

with these remarks, and I will be glad to answer any questions in the discussion period after the next speaker.

MODERATOR GALLE: Our next discussion on Root Pruning, Mudding, Fertilization, will be given by Ralph Shugert, Neosho Nurseries, Neosho, Missouri.

ROOT PRUNING, MUDDING, FERTILIZATION

RALPH SHUGERT

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It is indeed a very great pleasure to appear on this year's program. John Mahlstedt has given me a triple-barrelled topic, so we shall approach them one at a time.

In giving some thought to this paper, I reviewed all the back issues of our Society Proceedings, that are in my library. On the topic of Root Pruning there undoubtedly is a diversity of opinion. At our meeting in 1956, after Bill Flemer presented his paper on "Propagation of *Sophora japonica* by Budding," he was asked by Mr. Carl Kern, "I understand that the roots of *Sophora* trees grow straight down, like the horseradish. If permitted to grow in the nursery, the main root will go three or four feet straight down. Therefore, root pruning is necessary." Bill's answer was, "It is true they have deep taproots. Our experience has been that we get better growth if we dig the *Sophora* as two-year-old trees and actually transplant them, than if we merely run a blade under them and leave them where they are. The same thing is true of honeylocust trees. I think Jack Siebenthaler will agree. If you run the blade under them, it glazes the ground or something underneath the tree, and they stand still and refuse to grow; whereas, if you transplant them and prune them severely with the shears, they grow much more rapidly." Those of us who have grown *Sophora*, and other plants with a comparable root structure, will readily agree. We know that the majority of the coniferous seedling growers will run their digger under two and three year seed beds of *Pinus*, *Picea*, etc., (with the lifters off the digger) to initiate fibrous root development. Without question this fiber root system reduces transplant shock and will benefit many plant varieties. Another value of root pruning is, of course, the stimulation of flower buds. A good point in question would be that of *Wisteria*—in many cases a good root pruning will force a *Wisteria* into a prolific blooming plant. Just a few varieties that have been mentioned in our own proceedings in the light of root pruning have been *Cotoneaster* (1956), Pfitzer Juniper (1959), and Dogwood (1959). My own personal conviction is that most nurseries should be doing more root pruning than is being done. Perhaps this could be summed up well by referring to the 1956 proceedings when Harold Hicks asked Case Hoogendoorn this question, "Do you think it is better to trim the roots of Junipers and try to get new growth in the spring, or would you plant them earlier in the spring if you could, or would you pre-

fer to have new roots?" Case answered by, "Sure, you can trim them and plant them." In our own nursery, the bulk of our root pruning is accomplished by transplanting. For example, all our conifer cuttings and grafts are planted from the bench in late April into the field spaced closely in the row. The following January, the liners are lifted and sent to the nursery fields for customary field spacing. In our opinion, the additional growing year is of great benefit, in particular to Juniper grafts. We, also, have a better transplant than one growing for the eight month period in a pot with a constricted root system.

Now to move to Root Puddling or Mudding. In discussing this topic with growers around the country, apparently not many believe in its practice today. The only two references I could find in our proceedings were in 1953 in regard to *Wisteria* and in 1956 it came up again with this question from Bill Flemer, "Do you think there is any value in puddling — that is dipping the roots in a mud solution as they used to do in the old-time nursery, or do you think it mats the roots together and doesn't improve the stand?" He was answered by Case Hoogendoorn, "Years ago we used to dip in thin mud, but then we found when you get dry weather and the soil is dry, you pull the plant up, the mud will cake to the roots, and naturally, it is going to be that much harder for the young roots to break through. We have eliminated puddling and we just dip in clear water and plant." Apparently the answer is the soil used in the mudding slurry. For those of us who have visited the Shenandoah, Iowa, area, we have certainly seen evidence of mudding in that region. Concrete mudding vats are still in evidence where the roots of all stocks are dipped in a mud slurry before they are ricked in storage. Today most of the *Crataegus* and *Betula* varieties from the west coast are puddled before shipment. Many of the fine *Cornus* growers down south, for example, Hoskin Shadow, mud the root system of their plants prior to shipment. At Neosho we have a pseudo puddling technique that might be interesting to you. We harvest about 100,000 fruit trees annually, and after they are graded and tied in bundles of ten, they are all dipped prior to going into refrigerated storage. We use a four-hundred gallon tank which is two-thirds filled with water. Nicotine Sulphate is added to the tank for control of Aphids in storage. However, as a greater number of trees are dipped, much of our fine Hagerstown silt loam is washed off the roots and thus as a 'by-product' we puddle virtually all of our fruit trees. I personally feel this is an important factor in our Pear and Cherry holding up in storage, since these are the last fruit trees we harvest. Anyone who grows Pear and Cherry knows they will many times go bad in storage in late March or April.

The final phase of this discussion concerns Fertilization. This important topic has, of course, been discussed on many, many occasions during past meetings. In fact, there is mention of fertilizing in every issue of our Proceedings since 1953. That year our Vice-President, John Mahlstedt, discussed fertilization in his paper on "Principles of Rooting Softwood Cuttings of Deciduous Shrubs."

However, in a few moments I will discuss our fertilizer program in relationship to transplanting. As a bit of background, we build our soil with a green manure program, using cowpeas at the rate of one bushel per acre on all our fallowed ground. We are, also, fortunate being in a chicken broiler area, in that we clean out many chicken houses during the so-called 'slack' seasons. We believe we are receiving about 117 lbs. of Nitrogen, 96 lbs. of Phosphorus, and 77 lbs. of Potash per two tons of litter per acre, plus much humus advantage, during the plow-down of the manure. In general, most all plants, particularly evergreen grafts and slow-growing shade trees, are given a top-dressing of 12-12-12 fertilizer every winter. We do not fertilize at the time we plant our transplants, however, we will on occasion water in Broadleaf Evergreens with a Rapid-Gro solution, if the planting date is late in the spring. We are normally blessed with some open weather in Mid-January, and most all of our conifer planting is accomplished at this time. If weather causes us to plant in March or April, we will water in the transplants with water-soluble fertilizer. During the growing season, we use foliage fertilizer every time the spray rig leaves the barn. Our theory is that the machine and labor costs will be there anyway, and the small amount of the fertilizer cost (about \$5.25 per 400 gallons of water) is quite justified.

In summation, I would say all three subjects in this discussion could be important aids to successful transplanting. It goes without saying that no two of us will handle transplants in precisely the same manner, but we all know the importance of going to the field with the finest liner we can grow. We are all, I am sure, constantly trying to improve our techniques from year to year.

MODERATOR GALLE: Thank you, Ralph.

We are moving right along. We are now going to the panel on Hardening Plant Materials for Winter, and the first on the panel is Mr. Roland deWilde of Bridgeton, New Jersey.

HARDENING OF PLANT MATERIALS FOR WINTER (EAST)

ROLAND DEWILDE

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In considering this topic, I felt it wise to begin with a definition of the word "hardening." For the purpose of this talk, let's define it as "treatment of plant materials so as to promote the greatest resistance to damage from cold weather conditions."

There is no area in which we might find a greater difference of opinion and a smaller amount of scientific knowledge. We all know of times when things survived well and times when damage was great, and yet we cannot definitely state what caused the difference in results.

There are some measures we can take, which over the years have become standard practice. These might be divided into what might be termed "cultural practices" — and the things we do which might