1-1-1971

How profitable are herbicides for weeds in crops?

J W. Malcolm

G. A. Pearce

Follow this and additional works at: https://researchlibrary.agric.wa.gov.au/journal_agriculture4

Part of the Agricultural Economics Commons, Agronomy and Crop Sciences Commons, and the Weed Science Commons

Recommended Citation

Available at: https://researchlibrary.agric.wa.gov.au/journal_agriculture4/vol12/iss3/2

This article is brought to you for free and open access by Research Library. It has been accepted for inclusion in Journal of the Department of Agriculture, Western Australia, Series 4 by an authorized administrator of Research Library. For more information, please contact jennifer.heathcote@agric.wa.gov.au, sandra.papenfus@agric.wa.gov.au.
IMPORTANT DISCLAIMER

This document has been obtained from DAFWA's research library website (researchlibrary.agric.wa.gov.au) which hosts DAFWA's archival research publications. Although reasonable care was taken to make the information in the document accurate at the time it was first published, DAFWA does not make any representations or warranties about its accuracy, reliability, currency, completeness or suitability for any particular purpose. It may be out of date, inaccurate or misleading or conflict with current laws, polices or practices. DAFWA has not reviewed or revised the information before making the document available from its research library website. Before using the information, you should carefully evaluate its accuracy, currency, completeness and relevance for your purposes. We recommend you also search for more recent information on DAFWA's research library website, DAFWA's main website (https://www.agric.wa.gov.au) and other appropriate websites and sources.

Information in, or referred to in, documents on DAFWA's research library website is not tailored to the circumstances of individual farms, people or businesses, and does not constitute legal, business, scientific, agricultural or farm management advice. We recommend before making any significant decisions, you obtain advice from appropriate professionals who have taken into account your individual circumstances and objectives.

The Chief Executive Officer of the Department of Agriculture and Food and the State of Western Australia and their employees and agents (collectively and individually referred to below as DAFWA) accept no liability whatsoever, by reason of negligence or otherwise, arising from any use or release of information in, or referred to in, this document, or any error, inaccuracy or omission in the information.
HOW PROFITABLE ARE HERBICIDES FOR WEEDS IN CROPS?

BEFORE spending money on chemical weed control in crops, a farmer needs to know how profitable the operation will be. He may also be influenced by other things such as the need for weed-free seed, but the most important consideration should be an increased cash return.

When weeds are controlled the crop yield is usually increased, and this brings an extra return. If the extra return is greater than the cost of the herbicide and its application, the chemical treatment is profitable.

The profitability of using any herbicide on non-quota crop will depend on the expected increase in crop yield. Quotas complicate the situation for wheat, and this is considered later in this article.

Non-quota crops

Rather than attempt to forecast possible yield increases, it is easier to calculate the extra yield needed to pay for the cost of the herbicide treatment. Any yield above this figure becomes profit. The following formula calculates the yield required to break even (when the return equals the cost of treatment).

$$\text{Additional yield (bus. per acre)} = \frac{\text{Cost of herbicide + application (per acre)}}{\text{Value of crop per bushel}}$$

Example: Consider a linseed crop where it may be necessary to spend $4.50 per acre on a herbicide to control weeds. The value of a bushel of linseed is taken to be $1.50.

$$\text{Extra yield (bus. per acre)} = \frac{\text{Cost of herbicide treatment per acre}}{\text{Value of crop per bushel}}$$

$$\frac{\$4.50}{\$1.50} = 3 \text{ bushels per acre}$$

The yield of linseed must be increased by more than 3 bushels per acre for the treatment to be profitable. Linseed is very susceptible to weed competition and an increase in yield of 4 to 8 bushels per acre after controlling weeds is quite likely, so the decision to use a herbicide would be sound.

