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TREE PLANTERS' NOTES

A Publication for Nurserymen and Planters of Forests and Shelterbelts

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Chemical Weed Killing

This issue oi Tree Planters' Notes presents articles from eight nurseries on chemical weed killing. You will find them worthy of study and thought. Their titles and authors arc:

Chemical weeding is no longer a questionable practice. Now that cheap, safe and effective techniques have been devised, it is standard procedure in many nurseries. Some people claim that chemical weeding is one of the most important advances that have been made in the tree-planting program for many years. The vast nurseries that now exist in some states and which produce such scores of millions of trees so cheaply would be impossible if they had to be hand-weeded -- the neighborhoods would not be able to supply sufficient labor to keep up with the problem, and the cost of the young trees would be so great that many people would not plant their idle land. But the millennium has not been reached and even though satisfactory techniques have been worked out in places there is still much to learn. Many nurserymen are constantly trying out new materials and would like to know what is available for trial. Additional articles on this and related subjects are invited for publication in a future issue of Tree Planters' Notes.

Persons interested in nursery and other agricultural chemicals will find a lot of help in three lists that have been published recently. These are:

1. Better Farming Methods -- Vol. 23, No. 1, January, 1951.
(Watt Publishing Co., Sandstone Bldg., Mount Morris, Ill.)

This issue of this magazine is devoted to agricultural chemicals. It has articles on defoliants, brush (mesquite) killers, fertilizers, safety precautions in handling chemicals; and directories for suppliers of agricultural chemicals and equipment for spraying, dusting, seed treating, etc. Single copy price is 200.

2. Entoma - 8th edition, 1949-50.
(Eastern Branch, American Association of Economic Entomologists. George S. Langford, Chairman of Editorial Committee - Dept. of Entomology, University of Maryland, College Park, Maryland-)

This is a paper-backed book of over 400 pages. It gives recent information and instructions on the use of fungicides, insecLicides, weedicides, and others. It lists (and names companies selling) these chemicals and others used as spreaders, solvents, blending agents, diluents, emulsifiers, etc. It lists suppliers of tools and machinery such as dusters and sprayers, soil fumigators, gas masks, weed burners, seed-treating machinery and allied products. Single copy price is 41.50.

A new Government publication written by Paul C. Rudolph about the chemical killing of woody plants is now available. It discusses various kinds of chemical herbicides with the reasons, methods, rates and equipment used for their application. It tabulates the Lake States' woody plants that can be killed by chemical herbicides and specifies the product, rate and method of application, and suggested season to be used on each. It will be cf value to nurserymen who must control woody growth away from seedbeds, as around borders and buildings, and to men in charge of site preparation and established plantations needing release. The title and author is:

Miscellaneous Report #15
Chemical Control of Brush and Tree Growth for the Lake States
Paul C. Rudolph

Address requests for it to the Director, Lake States Forest Experiment Station, University Farm, St. Paul 1, Minnesota. There is no charge for this publication.

WEEDING WITH OIL

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Weeds, the "prime antipathy" of all nurserymen, have lost their sting in southern nurseries. Now, we wave a magic wand over the seedbeds and presto! most of them wither and die, leaving the pine seedlings in complete control.

That magic wand is the proper dosage of Stoddard Solvent, applied when temperature, humidity, soil moisture, seedling age and vigor are optimum. Within an hour the weeds begin to wilt and turn black, and the next morning the leaves begin to curl in the hot sun.

Sounds wonderful! It is. But there is an element of danger in using Stoddard Solvent, because, under some conditions, pine seedlings are either killed outright or are seriously injured. We do not know yet just why or how this happens, but unless the nurseryman is very careful he can wipe out a whole block in a few hours. Thus, a very useful tool can become a two-edged sword with disastrous results.

