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WEED CONTROL IN EASTERN CANADA AND BRITISH COLUMBIA

WHILE it is impossible to determine the enormous loss caused by weeds in Canada, some conception of this loss may be gleaned from a picture of conditions which would exist if there were no weeds. In such a happy condition little cultivation would be necessary beyond the preparation of a seed bed; much of the present seed cleaning equipment would be unnecessary; there would be no wastage of binder twine; the value of seed and feed would not be reduced because of the presence of weeds or weed seeds, and the fatality of live stock due to poisonous weeds would be non-existent.

Although all of the losses caused by weeds cannot be determined accurately, there is, however, a loss which can be assessed and which alone is sufficiently startling to arouse every farmer who has a weedy farm. It is the reduction in crop yield due to weeds.

The Field Husbandry Division has found from experiments conducted at Ottawa that the average loss due to mustard in grain, over a period of five years, was 12·7 per cent. Perennial weeds such as couch grass and perennial sow thistle cause much greater losses than annuals. The reduction in yield due to perennials was frequently 50 per cent.

From the experimental results secured, it would seem that 10 per cent would be a conservative estimate of the reduction in crop yield due to weeds in Eastern Canada and British Columbia. Based on the total value of the field crops in this region, this represents a loss of approximately $33,000,000 annually. In Wisconsin and Indiana losses from weeds have been estimated at $200 to $250 per farm or an amount equivalent to the taxes on the land.

Characteristics of Weeds

The reason weeds are prevalent is that they reproduce with great prolificacy and have the faculty of resisting adverse conditions. Early maturing weeds like mustard, for example, can produce two crops of seed per year. Each plant normally produces hundreds and often thousands of viable seeds. Furthermore, weed seeds, unlike the seeds of cultivated plants, can remain viable in the soil for many years; mustard seed has been known to remain alive for over 50 years.

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Perennial weeds have two means of reproduction: by seed and by perennial root stalks. In some instances these perennial roots are very extensive. The roots of field bindweed often penetrate the ground to a depth of seven feet. There is sufficient plant food stored in the roots of field bindweed to keep this weed alive for two years. Because this is so, it takes two years of a continuous summerfallow to exhaust the food supply stored in the roots. Couch grass, on the other hand, is very shallow-rooted. Practically all of its roots are found in the first four inches of the surface soil and yet it has a very extensive root system. According to investigations conducted at Ottawa, the weight of couch grass roots has ranged from 1,531 to 6,997 pounds per acre. A minute section of one of these roots is capable of producing a new plant.

An intimate knowledge of the characteristics of weeds is very helpful in devising effective methods of control.

After-harvest Cultivation

The best time to kill weeds is when there is no crop on the land to interfere with the treatment. In Eastern Canada summerfallowing is too costly to be practicable, but almost as good results from a weed control standpoint can be secured by thorough after-harvest cultivation, provided it is commenced not later than August 1. After-harvest cultivation commenced on this date and continued until the end of the growing season eradicates many species of perennial weeds and reduces the vigour of the others, except field bindweed and a few other persistent perennials, to such an extent that they can be killed by a hoed crop grown the following year. After-harvest cultivation commenced as late as September 1 is largely wasted effort.

When practising after-harvest cultivation in order to control perennial weeds, it is essential to cultivate each time any re-growth appears. If this is not done, the weed soon regains its normal vigour and the effect of previous work is lost. Cultivation for perennial weed control should be deep enough to shear off all top growth just below the level of the ground. There is no advantage in working deeper than this.

Smother Crops and Hoed Crops

When smother crops, such as buckwheat or millet, are used to control weeds, the land should be fall-ploughed. In the following spring this area should be worked as frequently as time permits before seeding in order to reduce the vigour of the weed growth.

Hoed crops, such as corn, potatoes and roots, offer an excellent opportunity to control weeds. The labour of hoeing weeds in the crop rows, however, will be greatly reduced if the field was subjected to after-harvest cultivation the previous year. This after-harvest cultivation reduces the vigour of most perennial weeds to a great extent and thus simplifies the work of keeping down weed growth in the hoed crop. Where couch grass is prevalent, however, it may be necessary to hoe twice and cultivate four or five times in order to secure complete eradication.

The Control of Weeds in Grain Crops

Weeds are usually most troublesome in grain crops. The cultivation necessary to prepare a seed bed provides ideal conditions for the germination of weed seeds, and most grain crops are not able to compete successfully with weed seedlings. Cultivation cannot be used to eradicate weeds in grain, so certain other methods have been devised.

Harrowing once or twice with a light harrow or finger weeder just as the weed seedlings emerge reduces the stand of weeds about 50 per cent and does not seriously injure the grain. When the grain is to be used as a nurse crop for grass and clover, it is essential that the seeding of the hay mixture be delayed until the time of the last operation of the weeder or harrow.

