WEED CONTROL IN THE NORTH-EASTERN UNITED STATES

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WEED CONTROL IN VARIOUS TYPES OF FARMING:

Weed control in crops in the Northeast is still a cultivation problem in the main. Other agents are used in conjunction with cultivation, or to replace cultivation altogether if conditions make it impossible to use machinery. As a whole, however, chemical and other agents have not replaced cultivation, but merely helped the farmer obtain better control than before.

Weed control in pastures is considered primarily a management problem. Under proper grazing and fertilization, the sward is relatively free from weeds. When hay fields begin to run out and lose much of the clovers, they are plowed under and cropped for several years and then put back into hay. With pastures, if the land is suited to it, a similar sequence is practised. In many cases, however, the land cannot be plowed owing to slope or stoniness. Weeds are then controlled by hand, by burning or left to grow if the livestock do not take care of them.

As most of the pastures contain little clover, chemical sprays, especially 2,4-D, would in most cases control the broadleaved weeds, but the cost of applying these chemicals over secondclass land is not felt to be justifiable, in view of the expected increase in returns from such treatment. It may be summed up this way: Good hay fields or pastures rarely need spraying, and poor ones aren't worth it.

CHEMICALS USED IN WEED CONTROL:

(a) Selective Weed Killers of the 2,4-D Type.

The hormone weed killers, such as 2,4-D and 2,4,5-T still lead the field in research. Klingman of North Carolina lists 79 proprietary compounds based on 2,4-D manufactured by 34 companies, while Knowles and Anderson of Ottawa list 112 compounds containing 2,4-D available in Canada. While a number of these latter are duplicates of the American ones, it serves to illustrate the widespread demand for 2,4-D. About half the compounds are amines, and the other half made up of salts and esters.

Some work has been done at various experiment stations, comparing 2,4-D with 2-methyl, 4-chloro-phenoxyacetic acid (M.C.P.A.) but otherwise practically all hormone weed killers for commercial use are based on 2,4-D formulations.

The effectiveness of 2,4-D is limited to controlling broadleaved weeds in crops of the Gramineae family. It has found its greatest use in the Northeast in controlling broadleaved weeds in lawns, golf-courses and other turfed areas.

No single crop has received more attention than corn (maize) where 2,4-D is concerned. Practically every experiment station in the United States and the U.S. Department of Agriculture has made several experiments to determine rates and times of applications, effects, and so forth, of 2,4-D in controlling weeds in corn. Corn lends itself particularly well to the use of 2,4-D, being somewhat tolerant of the chemical, and being a row crop which has to be cultivated fairly frequently to control weeds, many of which are sensitive to the chemical. Farmers are resorting to early applications of 2,4-D when the corn is young; some with their own equipment, but most by custom sprayers. This usually eliminates one, and sometimes two, of the early cultivations at a busy time of the year, kills weeds between the corn plants, and reduces the amount of injury caused by cultivating very young plants.

Weeds have been controlled in corn by the use of 2,4-D alone. However, where the crop was kept weed-free during the season by application

of the chemical alone, yields were considerably lower than when the plots received several cultivations. This showed that cultivation was still beneficial for other reasons than for weed control, especially on heavy soils. In the normal course of events, corn is cultivated three or four times during the season. The elimination of two or even one cultivation early in the season has found favour with many farmers. Where cultivation is impossible, chemicals are resorted to, rather than let the crop be wasted.

The low-volume, low-pressure equipment is being used to a large extent. Pressures as low as 30 pounds per square inch, and volumes as low as five gallons per acre are commonly used. A small truck can, by carrying two 55 gallon drums, easily spray 20 acres with one load of spray material. The lighter equipment is an advantage if the spray must be applied on wet land.

Interest has focussed recently on the use of 2,4-D as a pre-emergence spray in corn. Used at heavier rates than are possible after the corn has emerged, the chemical has controlled broadleaved weeds and annual grasses such as foxtail and crabgrass for several weeks after the corn plants have come up. As the weather plays such an important part in the effectiveness of such treatment, this type of application is not yet generally recommended to the farmers except as a trial over part of a field.

