

29. Weed Control by Crop Kinds: Other Field Crops, Turf, and Gardens

SMALL GRAINS

The majority of weeds in small grains are early maturing annuals or winter annuals whose life cycles are adapted to that of the grain. In the North Central states most of them are broad-leaved weeds, mustards being especially notorious. Wild oats becomes a major pest in the northwest. Common perennials include quackgrass, Canadian thistle, and milkweed.

Since cultivation is not possible as in corn and soybeans, seed bed preparation, clean and vigorously growing seed, and the use of proper rotations are especially important. Rotations are the general rule in corn belt agriculture, less so in western hard wheat production.

2,4-D is of maximum usefulness in small grains without legumes. If application is made properly, chances of injury to the crop are small; many of the common weeds are highly susceptible, and the operation is reasonably economical. 2,4-D is frequently employed in oats when weeds threaten, and extensively so in wheat. Either the amine or ester formulations ($\frac{1}{2}$ pound or $\frac{1}{4}$ pound per acre respectively) or MCP may be applied, usually when plants are 6 to 8 inches high. Small grains are quite susceptible to injury up to the 5 to 6 leaf stage, and again from when in boot until the seeds have well formed. Spraying at these times should be avoided.

Work with both wheat and oats has emphasized the fact that early weed competition (probably through reducing tillering) is much more important in reducing yield than subsequent weed growth. This suggests that if spraying is to be done, it is essential that application be made as promptly as possible after the seedling-susceptible period of the crop has passed. Application at a later date may clean up the field but have little effect upon yield.

The fact that oats are frequently employed as a nurse crop for legumes introduces a complication into the problem of weed control. It is often advisable to work the soil subsequent to grain harvest to prevent growth and seed production by numerous late summer annual weeds. If a legume seeding is present, it may be necessary to decide whether prior consideration shall be given to the legumes or to the weed problem. If 2,4-D is applied to the grain, it is capable of killing the

underseeding as well as the weeds. Red clover usually has a better chance of surviving than alfalfa. In general, the herbicide probably should not be used unless the weed problem is quite serious. Injury to the legumes may be reduced by using dinitros or MCP, reducing dosages to the minimum, directing the spray up, and permitting the grain to grow as tall as possible before treatment. These measures may reduce effectiveness of weed control.

SORGHUM

Herein we are considering row-planted grain sorghums, in distinction to the forage types and the related sudan grass. The following observations are, to a large extent, derived from work conducted in Kansas.

Mature sorghum is an excellent competitor, but young plants or seedlings (especially of the grain types) are not. Pre-emergence treatment is still in the developmental stage. Significant weed infestations may, therefore, ensue in young stands. Such infestations may materially reduce yield.

Cultural and mechanical methods possess a pre-eminent importance in sorghum weed control. The relative success of such control would seem to hinge, in large part, upon the degree to which it is possible to reduce weed seed populations in the soil. Assuming crop rotation, efforts should be devoted in previous year's crops to prevent seed maturation by annual weeds. Prior to planting the sorghum, repeated seedbed cultivation is capable of destroying successive crops of weeds. Kansas urges late planting for two reasons. Sorghum is a warm weather plant; it germinates and grows much more rapidly at higher temperatures. Secondly, early planting does not allow sufficient time for adequate replanting measures.

Cultivation subsequent to emergence is likewise to be emphasized. Specific methods employed will depend to some extent upon the procedure by which the sorghum was seeded. The rotary hoe may be used for the first working, but stand injury is often more significant than in corn or soybeans.

As earlier stated, pre-emergence herbicidal treatment is questionable. Post-emergence utilization of 2,4-D can be employed if earlier cultivations have proved inadequate. Suggested dosages and hazards are approximately the same as in corn. Formation of the head within the leaf boot begins when the plant reaches a height of about 12 inches; plants should not be sprayed from this time until the seeds have reached essentially full size.

FLAX

Flax is a poor weed competitor. It is especially important that the

land used be as free of weed seeds as possible and that clean seed be employed. 2,4-D, MCP, or dinitros can be employed much in the same manner as in the small grains, but the tolerance range of flax to these herbicides is rather narrow and dosages must be watched carefully. 2,4-D is the most effective but also most apt to injure the crop. It is usually applied when the plants are 5 to 6 inches tall, 1/8 to 1/4 pound amine per acre. Flax is very sensitive to injury on coming up, but gradually develops more resistance as it gets older. However, seed set and germination may be reduced by spraying during flowering. Susceptibility varies considerably between varieties.

Flax has a slightly wider range of resistance to selective dinitros than to 2,4-D, and these compounds are sometimes used in lieu of the latter. However, avoidance of crop injury is rendered difficult by the fact that toxicity of the dinitros increases with temperature. Dalapon, 1 pound per acre, applied when the weeds are small, can be employed against certain grasses (especially *Setaria*). This herbicide can also be used in conjunction with 2,4-D or MCP.

