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Long term rotation trials

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PLANT RESEARCH DIVISION
SUMMARY OF TRIAL RESULTS
1972 GROWING SEASON
I.C. ROWLAND

LONG TERM ROTATION TRIALS

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

W56H/604EX

Locality: Paddock 3E on Wongan Hills Research Station

Soil type: Wongan sandy loam

This trial was started on a virgin site in 1956. After a fallow and two initial crops, subclover (cv Dwalganup) was sown and after 2, 3, 5 or 7 years cropped for four years.

Wheat yields (Gamenya)

	1st	2nd	3rd	4th	Crop kg/ha
Years clover 2	1654	1375	1147	940	
3	1942	1419	1138	902	
5	1635	1438	993	880	
7	2115	1495	1128	1096	

Rainfall during May- October

May	June	July	Aug.	Sept.	Oct.	Total
14.7	56.6	39.9	66.7	10.9	9.7	198.5 m.m.

Results for the 1st crop after pasture ley represent yields from only one plot for each treatment. Observations of pasture growth in the years of ley showed that the plot of five years ley had relatively poor growth of clover. This may have led to the poor yield on this treatment.

66M29/2083EX

Locality: Padk 5AE on Merredin Research Station

Soil type: Merredin sandy clay loam.

The trial is on old land which was sown to Cyprus Barrel medic the year before commencement. Medic is allowed to regenerate after each cropping phase. Even after three successive crops there was an 85% return of medic.

Wheat yields (Gamenya)

Stage of Rotation						kg/ha
7th successive crop						387
1st crop after 1 year pasture						323
1	"	"	2	"	"	319
1	"	"	3	"	"	276
1	"	"	4	"	"	279
2nd	"	"	2	"	"	417
2	"	"	3	"	"	383
2	"	"	4	"	"	222

Rainfall during May-October growing season

May	June	July	Aug.	Sept.	Oct.	Total
18.0	62.0	45.0	27.9	16.8	4.6	174 m.m.

The average of first and second crops shows an increase in yield of 11% from first to second crop and a further 12% from second to continuous crops. This is not as expected from samples taken at flowering when there was a decrease in total dry weight of tops of 4% from first to second crops and a further drop of 20% to continuous crop.

The reversal in trend from flowering to harvest is probably due to the dry finish that followed the good mid-season rains, with the better plots "haying-off" earlier.

67N4/2333EX

Locality: Experimental Pdk on Newdegate Research Station

Soil type: Sandy soil over gravel at 20-30 mm

An old land site sown to Dwalganup subclover in 1962. Build-up of sorrel is becoming a problem on some plots. Also Wimmera ryegrass is starting to reduce yields in successive crops.

Wheat yields (Gamenya)

Stage of Rotation						kg/ha
6th successive crop						558
1st crop on 1 year pasture						1243
1	"	"	2	"	"	1263
1	"	"	3	"	"	1223
1	"	"	4	"	"	1290
2nd	"	"	3	"	"	1028
2nd	"	"	7	"	"	1075

Rainfall during the May-October growing season

May	June	July	Aug.	Sept.	Oct.	Total
29.2	60.0	60.5	25.2	20.6	11.4	207 m.m.

The average of first and second crops shows a decrease in yield of 16% from first to second and a further 47% decrease from second to successive cropping.

This is similar to the trend in dry weights of tops at flowering.

67BA6/2331EX

Locality: Pdk 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 sown with urea (90 kg/ha). Seaton Park sub-clover was then established. Wimmera ryegrass is becoming a problem in the trial. It has reduced yields on any plot growing a crop up to plot 10 and is spreading. Lupins were introduced into the rotations in 1972.

