



1985

Long term rotation trials, Lupins: wheat rotation.

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DEPARTMENT OF AGRICULTURE

Western Australia

SUMMARY OF EXPERIMENTAL RESULTS

For 1985

LONG TERM ROTATION TRIALS

66M29
67C13
67N4
68E5
68SG5
73SG16

Lupins : Wheat Rotation

80TS3
82TS2
82M26

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66M29/2083EX

Locality: Paddock 5AE on Merredin Research Station.

Soil type: Merredin sandy clay loam

History:

An old land site, cleared in 1909. First sown to Cyprus Barrel medic in 1955, grazed and topdressed. Cropped, 962 and 1964. Medic resown in 1965.

Rainfall: in mm.

May	June	July	August	September	October	Total
11	24	59	39	32	11	176

Wheat Yields: Gutha sown on July 6th

Rotation	Crop	Grain yield kg/ha	
		No urea	Plus urea at () kg/ha
Control	20th	266	174 (100)
1 crop : 1 pasture	1	451	440 (25)
1 crop : 2 pasture	1	440	393 (20)
1 crop : 4 pasture	1	509	555 (20)
2 crop : 2 pasture	1st	440	463 (20)
	2nd	463	416 (25)
2 crop : 4 pasture	1st	486	463 (20)
	2nd	440	393 (25)
3 crop : 3 pasture	1st	393	393 (20)
	2nd	440	347 (25)
	3rd	532	463 (30)

1. Plots scarified once. Urea applied before seeding. Sown with 70 kg/ha super
2. Sown very late and season finished early. Wheat just didn't grow. Cuts done on Oct. 2 had an average for 1st crops of 1136 kg/ha without urea and 1095 kg/ha for plus urea. Dry matter yields of 2nd crops were about 1050 kg/ha with or without urea.
3. Continuous crops have problems with wild oats and annual ryegrass.

67C13/2332EX:

Locality: Paddock 19B on Chapman Research Station (Nabawa)

Soil type: Red brown loamy sand

History:

An old land site, cleared in 1903. Sown to Dwalganup sub clover in 1964, topdressed each year until the start of the trial in 1967. In 1981 all pasture plots were reseeded with Northam at 20 kg/ha.

Rainfall: in mm.

May	June	July	August	September	October	Total
35	54	80	72	40	14	295

Wheat Yields: Eradu sown on June 19.

Rotation	Crop	Grain yield kg/ha	
		No urea	Plus urea at () kg/ha
Control	19th	1687	1557 (150)
1 crop : 1 pasture	1	2410	2520 (100)
1 crop : 2 pasture	1	2381	2440 (50)
1 crop : 4 pasture	1	2440	2540 (50)
2 crop : 2 pasture	1st	2143	2163 (50)
	2nd	2460	2778 (100)
2 crop : 4 pasture	1st	2421	2659 (50)
	2nd	2480	2540 (100)
3 crop : 3 pasture	1st	1905	2381 (50)
	2nd	2560	2897 (100)
	3rd	2560	2762 (100)

1. Plots chisel ploughed on June 6. Sprayed for raddish control on July 23. Urea applied before seeding.
2. First crops in a 1:2, 2:2 and 3:3 rotation have reduced yields. This may have been because they had a high number of raddish plants (100, 100 and 80 per sq. m. respectively). Although sprayed there was not a complete kill and they were still growing. Also were bigger and less damaged on the plus nitrogen half of the plots. The raddish is only a problem on one end of the site and is not related to rotation.

67N4/2333EX

Locality: Newdegate Research Station

Soil type: Grey sand over gravel at 20 - 30 cms.

History:

An old land site, cleared in 1951 and in pasture (Dwalganup sub clover) from 1963 to 1967. All plots were sown to Nungarin sub clover, by 1982 all plots had been resown.

Rainfall: in mm.