When mineral spirits was first used we thought that great Quantities had to be applied to make it effective. As our knowledge increased we found that more consistent results were obtained by spraying at more frequent intervals and using less chemical. Originally 40-50 and up to 80 gallons an acre were applied at intervals of 10 days to two weeks. Such heavy applications could not be employed on seedlings less than a month old. Now emerging seedlings can he sprayed with 6 to 8 gallons an acre without any resulting damage. As the season advances, heavier applications can be used, if needed, to kill more advanced weed growth. As a rule the dosage is kept to about 15-20 gallons an acre.

Unfortunately some weed species are immune to oil applications; others can be killed only if sprayed when extremely small. All weeds increase in oil tolerance with age. The general practice now is to spray frequently, especially during the active spring growing season. Some nurserymen make it a routine practice to apply oil twice and sometimes three times a week, using 10-15 gallons an acre. Under this system the weeds are killed as they emerge at the most susceptible stages, and . with a minimum of potential danger to the tree seedlings. There is also some evidence that a high proportion of the immune weeds can be killed, in addition to the resistant and susceptible ones, by spraying just when they are emerging.

Soil moisture should be high when the oil is applied to avoid damage to the seedlings. Generally the area is watered just prior to spraying

with Stoddard Solvent. Weak, chlorotic seedlings are sometimes more susceptible to damage than the weed growth on the same seedbed. Then the whole process is reversed--seedlings are killed and the weeds remain when sprayed at the normal rate.

Damage to seedlings sometimes occurs late in the season when secondary needles are fully developed. It is this damage in the form of a needle and growing-tip burn which may cause arrested growth and weakened stock.

It is best to spray the seedlings when the foliage is dry, especially if secondary needles are common. Severe needle droop resulted from needle burning near the fascicles where droplets of water had collected.

It is important that the oil be applied evenly and at a predetermined rate. This can be done only with a power sprayer traveling at a uniform rate of speed. Hand applications proved to be very unsatisfactory because it is not possible to make an even distribution of the oil over the surface of the seedbed.

THE USE OF GIL SPRAYS FOR THE CONTROL CF WEEDS IN CONIFEROUS NURSERIES IN NEW YORK

E. J. Eliason

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The annual production of the two New York State Nurseries is 40 million seedlings. This reouires that one hundred thousand 4 X 12 seedbeds, or about 85 acres, are in nursery trees at any one time. The use of oil sprays is the routine manner of weed control, supplemented with some hand weeding. In the 4 years, 1947-1950 inclusive, large nuantities of oil spray have been used -- approximately 15,000 gallons per year.

The year 1946 was one of experimentation, and relatively few beds were treated. The results were so favorable that large scale operations were used in 1947 and subsenuent years. While some risk was taken in such large scale use, it seemed necessary in light of the unusual population of weed seed in the ground, due to the necessary neglect during the war period.

The results of these early tests and experience through 1948, have been published in mimeograph form and distributed widely throughout this and other countries. In addition two papers were published by the Northeastern Weed Control Conference, in 1949 and 1950 on the subject. The most complete paper published under date of March 1, 1949, is still available for distribution.

While the above papers give the details, it is well to present here some of the more important practical reszdts in methods of application:

1. For best results, application should be made frequently. While it seems unnecessary to spray when few weeds are in evidence, experience has shown that best results will come from frequent spraying by the calendar, say every 10 days regardless of the apparent weed situation. The small, almost invisible weeds are very readily killed by light applications. As an administrative matter supervisors may have difficulty getting the foreman on the ground to spray this often, since there seem to him to be so few weeds present.

2. In general the more often the spraying is done the less need be applied at one time, since light application will more readily kill the very small weeds. The lesser the amount applied, the lesser too is the danger of tree damage. The number of applications per season then may be as many as 8 or 10, with rates varying from. 20 to 40 gallon per acre per application.

3. Even distribution can be made only with some powered mechanical sprayer. Hand application is not satisfactory. The spray boom and nozzles must be in proper adjustment at all times, in order to do a good :cb. Individual nozzle sprays which either overlap or fail to lap result in an unsatisfactory job.

