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The Control of Weeds in Orchards

By G. A. Pearce, M.Sc. (Agric.), Biological Services Division and S. E. Hardisty, B.Sc. (Agric.), Horticultural Division

The use of herbicides for the control of weeds in orchards has become established during the past few years. It has become more efficient with the introduction of newer herbicides which have proved more effective and less dangerous than some of those recommended in the past.

Growers can now choose between several chemicals each of which may be just as effective as another, when a particular weed problem is under review.

Effect of Weeds

Weeds growing in orchards serve some useful purposes. They supply organic matter to the soil and often prevent erosion following heavy rain.

During the spring and summer months however, weeds compete strongly with fruit trees for available soil moisture and nutrients and their control at this time is most desirable. Furthermore, rank weed growth around the butts of fruit trees increases the problem of controlling insect pests.

Weed Control and Soil Management

Bare soil conditions during the summer are desirable except where ample irrigation facilities are available. The two alternative systems, of clean cultivation, or close mowing of the orchard cover, are designed to reduce transpiration losses of moisture. Under both systems weeds growing around the tree trunks are out of reach of the cultivators or rotary mowers. In many orchards it has become standard practice to treat these small areas with herbicides.

In the orchard lands between the trees, weeds usually reappear towards the end of summer and although chemical control is possible, it is rarely undertaken because of the additional cost.

Chemical weed control is useful in the following situations:

- For the control of perennial grasses, particularly around tree trunks.
- For summer growing weeds where cultivation would lead to dusty conditions, or interfere with irrigation equipment or tree props.
- For the control of weeds close to the trunks of trees following spring cultivation. Cultivation then need not be so close to trees, and hence less damage would be done to surface feeder roots. In addition the control of many insect pests would be greatly facilitated.
- Where weeds grow on steep hill slopes, cultivation is only desirable in one direction. Herbicides could then be used for these narrow strips missed along the tree rows.

Application

Herbicides are normally applied at spraying pressures of from 50 lb. to 100 lb. per square inch. The usual volume applied is from 100 to 150 gallons per acre. Where absorption is taking place through the leaf, sufficient solution should only be applied to wet the leaf.

Normal orchard spraying equipment can be used to apply the herbicides mentioned, but some care is required to avoid
contamination. Although in no way as dangerous as hormone-like herbicides all spray equipment including the tank and hoses should be washed out after use.

The spray solution should not be allowed to come in contact with the foliage of the trees and for this reason spraying should not be undertaken in windy weather. Double spray nozzles attached to a lance are most satisfactory.

In a cultivated orchard the area to be treated around each tree will depend on the degree to which the implement is offset and upon the spreading habit of the tree.

The effectiveness of a herbicide depends on the ability of the operator to apply the material at the recommended rate per acre of treated area. Therefore the orchardist should know the quantity of spray mixture to be applied around each tree. It is usual to treat a circle six feet in diameter around each tree. This means that 10 gallons of the spray solution shown in Table 1 is sufficient to treat 80 to 90 trees, or that one pint of the spray mixture is required for each tree.

By spraying into a graduated bucket the actual time taken to apply one pint can be measured, and this will indicate the time that should be spent at each tree.

**Early Winter Treatment**

Where it is desired to control weed growth throughout the winter and spring, a residual herbicide should be applied within four weeks of the germinating rains, or at a stage not later than when the weeds are a few inches high. In order to kill all the weed seeds as they germinate it is essential to obtain an even application of the spray to the soil surface. Heavy plant growth or other trash lying on the surface will reduce the effectiveness of the treatment.

Young plants are more readily killed than large established plants so that a lower rate of application is required for

Offset cultivators not only damage surface roots, but cannot reach the base of large spreading trees. Weeds growing around the base of trees can be readily killed with suitable herbicides.
treatments applied at this time. However the herbicide must have a more lasting effect to cope with weeds which can emerge over a period of several months.

Spring Treatments

Although a number of advantages are obtained by creating a bare area around each tree, and this practice is most desirable, many orchardists leave their weed control activities till the spring. By this time the weeds are quite large and increased rates of application are required to obtain a complete kill. However, as tall weed growth requires a higher volume to wet the plants than for early season spraying, the increased rate of application required should be obtained by using more of the spray solution. This means that 1½ pints of mixture should be applied to a circle six feet in diameter around each tree, rather than one pint as generally recommended. If the treatment is left too late the plant material does not disintegrate and hence can continue to harbour insect pests.

The one advantage of a late treatment is that it does away with the need of providing a residual effect to kill the winter weeds as they germinate. However the early winter spraying often has some effect on summer growing annuals so that even this advantage does not always apply.

Risk of Damage

The recommended treatments should not be applied to fruit trees less than three years old. The exception is the use of either of the two contact herbicides Paraquat or Diquat. These have no residual effect and will not enter the trees through the root system. Some care is still required however, as the herbicides can scorch the bark of young trees if the trunks are sprayed.

Amongst the herbicides used in orchards, the one to which trees have least tolerance is 2,2-DPA. This is a specific grass weed killer recommended for the control of perennial grasses in orchards. Because of the possibility of causing damage with this herbicide when used at excessive rates of application, the use of any herbicide which contains 2,2-DPA, is not recommended unless a perennial grass is present. Also to reduce the amount of 2,2-DPA applied in controlling perennial grasses, instead of only this one herbicide being used, a mixture of amitrol and 2,2-DPA is suggested. The effect of the amitrol is to reduce the amount of 2,2-DPA required to obtain control of the grass, and hence the treatment is much safer.