Wheat yields (Kondut)

Stage of Rotation		kg/ha
6th successive crop + 100 kg urea/ha		666
Initial crop + 90 kg urea/ha		1374
1st wheat after 1 clover		718
1	" " 2 "	815
1	" " 3 "	479
1	" " 4 "	683

Lupin Yields (Unicrop)

Stage of Rotation		kg/ha
1st lupin after 1 clover		940
1	" " 3 "	855
1	" " 4 "	1238

Rainfall during the May-October growing season

May	June	July	Aug.	Sept.	Oct.	Total
43.7	114.3	114.5	167.4	27.9	38.9	507 m.m.

The yields from 1st wheat crop after 3 years clover and 1st lupin crop after 3 years clover are both down on the others. These plots were very weedy. Mainly Wimmera ryegrass.

68E5/2474EX

Locality: Pdk N1B on Esperance Research Station

Soil type: Fleming gravelly sand.

An old land site sown to Woogenellup and Brome grass in 1963.
Wimmera ryegrass is building up in successive crop plots.

Barley yields (Dampier)

Stage of Rotation	kg/ha
5th successive crop (2nd barley)	1273
1st barley after 1 clover	2357
1 " " 2 "	1735
1 " " 9 "	2273
1 barley after 1 rape after 2 clover	2260
1 " " 1 " " 8 "	2424

Rape yields (Turret)

Stage of Rotation	kg/ha
5th successive crop (2nd rape)	102
1st rape after 1 clover	209
1 " " 2 "	391
1 " " 9 "	409

Rainfall during the May-October growing season

May	June	July	Aug	Sept.	Oct.	Total
10.7	49.0	102.1	70.4	34.8	28.4	295 m.m.

There is no explanation for the low yield from a first barley crop after 2 years clover, the crop was relatively weed free and the clover was dominant for the 2 years of pasture.

68SG5/2475EX

Locality: Pdk H5 on Salmon Gums Research Station

Soil type: Nth two blocks are Circle Valley sand, the
Sth two blocks on Kumarl.

The site was first cropped in 1964 and Cyprus barrel medic was sown in 1968 on two of the blocks. The other two were allowed to regenerate volunteer pasture. 1970 was the first year that the medic established successfully.

All crop plots are sprayed with Avadex to control the Wimmera ryegrass.

Wheat yields (Gamenya)

Stage of Rotation	kg/ha
5th successive crop + 56 kg urea/ha	444
5th " " + 0 " "	504
1st crop after 1 year medic	517
1 " " 3 " "	712
2nd " " 3 " "	786
3rd " " 2 " "	551
1st crop after 1 year volunteer	484
1 " " 3 " "	591
2nd " " 3 " "	780
3rd " " 2 " "	504

Rainfall during the May-October growing season

May	June	July	Aug.	Sept.	Oct.	Total
3.6	63.0	34.0	51.3	13.5	9.9	175.3 m.m.

Yield differences are mainly due to Wimmera ryegrass. The successive crops are the worst affected, that is both the controls and third crops. A short rotation of 1 crop after 1 year pasture does not control the ryegrass.

69GE20/2466EX

Locality: H.R. Bridgeman, Horrocks Beach

Soil type: Heavy, red loamy soil

Prolific weed growth on this old land site is again a problem in the crop and in maintaining a bare fallow. Lasso was used to try and control Wimmera ryegrass, but was relatively unsuccessful.

Pasture plots are sown to Daliak subclover.

Wheat yields (Gamenya) and eelworm rating (the higher the number the more eelworms)

Stage of Rotation	kg/ha	Rating
4th successive crop + 160 kg urea/ha	571) 53
4th " " + 80 " "	470	
1st crop after 1 fallow	968	20
1st " " 1 pasture	423	50
1st " " 2 "	1431	12
1 " " 3 "	1512	6
2nd crop after pasture + 80 kg urea/ha	652	49

Where eelworm numbers are allowed to build up by successive cropping then yield is reduced. A possible explanation for the poor response of the short rotation of 1 crop after 1 pasture is the carry-over of eelworms on wild oats and Wimmera ryegrass.