4. The greatest handicap of the weather element is the wind. Even a light wind causes losses of material and generally an uneven and unsatisfactory result. To offset this element the work may have to be done also at irregular hours, namely early morning or evening. Also the equipment should. be of sufficient capacity to cover acres quickly. A tractor sprayer with an 18 foot boom and traveling at 2 miles per hour, can cover 3 to 4 acres per hour. This allows extra time for refueling. In New York the spray pumps draw the oil directly out of the attached oil drums. No exchange of liouid is necessary, therefore, in the refueling operation.

5. It is important that a consistent, uniform, and known product be used. In recent years there appears to be a gradual increase in the aromatic content in these naphthenic spray oils, and it is well to be informed as to the analysis of the product.

6. Detail records of spray application are necessary for control purposes. An extra man who aids the tractor driver during refueling can well spend the rest of the time checking the performance of the sprayer and make detailed notes on the operation. He should record the number of gallons actually applied per acre or seedbed unit, the condition of the weeds and trees at the time, and. weather conditions.

The importance of "control" in the application of the oil sprays to coniferous seedbeds must be emphasized. If one is working in the dark

unsatisfactory results may be experienced. This "tool" when properly used in the hands oi the nurseryman can greatly reduce the cost of weeding as well as increase the number of plantable trees.

CIL SPRAY WEEDING AS APPLIED Tb FOREST NURSERIES IN PENNSYLVANIA

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During the summer of 1950 the Pennsylvania Department of Forests and Waters conducted experiments at the Mont Alto Nursery on the use of mineral spirits for weed control, similar to those conducted. by Cossitt and Eliason.

Materials used in the tests consisted of two dry cleaning fluids; Sovasol #5, made by the Socony Vacuum Oil Co.; and Esso Weed Killer it35, a product of Standard Oil. The tests were conducted on two species, white and red pine, planted in the spring of 1950.

Applications at the rate of 40, 60, 80, 100, and 120 gallons per acre were made using hand sprayers of the type used around the house to apply insect sprays. Test plots were 80 sq. ft. in area.

All plots were sprayed at least twice during the summer and those plots treated with the lighter applications (40 and 60 gal. per acre) were sprayed three times. When the first application was made, between June 16 and 20, many seed coats still remained on the seedlings but no apparent injury resulted.

A good weed kill was obtained on all except the Esso 40 gal. per acre white pine plot. The poor control on this plot was due to the fact that the weeds were too large when the first application was made and consequently the weeds were not killed and soon overran the plot. This emphasizes a point of extreme importance in the use of mineral spirits, namely, that weeds should not be allowed to get too large before being treated.

It was difficult to tell whether any of the seedlings were killed by the sprays. Seedling counts made for this purpose showed some mortality on untreated as well as treated plots, which was probably due to drought. No permanent injury was observed. Seedlings on the treated plots had a chlorotic appearance and the tips of many of the needles appeared burned. This condition was very slight or almost non-existent on the areas sprayed with the lighter applications but became more apparent as the volume of oil per acre was increased. Three or four weeks after spraying the

coloration began to improve and by October when the seedlings were mulched for the winter, the coloration was again about normal.

Experience and observations from the experiment indicate that early sprayings with light applications (40-60 gal. per acre) when seed coats are still on the seedlings will control the weeds and cause no harm to the trees. Spraying should be repeated whenever necessary to control the weeds but it should be remembered that best control is obtained if weeds are not allowed to get too large between sprayings. Supplementary hand weeding should accompany the chemical treatment in order to control those few weeds which are resistant to the spray.

Difficulty in getting an even distribution of the spray material was encountered in the use of the hand sprayers. Some type of mechanical sprayer is being contemplated for future use, but even with the crude methods used it was possible to reduce weeding costs as much as 50 percent.

VARSOL TRIED ON BLACK LOCUST SEEDBEDS

J. W. Robinson

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During the summer of 1950 we had occasion to try Varsol on black locust seedbeds at TVA's Clinton Nursery. It wasn't a planned experiment, but rather a case of necessity. We had a long period of wet weather and couldn't get on four of our beds with cultivators. Rather than lose these beds to crabgrass, we decided to try spraying with Varsol.