ROTATION MEADOWS AND HAYFIELDS

This crop classification includes a wide variety of forage legumes and grasses. Plantings may involve a legume (with or without a companion crop), a legume-grass mixture, or grasses only. Weed kinds infesting these crop are likewise diverse and to some extent correlate with the crop species dominating the stand. Annuals are frequently conspicuous the first year; if stand establishment is successful and well managed, perennials may be the major weeds which succeed in persisting.

Legume seedlings are small, relatively slow-growing plants, and offer but poor competition to weeds. The cultural aspects of weed control are basic, if stand establishment is to be successful. A row crop or after-harvest tillage the previous season is highly desirable, as is seed bed preparation involving several workings of the soil. Legumes are usually seeded at rates several times exceeding the number of plants which will eventually be needed. One of the reasons for adhering to this practice is to obtain a sufficient number of vigorous seedlings to offer competition with weeds.

Several kinds of legumes are usually planted with a small grain companion crop. With respect to weed control, the grains, of course, hold back the legumes to some extent as well as the weeds. However, the early season development of seedling legumes is in any event slow and subsequent to harvest of the grain, may distinctly benefit from the prior suppression of weeds. Proper fertilization and liming (if necessary) will obviously improve the competitive relationship of the crop. Subsequent summer management practices (both first and succeeding years), insect and disease control, and mowing all aid in keeping the stand in a healthy condition.

Because of the sensitivity of small-seeded legumes to most herbicides, the usefulness of chemical control has remained somewhat limited. Pre-emergence application, to date, is not feasible. Light post-emergence dosages of dalapon (4 pounds per acre) or DNPB amine (1-2 pounds per acre) may be appropriate if weeds appear serious in seedings of alfalfa. Dalapon is most effective against grass weeds, the dinitros with respect to broad-leaved types. Dalapon is inadvisable if a companion crop is used. On the other hand, if the legume is protected by a companion crop, light dosages (1/4 pound per acre) of 2,4-D or MCP are sometimes suggested. Legumes are less sensitive to the new still experimental 2,4-DB than to 2,4-D, and this chemical may be released for use within the next few years. Possibly, as some workers have suggested, appropriate herbicidal treatment can, in time, substitute for the weed control functions of the companion crop.

The use of herbicides in established legumes for forage and hay is, in general, inadvisable. Aside from crop injury and residue considerations, mowing will better hold perennial weeds in check than light herbicide treatment. However, dormant alfalfa can be treated with CIPC, DNPB, or TCA, but some injury may ensue. For alfalfa seed production, CIPC (6 to 8 pounds per acre for dodder) and diuron (2 to 3 pounds per acre commercial preparation) have shown up well in trials.

In legume (usually alfalfa or white clover)-grass mixtures, the above-discussed cultural procedures have similar application. The usefulness of chemicals is limited. 2,4-D or MCP (amine, 1/2-3/4 pound per acre) are sometimes employed in Ladino-grass combinations. The treatment should not be attempted until the clover is well past the seedling stage; injury is a hazard. DNPB may be employed in alfalfa-grass combinations, as above described, but light dosages are advisable.

If the stand consists entirely of perennial grasses (brome, fescue, etc.) 2,4-D or MCP may be valuable in elimination of broad-leaved weeds, particularly in seed fields. Dosages of 1/2-1 pound per acre can be employed. As with other grasses, the seedlings and boot-to-head stages should be avoided.

PASTURES AND RANGE LAND

Here we are considering permanent pastures or ranges. They are areas in grasses or grass-legume mixtures which serve for grazing or hay. They are not susceptible to cultivation. Hence, crop rotation, a basic weed control method, is unavailable. As a consequence, many of the weed kinds are species which rarely occur in cultivated land. On the other hand, some of the common weeds of row crops (*Amaranthus*, *Setaria*, *Polygonum*) are infrequently found in permanent grassland.

Pasture weeds include all life cycle groupings: annuals, biennials, both herbaceous and woody perennials. Annual and biennial weeds are sometimes limiting factors in the establishment of new seedings, and

may become overwhelmingly abundant in run-down or overgrazed pastures. Unpalatable or spiny plants, e.g. mullein (*Verbascum*) or thistles (*Cirsium*) are sometimes prevalent. On the other hand, in vigorous, established crop stands, annual weeds are usually at a minimum; perennial kinds may be more successful in persisting.

Most pasture weed infestations result from improper management and overgrazing. If grasses and legumes are maintained in a healthy condition, weeds rarely become a problem. If improved management procedures are not undertaken in connection with measures to get a weed problem in hand, weed control will never be completely successful but will be a recurring problem.