In grain fields not intersown with clovers, 2,4-D has to some extent replaced other chemicals in the control of broadleaved weeds. Some mechanical injury results from the use of equipment in the grain fields, but even so this is often profitable in cases of severe infestation. The use of airplanes in applying the spray is increasing, especially in the larger fields. Dusting is not practised to any great extent in the Northeast, because of the danger of drift. Wind may drift the dust several miles and injure sensitive ornamental and crop plants. Many States have a ban on dusting from airplanes, and for others, dusting is controlled by regulations of the Civil Aeronautics Administration.

Esters of 2,4-D and 2,4,5 T are being used along railroad and power rights-of-way where elimination of gross vegetation such as weeds and brush is desired without eliminating all vegetation. Mixtures of 2,4-D and 2,4,5 T have been found more effective than either alone in doing this and still leave the grasses to prevent erosion. Fence-rows are sometimes sprayed, though as a rule they are left to grow into brush. More use is also being made of these chemicals along roads. This eliminates tall brush which obstructs vision around curves, and still leaves a grass cover.

(b) Calcium Cyanamide as a Weed Killer.

Calcium cyanamide ("Cyanamid"), while a nitrogenous fertilizer containing 20 to 22 per cent nitrogen and a lime equivalent of about 70 per cent of calcium hydroxide, is used to some extent as a herbicide in certain crops. "Cyanamid" is applied to asparagus beds and gives satisfactory control of small annual weeds and grasses. The deep-rooted perennial crop is not injured by the chemical, while the shallow-rooted weeds are killed. In tobacco beds the use of "Cyanamid" serves a three-fold purpose - it adds lime and nitrogen to the crop, destroys weed seeds in the upper surface of the soil and kills various molds, fungi and bacteria, which produce "sick" soils.

The use of "Cyanamid" is also increasing where weed-free compost is required for top-dressing on lawns and putting greens. For seeding new lawns large amounts of cyanamide have produced weed-free conditions greatly facilitating the establishment of a good turf.

To a limited extent calcium cyanamide is used as a weed control agent and fertilizer in deeper rooted crops such as corn. In this case, the crop is planted and then the material is applied uniformly over the surface at rates of 300 to 400 pounds per acre. This is also effective in controlling annual weeds and grasses for several weeks, or until the crop can be cultivated with less injury to the plants. A dusting grade of cyanamide is also manufactured, and is occasionally used as a selective weed killer of

broadleaved weeds, especially of the Brassicaceae, in peas and small grains, though 2,4-D and the dinitro compounds are usually used, the latter for crops sensitive to the hormone weed killers.

(c) Dinitro Compounds.

The dinitro compounds such as Sinox W (sodium dinitro-o-cresylate) and Dow Selective (2,4-dinitro-o-sec-butylphenol) are used as selective weed-killers in crops sensitive to 2,4-D. These compounds are used to some extent in field peas and canning peas, and in small grains seeded to clovers. Water solutions of these compounds are quite effective in controlling annual weeds without injury to the crop.

The concentrated dinitros in oil are used when quick temporary elimination of all herbaceous weeds is required, as along highways, railroads and fence rows. Good killing is obtained without sterilizing the soil, and new growth appears in a short time so that erosion is generally no problem. These materials are also used to kill potato vines and weeds before harvesting the crop, thereby loosening the soil from the roots and making easier digging and picking. One advantage of the dinitros is that they are relatively non-toxic when compared with sodium arsenite and sodium chlorate.

(d) Miscellaneous Chemicals.

The following chemicals are used quite frequently though they are limited at present to specific crops which are injured by 2,4-D, the dinitros, and cyanamide, or against weeds which are not controlled by these chemicals: Ammonium sulfamate, Stoddard solvent, sulfuric acid, sodium chloride, trichloroacetic acid, ammonium thiocyanate, and P.M.A.S.

