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## SHADE TREE PROBLEMS

J. G. Brown, Ph.D.

Problems Connected With Tree Culture. Serious Diseases And Methods Of Control.

TREES have been foremost in my mind this fall for several reasons. I had my first view of the big trees in the Sequoia National Park in August, and during the summer I studied for days a wild palo verde tree that has lived under severe conditions of the mesa since the earliest colonial times. The big trees have withstood the vicissitudes of climate for thousands of years and the palo verde for hundreds of years. A great contrast are these, compared with many of our planted trees. Prior to my vacation and since, letters and telephone calls have besought aid in the attempt to save planted trees which were supposed to have received careful attention. And here are these wild trees, whose first day of blossoming, like Thoreau's wild apple, was not observed unless by the chickadee or its western counterpart, standing for centuries in spite of a constant struggle for existence.

From such a comparison as the above one might think that man-planted trees must be handicapped in some way as compared with nature-planted ones; yet this need not be true. Many trees now very old and still thriving are known to have been planted by man. The Ginkgo or Maidenhair tree of Asia was so successfully planted around temples that it was saved from extinction, and the artificial groves appear so natural that they have been mistaken for natural forests even by botanists.

Although man-planted trees need not be short-lived, there are many problems connected with their culture. Some of these problems are very simple, for example that of water requirement. One would think that any person whose trees were not doing well and who suspected lack of water as the cause, would at once take a spade and examine the condition of the soil. Not so. Although lack of water is the commonest cause of the death of shade trees, and although it is comparatively easy to diagnose the trouble, more calls are



Cottonwoods Attacked by Cytospora Canker.

received for help in saving thirsty trees than for any other tree trouble. In such cases it is frequently found that the water is supplied by means of a small basin at the base of the tree. These basins are far too small, —some of them holding only four or five gallons of water to supply a tree giving off dozens of gallons from its green parts during dry windy weather. The tree is worse off than a tall man trying to take a complete bath in a washbasin. The man can bend over and at least moisten his face and head. But the tree, although its leaves are pulling hard on the water column in twigs, branches and trunk, cannot secure enough water to keep them turgid.

Among the interesting situations concerning the water relations of shade trees, which I have uncovered

in my routine work as pathologist, that existing in a neighboring city is noteworthy. Some 2 or 3 years ago many of the 80,000 trees in this city were dying. People were asking about the cause. Finally the mayor and the business manager invited aid. Some of the trees that were dying actually grew in the bed of irrigation ditches; others were located on low ground. The officials who were questioned were sure that lack of water had nothing to do with the matter. Having long since learned that it is best to take nothing for granted in scientific work, I made a series of borings to a depth of three or four feet in many places among dying and thriving trees. Then it was found that even in the irrigation ditches where dying trees were found the soil was

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exceedingly dry. Questioning brought out the fact that some of the ditches had not carried water for years unless after heavy rains and others contained irrigation water only at long intervals. The trees themselves, were crying for water. Margins of their leaves were dry and curled; the leaves farthest from the roots were first to die. Occasionally a tree that occupied a slight depression with no outlet had put forth tiny green shoots from the lower part of its trunk and the growth of the shoots had occurred after the summer showers. Of course the main question for the investigator was not the present cause of the death of these trees, but the reason why they should thrive for years and then die. The depth of the water table and its fluctuations suggested something. With irrigation ever increasing toward the rim of the valley in which this city is located the water table rose in the lower valley. During the period of shallow water most of the large trees had established their root systems. Later the farmers whose land had become water-logged succeeded in bringing about the establishment of pumps for reclaiming their fields. With the operation of these pumps in removing water from the soil, the water table was lowered until it lay far below the root systems of the trees. The latter were now suspended in a dry zone. Light showers and irrigations (where any were given) failed to penetrated deep enough to reach the roots and water did not ascend high enough from the water table to reach them.

Another common trouble is a root-bound condition which is most common found where caliche occurs. In planting the tree a sense of false economy dictates the excavation of a small hole in the hard soil. Often tree-holes are not more than two feet square and three to four feet deep. The tree set in such a restricted space grows well only for a few years; then its roots being to weave back and forth in the confined soil until eventually they form an almost compact twisted mass. Nutriment is exhausted and the roots cannot leave their prison to find more. This is a very efficient method for dwarfing trees,—in fact it is the very method in principle which is used by the Japanese for growing dwarf trees for the trade.

Although the condition previously



Umbrella Trees Killed By Texas Root Rot.

mentioned should be easy to read, there are others which "fool" even a pathologist. Such a case occurred in Tucson not many years ago. At the home of a certain merchant there was a large cottonwood which began to shed its leaves during the summer. I was called upon to examine the plant and to suggest remedial measures. Upon inspection the leaves of the cottonwood were found to be diseased with a fungus known as *Phyllosticta*. The owner was informed that he need not worry for the tree would promptly put forth a new coat of leaves after the diseased foliage had fallen. Great was my surprise a few weeks later when informed by the owner that the tree was dead. Upon removing the tree it was discovered that there was under it a leak in a gas main and the tree had succumbed to gas poisoning.

