GROWTH REGULATORS [1]

by Richard G. Alvarez

Abstract. A review of tree control using growth regulators; maleic hydrazide, Maintain CF 125 and Maintain A. The material will cover methods, rates, and equipment used in our spraying program.

Maleic Hydrazide—[MH] Slo Gro

Arbor Tree Surgery has been experimenting with and using growth regulators since 1963. We first started using maleic hydrazide on various tree varieties in northern Nevada. In 1966, we started spraying on the central California coast. Our spraying program has steadily expanded over the years and this year we will spray approximately 90,000 trees with maleic hydrazide.

When initiating a spray program, it is necessary to first audit the species of trees in the areas to be treated. This is needed to determine what chemicals would be best to use. After determining the best chemical, we tag sentinel trees which can later be documented on the results achieved. This information is important because timing and species are critical in a successful growth retardant program and timing can best be achieved through careful documentation. We are currently using Uniroyal's maleic hydrazide (Slo Gro) on various species of trees listed in the timing control chart.

When documenting a spray program, you should photograph the sentinel locations and maintain a control data sheet listing the location, date checked, name of person documenting, number of new leaves, growth in inches from the band and the estimated time of spray.

Since our growth control work is done for Pacific Gas and Electric Company, we use the same mapping system for spraying as we do for our trimming work. Their maps are laid out on a grid system and superimposed with circuit maps. Map supplements are used in conjunction with the grid maps, listing the district worked, grid map number, date started and completed, locations, chemicals used, number of trees sprayed, and miscellaneous remarks. Each day's spraying is listed on a weekly report, which corresponds with the grid map locations and the map supplements. These reports are submitted to Pacific Gas and Electric Company weekly.

In addition, we send a monthly report to Pacific Gas and Electric Company listing the number of days required to complete the map, and number of trees sprayed.

This system of cross reference provides a solid background of information which can be referred to at any time for future scheduling. We have both coastal and mountain areas in this district and with these varied climatic conditions trees leaf out at different times.

Prior to starting our spray program each year we have a 1-day seminar which covers:

1) personnel and areas they will work,
2) estimated starting dates,
3) mixtures and applications,
4) permissions, and
5) general conditions.

The State of California has instituted a state license for all operators that do the mixing of chemicals and all of the personnel involved with our spray program have licenses.

Now that the necessary paper work for documenting is done and we have thoroughly briefed our personnel in mixing, spraying, and securing permissions, we are ready to spray.

Permissions

A. Federal Government, U.S. Forest Service
B. State, Department of Agriculture, Division of Highways, Forestry, Building and Grounds
C. Counties, Department of Agriculture, Road Department, Parks, Buildings and Grounds
D. Cities, Street Department, Parks, Administration
E. Private

General Conditions

The crew size should consist of three men, one man to drive aerial lift, one man to spray, and

[1] Presented at the annual conference of The International Society of Arboriculture in St. Louis, Missouri in August 1976.

one man to follow in a pickup with caution signs and flashing orange light.

Starting and stopping. Start at 6:00 a.m., daylight to avoid afternoon winds. Stop when wind velocity is 10 mph or more.

Conditions to avoid. Learn to recognize trees in stress and avoid spraying.

Maps. Each spray crew will be assigned a set of spray maps. Map supplements shall be attached to each map issued and updated daily. Call the Division when you change districts.

TIMING CONTROL CHART

Deciduous trees are to be sprayed when the growth on each terminal branch shows approximately seven (7) full leaves. Evergreen trees are to be sprayed when they show approximately six (6) inches of new growth.

Group I

Trees that can be sprayed any time, weather permitting: Acacia, bay, olive, cedar, eucalyptus, redwood, cypress, fir, and pine (Note: Pines are extremely sensitive to spray. Use caution.)

Group II

Deciduous trees which require accurate timing: ailanthus, buckeye, Liquidambar, willow, oak, elder, catalpa, locust, sycamore, ash, poplar, madrone, fruit trees, elm, boxelder, maple, and walnut.

Mixtures and applications

Elm, sycamore, ash, cypress, walnut, oak, etc., use the 3-pound rate (1 gallon Slo Gro per 100 gallons of water) with 1 pint adjuvant (in hot dry areas add 2 pints). Spray to the point of drip over entire tree canopy.