Mowing or the use of 2,4-D are the usual control methods. Recent studies comparing the effect over several years of a single mowing versus one 2,4-D treatment have indicated the chemical to be the more effective in the gradual suppression of perennial weeds. However, mowing is probably the most effective method of weed control in many pastures, in virtue of the frequent presence of legumes if for no other reason. Two treatments a season (latter part of June and middle of August) will prevent seed production by most annuals and will inhibit spread of perennials. The combination of mowing and fertilizing is often highly effective in reducing weed problems to a minimum.

If the area is one not susceptible to mowing and if legumes are not a consideration, the use of 2,4-D may be advisable. Best times of application will depend upon the nature of the weed infestation; as a general rule, two applications a year, June and August, are best. Treatment will probably have to be continued two years for most perennial weeds. The rate of application may depend upon the nature of the infestation as well as the formulation used. The esters are commonly employed. One-fourth pound per acre will kill ragweed, but one pound is frequently required to allow control of weeds such as Canadian thistle. 2,4-D has been found to improve Kentucky bluegrass seed production when applied to pasture areas to be stripped. The reasons for the increased seed set have not been entirely clarified; they do not appear to relate to weed elimination.

In some instances, or as a last resort, pasture renovation involving liming, disking, fertilizing, and reseeding may be the logical procedure. Mowing incipient annual weed infestations may aid stand establishment. Herbicides are not frequently employed. Dalapon (5 pounds per acre) has been suggested for use against annual grasses in new seedings of birdsfoot trefoil.

As indicated in an earlier chapter, animals should not be allowed access to vegetation treated with 2,4-D for a period of 10 to 14 days.

BRUSH IN PASTURES

Brush includes shrubs, vines, and small trees which have little value for wood and which compete with pasture grasses and legumes.

Brush plants are, therefore, weeds. Examples: buckbrush (*Symphoricarpos*), box elder (*Acer*), alders (*Alnus*), sumac (*Rhus*), wild grapes (*Vitus*); larger trees: elm (*Ulmus*), hackberry (*Celtis*), poplar (*Populus*).

A large proportion of the permanent pastures in the North Central states possess brush to a greater or lesser extent. The same generalities apply to brush as to other kinds of pasture weeds. The problem frequently arises as a consequence of overgrazing or mismanagement; the application of control procedures without an accompanying improved land use program will bring no permanent solution. Removal of brush should often be followed by fertilization and reseeding; otherwise, its place will merely be taken by other weed species.

Small brush (shrubs, vines) may be mowed with a brush bar attachment on a mower and regrowth sprayed if necessary. Initial spraying rather than mowing may be employed, but kill is often not as complete as on the young, regrowing sprouts. Brush killers, 2,4-D and 2,4,5-T mixtures, 3/4 to 1 pound in 25 gallons of water, are usually recommended for foliage spraying. Ammate, 1 pound per gallon of water, is also satisfactory.

Larger trees can be (1) destroyed by foliage spray applications, "basal" treatment or soil sterilants and left standing, or (2) cut, followed by stump treatment to prevent regrowth or spraying to kill regrowth.

Foliage application is as above described. Basal treatment consists of spraying brush killer in oil (3/4 to 1 pound in 5 gallons) on the lower foot or so of the tree trunk and wetting it to run-off; usually this is done during the dormant season. If instead, the trees and brush are cut, the regrowth foliage can be sprayed in early summer, or the stump can be treated to prevent resprouting. With respect to the latter procedure, brush killer formulations in oil are frequently used. It is desirable to loosen the bark around the edges to aid penetration and to wet thoroughly. Ammate can be employed for the same purpose. If applied dry (2 to 3 tablespoons per 4 inches of stump diameter), ammate should be poured in holes drilled in the wood or around the edge of the loosened bark. It may also be used in water solution (3 to 5 pounds per gallon). In addition to inhibiting resprouting, ammate speeds decomposition.

In certain situations, the use of soil sterilants may constitute the easiest way of eliminating unwanted brush. Urea compounds, fenuron and monuron are applicable. They are applied to the soil, either by spraying or dry (pellets).

LAWN AND TURF WEEDS

Lawn weeds are usually rosette, low-growing, or prostrate types. They are plants in which the leaf- and stem-forming growing points are retained close to the ground, hence can tolerate repeated mowings.

Management Practices

As in most agricultural crops, the key to lawn and turf weed difficulties is proper management. Weeds rarely become a problem in lawns which are well cared for; on the other hand, the elimination of lawn weeds by spraying will only temporarily reduce the weeds if not coupled with good management procedures.

Grasses which are not adapted to climate or soil conditions under which they are growing will do poorly against weeds. Kentucky bluegrass is the most successful lawngrass in most of the North Central states area. It succeeds best in open areas. Under trees it is readily crowded out by weeds like chickweed (*Stellaria*) and nimblewill (*Muhlenbergia*). The use of shade-adapted grass species (fine-leaved fescues, *Festuca*; bentgrass, *Agrostis*; shade bluegrass, *Poa trivialis*) in such areas may be necessary if weeds are to be kept down.

