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1973 Long term rotation trials

Ian Rowland

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Recommended Citation

Rowland, I. (1973), *1973 Long term rotation trials*. Department of Agriculture and Food, Western Australia, Perth. Report.

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LONG TERM ROTATION TRIALS

SUMMARY OF RESULTS

1973

IAN ROWLAND

PLANT RESEARCH DIVISION

DEPARTMENT OF AGRICULTURE

WESTERN AUSTRALIA

LONG TERM ROTATION TRIALS:

The results shown are the yield of grain harvested from crops grown after various lengths of pasture ley.

W56H/604EX

Locality: Paddock 3E on Wongan Hills Research Station.

Soil Type: Wongan loamy sand.

Started in 1956 on a virgin site. After a years fallow and two cleaning crops, subclover (w. Dwalganup) was sown. After 2, 3, 5 or 7 years of topdressed pasture, four successive wheat crops were grown.

Rainfall:

| May | June | July | August | Sept. | Oct. | Total |
|------|------|------|--------|-------|------|---------|
| 19.8 | 68.8 | 71.4 | 57.2 | 88.1 | 11.7 | 317 mm. |

WHEAT YIELDS (Gamenya) kg/ha.

| | 2nd Crop | 3rd Crop | 4th Crop |
|----------------|----------|----------|----------|
| Years clover 2 | 2144 | 1486 | 1346 |
| 3 | 2462 | 1515 | 1442 |
| 5 | N.A. | 1544 | 1606 |
| 7 | 2481 | 1895 | 1837 |

Grain from 2nd crop after 5 years clover was lost during harvest. The other second crop treatments are from one plot each.

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66M29/2083EX

Locality: Paddock 5AE on Merredin Research Station.

Soil type: Merredin sandy clay loam.

Trial is on old land which was sown to Cyprus Barrel medic the year before commencement. Medic is allowed to regenerate after a cropping phase and is topped each year.

Rainfall:

| May | June | July | August | Sept. | Oct. | Total |
|------|------|------|--------|-------|------|---------|
| 23.0 | 56.0 | 76.5 | 49.0 | 41.4 | 22.1 | 270 mm. |

WHEAT YIELDS (Gambée)

| Stage of Rotation | kg/ha |
|-------------------------------|-------|
| 8th successive crop | 1587 |
| 1st crop after 1 year pasture | 1875 |
| 1 " " 2 " " | 1742 |
| 1n " " 3 " " | 1846 |
| 1 " " 4 " " | 1970 |
| 2nd " " 2 " " | 1773 |
| 2 " " 3 " " | 1817 |
| 2 " " 4 " " | 1686 |
| 3rd " " 3 " " | 1885 |

The continuous crop plots are becoming weedy, mainly wild oats and ryegrass.

67BA6/2331EX

Locality: Paddock 7 on Badgingarra Research Station.

Soil type: Sand over gravel at 10 to 20 cms.

A virgin site where each plot was cleared and a cleaning crop of wheat grown with urea (90 kg/ha). Seaton Park subclover was then established.

Rainfall:

| May | June | July | August | Sept. | Oct. | Total |
|------|-------|-------|--------|-------|------|---------|
| 70.1 | 163.3 | 167.6 | 111.0 | 112.0 | 23.9 | 648 mm. |

| Wheat Yields (Kondut) | kg/ha |
|--|-------|
| 7th successive crop + 100 kg urea/ha. | 333 |
| 1st crop after 1 year pasture | 556 |
| 1 " " 2 " " | 752 |
| 1 " " 3 " " | 661 |
| 1 " " 4 " " | 409 |
| 1 wheat after 1 lupin after 1 year pasture | 643 |

| Lupin Yield (Unicrop) | kg/ha |
|--|-------|
| 2nd lupin crop after 4 years pasture | 567 |
| 1 lupin after 4 " " | 861 |
| 1 lupin after 1 wheat after 1 year pasture | 825 |
| 1 " " 1 " " 2 " " | 663 |
| 1 " " 1 " " 3 " " | 828 |
| 1 " " 1 " " 4 " " | 877 |

.../4..

67BA6/2331EX

The trial was badly waterlogged during the 1973 growing season. Allowance has been made for any decrease in the length of plots caused by waterlogging. However, it is only an estimate and the results are presented bearing this in mind.

.../5..

68E5/2474EX

Locality: Paddock N1B on Esperance Research Station.

Soil Type: Fleming gravelly sand.

An old land site sown to Woogenellup and Brome grass in 1963.