Pine, fir, use the 3-pound rate (1 gallon Slo Gro per 100 gallons of water) with no adjuvant. Spray to the point of wetness over entire tree canopy. Do not spray in heavy fog.

Eucalyptus, cypress, use the 4-pound rate (1½ gallons Slo Gro per 100 gallons of water) with 3 pints adjuvant. Spray heavy, past the point of drip, into the inside of the tree.

Maintain CF 125 — Basal Treatment

Arbor Tree Surgery has been using Maintain CF 125 to basal treat trees for growth control since 1971. This program shows promise for the control of many tree species.

The ease in which it can be applied is an improvement over maleic hydrazide spraying. When spraying maleic hydrazide you need an aerial lift plus a 400-gallon minimum spray tank and a flag truck. When basal spraying you only use a pickup with a 50- to 100-gallon tank as a nurse rig and a 3-gallon hand sprayer. With the more mobile equipment, inaccessible areas are no longer a problem.

Maintain CF 125 is registered for use as a foliar spray using water as the carrier. We needed an experimental permit because we deviated from the label by using No. 2 diesel or transformer oil and toluene as the carrier and basal sprayed the trunk.

It is my understanding that U.S. Borax is now considering a label for this application.

Maintain CF 125 is systemic which means that it translocates throughout the system of the tree moving from the sprayed area to the terminal tips and roots. The transformer oil holds the chemical in suspension allowing it to penetrate through the bark, past the phloem into the xylem, which transports it.

When to treat

Needles should be fully elongated on newest candles (terminal growth).

Treat immediately after trimming if topmost terminals and obvious lateral terminals are removed.

How often to treat

This is dependent on needle life; needle renewal is important. If needles live two years, then new growth must occur every other year for replacement.

What part of tree to treat

Treat the base the first time; not all scaffolds will be inhibited equally. Spray low at the base, not at eye level so the band will not be too visible to the public. Treat individual scaffolds or higher up on main leader the next time to get more

chemical into more vigorously growing branches near utility lines.

How much to apply (dosage=concentration x volume x area of bark treated)

Usually the larger the area treated the larger the volume applied but this depends to some extent on individual applicator and formulation. For Monterey pines use the 1% morphactin formulation in transformer oil or No. 2 diesel and toluene. Vary the band width according to tree size. For large trees (20 feet tall, 20 feet spready and many scaffolds) the band width equal to trunk diameter. For small trees (less than 20 feet x 20 feet and few scaffolds) the band width equal to ½ trunk diameter. For largest trees increase the band width, concentration, or frequency of application (apply twice in one week).

Remember for growth regulators, the most effective dosage for each tree size is not a known relationship. We believe that the chemical moves mainly into the needles (leaves) with the transpiration stream, then to terminal buds, and hence, the larger the tree canopy (crown) the greater the dosage of chemical required to move into all parts of branches.

Treatment of broadleaved evergreens—tentative

The most important consideration is when to apply. This is related to leaf longevity. If the leaves live only 12 months, we must treat these trees as if they were deciduous and treat them only after leaf initiation in the spring (but before major stem elongation). If the leaves live two years, we may be able to treat them the same as coniferous species.

Dosage for eucalyptus, olive, and Ficus trees may be larger than for conifers. First results from experiments with small trees and scaffold branch treatments indicate that a 1% morphactin solution applied to a band width four times the trunk diameter is required for satisfactory inhibition. Perhaps 2% or 4% solutions can be applied but we have no data as yet on phytotoxicity. Other formulations are to be tested later this year and next.

What results do we expect to see?

We expect the control of terminal growth. The tree will not bolt, thus eliminating the new growth that would annually be trimmed. We expect thicker and greener looking trees. The trees treated have been shown to produce more bud break thus making thicker growth. The trees will maintain their shape without pruning.

