, Captan, Maneb, Dodine, and Tribasic Copper sulphate.

Under the microscope the causal organism appeared to be a fungus. So, it was isolated

by direct transfer of spores oozed out from fruiting bodies onto Petri dishes with Malt-Glucosc-Agar and incubating at room temperature (18-22°C) or in an oven at 25°C.

Spores produced in pure cultures were then suspended in sterile distilled water at a concentration of 5.5 units of turbidity determined with the aid of a Kleet Summerson Colorimeter. With this spore suspension leaves of 4 criollo avocado trees were sprayed by means of an atomizer and kept in the greenhouse under temperatures ranging from 15-22°C and 100% moisture.

As to the chemical control, a design of Blocks at random was selected, the treatments and dosages being as follows: Bordeaux Mixture (4:4:100, lb. and gallon); Captan (5070, 2 lb/acre; Maneb (80%), 2 lb/acre; Dodine (65%), 1.5 lb/acre; and Tribasic Copper Sulphate (50%), 4 lb/acre.

Applications were made every 15 days and at monthly intervals, beginning on August 15th and finishing on October 1st.

Evaluation of this experiment was not based on yield but on weight of fallen leaves because, due to a joint effect of defoliation caused mostly by the fungus and in a minor degree by frosts, the fruit production next year to the appearance of the disease was almost null.

Results

Three types of fungus fruiting bodies were discovered on foliage lesions: a) Spermogonia bearing numerous small, hialine, rod-shaped spores; b) Pycnidia full of filiform, hialine, 1-3 transversely septate conidia of the *Septoria* type; and c) Short beaked perithecia with bitunicate asci containing 8 hialine, fusiform, one-septate, the two cells being about equal, ascospores of the *Mycosphaerella* type. Figures 3 and 4.

Inoculations with the isolated fungus reproduced the typical symptoms of the disease. Furthermore, the fungus could be recovered from the new lesions, thus Koch's postulates being fulfilled.

In the experiments with fungicides significant differences were found among treatments as compared with the check and Dodine which was phytotoxic. Differences also were observed among varieties in the amount of lost leaves under the same treatment. For example, the weight of fallen leaves collected from Fuerte was about three times as much as from Zutano.

Field observations on the etiology of the disease indicated that under the environmental conditions prevalent in Huauchinango, primary infections begin in May but the disease reaches its maximum degree of incidence in August, which is the rainiest month of the season (June-through September).

Discussion

Up to the present time, the literature reports only 2 species of *Mycosphaerella*, *M. perseae* and *M. exutans*, causing leaf spots on avocado (2,4,8,10,11,12). The first one has been observed in various parts of the world associated with *Cercospora purpurea*

Cooke, but its relation has not been demonstrated. The second one has been found on *Persea pubescens* (8, 10) and *Persea* sp. but not on *P. americana*. And, while there is no information concerning the asexual stages of this species, Petrak in 1952 (5) observed 2 species of *Cercospora* attacking *P. nubescens*, *C. lupini* Cke. and *C. floridanum* whose perfect stage might belong to the genus *Mycosphaerella*.

The fungi, *Mycosphaerella* sp. and *Septoria* sp., encountered in Huauchinango do not attack fruits and twigs as reported for *Mycosphaerella perseae* (1, 11, 12). However, according to Sivanesan, from the Commonwealth Mycological Institute. U.K. (Personal Communication) these forms, (*Mycosphaerella* sp. and *Septoria* sp.), may be stages of same fungus. Furthermore, since our study, cultures from both ascospores and conidia produced free conidia (not in pycnidia) of the asexual type, just as other investigators have reported (1, 3, 6) for some species of *Septoria*, it is probable that the imperfect stage of *M. perseae* is a species of *Septoria* rather than a *Cercospora* species. Nevertheless, further studies are needed for a definite conclusion.

In our experiment, besides differences in control among fungicides and avocado varieties it could be noted a difference between frequencies of application. More control was obtained in plots sprayed every 15 days than in the ones treated monthly. It would be very interesting to evaluate this difference upon yield for then it could be qualified, from an economical standpoint, whether or not a 15 day schedule should be recommended.

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