HERBICIDES AND THEIR EFFECT ON THE PLANT COMMUNITY [1]

by John A. Meade

Abstract. Herbicides are chemicals designed to kill weeds. They will also kill desirable plants if they are misused. In our present day society, it would be difficult or impossible to do without some herbicides. Consequently, it is important to understand herbicides and use them in the proper manner. Most of our preemergence herbicides do not injure trees. The broadleaf herbicides account for most of the injuries reported to this office. The total vegetation control agents also account for a number of injuries. These can sometimes be alleviated by using activated charcoal. Once the herbicide gets into a tree there is little that can be done. No major pruning or removal should take place for a year or so because quite often a tree will recover from herbicide injury. Extreme efforts must be made to read the label for precautions and directions to insure minimum effect on trees.

Herbicides, as the name implies, are compounds designed to kill plants. Most of them do a respectable job. They remove unwanted herbs while leaving the desirable ones. Occasionally, one gets out of hand and injures desirable plants.

Hence, we have good effects on the plant community and bad effects. First, we will examine the good effects.

Beneficial effects of weed control

The characteristics which make weedy plants undesirable are well known. Weeds compete directly with desirable plants for water, fertilizer, and space. In addition, and of importance to plantsmen, they detract from the beauty of an ornamental planting. No one likes to see weeds obscuring the symmetry of a well-designed planting. Also, weeds are dangerous to health. Either directly as with poison ivy and the ragweeds, or indirectly as when weeds hide stop signs, guard rails, and bridge abutments.

Therefore, it is important to remove these weeds so that the desirable plant community can grow better and be of more benefit to mankind.

There are several ways to remove weeds. We generally categorize these as follows: *biological* — the use of bacteria, fungi , or insects to destroy weeds while ignoring desirable plants; *mechanical* — this ranges all the way from simple pulling to nylon spinners to large mowers; *chemical* — the use of a compound to kill existing plants and/or prevent germination of seeds.

Biological control is progressing slowly because of the high cost of finding weed predators and then making sure they eat only those weeds. There are some notable successes — an insect which devours prickly pear in Australia and one which destroys a range weed (Halogeton) on our western ranges. While work on biological control will increase, it will take many years to become of great significance.

Mechanical control is our oldest means of removing weeds and is still very much in use. The high cost of equipment and especially of labor makes other means (herbicides) more attractive. Also, a great many trees are injured or killed by rough treatment with mowing machines.

Chemical control has been readily accepted by a great many people because of its effectiveness, its economy, and its safety. There are several groups using herbicides in the tree environment. They include municipalities, railroads, utilities, highway departments, farmers, and last but not least, homeowners.

Not all of these users have been equally well trained in the safe use of herbicides.

Detrimental effects of herbicides

When used within the limits laid down by the manufacturer on the label and recommendations of the State Extension Service, herbicides rarely do great harm. Our problems are caused by failure to read the label, ignorance of some of the basics of herbicide use, or misapplication.

Relatively safe around trees. — There are some herbicides that, however grossly misused, rarely injure trees. These include the preemergence crabgrass herbicides for turf,

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such as DACTHAL, BETASAN, TUPERSAN, and BALAN. In ornamental plantings, TREFLAN and EPTAM cause no injury. The chemical trimmers such as ROUNDUP, PARAQUAT, cacodylic acid, disodium methylarsonate (DSMA), and calciumacid methylarsonate (CAMA) are not ordinarily responsible for any tree damage.

Not so safe. — The hormone or translocated herbicides can cause considerable damage to trees when misused. This group includes 2,4-D, 2,4,5-TP, MCPP, and dicamba (BANVEL). Precautions for safe use include:

1. Use at temperatures between 65 and 85 deg. F.
2. Use when wind is 5 MPH or less.
3. Use anti-drift additive when working close to trees.
4. Use in early spring or late fall when tree injury potential is less.
5. Use coarse droplets.
6. Keep nozzle pointed down toward target.
7. Do not apply these materials (especially dicamba) within 10 feet of the dripline of trees.

Not safe at all. — Some herbicides have been developed which remain in the soil a long time. These compounds, originally called soil sterilants, are now called Total Vegetation Control materials. They kill existing vegetation and then prevent germination of seeds and regrowth of perennials. Tree roots can absorb these and move them into the tree. Depending on the compound and the rate applied, they remain active for periods of 3 months to 1 year or more. When used properly and in the right places, they are very useful compounds. They should not be applied anywhere near trees nor should they be applied on slopes where a heavy rain could wash them into tree root zones.