An increase in the rate of seeding tends to smother the stand of weeds to a marked degree. In Eastern Canada, barley may be seeded at the rate of 2½ bushels per acre and oats at the rate of 3½ bushels on areas where annual weeds are prevalent.

The application of commercial fertilizer in the drill with the grain is advisable as it promotes a rapid and vigorous growth of the grain, which tends to smother weeds.

Annual and biennial weeds, except wild oats and other weeds of the grass family, can be killed in grain crops by certain chemicals, without injury to the grain. It is the differences in the characteristics of plants which makes this selective killing possible. The chemicals most commonly used in Eastern Canada for this purpose are copper sulphate spray and calcium cyanamid dust.

When copper sulphate is used for this purpose it should be applied as a 3 per cent solution at the rate of approximately 75 gallons per acre. Calcium cyanamid can be used to kill several species of annual weeds in grain. It should be applied when the foliage is wet with a heavy dew, at the rate of approximately 100 pounds per acre.

When chemicals of any kind are used to kill weeds in grain, they should be applied when the weeds are young—certainly before they are in bloom.

The Control of Weeds in Hay and Pasture Crops

There should be comparatively few weeds in the hay crop provided effective control measures have been followed with the other crops within the rotation. However, certain species such as ox-eye daisy, bladder campion, and night-flowering catchfly persist in hay. These weeds arise from seeds in the soil. Where couch grass is present, it gradually increases the longer the hay is left on the field.

When weeds are prevalent, it is advisable to cut the hay early or mow the pasture in order to prevent the weeds from maturing seed.

The Use of Crop Rotations

A suitable rotation of crops is of major importance in the control of weeds. Some crops check certain species of weeds, while other crops are wholly ineffective. Wild oats, for example, are eradicated by two or three years in hay or pasture. A vigorous stand of alfalfa for two or three years practically eliminates Canada thistle and perennial sow thistle. Hoed crops, if properly worked, are cleaning crops. Grain, on the other hand, encourages the growth of weeds.

It is impracticable to recommend a rotation which is suitable for all farms throughout Eastern Canada. However, the following five-year rotation may be mentioned because it offers an excellent opportunity for the control of weeds and may be used quite extensively: first year, barley; second year, hoed crop; third year, oats seeded down; fourth year, hay mixture; fifth year, pasture.

After-harvest cultivation is commenced in the first year of the rotation, immediately after the crop of barley is removed, and is continued to the end of the growing season. This after-harvest work makes the control of weeds in the hoed crop comparatively easy. Weeds can be controlled in both grain crops by the methods previously outlined. The hay acts as a smother crop for many weeds, and the pasture should be ploughed as early in the fall as possible.

Chemical Weed Killers

Up to the present, sodium chlorate has been found the most effective chemical for the eradication of perennial weeds. One objection to the use of this chemical is that it is inflammable. This has been overcome by the addition of a certain amount of calcium chloride, the mixture being patented and sold under the trade name "Atlacide."

In spite of its fire hazard, sodium chlorate alone is frequently used to eradicate perennial weeds. When used to kill such weeds as couch grass, perennial sow thistle, Canada thistle, and field bindweed, a 10 per cent solution is most generally employed, that is, one pound of the chemical dissolved in a gallon of water.

This solution is applied as a fine spray in sufficient quantity to moisten thoroughly all the top growth of the weeds. As soon as any re-growth of the weed appears, a second, third, or, if necessary, a fourth application, should be made. There is a considerable difference in the amount of sodium chlorate required to kill the various species of perennial weeds. Shallow-rooted weeds, such as ox-eye daisy and orange hawk weed, may be killed by one or two applications of a 2½ per cent solution of sodium chlorate. A young growth of weeds is more easily killed than an old stand of the same weed.

Sodium chlorate is rather expensive and, furthermore, it produces a toxic effect on the soil when it is applied in sufficient quantity to kill perennial weeds. The toxicity caused in soil by the application of sodium chlorate prevents the normal growth of a crop for about one year after it is applied. For these reasons it is not advisable to use sodium chlorate for perennial weed eradication on cultivated land, except on small areas.

Weed Seeds in Manure

Weed infestation frequently arises from weed seeds present in manure. It is advisable, therefore, to prevent the spread of weeds from this source.

Experiments conducted by the Field Husbandry Division show that weed seeds in the centre of a manure pile are killed in a period of one month, but those seeds located at or near the outer portions of the pile remain alive. In order, therefore, to prevent the spread of weeds from this source, it is advisable to keep the manure in a compact pile for at least one month and to remove about one foot of the outer surface of the pile before spreading the remaining manure on the land.

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