Control of cape tulip

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Cover Page Footnote
Grateful acknowledgment is made to Messrs. J. F. Rowbottom, Bannister, H. O. Pollard, Bannister and A. W. Horobin, Bokal, for assistance with field trials undertaken.
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CAPE TULIP is the worst weed in the Avon Valley and northern areas of the Great Southern districts. It occurs elsewhere to a limited extent but even then it is regarded as a serious weed.

It is toxic and a strong pasture competitor which is well adapted for spreading.

Stock losses usually occur when animals are grazed on heavy stands for the first time.

Because of the presence of dormant corms complete control with one operation, cultural or chemical, is seldom possible.

Once the corms have emerged, cape tulip can be controlled by spraying with 2,4-D, or by undertaking effective cultivation at the correct growth stage.

An unusual feature in the treatment of this weed with 2,4-D is that the plants are not killed the year they are sprayed. Although flowering is inhibited, the effectiveness of the treatment cannot be assessed until the following year. The presence of dormant corms during the year of application often shields the effect of the 2,4-D treatment, and this has led to misunderstandings by many farmers concerning the value of the herbicide.

**DORMANCY**

Cape tulip, like other corms and bulbs, has a rest period. This is a period of time when the corms will not germinate even under the most favourable conditions. With tulip this ends by April, and under ideal conditions complete sprouting is then obtained.

Investigations have shown, however, that a wide variation in dormancy is found from year to year, even at the same location. Table 1 shows the number of dormant corms found under samples containing a total of 500 growing plants at 12 centres sampled over a three year period.

It can be seen that at some locations a high proportion of corms fails to germinate. Under such circumstances little reduction is likely to be obtained even with the most carefully undertaken control programme.

One factor which has a major influence on germination is soil temperature. Table 2 shows the percentage of corms which germinated in the laboratory at various temperatures.

**TABLE 1**

CORM DORMANCY IN CAPE TULIP

The Number of Dormant Corms obtained from Samples Containing 500 Growing Plants, taken at 12 Centres over a Three Year Period.

<table>
<thead>
<tr>
<th>Centre</th>
<th>1959</th>
<th>1960</th>
<th>1961</th>
<th>Total 3 years</th>
<th>Average 3 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northam</td>
<td>65</td>
<td>102</td>
<td>31</td>
<td>198</td>
<td>66.6</td>
</tr>
<tr>
<td>York</td>
<td>331</td>
<td>140</td>
<td>11</td>
<td>482</td>
<td>160.0</td>
</tr>
<tr>
<td>Toodyay</td>
<td>112</td>
<td>105</td>
<td>64</td>
<td>281</td>
<td>93.6</td>
</tr>
<tr>
<td>Swan</td>
<td>75</td>
<td>114</td>
<td>56</td>
<td>245</td>
<td>81.8</td>
</tr>
<tr>
<td>Moora</td>
<td>4</td>
<td>225</td>
<td>138</td>
<td>365</td>
<td>121.6</td>
</tr>
<tr>
<td>Wagin</td>
<td>808</td>
<td>215</td>
<td>138</td>
<td>1,161</td>
<td>387.0</td>
</tr>
<tr>
<td>Cuballing</td>
<td>143</td>
<td>102</td>
<td>72</td>
<td>317</td>
<td>105.6</td>
</tr>
<tr>
<td>Brookton</td>
<td>434</td>
<td>105</td>
<td>95</td>
<td>634</td>
<td>211.3</td>
</tr>
<tr>
<td>Williams</td>
<td>343</td>
<td>239</td>
<td>173</td>
<td>755</td>
<td>251.6</td>
</tr>
<tr>
<td>Bokal</td>
<td>751</td>
<td>96</td>
<td>103</td>
<td>950</td>
<td>316.6</td>
</tr>
<tr>
<td>Bannister</td>
<td>351</td>
<td>288</td>
<td>111</td>
<td>750</td>
<td>250.0</td>
</tr>
<tr>
<td>Bunbury</td>
<td>258</td>
<td>281</td>
<td>189</td>
<td>723</td>
<td>241.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,670</td>
<td>1,992</td>
<td>1,179</td>
<td>6,841</td>
<td></td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td>306.8</td>
<td>166.0</td>
<td>98.2</td>
<td>190.0</td>
<td></td>
</tr>
</tbody>
</table>
Once soil temperatures drop below 60° F., the number of corms which do not germinate increases rapidly.

Soil temperatures, like air temperatures, decline steadily during the autumn and winter. Minimum temperatures below 50° F. are common.

The percentage of corms which do not germinate following the beginning of the growing season depends on the soil temperature at that time. As the date of the break of season becomes later, soil temperatures decline, and this is accompanied by a steady increase in dormancy.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Germination</th>
<th>Temperature</th>
<th>Germination</th>
</tr>
</thead>
<tbody>
<tr>
<td>°F.</td>
<td>%</td>
<td>°F.</td>
<td>%</td>
</tr>
<tr>
<td>41</td>
<td>0</td>
<td>50</td>
<td>90</td>
</tr>
<tr>
<td>50</td>
<td>90</td>
<td>59</td>
<td>90</td>
</tr>
<tr>
<td>68</td>
<td>96</td>
<td>77</td>
<td>98</td>
</tr>
<tr>
<td>88</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In practice, the break of season is accompanied by colder weather and a general lowering of soil temperatures which would explain the very high dormancy counts recorded in Table 1.