Application

No tree is to be band-treated unless it has been trimmed. Do not treat small trees. Diseased trees or trees under stress are not to be treated. All trees treated must show one year's leaf growth before retreatment. Pine trees must have developed a set of full new leaves and also must not be in candle stage. Deciduous trees must have a minimum of four or five leaves before treatment. Apply the mix on the base of the trunk near the ground line to the point of wetness and no more. Keep within the instructed band width. Limb treatment will be under the advice of the licensed operator. Keep the nozzles adjusted to conform to the band width.

Permits

Notify the proper government agencies and obtain permits. Start November 1st for the following year. At the present time, we are basal spraying under State Permit #506047 and Advisors Permit dated 10-14-74, per R.G. Alvarez. We are properly registered in each county in which we will be spraying.

Documentation

Procure grid switch maps of areas to be treated. Set out three pilot areas (100 trees) throughout the Division. Keep a history (data kept on grid maps and supplements) which tells the next employee what was done and has been done four or five years down the road of time. Always remember this, even the poorest memo is better than the greatest memory.

Records must be kept up as you go, not the next day or week. Do them now, today. We forget too fast. It's the only way we can be sure of results, if it is doing good or bad. Records tell us what it costs and if the method is worth continuing. They are a way of improving the work.

Public relations

Only foreman, spray operator, or someone who is familiar with the spray program shall contact the tree owner or his representative and document the contact. (Be sure of their authority.) He shall be neat in appearance and keep the equipment neat also.

He should say, "Hello, I'm _____, with Arbor Tree Surgery and we have a contract with PG&E. to treat trees which are growing close to energized electrical lines with a growth regulator. The chemical stops excessive suckering which keeps the trees from growing into the lines."

Answer all questions which you personally have the knowledge about and if they want further information, advise them that you will have your supervisor contact them. Do not spray without permission. Do not debate with the customer if they are not willing to let you spray. Do not press for permission. Let them know it is their decision on whether to spray or not.

Problems with Maintain CF 125 include timing, falling out of solution, staining the trunk, odor, agitation, deforming, traffic safety, uneven distribution, overspray. Do not treat fruit and nut trees (excluding black walnut), and do not treat exotic plants, trees, or exotic landscape areas. It is toxic to skin and hazardous to fish.

Maintain A

Maintain A is in an aerosol can which we use to paint the pruned cuts to prevent suckering. We have noticed less growth on trees which we have used this tree paint on, but not as noticeable as the 1% banding with Maintain CF 125 or foliar spray with maleic hydrazide. We feel that this is another tool, which when used properly, will aid in reduced tree growth.

All crews are issued Maintain A in aerosol cans which they carry with them at all times. It is considered part of their personal gear like a rope, saddle, or hand saw.

Our personnel are instructed to paint all cuts over 1 inch in diameter, wherever possible.

President, Arbor Tree Surgery
Atascadero, California

ABSTRACTS

Gardiner, L.M. 1976. **Tests of an introduced parasite against the native elm bark beetle.** Bi-monthly Research Notes, Canadian Forestry Service 32(2): 11.

At the northerly limit of its range in North America, Dutch elm disease is spread almost solely by the native elm bark beetle, *Hylurgopinus rufipes*. Indigenous parasites do not seem to be effective in controlling populations of this beetle. A European braconid, *Dendrosoter protuberans* has been introduced in the United States in recent years and is reported to be established in Wayne County, Michigan and possibly in Missouri. This is the most common parasite of the smaller European elm bark beetle, *Scolytus multistriatus* in Europe and was introduced in an attempt to control this beetle in the United States. It seemed worthwhile to test *D. protuberans* against *H. rufipes* in central Ontario where the beetle parasite niche seems to be inefficiently filled.

Weatherston, J. 1976. **A new insect trap for use with Lepidopteran sex heromones.** Bi-monthly Research Notes, Canadian Forestry Service 32(2): 9-10.

The use of sex-pheromone baited traps in the monitoring of management of populations of lepidopteran agricultural or forest pests, is affected by several factors including availability of the synthetic pheromone, type of pheromone dispenser, release rate, and trap design. Improvements in trap design that led to the patenting of the Astrotrop were increased access to the trap by flying insects while still maintaining a large trapping surface, increased service life by making the trap reversible because the majority of moths are trapped on the lower half of type 3 traps. These improvements were accomplished by making the trap from flexible sheets of plastic laminated paper.