1969

Long Term Rotation Trials

Ian Rowland

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DEPARTMENT OF AGRICULTURE, W.A.

PLANT RESEARCH DIVISION

1969 RESULTS OF FIELD EXPERIMENTS

Ian Rowland, Research Officer.

LONG TERM ROTATION TRIALS

The object of these trials is to attempt to determine the best rotation for each area or at least give some guidelines for recommendations as to the optimum rotation. Also to determine the effect of various pasture phases on the performance of the following crops and the number of crops required to utilise any accrued benefit from the pasture.

In addition the trials on the Salmon Gums Research Station (68SG5) will attempt to compare cereal rotations on both volunteer and barrel medic pastures. It is also hoped to be able to get some estimate of grazing production from barrel medic and volunteer pastures.

The trial being run by the Geraldton District Office at Northampton (68GE8) will determine the best rotation for soil badly infected with cereal eelworm. Also find the effect of various lengths of pasture and fallow on the level of eelworm in the soil. The eelworm work is being carried out by Miss Goss of Plant Pathology.
HISTORY;
/ SOIL TYPES & VEGETATION:

W 56 H : Pdk 3E on Wongan Hills Res. Stn.
Virgin Site.
Wongan sandy loam.
Smoke bush, wattle, low scrub & isolated mallee patches.

66M 29 : Pdk 5AE on Merredin Research Station.
Old land, cropped 1962 to 1964, sown to barrel medic in 1965.
Sandy clay loam.
Salmon Gum and Gimlet.

67BA 6 : Pdk 7 on Badgingarra Research Station.
Virgin site.
Sand over gravel at 2 - 8 inches.
Low native scrub.

Red brown loamy sand.
Standback, Jam & York Gum.

67 N 4 : Experimental pdk on Newdegate Res. Stn.
Old land, sown to subclover in 1962.
Sandy soil over gravel at 8-12 inches.
Mallee scrub.

Fleming gravelly sand.
Chittick and mallee.

68SG 5 : Pdk H5 on Salmon Gums Res. Stn.
Old land, cropped since 1964.
Northern two blocks are on Circle Valley sand, the Southern two on Kumari.
Mallee and medium eucalypts with teatree undergrowth.
**TREATMENTS:**

**W 56 H:**
- 2 years clover followed by 1, 2, 3 & 4 years wheat

**66M29: 67BA6: 67C13: 67N4:**
1. Crop continuously
2. Pasture
3. 1 year crop after 1 year pasture
4. 1 year crop after 2 years pasture
5. 1 year crop after 4 years pasture
6. 2 year crop after 2 years pasture
7. 2 year crop after 4 years pasture
8. 3 year crop after 3 years pasture

**68E5:**
1. Continuous wheat
2. " linseed
3. " pasture
4. 1 year wheat after 1 year pasture
5. 1 year linseed after 1 year pasture
6. 1 year wheat after 2 year pasture
7. 1 year linseed after 2 year pasture
8. 1 year linseed after 1 year pasture
9. 1 year linseed after 1 year pasture
10. 1 year wheat after 4 year pasture

**68SG5:**
1. Continuous wheat in Cyprus
2. 1 year crop after 1 year Cyprus
3. 1 year crop after 3 year Cyprus
4. 3 year crop after 3 year Cyprus
5. Continuous wheat in Volunteer pasture
6. 1 year crop after 1 year Volunteer
7. 1 year crop after 1 year Volunteer
8. 3 year crop after 3 year Volunteer

**68GEB:**
1. Crop continuously
2. 1 year crop after 1 year pasture
3. 1 year fallow, 1 year crop, 1 year pasture
4. 1 year crop after 2 year pasture
5. 1 year crop after 4 year pasture
6. 2 year crop after 2 year pasture
7. 1 year fallow, 2 year crop, 2 year pasture

Examples of reps and plots:
- (2 reps each year - 2 plots)
- (4 reps each year - 8 plots)
- (2 reps each year - 12 plots)
**HARVEST YIELDS (Bushels/acre) FOR 1969:**

### W56H:

<table>
<thead>
<tr>
<th>Years clover</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>19.7</td>
<td>14.8</td>
<td>14.7</td>
<td>16.7</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>19.6</td>
<td>16.2</td>
<td>17.1</td>
<td>18.3</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>22.9</td>
<td>18.9</td>
<td>21.7</td>
<td>18.5</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>23.1</td>
<td>17.3</td>
<td>19.8</td>
<td>19.4</td>
<td></td>
</tr>
</tbody>
</table>

2nd crop after fallow 11.9

The corresponding nitrogen levels, in lbs N/acre 3", from the plots before the 1969 crop was sown (i.e. from 1968 treatment) are:

<table>
<thead>
<tr>
<th></th>
<th>310</th>
<th>340</th>
<th>460</th>
<th>490</th>
</tr>
</thead>
<tbody>
<tr>
<td>420</td>
<td>320</td>
<td>360</td>
<td></td>
<td></td>
</tr>
<tr>
<td>390</td>
<td>420</td>
<td>430</td>
<td>460</td>
<td>450</td>
</tr>
<tr>
<td>490</td>
<td>410</td>
<td>500</td>
<td>640</td>
<td>460</td>
</tr>
<tr>
<td>640</td>
<td>460</td>
<td>460</td>
<td>500</td>
<td>640</td>
</tr>
</tbody>
</table>

280lbs N/ac 3"

This is total N in the top 3" calculated from samples taken in March and including any coarse organic matter. The low N results for 3 and 5 years clover may have been caused by the poor initial planting, in 1966 and 1964 respectively, of these clovers. The 1969 yield for 1 crop after 3 years clover reflect the low N value after 3 years clover; however, that from 1 crop after 5 years clover does not.

### 66M29:

<table>
<thead>
<tr>
<th>Stage of rotation</th>
<th>Yield</th>
<th>N lbs/ac 3&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 successive crops</td>
<td>2.4</td>
<td>85</td>
</tr>
<tr>
<td>1 crop after 1 year barrel medic</td>
<td>2.2</td>
<td>93</td>
</tr>
<tr>
<td>3 &quot; &quot; 1 &quot; &quot; &quot; &quot;</td>
<td>1.7</td>
<td>91</td>
</tr>
<tr>
<td>1 &quot; &quot; 2 &quot; &quot; &quot;</td>
<td>3.3</td>
<td>91</td>
</tr>
<tr>
<td>2 &quot; &quot; 3 &quot; &quot; &quot;</td>
<td>2.4</td>
<td>91</td>
</tr>
<tr>
<td>1 &quot; &quot; 4 &quot; &quot; &quot;</td>
<td>3.8</td>
<td>91</td>
</tr>
</tbody>
</table>

Stage of rotation has been altered to allow for 1 year of pasture before the trial started. Drought badly affected all plots. There was a response to 2 years and over of barrel medic, by the first crop. Nitrogen levels are for the less than 2 mm fraction of the top 3" sampled in March.
Stage of rotation

<table>
<thead>
<tr>
<th>Stage of rotation</th>
<th>1st crop</th>
<th>3rd crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st crop</td>
<td>11.0</td>
<td></td>
</tr>
<tr>
<td>3rd crop</td>
<td>16.8</td>
<td></td>
</tr>
</tbody>
</table>

The 1st crop is an initial clearing crop on virgin land, before being sown to pasture. The continuous crop shows the effect of more thorough cultivation and a cleaner seedbed.

Stage of rotation altered to allow for 3 years previous pasture.

Stage of rotation

<table>
<thead>
<tr>
<th>Stage of rotation</th>
<th>3rd crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st crop after 1 year clover</td>
<td>9.0</td>
</tr>
<tr>
<td>2nd &quot; &quot; 4 &quot; &quot;</td>
<td>12.9</td>
</tr>
<tr>
<td>1st &quot; &quot; 5 &quot; &quot;</td>
<td>7.2</td>
</tr>
</tbody>
</table>

Stage of rotation altered to allow for 5 years previous pasture.

Stage of rotation

<table>
<thead>
<tr>
<th>Stage of rotation</th>
<th>3rd crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st crop after 1 year clover</td>
<td>19.7</td>
</tr>
<tr>
<td>2nd &quot; &quot; 6 &quot; &quot;</td>
<td>25.4</td>
</tr>
<tr>
<td>1st &quot; &quot; 7 &quot; &quot;</td>
<td>20.8</td>
</tr>
</tbody>
</table>

Stage of rotation altered to allow for 5 years previous pasture. Linseed yields decreased by cutworm damage and the dry conditions at flowering.

Stage of rotation

<table>
<thead>
<tr>
<th>Stage of rotation</th>
<th>2nd wheatcrop</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st crop after 1 year linseed</td>
<td>29.2</td>
</tr>
<tr>
<td>1st &quot; &quot; 6 year clover</td>
<td>35.1</td>
</tr>
<tr>
<td>2nd linseed crop</td>
<td>32.9</td>
</tr>
<tr>
<td>1st crop after 6 year clover</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Stage of rotation altered to allow for 5 years previous pasture. Barrel medic sown in 1968 never established and the lack of pasture and the extra working the soil received possibly accounts for the lack of response to a year of improved pasture.

Stage of rotation altered to allow for 4 years of crop prior to commencement of the trial. Drought had badly affected all of the plots. Barrel medic sown in 1968 never established and the lack of pasture and the extra working the soil received possibly accounts for the lack of response to a year of improved pasture.

23.2.70
IR:EH.