May	June	July	August	September	October	Total
14	18	66	51	26	25	200

Wheat Yield: Aroona sown on July 7th, 1985

Rotation	Crop	kg/ha	Weeds per sq. m. Aug 27.			
			Ryegrass	Brome	Sorrel	
Control	19th	600	46	3	81	HD
1 crop : 1 pasture	1	1100	122	26	5	H
1 crop : 2 pasture	1	1296	5	1	3	
1 crop : 4 pasture	1	1389	11	5	5	
2 crop : 2 pasture	1st	986	32	2	60	HD
	2nd	1037	10	5	0	
2 crop : 4 pasture	1st	1345	36	0	7	H
	2nd	713	5	2	1	
3 crop : 3 pasture	1st	1153	38	5	5	H
	2nd	1384	0	1	0	
	*3rd	787	6	0	44	D

* Plot had been grazed by sheep in mid-August.

H= Hoegrass at 1 1/2 L/ha on Sept. 2

D= Dicamba at 1 L/ha on Sept 12.

1. All plots had stubble burnt (if present), scarified on June 5, worked back July 2 and sown with super at 100 kg/ha.
2. Use of Glean in 1984 gave such good control of ryegrass that there was virtually no ryegrass in second and third crops.
3. Brome grass was worst in the 1:1 rotation and although not very bad would have had an effect on yields.

68E5/2474EX

Locality: Paddock N1A on Esperance Downs Research Station (Gibson)

Soil type: Fleming gravelly sand.

History:

Cleared in 1951 and sown to clover, cropped in 1961 and 1962 then Woogenellup sub clover and Brome grass were sown in 1963, topdressed until the start of the trial in 1968. Lupins were sown in trial in 1974. Esperance sub clover has been established on all plots.

Rainfall: in mm.

May	June	July	August	September	October	Total
19	40	67	88	70	62	346

Lupin Yields: Yandee sown on June 12
Sprayseed and Simazine June 11
Fusilade sprayed on Aug 29, on plots marked F.

Rotation	kg/ha	Ryegrass per m ²
Control : 12th lupin	476	530 + F
1 lupin : 1 wheat	729	99 F
2 clover : 1 lupin : 1 wheat	645	14
2 clover : 1 wheat : 1 lupin	660	8
4 clover : 1 lupin : 1 wheat	1140	12
4 clover : 1 wheat : 1 lupin	865	10

Wheat Yields: Jacup sown on July 27.
Hoegrass sprayed on Aug 29, on all cereal plots

	Nitrogen fertiliser		
	Nil	Rate in ()	
Control : 19th cereal	700	1968 (300)	25
1 lupin : 1 wheat	1713	1435 (100)	133
1 clover : 1 wheat	1921	2083 (100)	28
2 clover : 1 lupin : 1 wheat	2384	1991 (50)	32
2 clover : 1 wheat : 1 lupin	1505	1667 (50)	21
4 clover : 1 lupin : 1 wheat	2500	2691 (50)	26
4 clover : 1 wheat : 1 lupin	2014	2153 (50)	9

1. Cereal plots were treated with Sprayseed on July 7 then cultivated on July 15. Nitrogen was applied as NH_4SO_4 . On continuous wheat at 150 kg/ha at seeding and another 150 kg/ha on Aug. 7. All others had their rate applied on Aug. 7, i.e. eleven days after seeding.
2. Lupins yielded very poorly considering the excellent growth made by most of the crops, average dry matter on Oct. 16 of 7750 kg/ha. Not for continuous lupins (2780 kg/ha). Late sowing probably had flowering occurring during hot weather at the end of September.
3. Annual ryegrass is a problem in the lupin:wheat rotation, even though sprayed with Hoegrass it had probably already effected yields. This could also explain the drop in yield with applied nitrogen, the ryegrass responded to the N fertiliser and competes more strongly with the wheat. This rotation needs ryegrass control every year in both lupins and wheat.
4. Both rotations with lupins between the pasture phase and the wheat crop did better than where wheat was grown after pasture. Possible there was more "take-all" in the wheat on pasture while lupins acted as a cleaning crop.