We used an application rate of 25 gallons per acre on two of the 400-foot beds and 35 gallons per acre on the other two. Each bed was sprayed twice, with an interval of three weeks between sprayings. The first was applied when the black locust seedlings were about four inches high, and still green and succulent. The crab grass was half this high and completely covered the beds.

This first spraying killed about half of the grass--and about a third of the seedlings. That's roughly 27,000 of the estimated 80,000 in the four beds.

At the time of the second spraying the seedlings had reached a height of eight inches and their foliage made a tight canopy over the beds. Some of the grass and weeds protruded above this canopy but the bulk was underneath. As a result only the exposed portions were killed by spraying. The locust seedlings suffered a 50 percent temporary defoliation; practically none were killed-

On the basis of this very limited experience we offer these observations for whatever they may be worth:

1. Both application rates had the same apparent effect.

2. Varsol should not be used on locust seedlings while stems are succulent.

3. Later application caused only temporary defoliation.

4. Spraying from above after the seedling canopy has closed does no good. To be effective spray would have to be applied below the canopy.

5. Seedling production on the four beds was cut about one-half by the spray and weed competition.

STUDY CF METHYL-BROMIDE AS WEED CONTRCL IN PARSONS NURSERY

D. A. Oliver

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The study of methyl-bromide as a weed control in the Parsons Nursery was started in 1949. On June 1, one of the standard seedbeds, prepared for spring-sowing, was treated with Dowfume MC-2 under a gas-tight cover. The bed had been prepared in the usual manner by tilling to a depth of 6 to 8 inches with a Seamantiller. After tilling the bed was covered with a sheet of Sisalkraft paper supported above the soil on small wooden horses and covered around the edges with soil shoveled from the paths.

The methyl-bromide was applied with the "Jiffy Applicator" at rates of one-half and one pound per one hundred square feet. The air temperature was 80°F at the time of treatment and minimum temperatures were 44aF while maxima remained at 80°F for the period of treatment. The gas-tight cover was removed on June 3 after being in place 44 hours.

Unfortunately, we were unable to seed this bed to red pine as planned so the effect of the treatment on seedling emergence and growth could not be observed. For nearly a month after treatment this bed showed only two weeds and these were perennial vetch. A few volunteer black locust seedlings also emerged. After six weeks time only a small number of weeds were present and practically no grass at all. At the end of this period, adjacent, untreated beds were a solid mass of weeds and crabgrass up to 24 inches in height. Conditions for weed growth were excellent with generally high temperatures and a total of 9.89" of rainfall during

the period. of 6 weeks. At the end of the growing season the plots had only a few scattered clumps of crabgrass and vetch and some miscellaneous weeds. There was no appreciable difference in the plot with the recommended treatment of one-pound per one-hundred square feet and that with one-half this amount. At the end of 1950 the plots could still be readily picked out on the ground while the adjacent beds had a well-established mat of weeds and. grass.

Cost of this method of weed control should compare favorably with that of applying mineral spirits. The latter, under ParFons conditions, has proved only partially successful. The initial investment in gas-proof covers would be high if plastic-coated fabric were used but, properly cared for, they would last for a long time. Cne type of material was quoted at $0.15 per square foot. Asphalted paper would be cheaper but has a relatively short life.

While the gas temporarily halts growth of all sorts in the soil, it is felt that bacteriological balances will be readily re-established from the adjacent seedbed paths. Given funds with which to operate, it should be a relatively simple matter to devise a machine, mounted on a tractor, which would open trenches in the paths, reel out the cover, and bind and seal the edges.

