

DICK VANDERBILT: No, we have not run into any problem of retarded root development.

CHARLES SCHEER: Dick, have you checked the actual phosphorus levels in the containers when you use the high phosphorus fertilizer?

DICK VANDERBILT: For some reason or another the readings vary all over the block. It is usually greater than 80 parts per ten million and in some cases, in excess of 200. It doesn't seem to make too much difference as long as it is above 80 per ten million.

MODERATOR TUKEY: The first speaker on the last portion of our program today is Mr. James Law from Stark Bros. Nursery. He will speak on "Spray Programs and the Propagator".

SPRAY PROGRAMS AND THE PROPAGATOR

JAMES LAW

*Stark Brothers Nursery
Louisiana, Missouri*

The title of this paper may be a bit misleading. It sounds like I am going to give you a spray program to fit your propagation system. Far from it and in fact about all I want to discuss with you today is how we are approaching the problem at Stark Bro's and how some of our techniques may be of benefit to you. Like a lot of us sometimes we talk a better ball game than we actually play, so bear with us.

Let's try and get a spray program into proper perspective in our total growing philosophy. Basically, on outdoor production (and I'm purposefully avoiding discussion of microclimates such as greenhouses, mist beds and specialized propagation structures) we are working with three noncontrollable growth factors — heat, light and air. With the controllable factors we have water and nutrition.

In these two areas of water and nutrition we can manage several things to modify our control of these factors; namely, weed control, irrigation, fertilization and pest control or insect and disease control if you prefer. The point I am attempting to make is this: without the management of all these controllable factors we can't come up with the final stand, size and grade of a finished plant that we want or desire. Many of us get on a "kick" to have blocks of stock absolutely clean of weeds and yet we are content in our happiness over these weed clean blocks to overlook a disease or insect problem that is either reducing our total stand or grade. It sounds like I'm rationalizing our weedy fields. I'm not, but let's look at the whole picture.

We, and I say WE because our spray program at Stark Bro's is a cooperative effort. We approach our spray program primarily as a preventive program, not *eradivative*. We begin

by writing a tentative spray program in early winter by re-writing our previous season's spray program. Incidentally, this spray program is written for our five branch plants and includes spray programs for our scion orchards, vineyards and fruit variety test orchard.

Shortly after World War II upon the return of Paul Stark, Jr. to the nursery, he was instrumental in writing the spray program, which in somewhat modified form continues to this day. After the tentative program is written we have a work conference between production and research and work out final details and then issue the printed program and issue to the plant superintendents and the spray operator involved.

As to spray records, each operator keeps a record as to crop sprayed, date, material used dosage and gallons applied, plus any remarks or notes he cares to make at that time. We do have these records for several years and use them primarily in revising our program, but also use them for estimating our material requirements when we send out bid lists for spray materials needed.

In formulating our spray program we try and keep the following general principles in mind:

- (a) Recognize that timing of spray application and thorough coverage is just as important as the spray material used.
- (b) The use of competent interested help is most important.
- (c) Use material in our program that does not encourage the build up of other plant pests.
- (d) We attempt to write spray programs with safest material possible, consistent with good control and cost.
- (e) Return to the use of some of the inorganic compounds such as sulphur and copper, especially the latter.
- (f) We are returning to the use of some of the older insecticides, especially the miticides.
- (g) Don't argue with success!

In laying out our nursery rows we leave a spray row every eight or ten nursery rows, our row spacing on this stock being forty-four inches and the spray row one hundred thirty-two inches in width. We use this space to drive through with a self-propelled sprayer built up on a truck frame with a high-pressure pump, tank and blower mounted to the rear, with controls up next to the driver. We arrange our shade tree and scion rows on six foot row spacing and have a spray row every six rows. We spray these with the same unit as above and change the nozzle direction as needed. Except for very windy days we can spray both directions. Should it become windy we spray only one way, with the wind. We like this arrangement for two reasons. (1) — We can get good coverage, especially on trees up to ten feet tall without having to use booms. (2) — It is a rather rapid way to cover a maximum

acreage in a short period of time. The main disadvantage of course is the loss of land tied up in spray rows. This is not a complete loss, however, as we do take advantage of these spray rows on both planting and digging operations.