65SG5/2475EX

Locality : Paddock H5 on Salmon Gum Research Station

Soil type : Complex of Kumarl loam (heavy) and Circle Valley/Beete calcarious sandy loam (lighter).

History :

Cleared in 1962, then cropped until the start of the trial in 1968. Two of the four blocks were sown to Cyprus Barrel medic which is topdressed with superphosphate. The other two blocks regenerate volunteer pasture which is not topdressed. In 1984 all pasture plots were sown to SERENA medic. This grew exceptionally well in 1984 and set a lot of seed.

Rainfall : in mm.

May	June	July	Aug	Sept	Oct	Total
18	13	36	52	62	28	209

Wheat yields : Gutha sown on July 16
22nd crop - Nil N fertiliser 752 kg/ha
22nd crop - + 50 kg Urea/ha 689

	<u>Pasture</u>	
	<u>Medic</u>	<u>Volunt.</u>
1 crop : 1 year pasture, 1st crop	685	*
1 crop : 3 year pasture, 1st crop	915	694
3 crop : 3 year pasture, 1st crop	539	687
2nd crop	932	965
3rd crop	778	794

1. Crops were scarified on May 6, worked back May 27 but then dry weather held up seeding until July 16. Gutha sown with 100 kg super/ha. Urea applied on July 30, "Combine" was used on all cereal plots at 2 L/ha on Aug. 29.
2. Crops after volunteer pasture are not all strictly after volunteer, because of the change to 4 blocks of Serena medic in 1984 any 1st crops are actually after 2 years volunteer and 1 year Serena. Whereas 2nd or 3rd crops would be after 3 years of volunteer pasture.
3. First crops grown after 1984 Serena had a lot of weeds, wild mustard, Serena medic and ryegrass, mainly because the 1984 pasture was ungrazed and set a lot of weed seeds. These weeds were controlled by the "Combine".
4. Yields of crops grown with extra nitrogen from either Urea or the 1984 Serena yielded worse than multiple cropping. The exception been 3 years medic (i.e. 2 years Cyprus based and 1 year Serena) and 1 crop. This has one plot which gave the top yield of 1076 kg/ha, it has an area of "crabhole" which yields better in a dry finish.

5. 1985 Serena medic was very disappointing. The sown pastures had very thin stands of small plants. Whereas second year pastures had a lot of Serena which did not set much seed, the burrs that were there were small and mostly empty. It seems that moisture may have run out at the time the seed should have been setting. Because of Serena's very short growing season it had tried to set its seed and finished before the later rain came. There were a few patches around the "crabholes" where plants had grown better and set reasonable amounts of seed.

73SG16/3229EX

Locality: Lease block, Salmon Gums

Soil type: Circle Valley sand.

History:

The site was cropped in 1971 and 1972 after two years of volunteer pasture, mainly grasses and some wild legumes (Goldfields medic and wooly clover). In 1973 the trial started with pasture being sown to a mixture of Harbinger, Cyprus and Tornafield medics. The Harbinger quickly became the dominant species.

Grain Yields: Gutha sown June 14
Forrest barley is the 2nd crop in 2:2.

Rotation	Grain yields kg/ha
1 crop : 1 medic	1161
1st crop : 2 medic	1129
2nd crop : 2 medic	910
1 crop : 3 medic	1064

1. Plots scarified on May 7 and worked back on May 28. Cereal sown with super at 83 kg/ha and all sprayed with Hoegrass at 1 L/ha on July 29.
2. Annual ryegrass was worst in the 1:1 and the first crop of the 2:2. The other two rotations had no ryegrass, although barley grass was a problem in the 3 medic:1 crop rotation.
3. All crops had quite bad rhizoctonia. There was no obvious differences with rotations.
4. The second crop of barley was lower yielding. It was relatively weed free and had probably run out of nitrogen.

80TS3/3288EX

Trial: Lupins : Wheat Rotation
Locality: J. Pericich, W. Arrino
Soil type: Sand plain
History: Paddock in wheat in 1979.
1984 lupin crop averaged 3750 kg/ha of grain
Rainfall: For Three Springs (30 km S.E. of trial) in mm.