CONTROL OF WEEDS WITH DGNYUME MC-2 IN WOODY STOCK PRODUCTICN AT THE ALBUQUERQUE SCS NURSERY

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For a number of years we have used 2,4-D as an indirect control of weeds in the area under sprinkling system where most of our woody stock is grown. This indirect control has been done by spraying fallowed areas, borders, surrounding waste areas, and grass-sodded areas in the soil-improvement stage of rotation. Sometimes very local applications of 2,4-D have been made in nursery plantings on individual plants of bindweed. We have had good results in the eradication of bindweed and in the control of horse-nettle. The latter species seems to be very difficult to eradicate, though we probably have not expended as much energy on this species as on bindweed, Fair control of nutgrass with 2,4-D has been obtained where applied on borders, under sprinkling lines, and other areas where a high density of this weed occurred.

Diesel oil and kerosene have been tried as a spray in the control of weeds on borders and. under sprinkling lines and were found fairly effective,

particularly on nutgrass, but too expensive to be recommended as weedicides in standard practice.

The only use made of chemicals for control of weeds directly in nursery beds has been the experimental use during the summer of 1950 of Dowfume MC-2 as a fumigant prior to planting. This chemical was tried on one broadleaf species and two conifers. For the conifer trial, one hundred linear feet of a four foot bed was treated at the rate of three pounds of Dowfume MC-2 per hundred square feet of bed space. Three days after fumigation or on June 23, 1950, fifty feet of bed space was planted. to Pinus ponderosa and fifty feet to Thueja crientalis. The seed was drilled in rows four inches apart. After emergence of the conifers and durirg the rest of the summer there were absolutely no weeds and no loss of seedlings from damping off. Untreated sections of the same bed at both ends of the treated space had an abundance of weeds, particularly our troublesome annual Eragrostis. Damping off was severe in the untreated part of the P. ponderosa planting and a slight amount occurred in the untreated Thu ja. At the end of the season seedlings of both species in the treated portion of the bed showed superiority over those in the untreated ends, particularly in density of stand but to some extent in growth of plants. Furthermore, no weeding was necessary whereas the untreated areas had to be hand weeded two or three times.

About a week later 300 feet of bed space was fumigated at the rate of one pound per 100 sbuare feet and planted to Norus alba (Russian mulberry). This treatment practically eliminated weeding in this bed until late fall when it was necessary to go over the planting by hand to eradicate some late germinators principally of the biennial species. In contrast an adjacent untreated bed had to be weeded by hand shortly after emergence of the Morus.

It will probably be a future practice at this nursery to fumigate prior to planting late-spring and summer sown conifer beds with Dowfume MC-2 at the heavier dosage, not only for the purpose of eliminating weed competition but also for the control of damping off. In reference to broadleaves it should be highly worthwhile to fumigate with the lighter dosage the beds intended for those species which ordinarily suffer from weed competition or are difficult and costly to hand weed.

By using one pound. of Dowfume MC-2 per 100 square feet we figure we were able to reduce our weeding cost by 50 percent.

SODIUM TCA FUR CONTROL OF GRASSES

James B. Augenstein

Savenac Nursery 1951

Undoubtedly ouack grass, Bermuda grass and Johnson grass are some of the most unwelcome weeds around a conifer nursery. These grasses have deep heavy roots and are almost impossible to eradicate either by previously known chemicals, by machinery, or by hand. Any small portion of the root that breaks off and remains in contact with the soil will start growing again even during dry weather.

A fairly new chemical, known as Sodium TCA (sodium trichloroacetate), introduced a few years ago by the Dow Chemical Company has given promising results for the control of these grasses. Sodium TCA does not sterilize the soil as will other herbicides previously used on the control of grasses, such as ammonium sulfamate or atlicide. The chemical is a powder readily soluble in water and is applied as a soil and plant drench. It can be applied any time from early summer to late fall prior to heavy frosts.

Tests were started at the Savenac Nursery in 1949 with Sodium TCA 60% which the company produced that year. The tests were made on a heavy quack grass sod and application was made in late July. The grass was full grown and was cut prior to the application. The TCA was applied at the rate of 80 pounds dissolved in 80 gallons of water per acre. The summer was quite dry and the test plots were not watered after application, so the test was not a fair test. The result was about a 70% kill.