OVERCOMING DORMANCY

It is apparent that if virtually complete control of cape tulip is to be obtained in one season all corms must germinate.

One way of inducing this is to provide the conditions necessary for germination while the soil temperatures are still favourably high.

Burning the surface cover during the autumn has been found to help this. With a bare soil surface the infiltration of the first 100 points of rain is faster than on a covered surface.

Light autumn rain of 15 to 20 points falling on a bare soil increases the soil moisture enough to cause cape tulip corms to germinate. With surface cover present sufficient moisture does not reach the corms. The critical factor is that sprouting occurs at a time when soil temperatures are relatively high. This results in a higher percentage germination than later in the season.
2,4-D does not kill the plants the year they are sprayed. The effect can be assessed the next year when the treated plants do not germinate. The strips shown in the picture were not seen until the year after spraying.

### TABLE 3

**EFFECT OF BURNING ON DORMANCY**

The Percentage of Dormant Corms on Burnt and Unburnt Areas at Bannister and Bokal before and after the break of the Season in 1962

<table>
<thead>
<tr>
<th>Site</th>
<th>Dormant Corms</th>
<th>Burnt</th>
<th>Unburnt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25th May</td>
<td>25th July</td>
<td>25th May</td>
</tr>
<tr>
<td>Bannister</td>
<td>8%</td>
<td>3%</td>
<td>100%</td>
</tr>
<tr>
<td>Bokal</td>
<td>4%</td>
<td>2%</td>
<td>99%</td>
</tr>
</tbody>
</table>

Rainfall—Bannister = 14 points; Bokal = 12 points.

Break of season 12th May.

Thus, providing some rain falls during April, and before the season opens, corm dormancy will be reduced.

Table 3 shows the number of dormant corms found on burnt and unburnt areas in 1962 at Bannister and Bokal. The rainfall at Bannister was 14 points for April while Bokal received 12 points.

### CONTROL PROGRAMME

To obtain the maximum results from control measures a properly planned programme should be followed.

1. **Burning**

   If practical, any area infested with cape tulip on which control measures are to be undertaken should be burnt before the beginning of April. This ensures an increased corm germination.

2. **Chemical Treatment**

   The highest degree of control has been obtained by the application of 2 lb. acid-equivalent of 2,4-D ester per acre. Good results can also be expected with the same rate of 2,4-D amine, while under favourable conditions 1 lb. acid equivalent per acre has caused a substantial reduction. This lower rate is often used where it is important not to affect pasture or crop species amongst which the cape tulip is growing.

   The most appropriate time for application is not nearly as restricted as for cultural methods of control. Early spraying has not proved as satisfactory as spraying at the corm transition stage or later. The reason for this is thought to be that during the early growth stages food materials are moving from the corm to the leaves, the opposite direction to which the herbicide has to move to enter the corm. Spraying is therefore usually undertaken from mid-July until the flowering stage.

   The use of 2,2-DPA (2,2-dichloroproplionic acid) has a number of advantages over 2,4-D, including a kill of the growing plants during the year they are treated.
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Increased pasture production is obtained after cape tulip has been controlled. A planned control programme carried out over a number of years will lead to higher carrying capacity. The cape tulip on the right of the picture has completely overgrown the pasture.

In addition the material can be applied during the early part of the season before the heavy winter rains occur.

2,2-DPA is recommended for the control of cape tulip growing on areas which would be too boggy at the time 2,4-D is normally applied. Because it is non-volatile it is also used where the use of 2,4-D is inadvisable, such as in vineyard and market garden areas. The rate of application is 5 lb. of 80 per cent. 2,2-DPA per acre. This makes the treatment more costly than 2,4-D.

3.—Cultural Treatments

With cormous perennials such as cape tulip there is usually a well-defined period during which the food reserves are at a low level.

This growth stage in cape tulip is when the parent corm is almost exhausted, while the development of the new organ has only just started.

This growth stage is the critical time during which cultural control methods should be undertaken. Ploughing should be carried out when the corms are in this transition stage. In order to be effective, ploughing must be done thoroughly to the depth of the corms. Half turning the plants over will allow many to continue growing so that cultivation following ploughing becomes necessary.

Early working during May or June is not effective unless followed by further cultivation. At that time the parent corm has sufficient food reserve to promote further growth. This is either regrowth of the original plant, or the formation of a new plant from the rudimentary bud. If ploughing is left until the spring little is achieved as at least one corm on each plant is sufficiently formed and there is little or no reduction in the corm population.

4.—Follow-up Treatment

In the year following treatment scattered plants are often present and it is essential that these be treated rather than allowed to multiply. Spot spraying with 2,4-D or 2,2-DPA should be carried out.
The advantage of using 2,2-DPA in this situation is that the treatment can be applied early in the season and those plants missed with the initial application can be treated with 2,4-D when flowering commences.

IN BRIEF
- The percentage of corms which do not sprout is governed by the soil temperature at the time of germination.
- Burning the surface cover helps light autumn rain to penetrate to corm depth and cause germination. Dormancy is reduced because sprouting starts before soil temperatures drop to winter levels.
- Spraying or ploughing at the appropriate growth stage will give a high degree of control after burning.
- Spot spraying isolated plants the following year is necessary to prevent a build-up of cape tulip in succeeding years.

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