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BRACKEN FERN
Control Experiment at Eastbrook
By F. E. Ryan, B.Sc. (Agric.), Hons., Agrostologist

Bracken fern occurs over a large proportion of the civilised world and is recognised in all countries as a serious pasture pest. Its control is a matter of great concern. In Western Australia large areas have been invaded by bracken, and recommendations for its control have been made from time to time. Generally speaking, control measures are aimed at the removal of the frond cover and stimulating pasture growth beneath.

The persistent removal of fronds by mowing weakens the reserves of plant food stored by the plants. Trampling by grazing animals helps to break and destroy the young fronds as they come through the ground and competition from vigorous pasture reduces fern growth.

There are still considerable areas in the higher rainfall areas in Western Australia which are overrun with bracken and little progress is being made to reclaim these bracken-infested areas. For this reason, the general recommendations concerning bracken control were put into operation in a trial in the Manjimup area through the cooperation of the Australian Dairy Produce Board Pasture Improvement Committee and officers of the Department of Agriculture. The following is a report of the progress so far with this trial.

SITE AND SOIL
The trial was commenced in November, 1950 on the property of Mr. G. Fox of Eastbrook near Manjimup. The area chosen had been partly cleared for many years, but had been vacant prior to purchase by Mr. Fox two years before the commencement of the trials.

The soil has a dark grey sandy surface inclined to be gritty and originally carried a tree cover of jarrah and red gum. At the time of the commencement of the trial it carried a heavy growth of fern fronds and it was estimated that the ferns provided 40-50 per cent, ground cover and grew to a height of about four feet.

TREATMENTS
The area of the trial was five acres, being 10 chains long and 5 chains wide. This area was divided up into four plots A, B, C, and D each 10 chains long and 1½ chains wide. The plots were treated as follows:

A. Mown November 28, 1950.
   Mown March 10, 1951.
   Cultivated with tandem discs April 5, 1951 and sown with a pasture mixture.

B. Mown November 28, 1950.
   Mown March 10, 1951.
   Ploughed with a mould-board plough March 12, 1951.
   Cultivated April 5, 1951 and sown with a pasture mixture.

   Rolled (with Rooney roller) February 24, 1951.
   Ploughed with mould-board plough March 12, 1951.
   Cultivated with tandem discs April 5, 1951 and sown with a pasture mixture.

D. Rolled (with Rooney roller) November 28, 1950.
   Rolled (with Rooney roller) February 24, 1951.
   Ploughed with mould-board plough March 12, 1951.
   Cultivated with tandem discs April 5, 1951 and sown with a pasture mixture.

The following seed mixture was sown over the whole area on April 10, 1951:

- Mid-Season subterranean clover 8 lb. per acre.
- Wimmera ryegrass 4 lb. per acre.
- Ballidu oats 2 bushels per acre.

The whole area was topdressed with superphosphate at 2 cwt. per acre.

The Rooney roller was designed by Messrs. W. J. & S. Rooney of Manjimup. It is square in section and consists of two sleepers bolted together and protected on the cutting edge by steel plates.

A diagram illustrating the construction of this roller, together with further information concerning its structure and use was published in the Journal of Dept. of Agriculture of Western Australia, Vol. XXV (Second Series) No. 1, March, 1948, pages 34-43. This article is reprinted in leaflet No. 920.

PROGRESS OBSERVATIONS
Pasture Species.

The seed mixture germinated well and a good growth of oats, sub. clover and Wimmera ryegrass was obtained. The oats were
later grazed out completely and the subclover and Wimmera ryegrass allowed to establish under mild grazing conditions.

The first year stand of subclover and Wimmera ryegrass in 1951 was good, with stronger growth from both species on the ploughed section.

During 1952 a good pasture stand of subclover and Wimmera ryegrass was obtained over the whole area and this was heavily grazed.

Ferns.

The rolling and mowing carried out in November, 1950 and in February and March, 1951, successfully removed the cover of ferns at the time of the cultivation and sowing of the area.

During 1951 some regrowth of fern fronds occurred but the numbers of fronds had been greatly lessened and the vigour of growth of the individual fronds greatly reduced.

From the time of the commencement of the trial, reduction of ferns on all plots was obvious when compared with adjacent untreated areas.

During 1952, the land surrounding the trial was bulldozed and the fern growth knocked down so that the comparison between the untreated land and the four plots can no longer be made.

RESULTS

Green Weight of Ferns Per Acre.

In order to measure the fern growth of these plots, sample cuts of fern fronds were taken before the commencement of the trial and again in November of each year. The green weights of fern fronds per acre have been estimated on each plot and the figures are given in the following table:

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Green weight of Ferns—cwts./ac.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27th Nov. (Before Commencement)</td>
</tr>
<tr>
<td>A.—Mown and cultivated</td>
<td>57.5</td>
</tr>
<tr>
<td>B.—Mown and ploughed</td>
<td>43.2</td>
</tr>
<tr>
<td>C.—Rolled and ploughed</td>
<td>50.5</td>
</tr>
<tr>
<td>D.—Rolled and cultivated</td>
<td>37.8</td>
</tr>
</tbody>
</table>

It is clear from these figures that a considerable reduction for fern growth has occurred over the two year period. There does not appear to be any great difference in the degree of control obtained from rolling as compared with cutting, but ploughing appears to be more effective than cultivating.

