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Long term rotation trials - Annual summary of results 1975

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ANNUAL SUMMARY OF RESULTS

1975

IAN ROWLAND

PLANT RESEARCH DIVISION
DEPARTMENT OF AGRICULTURE
WESTERN AUSTRALIA

LONG TERM ROTATION TRIALS:

Results 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

Plots were started in 1956 on virgin sandplain site. Each plot was fallowed cropped twice, then sown to sub. clover (cv. Dwalganup). Starting times for plots within a block were staggered so that the cropping phase was over the same 4 years, although after 2, 3, 5 or 7 years of pasture. The 4 blocks were further staggered to give a replication in time.

Rainfall:

May	June	July	Aug.	Sept.	Oct.	Total
95.6	61.8	65.4	62.0	10.2	26.6	321.6 mm

Wheat Yields (Gamenya) kg/ha. Sown June 11.

	3rd	4th crop
Years clover 2	1191	1123
3	1211	899
5	1250	1065
7	1250	938

After four crops, plots are resown to Dwalganup, maintained for 1, 2, 3 or 4 years and then cropped again.

The second table shows the yield (averaged over four plots) ignoring the effect of the previous treatment.

1st crop after 1 pasture	1529 kg/ha
1 " " 2 "	1553 "
1 " " 3 "	2212 "
1 " " 4 "	2407 "

Previous lengths of pasture showed yield response in the 1974 crop after 1 or 2 years pasture but not to yield after 3 or 4 years pasture.

The large yield increase from crop on 3 years compared to 2 years clover may have been caused by the very poor growth of clover sown in 1972, so that the 2 year clover was more realistically one year.

Length of pasture in the original treatments, ie before 4 successive crops were grown, still shows a response to the longer length of ley. The response is more marked when the recent clover ley is short.

Old Treatment	1st crop after			
	1	2	3	4 years pasture
4 crops after 2/3 pasture	1289	1358	2178	2315 kg/ha
4 " " 5/7 "	1768	1748	2247	2500 "

66M29/2083 EX

Locality: Paddock 5AE on Merredin Research Station

Soil type: Merredin sandy clay loam.

An old land site, cleared in 1909, and sown to Cyprus barrel medic in 1965. The medic pasture is allowed to regenerate after cropping and is topdressed each year.

Rainfall:

May	June	July	Aug	Sept	Oct	Total
96.9	39.3	52.7	64.4	30.2	23.4	307 mm

Wheat Yields (Gambie) Sown May 23

Rotation	Crop	kg grain/ha
Control	9th crop	1363
1 crop : 1 pasture	crop	2865
1 crop : 2 pasture	crop	2357*
1 crop : 4 pasture	crop	2875
2 crop : 2 pasture	1st crop	2786
	2nd crop	2845
2 crop : 4 pasture	1st crop	2613*
	2nd crop	1805*
3 crop : 3 pasture	1st crop	3126
	2nd crop	2712
	3rd crop	2510

The control plots have become very weedy, mainly wild oats.

* These plots were affected by water at the beginning of the season and poor germination, in parts of the plots, reduced yields.

67N4/2333EX

Locality: Newdegate Research Station

Soil Type: Grey sand over gravel at 20-30 cm

An old land site, cleared in 1951 and in pasture (Dwalganup sub. clover) from 1963 to 1967.

Rainfall:

May	June	July	Aug.	Sept.	Oct.	Total
145.5	42.1	70.1	64.2	18.4	28.2	368.5 mm

Wheat Yields (Gamenya) Sown on May 23.

Rotation	Crop	kg grain/ha
Control	8th crop	153
1 crop : 1 pasture	crop	1206
1 crop : 2 pasture	crop	1454
1 crop : 4 pasture	crop	1618
2 crop : 2 pasture	1st crop	1265
	2nd crop	-
2 crop : 4 pasture	1st crop	1638
	2nd crop	591*
3 crop : 3 pasture	1st crop	1512
	2nd crop	-
	3rd crop	538

* One third of this plot was waterlogged. The control plots were checked by ryegrass.

The control plots were checked by ryegrass.