1. Ammonium Sulfamate:

Ammonium sulfamate ("Ammate") is used to some extent to kill Poison Ivy, Poison Sumac, and other woody shrubs. It is used in much the same manner as 2,4-D plus 2,4,5 T compounds, except that it is more effective against poison ivy than the hormone weed killers. This compound is also applied to stumps to prevent resprouting along highways and under power and communication lines. The fact that it is not poisonous and not dangerous to handle is also in its favour. That it will kill poison ivy is alone sufficient for Ammate to have its place among the other weed control agents used in the Northeast.

2. Stoddard Solvent:

Stoddard Solvent, a light unsaturated aromatic oil, is commonly used to control weeds in carrots, parsnips, parsley, and in other members of the Umbelliferae. The oil, when applied just before the slow germinating crop appears, or shortly after germination, will control annual weeds with no injury to the crop. Other similar oils are used; Stoddard Solvent being used as an example.

3. Sulfuric Acid:

Sulfuric acid as a two per cent solution is still used for the control of small broadleaved weeds in onions, in spite of its danger and damage to equipment. The dinitros have been tried out, but reports are conflicting, so it appears that sulfuric acid will have to be used until something more suitable is discovered.

4. Sodium Chloride:

In garden beets, common salt (sodium chloride) has been used for a good many years, and is still being used. Besides controlling weeds, the crop seems to do better with the salt, and growers say that the beets are of a better quality than when no salt is used. In the Northeast, with an average rainfall of over 40 inches, even using this method of controlling weeds on the same land several years running would hardly build up any

concentration of salt as it is rather easily leached, much in the same manner as sodium nitrate. Until some chemical is found which is as effective in controlling weeds, improves the quality of beets, and is as inexpensive as this one, salt will continue to be used to a large extent.

5. Trichloroacetic Acid (Salts).

Several minor compounds are being investigated for their herbicidal qualities in specific weeds. Ammonium and sodium trichloroacetates have shown considerable promise in the control of Quackgrass and Kentucky Bluegrass (*Poa pratensis*) in experimental trials and are being used to a limited extent commercially. As they are practically non-toxic, they can be used where livestock graze. Most perennial and annual grasses can be controlled. While these chemicals are a specific for Quackgrass and other similar grasses, they can also injure broad-leaved plants, shrubs and trees. The period of soil sterility is relatively short (60 days), and this may replace the inorganic soil sterilants, where less drastic action is desired. So far, cost has been the main factor limiting their use.

6. Ammonium Thiocyanate.

In limited trials, ammonium thiocyanate has shown possibilities against Nutgrass. There again, the cost of this chemical is prohibitive, except on limited areas of high return land, such as truck farms and gardens. The chemical upon decomposition releases nitrogen and therefore has some fertilizer value in addition to its herbicidal properties. Soil sterility may last one season, but in areas of heavy infestation, may be well worth it.

7. P.M.A.S.

An interesting example of how a chemical which was developed as a fungicide and later found to be a selective weed killer is furnished by phenyl mercury acetate solubilized (PMAS). This chemical was synthesized a few years ago to control various turf diseases. However, except for good control of one disease, it wasn't very efficient. After various trials, it was noted that where PMAS was used, Crabgrass infestation was much reduced. This chemical is now used widely in controlling Crabgrass in fine turf and lawns of Bentgrass, and Kentucky Bluegrass. Not only does this chemical control Crabgrass without injury to the turf, but it also reduces the incidence of disease. Other mercury and cadmium compounds have now been substituted for PMAS in disease control.

(e) SPECIAL APPLICATIONS:

1. Soil Sterilants.

Where no vegetation is wanted, as on railroad beds, drainage ditches, under power transmission towers and around power and communication poles, soil sterilants are still used. Sodium arsenite, borax, and sodium chlorate, are the chemicals most commonly used for this purpose where semi-permanent sterilization is required. Where danger from fire is a factor, as around petroleum installations, arsenals, and warehouses, borax or sodium arsenite is used. If there are any livestock around, sodium arsenite is not used. Often some sodium chlorate is added to the borax to make a more effective kill and longer sterility.

