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Linuron : a success in 1966?

Geoffrey A. Pearce

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LINURON — a success in 1966?

Although some of the farmers who used linuron last year reported poor results, there is little doubt that this is the best herbicide since the advent of 2,4-D for weed control in cereals. This article gives the reasons for failure in some of last season’s crops, and recommendations for use of linuron in 1967.

By G. A. PEARCE, M.Sc. (Agric.), Biological Services Division

There is little doubt that linuron is the most useful herbicide for the control of weeds in cereals to become available since the advent of 2,4-D. Linuron kills a wider range of weeds, is less harmful to the crop and can be applied in the two-leaf stage, thus giving a maximum increase in yield.

In its first year on the market 25,000 acres were treated and the area sprayed this year will far exceed this amount.

As might be expected, some disappointing results were experienced in the first year and it is estimated that 20 per cent. of the crops treated had poor weed control.

Reasons for poor results
Trials on three research stations during 1966 gave the same excellent results with linuron as had been obtained in previous years. Because of this, many of the poor results obtained on farms were investigated by the Department of Agriculture while the distributors checked complaints received through commercial channels.

These investigations have shown that the reasons for the poor kill of weeds on each property were one, or a combination, of the following factors:

1. Time of spraying
For the last 15 years, general cereal crop spraying has been undertaken during the early tillering growth stage. This has resulted in most farmers not inspecting their crops for the presence of weeds during the first four or five weeks after planting. This is too late for best results with linuron as the weeds are too large to be killed by the rate of application used.

Weed emergence should be checked at least weekly if it is intended to use linuron.

In other cases, where aerial application was used, the period between the inspection of the crop and the actual time of application was several weeks and this again meant that the weeds were too large.

The best time for application is when the cereal is in the two leaf growth stage and the weeds are no more than two inches in diameter. This is usually within two to four weeks of sowing, depending on the growing conditions in a particular district.

The size of the weeds is the most critical factor.

2. Weeds older than crop
On a number of farms the weeds present at the time of sowing were not killed by cultivation. This meant that by the time the cereal was in the two leaf stage these older weeds were 6 to 8 inches in diameter, and were not killed by the herbicide treatment.

In such a case, if the number of these older plants is sufficiently important, the rate of application should be increased.
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3. Dry growing conditions
The uptake of wettable powders by plants is influenced by the growth activity of the weeds at the time of spraying. Where the plants are under stress due to a shortage of soil moisture, or particularly cold weather, results can be disappointing.

During 1966 there was such a dry period shortly after planting and this affected the linuron treatment on a number of farms.

This effect is also seen with 2,4-D spraying but not to such a marked degree.

4. Rate of application too low
The rate of application recommended for 1966 will give excellent weed control provided the treatment is not applied under adverse conditions.

Because there may be some sections of a district or a crop where the conditions listed exist, the general application rate should be increased to 8 oz of the commercial product per acre. This will greatly increase the safety factor of spraying and more uniform results should be obtained.

Advantages of linuron
The main reason for using linuron for crop spraying in preference to 2,4-D, is the increased yield associated with controlling weeds in the seedling stage.

The following results show the type of increase in yield of wheat to be gained. They were obtained at Wongan Hills Research Station during 1965.

Yield increases following control of doublegee at two growth stages

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Growth stage</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not sprayed</td>
<td></td>
<td>30.2</td>
</tr>
<tr>
<td>Linuron</td>
<td>2 leaf</td>
<td>40.2</td>
</tr>
<tr>
<td>Dicamba</td>
<td>Tillering</td>
<td>35.5</td>
</tr>
</tbody>
</table>

Although an extra five bushels per acre was obtained by killing the doublegee at the tillering stage as compared with the control, the increase was 10 bushels when the weeds were killed at the very early growth stage.

The second important advantage is that linuron will control capeweed, doublegee, wireweed and amsinkia in addition to the other crop weeds controlled by 2,4-D.

**APPLY LINURON TO CEREALS AT THE TWO-LEAF GROWTH STAGE**

<table>
<thead>
<tr>
<th>One leaf showing:</th>
<th>Two leaves showing:</th>
<th>Early tillering stage:</th>
</tr>
</thead>
<tbody>
<tr>
<td>too early - weeds</td>
<td>best time to spray</td>
<td>too late for best results - complete kill not obtained</td>
</tr>
<tr>
<td>not fully emerged</td>
<td>weeds fully emerged</td>
<td></td>
</tr>
</tbody>
</table>
**PRESENT RECOMMENDATIONS**

Linuron will be available during the current season under two trade names, Afalon and Linuron 50. Similar results will be obtained with either formulation.