Rainfall:

| May | June | July | August | Sept. | Oct. | Total |
|------|------|------|--------|-------|------|---------|
| 19.3 | 75.7 | 57.4 | 80.0 | 87.6 | 41.1 | 361 mm. |

Barley yields (Dampier)

| Stage of Rotation | kg/ha |
|--------------------------------------|-------|
| 6th successive barley | 1049 |
| 1st barley after 1 year pasture | 1725 |
| 1 " " 2 " " | 1841 |
| 1 " " 4 " " | 1827 |
| 1st barley - 1 rape - 2 year pasture | 2098 |
| 1 " - 1 " - 4 " " | 2045 |

Rape yields (Turret)

| Stage of Rotation | kg/ha |
|-------------------------------|-------|
| 3rd successive rape | 71 |
| 1st rape after 1 year pasture | 165 |
| 1 " " 2 " " | 276 |
| 1 " " 4 " " | 310 |

Better weed control was achieved when barley was sown on a 1972 rape plot. Ryegrass is becoming a problem in the continuous barley. Blackleg wiped out the 3rd successive rape crop and was severe in the other plots. Despite the disease problem there was a response to the increased soil fertility following pasture.

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68SG5/2475EX

Locality: Paddock H5 on Salmon Gums Research Station.

Soil Type: Complex of Kumarl loam and circle valley/Beete calcareous sandy loam.

The site was first cropped in 1964 and Cyprus barrel medic was sown in 1968 on two of the four blocks. The other two blocks are allowed to regenerate volunteer pasture, based on grasses. Only the two medic blocks are topdressed.

All crop plots are sprayed with Avadex to control ryegrass.

Rainfall:

| May | June | July | August | Sept. | Oct. | Total |
|------|------|------|--------|-------|------|-----------|
| 16.8 | 85.1 | 59.2 | 35.6 | 38.9 | 25.1 | 260.7 mm. |

Wheat Yields (Bokal)

| Stage of Rotation | kg/ha |
|--------------------------------------|-------|
| 10th successive crop + 56 kg urea/ha | 487 |
| 10th " " NIL urea | 339 |
| 1st crop after 1 year medic | 1484 |
| 1 " " 3 " " | 1259 |
| 2 " " 3 " " | 1078 |
| 3 " " 3 " " | 949 |
| 1st crop after 1 year volunteer | 825 |
| 2 " " 3 " " | 1017 |
| 2 " " 3 " " | 947 |
| 3 " " 3 " " | 1055 |

The successive crop plots all have a severe infestation of ryegrass, despite the use of Avadex and good cultivation.

In the two medic blocks, yields show the response to the incidence of "take all". A crop following three years of pasture, in which barley grass had built up, gave a lower yield than after a year of pasture. This was more noticeable in the lighter soil type.

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A second and third crop both reduce the yield as ryegrass and root rots become more severe.

In the volunteer blocks the yield from the 1:1 rotation is lower than that from a 1:3 rotation. This could be due to lower soil fertility in the short rotation, but also to ryegrass being the main grass species in the pasture year. Thus allowing ryegrass to buildup and reduce yields.

A second crop reduced yields. There is no explanation why the third crop did so well.

In the pasture during 1973 the barley grass buildup from virtually none in the first year to 30% in the second and to 50% (of the grass component) in the third year. Ryegrass tended to go in the reverse order.

69GE20/2466EX

Locality: H.R. Bridgeman, Horrocks Beach.

Soil Type: Heavy, red loamy soil.

This old land site is very weedy and Avadex was used to try and control ryegrass, crop plots were also sprayed to control turnip and doublegees. Urea at 84 kg/ha is applied to all second crops, to offset any drop in soil fertility.

Fallow plots are kept relatively clean during the growing season.

Wheat Yields (Gamenya)

| Stage of Rotation | kg/ha |
|--|-------|
| 5th successive crop + 84 kg urea/ha | 909 |
| " " " +168 " | 1051 |
| 1st crop after fallow after 1 year pasture | 1278 |
| 1 " " " " 2 " " | 2088 |
| 2 " " " " 7 " " | 1080 |
| 1st crop after 1 year pasture | 1449 |
| 1 " " 2 " " | 1179 |
| 1 " " 4 " " | 2102 |
| 2nd " " 2 " " | 1477 |

Because of other commitments at the optimum sampling time, counts of eelworm numbers were not done this year.

Except for the 1:2 rotation, which had ryegrass worse than other plots, the yields follow a similar pattern as shown in previous years. To maintain good yields, at least three years without a crop is needed.