Table 1 shows the additional yield of various non-quota crops needed to pay for the cost of various herbicide treatments.
PLAN A

1,000 acres wheat
18 bushels per acre
not sprayed

18,000 bu.
(Quota
filled
exactly)

Returns
18,000 bu at $1.10/bu .... = $19,800

Costs
1,000 acres at $5/ac .... = $5,000

Net return .... = $14,800

PLAN B

1,000 acres wheat
sprayed with 2,4-D
22 bushels per acre

22,000 bu.
(Quota
exceeded)

Returns
18,000 bu at $1.10/bu .... = $19,800

Costs
1,000 acres at $5/ac .... = $5,000
1,000 acres sprayed at $0.75/ac .... = $750

Net return .... = $14,050

PLAN C

818 acres wheat
sprayed with 2,4-D
22 bushels per acre

182 acres
VACANT

18,000 bu.
(Quota
filled
exactly)

Returns
18,000 bu at $1.10/bu .... = $19,800

Costs
818 acres at $5/ac .... = $4,090
818 acres at $0.75/ac .... = $614

Net return .... = $15,096

PLAN D

818 acres wheat
sprayed with 2,4-D
22 bushels per acre

182 acres
barley
28 bushels
per acre

18,000 bu.
(Quota
filled
exactly)

Returns
18,000 bu at $1.10/bu .... = $19,800
5,096 bu at $0.60/bu = $3,058

Costs
1,000 acres at $5/ac .... = $5,000
1,000 acres at $0.75/ac .... = $750

Net return .... = $17,108
Table 1.—The additional yield in bushels per acre of various crops to meet the outlay on herbicide treatments costing different amounts.

<table>
<thead>
<tr>
<th>Cost of herbicide and application (per acre)</th>
<th>Additional yield (bushels per acre) to meet cost of herbicide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rape*</td>
</tr>
<tr>
<td>50 cents</td>
<td>0.4</td>
</tr>
<tr>
<td>75 cents</td>
<td>0.6</td>
</tr>
<tr>
<td>$1.00</td>
<td>0.8</td>
</tr>
<tr>
<td>$1.50</td>
<td>1.1</td>
</tr>
<tr>
<td>$2.00</td>
<td>1.5</td>
</tr>
<tr>
<td>$3.00</td>
<td>2.2</td>
</tr>
<tr>
<td>$4.50</td>
<td>3.3</td>
</tr>
</tbody>
</table>

* The value of a bushel of each crop is taken to be: rape $1.35, linseed $1.50, oats $0.50, barley $0.60.

If weeds are removed from these crops a worthwhile increase in yield is very likely. The use of herbicides, particularly on linseed and rapeseed, can therefore be extremely profitable.

**Quota crops**

When the production of a crop such as wheat is limited by a quota, there is no direct advantage in increasing the yield. If the farmer delivered this extra grain to the siding as over-quota wheat, the following year’s quota would be reduced, and he would wait a year before being paid the normal price, less storage costs.

The farmer has at least four alternatives when deciding whether to use a herbicide on his wheat crop. These are shown in figure 1.

**PLAN A** is a typical farming operation. The farmer grows 1,000 acres of wheat which average 18 bushels per acre, exactly filling his 18,000 bushel quota. It costs $5.00 per acre* to grow the wheat, so he has a net return of $14,800. The price of wheat is taken as $1.10 per bushel.

* The growing cost of $5.00 per acre was calculated as follows:—

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost (per acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel</td>
<td>$0.45</td>
</tr>
<tr>
<td>Repairs</td>
<td>$0.20</td>
</tr>
<tr>
<td>Depreciation</td>
<td>$1.50</td>
</tr>
<tr>
<td>Fertiliser (135 lb. superphosphate)</td>
<td>$1.50</td>
</tr>
<tr>
<td>Seed (45 lb. at $4.00 per bag)</td>
<td>$1.00</td>
</tr>
<tr>
<td>Sundries (7%)</td>
<td>$0.35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$5.00</strong></td>
</tr>
</tbody>
</table>

If your costs are different from these, make sure you use your costs in calculations about your farm.