Bluegrass is a cool weather plant and does most of its growing in the spring and fall. Seeding, fertilization, and possible liming should be carried out during these periods to encourage vigorous growth so that the grass will gain a competitive advantage over weeds which fare better in the hot, dry period of the year. Midsummer watering should be either very thorough or completely omitted. Shallow watering usually helps the weeds more than the grass.

Herbicides

2,4-D amine will kill most broad-leaved lawn weeds. Injury to bluegrass is usually slight, but bentgrasses are more susceptible and clovers will usually be killed. The homeowner should carefully follow instructions on the container in regard to application and dosage. A knapsack sprayer or simple sprinkling can may be employed to apply the chemical. Since application is often in close proximity to susceptible ornamentals and garden plants, caution should be used to prevent careless directioning or blowing of the spray.

Application of herbicides is usually made in the spring when dandelions become conspicuous. Suggestions that treatment might be carried out in the fall have merit on the basis that the lawn can start out in the spring in more attractive condition; also, there is less chance of injury to ornamentals in the fall.

Certain other chemicals, for example MCP, may be used in the same way as 2,4-D. Some manufacturers are now preparing herbicides in granular form, sometimes in conjunction with a fertilizer so that it can be applied with a conventional lawn spreader.

Since the advent of 2,4-D, crabgrass has become the number one lawn weed in many of the North Central states. Several chemical treatments are reasonably effective in killing crabgrass seedlings and young plants without extensively injuring the established grasses. These include PMA, potassium cyanate, disodium methyl arsenate, and

chlordane. They are sold under a variety of trade names. All of these weed killers have selective action against young crabgrass in contrast to the established perennial bluegrass. The latter may be subject to some injury, i.e., turn yellow, but will usually quickly recover. Since crabgrass may emerge over a considerable period of time during the summer, several applications will be necessary to catch all seedlings in the susceptible stage. Treatments applied at two week intervals from May 15 to July 15 may be apropos in the middle part of the North Central states; such action should perhaps be initiated two weeks earlier in the south, two weeks later in the north. If crabgrass is to be essentially eradicated, this procedure must be continued for two years since a considerable number of seeds may carry over in the soil.

Disodium methyl arsenate is the most popular crabgrass killer at the present time. It can be applied dry or as a spray. More consistent results are usually attributed to the spray formulation. Potassium cyanate is especially valuable for older plants of crabgrass but usually yellows the bluegrass.

Crabgrass treatment may injure bluegrass seedlings. The better the start the young bluegrass has, the less will be the injury. Reseeding in the fall following treatment is probably a desirable procedure.

HOME GARDENS

Weeds have the same importance in gardens that they have on the farm. They reduce yield, crop quality, deplete fertility, and serve as hosts for insects and diseases. The majority of species are the same as those in tilled agricultural fields. Low prostrate annuals are possibly more abundant, e.g. purslane (*Portulaca*), annual spurges (*Euphorbia*), and prostrate pigweed (*Amaranthus*). Strawberry beds and similar areas in which cultivation is reduced are often infested with quackgrass (*Agropyron*), and annual or biennial weeds such as yellow sorrel (*Oxalis*), and cinquefoil (*Potentilla*).

The advancing science of weed control has to some extent left home gardens less touched than any other area. The majority of garden crops are easily injured or killed by 2,4-D and similar herbicides. Furthermore, the selective application of herbicides requires attention to details which the average homeowner may be unable to provide. The hoe and hand weeding are still king in the garden.

The garden should be plowed or spaded in the fall and, if possible, worked again in the spring to stimulate germination of weed seeds. Cultivation (and hand weeding as necessary) should be started as soon as the crop is discernible in the rows and continued at regular intervals.

Many gardeners let up on weed control as the crop matures and allow the entire garden to go to weeds the latter part of the summer. The abundant seed production ensuing will amply replenish the reservoir of

weed seeds in the soil for the ensuing seasons. Much can be gained, in the long run, if an effort is made to prevent weeds from seeding. Little effect may be noticed the first year or two, but a gradual diminution of weeds emerging will be evident in subsequent seasons.

WEED CONTROL PROBLEMS NOT DISCUSSED

Weed control in the principal agricultural crop types in the North Central states has been treated above. It is not feasible to treat all types of weed control problems in an elementary consideration, and a number have been omitted. Among these are nonagricultural areas, highway and railroad rights-of-way, under telephone and power lines, industrial areas, drainage and irrigation ditches, ponds, etc. Vegetable crops (in which weed control is often the single most expensive production item) and orchards have not been treated. Likewise, major southern field crops have been omitted.

Information concerning these topics may be obtained from the books and bulletins which are cited at the end of this book.