May	June	July	August	September	October	Total
29	34	55	38	34	10	200

Wheat Yields: Arona sown on June 27
Grain yields kg/ha

Nitrogen rate	6th Wheat crop	Wheat after lupins
Nil	1055	1806
20 kg/ha	1405	1753
40 kg/ha	1435	1713
80 kg/ha	1210	1740
120 kg/ha	1154	1872
160 kg/ha	1100	1637

1. Wheat plots cultivated June 25. Super at 100 kg/ha. Nitrogen applied as Agran 34 immediately before sowing. Sprayed with Barrel at 1.2 L/ha on Aug. 2 for raddish control.
2. Continuous wheat was very poor early in the season. The stubble left from the 1984 crop was not burnt and caused problems with trash clearance at seeding. There was a very patchy establishment.
3. Excess stubble also caused serious problems in the 1985 lupin blocks. These were so weedy (mainly raddish) that they were not harvested.
4. Because of weed problems this trial will be cropped with wheat in 1986, giving a first and second crop on lupins compared to continuous wheat.

82TS2/3288EX

Trial: Lupins : wheat rotation
Locality: P. Dring, West Bunjil
Soil type: Sand plain
History: Paddock in wheat in 1981. The 1982 lupin crop averaged 2600 kg/ha of grain
Rainfall: For Perenjori (20 km N.E. of trial) in mm.

May	June	July	Aug	Sept	Oct	Total
29	35	67	30	22	10	193

Wheat yields Gutha sown on July 15

Nitrogen rate	5th wheat	Wheat after lupins
Nil	807	1,252
13 kg/ha	887	1,204
29	979	1,072
41	748	1,142
84	774	1,062
140	787	842

1. Wheat plots received Sprayseed at 1.5 L/ha on June 12. Sown with 200 kg super/ha. A very poor germination resulted in plots being resown on July 15. All wheat sprayed with Barrel at 1.5 L/ha on Aug, 15.
2. Continuous wheat plots had a lot of brome grass which would have reduced yields, approximately 130-150 plants per sq. metre. This compares with only 1 or 2 in the wheat after lupins. Further the brome was worse at higher N rates.
3. Lupin blocks - cereal stubble from the excellent 1984 crop caused problems with the lupins. Although Sprayseed and Simzaine were used it was not very effective and lupins were very weedy with raddishand capeweed but also bad brome grass. Even though this was sprayed with Fusilade twice (1 L/ha on Jun 12 and 0.75 L/ha on August 8) the grain samples still have a lot of brome grass. Average yield as recorded was 1014 kg/ha but about half of this would be weed seeds.

82M26/3288EX

Trial: Lupins : wheat rotation
Locality: Korbelt lease - Merredin Research Station
Soil type: Good quality sand plain
History: Paddock in wheat in 1981. The 1982 lupins yielded an average of 470 kg/ha and in 1983 averaged 570 kg/ha. Both years the lupins were relatively poor crops. 1984 lupins had 3.8 t/ha of dry matter but only yielded 580 kg grain/ha
Rainfall: For Merredin Research Station (15 km NE of trial).

May	June	July	Aug	Sept	Oct	Total
11	24	59	39	32	11	176

Wheat yields Gutha sown on June 18.

Nitrogen rate	5th wheat	2nd wheat after Lupins	Lupins:wheat
Nil	853	963	1046
9	1056	1148	1046
26	1148	1241	1130
51	1296	1259	1166
102	1296	1222	1157

1. Wheat plots had Sprayseed at 2 L/ha on June 18. Nitrogen applied as Agron 34 immediately prior to seeding. Wheat sown with super at 200 kg/ha.
2. Lupin blocks - Simazine at 2 L/ha on May 31. Sprayseed at 2 L/ha and sown on June 18 with 200 kg super/ha. although a relatively weed free crop early brown spot and a dry season did not allow much growth. By October 2 there was an average of 720 kg/ha of dry matter which yielded only 220 kg grain/ha.