**UNDER PLAN B** he is using a herbicide treatment which costs 75 cents per acre and which increases the yield by four bushels per acre. Costs have increased to $5.75 per acre because of the herbicide treatment but the returns have remained the same because the extra wheat cannot be sold with the quota. The net return is $14,050, $750 less than Plan A. (This is the cost of the treatment.) If the farmer is able to dispose of the surplus wheat, this plan could be profitable.

**UNDER PLAN C** the farmer reduces the area sown to wheat by 182 acres so that his quota is again exactly filled after controlling weeds. The area not sown to wheat is left vacant, so the cost of sowing that 182 acres is saved ($910). However, since the 818 acres of wheat is sprayed there is an extra cost of almost $614 (818 × 75 cents). This extra cost is taken from the saved cost on the 182 acres, leaving a net return of $15,096, slightly more than Plan A.

We can use a simple formula to work out what the new yield would have to be to cover any cost of herbicide or other treatment. Here is the formula:—

\[
\text{New yield} = \frac{\text{old yield} \times (\text{growing cost} + \text{treatment cost})}{\text{growing cost}}
\]

**In the previous example if the cost of the herbicide is 75 cents per acre:**—

\[
\begin{align*}
\text{New yield} &= \frac{18 \times (5.00 + 0.75)}{5.00} \\
&= 20.7 \text{ bushels per acre}
\end{align*}
\]
Table 2.—The additional yield of wheat required to pay the cost of various herbicide treatments when the area sown is reduced

<table>
<thead>
<tr>
<th>Cost of herbicide and application per acre</th>
<th>Additional yield (bushels per acre)</th>
<th>Present yield (bushels per acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>50 cents</td>
<td>1½</td>
<td>1¾</td>
</tr>
<tr>
<td>75 cents</td>
<td>2½</td>
<td>2¾</td>
</tr>
<tr>
<td>$1·00</td>
<td>3½</td>
<td>3¾</td>
</tr>
<tr>
<td>$1·50</td>
<td>4½</td>
<td>5½</td>
</tr>
<tr>
<td>$2·00</td>
<td>6½</td>
<td>7½</td>
</tr>
<tr>
<td>$3·00</td>
<td>9½</td>
<td>10½</td>
</tr>
<tr>
<td>$4·50</td>
<td>14½</td>
<td>16½</td>
</tr>
</tbody>
</table>

Yield must increase by 2.7 bushels per acre to meet the cost of the herbicide. Such an increase is quite likely, so Plan C will meet the cost of the treatment provided the herbicide treatment is cheap. If the cost of the herbicide is $3.00 per acre, yield must increase by more than 10.8 bushels per acre for the plan to be profitable. This is most unlikely.

Table 2 shows that the increase in yield needed to meet the cost of expensive herbicides is often greater than the likely yield of the crop.

Not only must the cost of the herbicide treatment be met, but some profit margin is desirable. It is difficult to adopt this procedure and at the same time maintain or increase farm income.

IN PLAN D the farmer decides to use the vacant land he had under Plan C to grow two-row feed barley which costs about $5.75 per acre to grow, including spraying with 2,4-D. The barley normally yields 24 bushels per acre but, with weeds controlled, this is increased to 28 bushels per acre, worth an extra $3,058 over the 182 acres. The net return from Plan D is $17,108 so this is the most profitable plan.

The net return from growing barley is the difference between the growing costs of $5.75 per acre and the income from the sale of 28 bushels of grain at $0.60 per bushel. This income amounts to $16.80, so the net return is $11.05 per acre.

We can use a formula to work out what the new yield of wheat would have to be where the land saved from wheat is planted to feed barley.

\[
\text{New yield} = \frac{\text{old yield} \times (\text{net return from barley} + \text{wheat growing cost} + \text{wheat spraying cost})}{\text{net return from barley} + \text{wheat growing cost}}
\]

In Plan D—

\[
\text{New yield} = 18 \times \frac{(11·05 + 5·00 + 0·75)}{11·05 + 5·00} = 19·0 \text{ bushels}
\]

This is an increase of 1 bushel per acre over the yield of wheat obtained without spraying with herbicide.

