CHEMICAL CONTROL OF WEEDS AND GRASS IN SOUTHERN PINE NURSERIES

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A 2-year study was completed in 1961 by the Texas Forest Service on the screening of chemicals for weed and grass control in nursery seedbeds. The three general types of treatments tested included pre-seeding, pre-emergence, and post-emergence--or stated another way, chemicals were applied before and after sowing of pine seed. The term "pre-emergence" and "post-emergence" apply to treatments after the pine seed are sown but respectively before and after the seed germinated. Techniques evaluated in this study included variable spray volumes, nozzle pressures, optimum application dates for treatments, toxicity limitations to the seedling crop, and cost-benefit ratio.

Before I go any further into a description of the chemicals and treatments used, I'd first like to explain briefly the reason why we undertook this research study. Back in 1957 the Texas Forest Service acquired a new forest tree nursery of some 325 acres, 200 of which were to be in seedling production, The remainder was made up largely of a watershed and a 35-acre surface area lake plus some administrative grounds for the customary seedling processing buildings, office shops, equipment sheds, etc.

We knew that for the first 5 or 6 years of production and perhaps longer, germinating weed and grass seed, lying dormant up to now, would literally eat us up cost-wise, even though grass is relatively easy to control with mineral spirits. Periodic applications of naptha notwithstanding, hand weeding costs soared. Even at our older Indian Mound Nursery, hand weeding costs were inordinately high, being in excess of $0.25 per thousand plantable grade seedlings. Hand weeding costs at the new nursery were in the range of $0.40 to 80.50 per thousand plantable grade seedlings. These costs are direct nursery operating costs and include wages or salaries of all personnel directly concerned in that phase of nursery operations. It does not include the salary of any classified supervisory employee who may be handling several jobs concurrently.

I want to emphasize that the results of this study are applicable only to the then named Magnolia Springs Nursery and may not necessarily apply to the soils and conditions on your nursery. This is a circumstance that brings joy to the heart of the individual who is interested in chemical research in nursery weed control, always something new with no two soils showing the same results with similar treatments!

The soils at this new nursery are an alluvial sandy loam with an "A" horizon ranging from 18 to 30 inches. The "B" horizon is a good porous sandy clay loam of 30 inches or more. On this type of soil, it is difficult, if not almost impossible, to achieve and hold organic

matter content in excess of 1 percent even with annual applications of a mixture of sawdust and broiler house litter at the rate of 100 cubic yards per acre.

Results from the study indicated that Vapam and Mylone treatments gave some weed and grass control; but they were not as effective as had been anticipated. Results from comparable tests in heavier soils in Louisiana and Mississippi and, perhaps, Arkansas, indicated much more effective control. Vapam does hold an edge over methylene dibromide (MC-2), as a pre-seeding fumigant in that the former costs less and is less expensive to apply. Overall, Vapam was more effective than Mylone in weed control with the costs running about the same. Both Vapam and Mylone cost about S250 per acre applied as compared to about S350 per acre for applied MC-2 treatments. Both Vapam and Mylone have additional properties as a fungicide and nematicide in addition to their herbicidal properties.

Treatments in the pre-emergence tests included such chemicals as Allyl alcohol, Casoron, Dachthal, Diuron, DNSOPBP, Dow General, Neburon, and Zytron. Allyl alcohol, Casaron, Dachthal, and Neburon showed no weed and grass control at all, whereas Diuron gave excellent weed and grass control concurrently with 100 percent mortality of the seedling crop. The remaining chemicals showed some promise but required additional testing beyond the scope of this project.

Post-emergence chemical treatments included Karsil, Dicryl, Solan, C-56 in solution with mineral spirits, Dow General in mineral spirits, Simazin, Amitrol, and Simazin plus Amitrol. While applications of Karsil, Dicryl, and Solan showed some promise of weed and grass control, pending further study beyond the scope of this project, the results from the Dow General and mineral spirits treatments showed excellent control of all weeds and grasses. Many of you know that C-56 has been used for 5 to 10 years as an additive with herbicides in the control of Johnson grass, however, it in itself is toxic to pine seedlings in the heavier concentrations or in repeated applications of lighter concentrations. Results from the remaining treatments showed little or no weed and grass control.

You might as well ask yourself what did all of this chemical screening amount to. In the first place it gave us information on how we could better control weeds and grass in the nursery seedbeds. At the same time and what I consider most important we found that more efficient weed and grass control resulted, significantly, in a greater production of seedlings of premium and maximum grades.

Operational procedures today at the Texas Forest Service nurseries for the chemical control of weeds and grass include one application of a mixture of 3 pints of Dow General (commonly sold under the trade name DNBP) in 30 gallons of mineral spirits to the acre applied within 5 days following sowing. Any later date for the initial application may result in some early seedling loss. Applications of mineral

spirits at 4-day intervals for 7 consecutive treatments at the rate of 12 gallons per acre for the first treatment and increasing each subsequent treatment by 4 gallons per acre, up to 30 gallons per acre maximum. Nozzle pressure may be reduced to 18 p.s.i. to achieve adequate coverage of seedbeds when winds are prohibitive for using 30 to 50 p.s.i. A valve may be installed on the sprayer equipment between the pump and the boom *rig* to regulate accurate p.s.i. output. The materials cost for the first application is approximately S9 per acre with the remaining materials cost for the 7 subsequent treatments amounting to approximately 360 per acre, or based on cost per thousand plantable seedlings, the total investment in materials for the 8 applications amounts to approximately $0.0583 per thousand--using a production figure of 1.2 million plantable trees per acre of seedbed for the sake of convenience.

Now I don't know what your hand weeding costs have been or are at the present time, but I do know that we have spent a substantial amount of money- over the past several years in this activity. By following the operational procedures that were just described, hand weeding costs at the Texas Forest Service nurseries have been reduced from a range of 30.24 - $0.36 to $0.06 - 30.11 per thousand plantable trees, a reduction of 75 percent. This represents quite a substantial savings! It would amount to an even greater savings today in view of the fact that hourly wages have increased by 68 percent over what they were 5 years ago; viz., the average seasonal nursery worker was paid 50.75 an hour in 1960 and 1961 whereas today this same worker is paid an hourly wage of $1.25. It will go even higher within the next 3 - 5 years.

Well, what does all of this boil down to! For one thing, I subscribe to the philosophy that state-forestry-agency-operated forest tree nurseries are charged with the responsibility of producing for the landowner, whether he be small or large, private or industry, seedlings (both pine and hardwood) that are of the best quality possible, commensurate with cost. All of us know that the quality of seedlings our nurseries are producing today could be improved possibly by as much as 20 to 30 percent. That is, in terms of number of prime and maximum grade seedlings. But would the planting forest landowner pay the price? And this improved quality may be stated as including both morphological and physiological expressions, which will be demonstrated as seedlings of larger diameter, more balanced aerial-root ratio, greater percentage of fascicular needles, a larger tuberous primary root for greater food storage, more woodier stem, winter bud, a seedling that initiates faster spring growth, etc. This improved quality does not include the disciplines of genetics, tree breeding, and tree improvement in general, which is another story and a highly important one at that. But, to go back to the original premise, would we get value received for the additional cost the improvement in seedling quality would incur? It is a matter of economics, of application of business principles, of hardnose dollars and cents appraisal. If it

will pay for itself and can be demonstrated to the landowner in such a way as to be acceptable to him, then it is certainly worth the effort and cost to produce forest tree seedlings of the highest quality possible at a cost acceptable to the forest landowner.