Common Salt (sodium chloride) is also used to eliminate all vegetation along paths, driveways, against garages, and similar places. It is cheap, easy to apply for small areas, and non-toxic. The latter is very important where children and pets are concerned, and this compound is used primarily in residential areas.

2. Contact Weed Killers.

Another aspect of weed control is the elimination of all vegetation when digging potatoes. Several killers are used to kill the weeds and any potato vines which may still be alive. Sodium arsenite, the dinitros, and other non-selective weed killers are applied. Some growers have even gone one

step further on badly infested fields. When the vegetation is dead and dried up, the plants are burned with tractor mounted burners. Others go over their fields twice with burners: The first time to kill, the second to burn the plants.

3. Public Health.

The control of Ragweed and Poison Ivy presents a special problem in that much of the work done in eradicating these weeds is done for health reasons. The pollen of Ragweed has been determined to be the prime cause of hay-fever and much work has been done in trying to control this plant around New York City. A number of townships in New Jersey and New York have co-operated in spraying vacant lots, roadsides, and waste places; and in encouraging home-owners to do the same. In several areas considerable success has been obtained, as evidenced by pollen counts, and by the reaction of hay-fever sufferers. The control of Poison Ivy and Poison Sumac has also been attempted in heavily settled areas, but the demand for such measures by the general public has been much less pronounced.

(c) FLAME CULTIVATION:

Flame cultivation is a technique which is relatively new, but has been used with success in the control of annual weeds. The flame is a selective killer in that it kills young, tender weed seedlings without appreciable injury to coarse and rapidly growing crop, such as sweet and field corn. As with 2,4-D, the flame kills the weeds between the corn plants as well as between the rows. Flame cultivation requires careful adjustment of the apparatus and considerable skill on the part of the operator. The fuel is generally kerosene or light fuel oil, costing respectively one-half and one-third of gasoline.

The flaming apparatus is tractor mounted, and takes the place of regular cultivators. The nozzles are aimed so as to cover as much of the ground as possible and avoid the crop plants.

CONCLUSION.

The development of the hormone weedkillers and the attending propaganda had overshadowed other weed control agents and techniques for a few years. The tremendous advertising campaign and exaggerated claims shortly after the end of the war would have led one to think that 2,4-D has solved the weed problem once and forever-more. When a study is now made of the literature, 2,4-D appears to have made its place as a valuable addition to the field in general, but is far from being a cure-all. Those people who advocated discarding cultivators have now modified their views, and state 2,4-D, used in conjunction with cultivation, is a valuable tool in the hands of the farmers.

As a whole, weeds are still controlled by cultivation, crop rotation, fertilization practices, and proper management. The above mentioned chemicals are used as an aid to cultivation, rather than replacing it.

This has been rather a quick summary of weed control practices in the North-eastern part of the United States. Practically all weeds can be controlled by chemical agents. However, in the case of nutgrass, quackgrass, purslane, and a few others, the uncertainty of control, the cost of the chemicals, and the possible temporary loss of cropping space still make it necessary to rely wholly on cultivation. For the other weeds, the use of chemicals has become a standard practice in many row crops, small grains and public and private utilities and promises to increase as more research is conducted in this field.

QUESTIONS AND DISCUSSION

MR. KERR (Christchurch Tomato and Stone Fruit Growers' Association):

Could you give me an idea as to whether there are restrictive practices in the United States other than those against dusting from the air and the use of hormones where truck farming is carried on?

MR. MULLER : I imagine that spraying or dusting would be restricted near the big cities in the North-east. In the hills miles from truck farming I imagine the control of brush weeds by spraying would be permitted. Dusting is controlled by the Civil Aeronautical Administration and you may have special permission for dusting. I imagine that the States have laws as to where you can spray and where not.

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