The problem of the variety of the tree to plant is ever present in a developing country like ours. My opinion, of course, is influenced by the matter of resistance to diseases and severe conditions. The Arizona Cypress, the Arizona Ash, and the Tamarisk are among the freest from plant diseases. The ash occasionally

has an infection of the leaves with *Phyllactinia*, but the disease has never been serious here. Occasionally a tree is killed by the Texas root rot fungus but it is comparatively resistant. The Arizona Cypress, if properly set, is usually free from disease and the Tamarisk is free from vegetable parasites, although attacked by a scale. The Pepper Tree or American Mastic tree is frequently planted for its beauty although often killed by disease and deformed by frost injuries. Sometimes I am tempted to believe that almost all Pepper Trees in Arizona are diseased. The commonest disease of the Pepper Tree is caused by a bracket fungus which has been named *Inonotus Schinii*. The filaments of this fungus grow through the wood so thoroughly that often the only sound part is a very narrow region next to the bark. The fruiting bodies are brown, bracket-like growths which appear during the summer rains most frequently on the trunk or a large limb where a branch has been improperly pruned. Many Pepper Trees are also killed annually by the Texas root rot fungus.

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**SHADE TREE PROBLEMS**

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The commonest shade tree in the country and in small towns is the cottonwood of which there are many species, and all our species are subject to a canker which may kill in a few days. Red threads of mucilaginous nature which are straight, or curled and twisted, are pressed out apparently from the bark, but really from small, flask-shaped fruit bodies of the fungus. These threads contain millions of spores which are distributed by rain, by birds and insects. The disease may travel in every direction from a center of infection in a neighborhood. If one owner tolerates diseased cottonwood or poplar trees on his premises he may scatter the disaster in the plantings of his neighbor.

The palms are free from serious diseases, although fungal leaf-spot attacks most of them. The Chinese Elm is killed by Texas root rot; the Eucalyptus by a disease supposed to be physiological (non-parasitic) and bearing the undignified but appropriate name of "fazzle"; the Olive has a bacterial infection characterized by knotty branches and the Oleander a very similar disease, but neither disease is fatal under average conditions. The Locust tree is easy to keep healthy, and similarly the Austrian Beefwood. Mesquite is subject to a blight caused by the fungus, *Scleropycnium aureum*, when growing in forests, but has no serious troubles when grown as a shade tree and properly cared for.

A much longer list of tree troubles might be given, but enough has been said to show that some care should be taken, at least enough to keep trees in a well-watered and well-nourished condition so that they will

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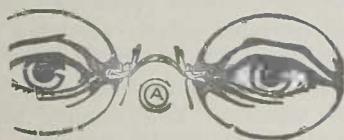
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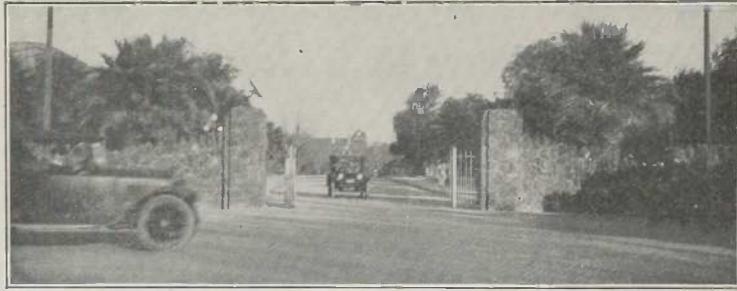


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# CAMPUS ACTIVITIES

GUY MURPHY, '31

## HORTICULTURE WORK PROGRESSING RAPIDLY

Aspirants for the Horticulture Judging Team have been spending every Thursday night working on the identification of the twenty-five different varieties of apples to be judged at the contest to be held in January. Rules and regulations concerning the coming event have been received. This year the contest is to be held on January 16, 17 and 18 inclusive at Rochester, New York.

Practically all of the twenty-five varieties to be used have arrived and the study of varietal characteristics is taken up with competitive identifica-

tion at every meeting of the class.

Due to the Thanksgiving and Christmas holidays coming before the contest, two nights a week will be set aside for this work and during the last few remaining days it will probably be necessary to devote even more time towards an adequate preparation.

The National Intercollegiate Contest will be attended by teams from all sections of the United States, and Arizona will probably be the only team entered coming from a state where apples are not grown on a strict commercial basis. Should Arizona place high in the coming event, it would mean that it doesn't take

everyday contact with fruit growing to be able to judge and identify one variety from another.

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have some resistance when subject to infection. To do this one must begin with the tree hole which should be at least five or six feet square and entirely through the caliche. If caliche exists, dynamite or blasting powder should be used to break it up outside and adjacent to the tree-hole. Then clean mesa soil should be used to fill in around the roots of the tree. With an irrigation basin the size of the top of the tree hole, eight inches deep, and a mulch of manure two inches deep around the tree to lower evaporation; with porous soil, no trouble should be experienced with sun scald, drought injury and other physiological troubles.

Are good trees worth the trouble and cost of producing them? Emphatically yes. Nothing adds more to the beauty of town, city, or country home. That they also add to the actual money value of real estate is beyond dispute. A few years ago I wrote to a number of real estate agents in order to determine the value placed by them upon shade trees. The answers varied, but most were agreed that a good shade tree six inches or more in diameter breast-high increased the value of city residence property from fifty to two hundred dollars, depending upon the location of the tree. An arid country without trees is arid indeed. Repeated planting is costly. Care in planting trees, including the proper preparation of the soil and wise choice of the variety, may not insure trees as long-lived as the Sequoia but certainly it may result in trees as long-lived as the palo verde. Let us plant for both the present and future generations and not for the present alone.

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There is a neighbor living near you. You know he is trying to do his best, for he frequently asks you what to do and when to do it, and you are always glad to give him the information.

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## Arizona Agriculturist,

College of Agriculture, University Station, Tucson, Arizona.

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