

MONOCULTURE CAN BE DETRIMENTAL TO YOUR TREES¹

by Spencer H. Davis, Jr.

You won't find the word *monoculture* in many dictionaries but most arborists are well acquainted with what it means. *Mono* means *one* or *single*, and *culture* from the standpoint of botany and arboriculture means *the breeding or growing of plants*. Thus, monoculture to arborists is the growing and planting of a single species of trees.

In recent years the word *clone* has entered our vocabulary and indicates that all specimens are descended asexually (by cuttings or graftings) from a single common ancestor. All trees of a single clone would have identical cell makeup and therefore all would be resistant to or susceptible to any given disease organism, insect, air pollutant, etc. If all are resistant to a problem that is fine, but then at a later date it may be learned that this clone is particularly susceptible to any given disease, insect, air pollutant; then the entire planting would be equally susceptible.

All plants of a single species have somewhat similar appearance, growth habit, resistance or susceptibility to any given problem. However, there is some variation among the individuals in all these aspects. If you plant thousands of apple seeds, most of the trees that are produced will be susceptible to apple scab, but a few will be resistant. We like those individuals that are resistant and might wish to propagate them asexually forming a clone of apples which are resistant to scab. However, it might turn out at a later date that this clone is extremely susceptible to fireblight or some other apple disorder.

London planetree (*Platanus acerifolia*) has been planted throughout the country because it has proven to be relatively resistant to the anthracnose disease, whereas the American planetree (*Platanus occidentalis*) is very susceptible to this problem. This would seem to be a good reason to plant the London rather than the American plane, but in the eastern part of the country where the cankerstain disease (*Ceratocystis fimbriata* f.

platani) is present, a large London planetree will die in three to four years after becoming infected. On the other hand, I have seen large American planes with the canker disease of many years still growing merrily along.

There is a difference between growing all specimens of the same species, which can vary slightly in their response to any given problem, and growing all specimens of the same clone which do not vary in their response to a problem. For the sake of this presentation I would like to use the term *monoculture* to mean the same species in some cases, and the same clone in other cases. The etymologist who knows about the origin, development and meaning of words would not tolerate my use of the word *monoculture* to refer to two different things. But if you will bear with me, I think you will get my point.

I don't believe that the Good Lord when he planted our land believed in monoculture. If he had, the entire eastern part of the country might have been a monoculture of the American chestnut tree, which is a magnificent tree from the standpoint of wood, fruit and growth. But in 1904 with the advent of chestnut blight, had every tree been a chestnut, we would now be living in a treeless state.

Suppose all the trees had been elms! The folks in our western states would now be facing what started in Ohio in 1930 and has since ravaged the East Coast and is going across the U.S. and Canada. However, in the center of a group of dead elms, you may still find an occasional living one standing tall, beautiful and healthy. Since all the elms are of the same species (not clones) there is an outside chance that this healthy one may have a different genetic makeup and may be resistant to the Dutch elm disease. Let us hope so! It is bad enough that most elms are susceptible to DED, but if all were the same clone we would then have no hope for the future.

1. Presented at the annual conference of the International Society of Arboriculture in Indianapolis, Indiana in August 1983.

When elms died with DED there was a demand for something resembling the elm in growth habit. Many cities planted street after street with honeylocust. The mimosa webworm found this to its liking and before long this tree became such a problem that it is now banned as a street tree in some cities.

As we look at what man plants in some reforestation areas or parks, we may find white pines, which are much the same in growth habit and disease problems. But we have learned in recent years that about 7 to 10 percent of every seedling lot of white pine will be susceptible to the air pollutant ozone and have the problem we refer to as "chlorotic dwarf." Isn't it fortunate that the solid stand of white pines is of white pine species rather than clones, in which case 100 percent might have been selected for growth habit and the selector not have realized that this clone was susceptible to ozone pollutant.

In recent years we have found many cities planting not only trees of a selected species, but even of a selected clone on street after street. We have discovered that some clones of linden are beautiful in growth habit but are extremely susceptible to decline resulting from mechanical damage and the subsequent entrance of any one of several wood decaying fungi.

Recently, Dr. Sydnor of Ohio State University has presented data indicating that one of the popular and much-planted clones of red maple is in trouble as the result of non-hardiness to low temperatures, graft incompatibility and wind damage.

It is (or was) a beautiful sight to see a wide avenue of magnificent American elms arching over the roadway. And we see streets with low-hanging wires where rows of Bradford callery pears are enhancing the view. And on narrow streets with store-fronts close to the street we find attractive rows of the upright Ginkgo.

We know what happened to the avenue of elms. We are now finding that the callery pear as it becomes older is a brittle tree and is starting to show other problems as plantings increase. What may happen to the overplanted Ginkgo sometime in the future?

More than 40 years ago Richard Walter, the municipal arborist for the town of Maplewood, New Jersey, started planning, planting and preaching "mixed plantings." The town of Maplewood does not feature street after street of a single species, but rather it has a mixed planting — a beautiful sight when fall coloration on the streets matches the beautiful mosaic of fall colors in the native forests with its mixed species.

Several years ago at these meetings William Flemer III of Princeton Nurseries in New Jersey presented a paper on "Mixing Species of Shade Trees for Beauty and Safety." As he pointed out then and I wholeheartedly support now, "the concept of mixed plantings is not a new one but rather an idea that has received less attention than it deserves."

If you have seen some of the problems with the solid plantings of whatever species or clones are grown in your area, you may now too be an advocate of mixed plantings. If you have never experienced the devastating effect of rows and rows of dead elms, or the palm trees with lethal yellows or the streets lined with sugar maples declining because of the salt concentration in the soil, then you will probably continue to plant your streets with solid stands of your favorite trees. But remember — monoculture can be detrimental to your trees!

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