

## BLACK STREAK DISEASE OF AVOCADOS

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The avocado disease called black streak has been present in California for some time. It was observed as an occasional occurrence 20 to 25 years ago but the problem was considered of minor importance and little effort was expended to determine its cause. In recent years, however, the disease has been observed on an increasing number of trees over a geographical area extending from Santa Barbara County to San Diego County. In early 1975 the problem was recognized as one that was not only of importance in localized areas but potentially of importance to the avocado industry. This recognition, in turn, led to the decision to make the disease the subject of a major research effort. The most obvious and at present the diagnostic symptom of the disease is the presence of characteristic lesions on the main trunk and branches of the tree (See figures). These lesions often start at the base of the trunk or on the underside of a lower branch, as a small cinnamon colored spot which becomes black and is usually covered by a white powder that is the result of exudation from the lesion that dries leaving the powder behind. Another characteristic of the lesions is that in most cases they are shallow and do not extend to the cambium. Under the surface they are dark brown and sometimes will pop out if pried from underneath. Usually these lesions enlarge and others appear on the-tree trunk and branches. In a few cases the tree exhibits other characteristics of the disease but no bark lesions are present.

Other symptoms of the disease may include chlorosis, off bloom, some stunting of growth, and in some cases, symptoms of nutrient deficiency or excess. It must be emphasized that at present the only diagnostic symptoms are the trunk lesions. We cannot diagnose the problem on the basis of other symptoms at this time.

In advanced stages the tree defoliates allowing the branches and fruit to sunburn. Eventually the tree may die.

Field observations of infected trees that have been topped to lower their height indicate that such trees do not have much vigor and may not regrow. Those that do regrow do so by producing weak, non-vigorous shoots.

In late summer of 1975 surveys were initiated to determine the distribution of the disease. Representative groves were chosen in several counties with the intention of surveying these groves each year to determine the extent of the disease within the groves and its rate of increase from year to year.

From the results of these surveys we now know that the disease occurs mainly on the 'Hass' variety but also occurs on the 'Reed' and other varieties. The disease has been found in Santa Barbara, Ventura, Orange, Riverside, and San Diego counties. Within a grove it may affect an occasional tree or more. Some groves have been found with as many as 20% of the trees showing positive symptoms. In a second survey, a year following the first, one grove had an increase of 104% in the number of affected trees: from 116 to 237 trees out of 1700 in the survey area.

Ten-year-old 'Hass' showing trunk symptoms of Black Streak Disease.



Upper trunk and branches of 'Hass' showing symptoms of Black Streak Disease.



As part of the survey we are investigating, with the cooperation of the California State Department of Agriculture, the possibility of detecting the disease by means of infra red aerial photography. Photos of diseased areas have been made and are currently being evaluated.

Of prime importance is the investigation into the cause of the disease. Possibilities of a nutrient deficiency or excess have been investigated without consistent results. Isolations for a fungal or bacterial pathogen have been made and to date nothing has been found that could be linked to the disease.

Present research is primarily directed towards a causal agent other than bacteria, fungi or nutrients. In the laboratory we are using light and electron microscopy to determine if any foreign bodies such as virus particles or mycoplasmalike organisms are present in the tissues. Further attempts are being made to culture organisms from diseased tissue.

In the greenhouse, investigations are underway to determine if the disease can be transmitted by grafting or by insects.

Field studies include a number of investigations. Again, a large study involving 100 trees is underway to determine if the agent is transmissible by grafting. Insect population studies are underway to determine what possible insect vectors of disease reside in or pass through a grove.

A number of trees have been pressure injected with tetracycline to determine if this antibiotic causes remission of symptoms. Whether such a remission occurs or not, it will be valuable data into the nature of the cause of the disease.

At present, we do not know the cause of black streak of avocados and, therefore, cannot recommend a treatment. We do hope that through our research, which is being assisted by a grant from the California Avocado Advisory Board, we will be able to find the cause of the problem in a minimum amount of time.