Effect of Soil Type

Where fruit trees are growing in sandy soils the risk of causing damage is increased. In such soils rain or irrigation water washes the herbicide through the soil quite readily into the root area and may cause damage. Under these conditions 2,2-DPA, or herbicides containing 2,2-DPA, should not be applied.

The other herbicides listed can be used but it is often desirable to reduce the amount applied.

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Weeds growing around trees not only compete for soil moisture and plant nutrients, but harbour insect pests. Treating a circle 6 ft. in diameter around each tree with herbicide will keep the ground bare for the whole season.
Herbicides

The following herbicides are not harmful to animals or humans when used under normal conditions. Vaporisation does not occur and the only damage likely to fruit trees is when the spray comes in direct contact with the foliage.

Diuron

This herbicide has little effect on established weeds and should only be used by itself when applied within four weeks of weed germination. It remains active in the soil for some eight to 10 weeks and at the recommended rate will keep the ground bare for that period. It is highly insoluble, so that the spray solution should be agitated to keep the herbicide in suspension.

Once the weeds are past the small seedling stage it is necessary to add a contact herbicide to obtain control of the established plants. Diuron combined with paraquat will kill standing weeds and a residual effect is obtained against weed seeds as they germinate.

Atrazine

Atrazine has similar properties to diuron and can be used for the same weed problems. It is slightly more effective against established plants and is usually combined with amitrol where both a contact and residual effect is required.

Amitrol + Atrazine

These herbicides are combined together under the trade name of Vorox AA which

Table 1.—Recommended treatments for major weeds in orchards

<table>
<thead>
<tr>
<th>Weeds Present</th>
<th>Time of Application</th>
<th>Herbicide</th>
<th>Amount in 100 gallons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual grasses and broadleaved weeds</td>
<td>Within 4 weeks of germination</td>
<td>Diuron 80% or Atrazine 80%</td>
<td>3 lb.</td>
</tr>
<tr>
<td>Summer or Winter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4-8 weeks after germination</td>
<td>Amitrol 40% + Atrazine 40% or Diuron + Paraquat*</td>
<td>4½ lb. of mixture</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amitrol 40% + Atrazine 40% or Paraquat + Diquat*</td>
<td>3 lb. + 1 pint</td>
</tr>
<tr>
<td></td>
<td>Mature growth</td>
<td>Amitrol 24% + DPA 53%</td>
<td>4½ lb. of mixture**</td>
</tr>
<tr>
<td>Perennial Grasses ...</td>
<td>Active growth period</td>
<td>Amitrol 24% + DPA 53%</td>
<td>4½ lb. of mixture**</td>
</tr>
<tr>
<td>Soursob, Sorrel and Nutgrass .... ....</td>
<td>Resistant</td>
<td>Vorax AA or Paraquat*—kills topgrowth only</td>
<td>4½ lb. of mixture 2 pints*</td>
</tr>
</tbody>
</table>

* Add 2 pints wetting agent.
** Respray after 3 weeks.
*** Increase volume to 1½ pints per tree (circle 6 ft. diameter).

This table gives the recommended treatment for various weeds applied at different growth stages. The notes concerning these herbicides should be read before undertaking the treatments. Column 4 shows the amount of herbicide required to treat 2/3rds of an acre. One pint of this mixture is sufficient to treat a circle 6 ft. in diameter.
contains 40 per cent. amitrol and 40 per cent. atrazine. The amitrol kills the established weeds and the atrazine has a residual effect on weeds as they germinate.

Paraquat and Diquat

These are closely related herbicides which act only as contact weedkillers. They break down quickly in the soil and have no residual effect. Paraquat is more effective against grasses while diquat is used for the control of broad-leaved weeds. A wetting agent at the rate of two pints per 100 gallons of solution should be used.

When used without any other herbicide they should not be applied until further germination of weed seeds is unlikely. Best results are obtained with an August application for winter weeds.

Amitrol + 2,2-DPA

These two chemicals are combined together under the trade name of Weedazol Banana Total which contains 24 per cent. amitrol and 53 per cent. 2,2-DPA. It is only recommended for the control of perennial grasses. Amitrol is particularly safe to use in orchards and by combining it with 2,2-DPA the amount of this latter herbicide required for control is reduced. At the recommended rate of application a second treatment, particularly for paspalum, is required. This should be undertaken three weeks after the initial spraying.

Any regrowth should be treated as it appears.

SUMMARY

- Most weeds growing in orchards can be controlled with herbicides without damage to the trees.
- Cultivation, which is still an important method of controlling weeds, and mowing, should be supplemented with chemicals to eliminate hand hoeing around trees.
- Herbicides are ideal for treating areas where cultivation cannot be used.
- Table 1 lists the recommended treatment for various weeds at different growth stages. The trade name and distributor are listed in Table 2.

### Table 2.—Trade names of recommended herbicides and their distributors

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Trade Name</th>
<th>Distributor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuron</td>
<td>Karmex Diuron</td>
<td>[David Gray Lanes]</td>
</tr>
<tr>
<td>Atrazine 80%</td>
<td>Primatol A</td>
<td>I.C.I. Shell Chemicals</td>
</tr>
<tr>
<td>Amitrol 40% + Atrazine 40%</td>
<td>Vorox AA</td>
<td>Barrow Linton</td>
</tr>
<tr>
<td>Paraquat</td>
<td>Paraquat</td>
<td>I.C.I.</td>
</tr>
<tr>
<td>Diquat</td>
<td>Diquat</td>
<td>I.C.I.</td>
</tr>
<tr>
<td>Amitrol 24% + DPA 53%</td>
<td>Weedazol Banana Total</td>
<td>Barrow Linton</td>
</tr>
</tbody>
</table>

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