The only Hi-row spraying we do in our nurseries is for borer control and the application of herbicides. We have several homemade units for this and we were able to purchase a standard farm unit several years ago which we are very pleased with — a John Deere model 600 Hi-clearance sprayer. We also use this unit for granular spreading and for boom broadcast spraying of herbicides.

The only other spraying that we do in the nursery is herbicide spraying in our shade tree and scion orchards. For this type of spraying we use a modified Holder tractor with nozzles arranged in front, using spray systems off center or off-set nozzles. We have been quite pleased with this arrangement.

For your possible help in disease and pest identification a short list of available publications is attached. We have found the Ohio State bulletin particularly helpful to us on ornamentals and use a combination of several states on our fruit spray program.

To summarize:

- (a) — Decide what you want to achieve from your program.
- (b) — Identify the problem
- (c) — Formulate your spray program.
- (d) — Carry through on proper timing and application.
- (e) — Keep good records.

The above won't insure healthy vigorous plants of the size and grade you want but it will enable you to manage one more of the controllable factors in your production program.

Available Publications:

"The Control of Insects and plant Diseases in the Nursery"
Ohio Department of Agriculture
Division of Plant Industry
Section of Insect & Plant Disease Control
Reynoldsburg, Ohio

"Diseases of Ornamental Shrubs & Vines".
The Pennsylvania State University
Agricultural Extension Service
College of Agriculture
State College, Pennsylvania

"Pests & Diseases of Trees & Shrubs"
Wisconsin State Department of Agriculture
(Bulletin #351)
Madison, Wisconsin

"Controlling Insects & Diseases on Ornamental Trees"
Michigan State University
Cooperative Extension Service (Ex. Bulletin
#269)

- East Lansing, Michigan
“*Insect Pests of Shade Trees & Shrubs*”
Purdue University, Cooperative Extension
Service
(Mimeo E-41)
Lafayette, Indiana
- “*Plant Pest Handbook*”
Connecticut Agricultural Exp. Station
(Bulletin #600)
New Haven, Connecticut
- “*Illinois Trees: Their Diseases*”
Illinois Natural History Survey
(Circular #46)
Natural Resources Bldg.
Urbana, Illinois

MODERATOR TUKEY: Our next subject is propagating blueberries by cuttings. Mr. Philip Fisher will be the speaker.

ROOTING BLUEBERRY SOFTWOOD CUTTINGS

PHILIP MCKAY FISHER
Blueberry Pine Farm, Inc.
Allegan, Michigan

My subject is rooting blueberry cuttings which is, of course, the cultivated high bush blueberry, *Vaccinium corymbosum*. There are not many other propagators here, if any, who want to know how to root blueberry softwood cuttings under mist, but possibly some of our experiences will have some application in other fields, with other material. The field is very specialized because if you do not have a blueberry plantation in a blueberry growing area, you do not have the material or market for blueberry plants.

Traditionally in most states blueberries are rooted from hardwood cuttings. The whips from the previous year's wood are 12 inches to 30 inches long, about the diameter of a pen or pencil, cut in 6-inch lengths and taken in March while the plants are dormant. The cuttings taken from the tip of the whip root better than those from the more mature wood at the base, and cuttings with leaf buds root better than those with flower buds. I first heard about rooting blueberry softwood cuttings at the Experiment Station in Puyallup, Washington, many years ago. Because of their cool climate, they had some success rooting them without intermittent mist.

About that time I heard about what Harvey Templeton was doing and what Jim Wells was doing at Dundee, and we got our first advice and nozzles from Jim at that time. We were advised by the Experiment Station at South Haven, Michigan, that even if we could root softwood cuttings, we could not winter them over unless we had a greenhouse. We have been