**Rate of application**

To give a greater safety factor under a wider range of conditions, the rate of application for general crop spraying should be 8 oz of the 50 per cent. commercial product per acre.

The tables below show the weeds which will be controlled at this rate and summarise the situation under which the rate should be increased.

**Time of application**

Best results will be obtained if the herbicide is applied when the weeds have fully emerged but are no more than two inches in diameter. At this stage the cereal is in the two leaf stage and it may be two to four weeks after planting. The treatment has practically no residual effect through the soil so that spraying must be delayed until a full emergence of weeds has taken place, yet the linuron must be applied to the weeds while in the seedling stage.

Once the weeds have passed this growth stage the rate of application should be increased to 12 oz. per acre.

**Method of application**

Linuron can be applied through a low volume boom or by aircraft, provided adequate agitation is used. It does not dissolve in water and the agitation is required to keep the powder in suspension.

With aerial application, a minimum of 2 gallons of solution should be used. Where the treatment has been applied in 3 gallons per acre the results have been uniformly good.

Trials with mister applications have shown that this method needs great care. The solution is not thrown as far as with 2,4-D, and it appears easier to scorch the crop close to the machine. For this reason it is felt that farmers should only apply small trial areas with misters during the current season.

**Trade names and cost**

Linuron will be sold under the trade names of Afalon and Linuron 50 during the current year.

The price is likely to be in the vicinity of $3.80 per pound so that the cost per acre will be $1.90 for chemical.

This cost is considerably higher than for 2,4-D but the increased yield plus the fact that a number of different types of weeds are killed with the same treatment makes spraying with linuron an economic proposition.

### RECOMMENDATIONS FOR THE USE OF LINURON TO CONTROL WEEDS IN CEREALS

**Use 8 oz. linuron (50% commercial material) per acre to control—**

<table>
<thead>
<tr>
<th>Weed</th>
<th>When the crop is at the two-leaf growth stage and the weeds are up to two inches across usually two to four weeks after planting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capeweed</td>
<td></td>
</tr>
<tr>
<td>Radish</td>
<td></td>
</tr>
<tr>
<td>Turnip</td>
<td></td>
</tr>
<tr>
<td>Mustard</td>
<td></td>
</tr>
<tr>
<td>Doublegee</td>
<td></td>
</tr>
</tbody>
</table>

**Use 12 oz. linuron (50% commercial material) per acre to control—**

<table>
<thead>
<tr>
<th>Weed</th>
<th>When the crop is at the two to six-leaf growth stage and the weeds are two to four inches across usually four to six weeks after planting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capeweed</td>
<td></td>
</tr>
<tr>
<td>Radish</td>
<td></td>
</tr>
<tr>
<td>Turnip</td>
<td></td>
</tr>
<tr>
<td>Mustard</td>
<td></td>
</tr>
<tr>
<td>Doublegee</td>
<td></td>
</tr>
<tr>
<td>Amsinkia</td>
<td></td>
</tr>
<tr>
<td>Wireweed</td>
<td>If weeds are more than four inches across, complete kill is unlikely</td>
</tr>
</tbody>
</table>
YIELD INCREASES AFTER LINURON SPRAYING

Heavy infestation of doublegee at Wongan Hills Research Station. The unsprayed area (left) yielded 30 bushels per acre but where the doublegee was removed with linuron (right) the yield was 40 bushels per acre.

This control plot heavily infested with cape-weed yielded 16 bushels of wheat per acre. Where the weed was controlled with linuron the yield was 25 bushels per acre.

This experiment at Wongan Hills Research Station in 1966 gave an excellent demonstration of the effectiveness of linuron in controlling broad-leaved weeds. In the foreground is a treated plot; the plot behind it was not sprayed and was heavily infested with doublegees.

The yields were: Treated plots—20.7 bushels per acre, untreated—10.8 bushels per acre.
THE IMPORTANCE OF WEED SIZE IN CROP SPRAYING

The three-inch pocket knife shows that even these small weeds are past the ideal growth stage for linuron treatment. A higher rate of application—12 oz. per acre—would be required to give a complete kill. The ideal stage for linuron spraying is when the weeds are up to two inches across, when 8 oz. of linuron per acre is a satisfactory rate.

Capeweed in cereals can only be controlled with linuron, but a complete kill would not be obtained with weeds as large as those pictured here, despite the small size of the cereal. Spraying with linuron at 12 oz. per acre would, however, give practical control of the weed.

By the time the crop is at the tillering stage the weeds are too big to be killed with linuron. Once this stage has been reached, only 2,4-D, Banex or Banair should be used.

This heavy infestation of capeweed (left) at Merredin Research Station reduced the crop yield to 7.6 bushels per acre. Where the capeweed was killed with linuron the yield was 16.3 bushels per acre.