Frond Count.

In addition to the weight of ferns per acre, a count was made of the number of fronds per acre and the following figures were obtained:

<table>
<thead>
<tr>
<th>Treatments</th>
<th>No. of Fronds per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>August, 1951</td>
</tr>
<tr>
<td>A.—Mown and cultivated</td>
<td>8,700</td>
</tr>
<tr>
<td>B.—Mown and ploughed</td>
<td>6,800</td>
</tr>
<tr>
<td>C.—Rolled and ploughed</td>
<td>6,100</td>
</tr>
<tr>
<td>D.—Rolled and cultivated</td>
<td>8,000</td>
</tr>
</tbody>
</table>

Note.—The number of fronds initially present has been estimated as 100,000 per acre.

These figures reflect the increase in numbers of fern fronds between August and November when fresh fronds are emerging through the soil. There appears to have been a slight increase in the total number of fronds during 1952 as compared with 1951, but the vigour of the individual fronds was reduced. Thus Table 1 indicates that the total weight of fern material on the area did not increase even though the numbers were slightly larger.
During the first few years of treatment, the number of fern fronds may be expected to remain high even though the vigour of their growth may be greatly reduced, since the mowing of one frond would tend to stimulate dormant buds. Over a period of time, the destruction of fronds is expected to weaken the food reserves in the underground rhizomes and eventually the numbers should also decline as well as the vigour of growth.

It was estimated from visual observations made during 1951 that the untreated fronds in the surrounding area were at least five times more vigorous than the treated ones. This trial will be continued for some time to observe the recovery or decline of the fern cover with the passage of time.

**DISCUSSION**

The reduction of fern growth as a result of cutting, rolling, ploughing and cultivation treatments was quite evident on this area. The reduction was due firstly to a much smaller total number of fern fronds per unit of area on the four treated areas as compared with the surrounding country and secondly to a very great reduction in the vigour of the individual fronds. The difference between the various treatments was not quite so obvious. The number of fronds recorded and the green weight of the fronds per acre were less on the ploughed sections than on the cultivated sections and ploughing appears to have been more effective in reducing fern growth than cultivation.

Some fern-infested paddocks throughout the State are only partly cleared and contain too many roots and stumps in their present condition for ploughing, and this practice would not be very practical on these areas, but on much of the infested country, ploughing can be used with advantage. The more vigorous growth of the pasture on the ploughed area also supports the view that, if practical, ploughing should be carried out.

Rolling plus either cultivation or ploughing and cutting plus either cultivation or ploughing proved equally effective in reducing the fern cover and allowing a vigorous growth of pasture. Rolling can be done in rough country since the roller is not so seriously affected by obstructions as the mower. Since rolling was just as effective as mowing and the roller is a relatively simple implement to make, it could be used to advantage under fairly rough paddock conditions which occur in some infested areas.

Finally, the paddock treated for ferns as described has continued to produce a good stand of pasture over the two year period and has provided a considerable amount of grazing as a return for the work expended on reclamation. The practices of ploughing and cultivating have been recommended for good pasture management even when the areas are not affected by bracken fern and consequently the only extra effort needed in the control of the ferns has been periodic rolling or mowing of them.

This trial is still in progress and it will be interesting to watch the success or otherwise of the treatments over a period of time.

**SUMMARY**

Rolling, mowing, ploughing and cultivation treatments for the control of bracken fern on four plots in the Manjimup area are outlined. Progress results indicating the success of the treatments in affecting a reduction in fern cover are given.

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**THE CEYLON CROW**

_Specimens_ of the Ceylon crow occasionally reach Western Australia, having apparently "stowed away" on ships from overseas. Several have been shot in the metropolitan area in recent years.

The Ceylon crow is smaller than the ordinary crow or Australian raven and it has grey feathers extending from the back of the head to the shoulders and partly encircling the neck. It has a much more erect stance than the raven, which keeps its body practically parallel with the ground. The call of the Ceylon crow is a series of mumbling tones ending in a shrill note, while that of the raven is the familiar "kar-caw".

The native "Little Crow" found in districts north of Perth, more closely resembles the Ceylon crow but it lacks the grey feathers which provide a sure means of identification.

The Ceylon crow is a most undesirable immigrant which could become a serious pest if it gained a footing here. It is particularly destructive to chickens and other small birds.

Anyone seeing a Ceylon crow should destroy it immediately and send the head (including the neck) and the legs to the Chief Vermin Control Officer, Department of Agriculture, Adelaide Terrace, Perth. A bonus of £1 will be paid for each Ceylon crow destroyed.
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