Ryegrass has also built up in the 3rd crop of the 3 crop : 3 pasture rotation.

67C13/2333EX

Locality: Paddock 19B on Chapman Research Station

Soil Type: Red brown leamy sand

An old land site, cleared in 1903 and in pasture (Dwalganup sub. clover) from 1964 to the start of the trial in 1967.

Rainfall:

May	June	July	Aug.	Sept.	Oct.	Total
121.6	85.6	149.0	89.6	42.3	19.8	508 mm

Wheat Yields (Gamenya) Sown June 11.

Rotation	Crop	kg grain/ha
Control	8th crop	363
1 crop : 1 pasture	crop	1347
1 crop : 2 pasture	crop	1634
1 crop : 4 pasture	crop	1578
2 crop : 2 pasture	1st crop	1627
	2nd crop	843
2 crop : 4 pasture	1st crop	1781
	2nd crop	1102
3 crop : 3 pasture	1st crop	1369
	2nd crop	-
	3rd crop	1062

Broadleaf weeds (mainly turnip) were very bad in all the second or third crops, they were not sprayed because the surrounding paddock contained lupin pedigree.

68SG5/2475EX

Locality: Paddeck H5 on Salmon Gums Research Station

Soil Type: Complex of Kumarl loam and Circle Valley/Beete calcareous sandy loam. Two of the four blocks are on the heavier soil.

The site was first cleared in 1962, then cropped until the trial started. Two of the four blocks were sown to Cyprus barrel medic which is topdressed each year with superphosphate. The other two blocks are allowed to regenerate volunteer pasture, which is not topdressed.

Rainfall:

May	June	July	Aug.	Sept.	Oct.	Total
86.8	49.2	34.6	45.5	21.0	19.6	257 mm

Wheat Yield (Madden) Sown June 12

Rotation	Crop	kg grain/ha	
		Light soil	Heavy Soil
Control + 50 kg urea/ha	11th crop	493	358
Control no urea	11th crop	487	425
1 crop : 1 medic	crop	1618	1012*
1 crop : 3 medic	crop	1524	1100*
3 crops : 3 medic	1st crop	1488	891*
	2nd Crop	1444	1597
	3rd crop	1256	1291
1 crop : 1 volunteer	crop	1359	901
1 crop : 3 volunteer	crop	1003	941
3 crop : 3 volunteer	1st crop	1624	1338
	2nd crop	1600	1274
	3rd crop	1185	1247

* These plots were affected by wet conditions during the first half of the season.

The ryegrass in the control plots responded to the added nitrogen fertilizer, preventing any yield response on the light soil and reducing the yield on the heavy soil.

SOIL FERTILITY - GRAIN LUPINS (3231EX)

It was decided to use some of the lupin (stage 4) variety trials to get an assessment of the value of one year of sweet grain lupins to a following cereal crop.

Three trials were set out on the 1973 lupin variety trial plus an adjacent 1973 cereal variety trial, on the following research stations:

Mount Barker - Paddock N2A
 Chapman - Paddock 62A
 Avondale - Paddock 1A1

Dry weight of tops (at late flowering) of Gamenya:

Site	1973 crop		% increase
	Lupins	Cereal	
Mount Barker	7107 kg/ha	4121 kg/ha	73
Chapman	4881 "	3341 "	46
Avondale	3047 "	1769 "	72

Grain Yield

Site	1973 crop		% increase
	Lupins	Cereal	
Mount Barker	2307 kg/ha	1551 kg/ha	49
Chapman	1445 "	1111 "	30
Avondale	1549 "	1450 "	7

Although there were increases in wheat production from crops grown after grain lupins compared to after cereal, the reason why is not yet clear. Lupin contribution to soil fertility may be one reason, but the trials were not able to separate this from other causes. At Mount Barker there was a much higher incidence of root rots on the wheat/cereal plots.

Weed competition was greater in the wheat grown after lupins. At Avondale ryegrass was very bad. Chapman had more large capeweed and doublegee plants. Mount Barker had some ryegrass. This competition may have caused the reduced response to lupins of the grain yield compared to the response of above ground dry matter sampled in October.