This comparison of the four plans has shown that the most profitable way to use a technique which can moderately increase the yield of a quota crop is to follow Plan D. That is, reduce the area sown to the quota crop so the quota is again exactly filled, and use the land released from quota production for the next most profitable alternative.

The next most profitable alternative will vary between farms, and some enterprises, though profitable, may not be acceptable. Barley, the alternative considered in the example, and grazing sheep are the two enterprises most likely to be considered.

At present prices, the likely return from breeding ewes stocked at three dry sheep equivalents per acre is about $7.50. This compares unfavourably with the net return from barley of $11.05 used in our example.

We used a formula earlier to determine the new yield of wheat needed for Plan D to be profitable. This formula has been used to produce Table 3. If the net return from barley is $11.05 per acre, the table shows the yield increase in bushels per acre needed for the increased cash return to equal the treatment cost using Plan D.
Table 3.—Additional yield of wheat required to break even when the area sown to wheat is reduced to just fill the quota, and the extra land is sown to barley.

<table>
<thead>
<tr>
<th>Cost of herbicide and application per acre</th>
<th>Additional yield (bushels per acre)</th>
<th>Present yield (bushels per acre)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td>50 cents</td>
<td>1/4</td>
<td>1/4</td>
</tr>
<tr>
<td>75 cents</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>$1.00</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>$1.50</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>$2.00</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>$3.00</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>$4.50</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

The increased yield needed on a particular farm can be read from the table using the present wheat yield and the likely cost of the herbicide treatment selected.

The yield increases which can be expected using various chemicals at the recommended rates are outlined in other articles. It is sufficient here to note that yield increases with wheat can range from three to eight bushels per acre.

**RURAL RECONSTRUCTION**

Application forms for Rural Reconstruction are now available from Trading Banks in rural areas. When completed, application forms should be returned to the farmer's own Trading Bank.

The forms include an outline of the Reconstruction Scheme which will give farmers an indication of their likely eligibility for assistance. The objective in lending the funds is to help restore to economic viability those farms and farmers with the capacity to maintain viability once achieved, the prime requirement being ability to service commitments.

Farmers with no long term prospects due to farm size or total debt; or those who have not tried to obtain finance from normal sources are urged not to apply, and thereby, delay processing of acceptable applications.

Allowing for receipt, processing and approval of applications it is unlikely that any funds will be available before the end of May. Therefore, where funds are required for a cropping programme this year, other arrangements must be made. (See Rural Emergency Carry-On p. 83.)

**Debt Reconstruction**

The purpose of making funds available for debt reconstruction is to assist farmers who, although having sound prospects of commercial viability within a reasonable period, have used all their cash and credit resources and cannot meet their financial commitments.

The re-arrangement of debt may take the form of advancing money to assist payments to creditors. Additional funds for carry-on, livestock or further property development will be strictly limited to the minimum required to enable the farmer to carry on and free himself from dependence on assistance.

The interest rate to be charged will be flexible and may be varied within the duration of the loan between 4 and 6 1/2 per cent. The maximum repayment period will be 20 years.

**Farm Build-up**

Funds will be available to assist the amalgamation of smaller uneconomic farms with adjoining holdings.

Assistance will take the form of the provision of finance or a guarantee of repayments of principal and interest where this is essential to enable finance to be obtained from other sources. The value of buildings included in the purchase of a property may be written down where they are not necessary for the built up property. Consideration will be given to advances for carry-on, plant, livestock and development for the additional land under the conditions for debt reconstruction where not available elsewhere.

Uneconomic farms will not be purchased by the authority for resale. Funds will be made available only where the purchase price and terms have been negotiated between a buyer and seller and other sources of finance cannot be found.

The interest rate for assistance for farm build-up will be not less than 6 1/2 per cent. and the maximum term will be 25 years.