Two plots of quack grass were treated with the same TCA 60% in June of 1950. The quack grass in both of these plots was a medium stand that had not yet formed a heavy sod. One plot was treated with 80 pounds per acre and the other plot with 100 pounds per acre. The 80 pound treatment killed about 80% of the grass and the 100 pound treatment killed 95% of the grass. The plots were wet down occasionally during the summer.

The company replaced the Sodium TCA 60% with Sodium TCA 90% in 1950. Tests were started at Savenac with the TCA 90% in July 1950. The tests were made on moderately heavy stands of quack grass. The application was at the rate of 120 pounds per acre as recommended by the manufacturer. The TCA was dissolved in water at the rate of 1 pound per gallon. The results by late September were a 100% kill.

Apparently the best time for applying TCA depends on the climatic condition. Since TCA works almost entirely on the roots, considerable moisture is needed to carry the chemical down through the soil

to the roots. Tests will be necessary in each locality to set up standards.

The cost of Sodium TCA 90% is 40¢ per pound. At the rate of 120 pounds per acre the cost of treatment would be $448.00 per acre plus cost of application. This cost is very cheap compared with hand digging.

The chemical can be applied with a power sprayer, gravity sprayer, or sprinkling can.

USE CF DOWFUEE MC-2 AS INSECT AND WEED KILLING AGENT IN A FOREST TREE NURSERY IN MAINE

Roger F. Taylor

AssIt. Supervisor, Maine Forest Nursery, Orono, Maine

The poson gas used in this instance was Dowfume MC-2, a product of the Dow Chemical Co., Midland, Mich. No conclusive results were obtained because of insufficient data. This experiment was suggested and materials obtained through cooperation with Dr. Alton Prince, Plant Physiologist of the Maine Agricultural Experiment Station staff, who left to accept another position before the test was completed. It is to be noted that Dr. Prince very carefully screened many types of "cover" materials for this bed treatment. He selected "Scutan" NO. 1241-L, which has a 170 lb. ream weight, 57 lbs. per M sq. ft. - 84 inches width of roll. This product is manufactured by Union Bag and Paper Corporation of Hudson Falls 3, New York.

Two 4 by 12 ft. prepared seedbeds were treated in the spring of 1949 prior to seeding. These beds were adjacent to each other and a metal tray was placed in the space between them. A gasproof paper (mentioned above) was used to cover both beds and. all edges were covered completely with soil to make an airtight seal. A plastic tube ran from the tray on the ground between the beds to the outside of the sealed area. The liquid gas, which is in specially designed pint size cans of one pound under pressure, was released by means of a special circular band attached to the tube, which when clamped on to the can, punctures it and discharges the lieuid gas through the tube into the tray. The fumes then spread throughout the seed-beds. These gas fumes are very injurious to all animal life.

The beds were left undisturbed. for 24 hours and then the gasproof paper was removed. The beds were left to aerate for 48 hours more

before seeding. After this period had elapsed, the beds were seeded to white fir (Abies concolor), by broadcast seeding.

Germination was poor in these treated beds, about 30%. No more of this seed was sown at this time. however, the following spring (1950), two untreated beds were sown beside the treated ones with seed from the same source. These beds had about 50 germination. (Preceding germination test had indicated a low viability for this species, thus no conclusion can be drawn from the above.) It is intended to continue the above experimental treatments in 1951 on species native to Maine.

Henry A. Plummer aided in the treatments.

Presence of weeds was noticeably minimized for the first six weeks after treatment. After that, weeds appeared about the same as in other seed beds. There was no sign of grubs or wireworms in these beds at any time. However, since this land has been worked each year, there are very few of these pests present.

Invitation

All persons who work in reforestation, or who are interested in it or some allied field are invited to send in material for publication in Tree Planters' Notes. If their material is not yet in final form for publication they are invited to at least send a letter to Tree Planters' Notes and tell what they are doing and what manner of information should be published.

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