These compounds are used by highway departments to maintain guardrails; utilities to keep substations weedfree, and industrial parks to reduce fire hazard from vegetation killed by frost. Other areas of use include cemeteries to obtain a vegetation-free band around tombstones and homeowners who want weed-free patios, driveways, and similar areas.

Materials used include HYVAR, KROVAR, VELPAR, SPIKE, UROX, PRAMITOL, ATRATOL, TELVAR, KARMEX, and CHLOREA. These, like the preemergence crabgrass materials, are often sold in combinations and under various trade names. Usually the common name is listed on the label.

One of the troublesome areas in the use of these materials is the practice of companies formulating these products and selling them along with their floor waxes, cleaning solutions, and other maintenance items. Unfortunately, neither the salesman nor the buyer is aware of the problems involved and the materials are often misused resulting in serious tree injury.

What do herbicide effects look like?

The preemergence herbicides, eg. DACTHAL, TREFLAN are not known to cause injury to trees. They are not absorbed by tree roots and do not enter through leaf surfaces.

The postemergence crabgrass materials do not enter tree roots but if they are sprayed on leaves, the drops leave spots. If coverage is sufficient, the entire leaf may die. Fortunately, these compounds do not move inside the tree so only the sprayed leaves are affected.

The same is true of the contact type herbicides such as PARAQUAT, PHYTAR, BROADSIDE, and CHEX-MATE. ROUNDUP does appear to move in some trees although usually only the treated portion dies.

The majority of problems that are referred to this office are caused by the phenoxy or hormone type materials. Included here are 2,4-D, 2,4,5-T, silvex, mecoprop, and BANVEL. These materials are readily absorbed by tree leaves and are moved throughout the tree usually to growing points. BANVEL can also enter tree roots from the soil solution. Once in the tree, these materials cause curling of leaf margins and elongation of the central vein. This type of injury is widespread since these materials are applied by homeowners and commercial applications.

The root absorbed total vegetation control agents, while causing less frequent injury than the others, bring about a more permanent injury. As with the other herbicides, once they are in the tree they move to the growing point. A marginal

chlorosis is the first sign, then the chlorosis becomes more pronounced and moves back between the veins. Then the leaf turns brown and dies. One of these materials (HYVAR) turns the veins black. Usually injury from these compounds shows up near railroad tracks, power lines, substations, highways, and cemeteries.

Care must be taken to make sure that suspected trees were not injured by some other factor. Trees can only change so many colors and so many growth malformations and there are several things that can look like herbicides. Included among these are nutritional disorders, air pollution, and soil drainage changes. One of the best ways to determine if herbicide injury is present is to find the material that was applied and check with your state weed specialist. Some detective work is sometimes necessary. A survey of the area around the tree may reveal other plants with similar symptoms. Or you may find an otherwise forgotten herbicide container in a shed.

What to do if a tree is injured

This is a difficult question to answer because of the different degrees of injury. If there is a misapplication and it is detected right away, the area can be treated with activated charcoal (2 trade names known to me are Gro-Safe and Aqua-Nuchar — there are probably more). The amount depends on the rate used but is usually 1-2 lbs per 150 sq ft. This must be worked into the soil where the herbicide was applied or the area to which it moved.

If the herbicide is in the tree there is little that can be done. Pruning will remove some of the injured branches and improve the looks. No major surgery should take place for at least one year because quite often the tree will recover completely.

In summary, herbicides are useful tools when properly used and it would be difficult, if not impossible, to get along without some of them. The potential for misuse demands that the user read the label and follow directions and precautions to the letter. Don't hesitate to contact your county agent or state weed specialist if you have any doubts about the safety of an herbicide application, either yours or someone else working close by.

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ABSTRACT

Skirvin, R.M. & M.C. Chu. 1977. **Tissue culture may revolutionize the production of peach shoots.** Illinois Research 19(4): 18-19.

Tissue culture is a system whereby cells from very small pieces of plants are proliferated on an artificial medium under sterile conditions. Typical sources of plant tissue cultures include embryos, seeds, stems, leaves, shoot tips, root tips, callus (wound tissue), single cells, and pollen grains. Scientists are interested in tissue culture for three reasons: rapid propagation, elimination of disease, and improvement of asexually propagated varieties. Most early tissue culture investigations concentrated on herbaceous species. Only recently have investigators seriously attacked the strenuous task of developing intact plants from tissue pieces of woody plants. Success has been reported with eucalyptus, certain types of *Citrus*, poplar, hazelnut, Koa, and almond.