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Nitrogenous fertiliser requirements in different cropping rotations 1981 results

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DEPARTMENT OF AGRICULTURE

WESTERN AUSTRALIA

NITROGENOUS FERTILISER REQUIREMENTS

IN DIFFERENT CROPPING ROTATIONS

1981 RESULTS

M.G. Mason and I.C. Rowland
Research Officers
Plant Research Division

Nitrogen Requirement of Wheat After Clover, Lupins and CerealChapman Research Station, Nabawa

Treatment 1978 and 1980	Treatment on Wheat 1979 and 1981	Vegetative Yield (kg/ha)	Grain Yield (kg/ha)
Northam Clover Pasture	Nil	1888	1635
	Ammonium Nitrate 40kg/ha	2542	1573
	Ammonium Nitrate 75kg/ha	2374	1643
	Ammonium Nitrate 115kg/ha	2513	1677
	Ammonium Nitrate 152kg/ha	2690	1677
	Ammonium Nitrate 230kg/ha	2875	1685
Lupins (Unicrop 1978 Illyarrie 1980)	Ammonium Nitrate 455kg/ha	2659	1696
	Nil	1736	1323
	Ammonium Nitrate 40kg/ha	1972	1381
	Ammonium Nitrate 75kg/ha	2134	1550
	Ammonium Nitrate 115kg/ha	2624	1470
	Ammonium Nitrate 152kg/ha	2295	1448
Wheat	Ammonium Nitrate 230kg/ha	3081	1480
	Ammonium Nitrate 455kg/ha	3127	1520
	Nil	1166	1292
	Ammonium Nitrate 40kg/ha	1747	1532
	Ammonium Nitrate 75kg/ha	1961	1516
	Ammonium Nitrate 115kg/ha	2061	1504
	Ammonium Nitrate 152kg/ha	2322	1544
	Ammonium Nitrate 230kg/ha	2465	1528
	Ammonium Nitrate 455kg/ha	2832	1603

Soil Type: Brown Sandy loam over brown clay at 40cm +.

History Prior to 1978: Old Clover land. Stubble of 1980 crops burnt.

Crop: Gamenya wheat 50kg/ha.

Sowing Date: 6.7.81

Basal: Superphosphate 120kg/ha.

Vegetative Sampling Date: 22.9.81 (Feekes 10.1)

Comments: Ammonium nitrate rates topdressed by drill immediately before sowing. 1980 lupin seed yields averaged 990kg/ha (range 758-1168kg/ha) and 1980 wheat yields averaged 1526kg/ha (range 1131-1848 kg/ha). 1980 pasture cuts averaged 2377kg/ha (range 1200-2840kg/ha) with an average of 47% clover (range 18-73%). Extremely weedy. Some blocks completely smothered by Wimmera Rye grass. Also heavy infestation of doublegee, capeweed and wild turnip.

Nitrogen Requirement of Wheat After Clover, Lupins and CerealBadgingarra Research Station

Treatment 1980	Treatment on Wheat 1981	Vegetative Yield (kg/ha)	Grain Yield (kg/ha)
Subclover Pasture	Nil	1916	1393
	Ammonium Nitrate 38kg/ha	2188	1619
	Ammonium Nitrate 76kg/ha	2531	1702
	Ammonium Nitrate 114kg/ha	2725	1774
	Ammonium Nitrate 152kg/ha	3114	1940
	Ammonium Nitrate 228kg/ha	3618	1964
Illyarrie Lupins	Ammonium Nitrate 456kg/ha	3827	1810
	Nil	2085	1667
	Ammonium Nitrate 38kg/ha	2168	1655
	Ammonium Nitrate 76kg/ha	2368	1690
	Ammonium Nitrate 114kg/ha	2586	1810
	Ammonium Nitrate 152kg/ha	2776	1881
Miling Wheat	Ammonium Nitrate 228kg/ha	3038	1845
	Ammonium Nitrate 456kg/ha	4282	1893
	Nil	1215	1095
	Ammonium Nitrate 38kg/ha	1485	1321
	Ammonium Nitrate 76kg/ha	1784	1405
	Ammonium Nitrate 114kg/ha	1774	1560
	Ammonium Nitrate 152kg/ha	2433	1643
	Ammonium Nitrate 228kg/ha	3000	1893
	Ammonium Nitrate 456kg/ha	3119	1738

Soil Type: Grey gravelly sand over very gravelly sandy loam at about 30cm.

History Prior to 1980: Old Clover land. Stubble of 1980 crops burnt.

Crop: Miling Wheat 45 kg/ha.

Sowing Date: 26.6.81

Basal: Superphosphate 158kg/ha

Vegetative Sampling Date: 13.10.81 (Feekes 10.5.2)

Comments: Ammonium nitrate rates topdressed by drill immediately before sowing. 1980 lupin seed yield averaged 2392 kg/ha (range 2275 - 2531 kg/ha) and the wheat yields averaged 2755 kg/ha (range 2245 - 3184 kg/ha). Quite a bit of Wimmera Ryegrass in plots. Also some brome-grass and capeweed.

Nitrogen Requirement of Barley After Clover, Lupins and Non LegumeEsperance Downs Research Station, Gibson

Treatment 1978 and 1980	Treatment on Wheat 1979 and 1981	Vegetative Yield (kg/ha)	Grain Yield (kg/ha)
Subclover Pasture	Nil	1766	2210
	Ammonium Nitrate 38kg/ha	1958	2176
	Ammonium Nitrate 76kg/ha	2385	2105
	Ammonium Nitrate 114kg/ha	2626	1971
	Ammonium Nitrate 152kg/ha	2695	1874
	Ammonium Nitrate 228kg/ha	2680	1724
	Ammonium Nitrate 456kg/ha	2674	1350
Lupins (Unicrop 1978 Illyarrie 1980)	Nil	1527	2174
	Ammonium Nitrate 38kg/ha	1677	2367
	Ammonium Nitrate 76kg/ha	2024	2260
	Ammonium Nitrate 114kg/ha	2418	2168
	Ammonium Nitrate 152kg/ha	2419	2102
	Ammonium Nitrate 228kg/ha	2313	1800
	Ammonium Nitrate 456kg/ha	2475	1495
Rape (West Oats 1978)	Nil	1375	1936
	Ammonium Nitrate 38kg/ha	1665	1993
	Ammonium Nitrate 76kg/ha	1977	1962
	Ammonium Nitrate 114kg/ha	2550	2019
	Ammonium Nitrate 152kg/ha	2423	1819
	Ammonium Nitrate 228kg/ha	2396	1707
	Ammonium Nitrate 456kg/ha	2320	1398

Soil Type: Grey sand with some gravel over gravel at 10 - 35cm over clay. Gravel layer not present in a few blocks.

History Prior to 1978: Old clover land. Stubble of 1980 crops grazed off.

Crop: Clipper barley 50kg/ha.

Sowing Date: 14.7.81

Basal: Superphosphate 116kg/ha

Vegetative Sampling Date: 29.9.81 (Feekes 9 - 10)

Comments: Ammonium nitrate rates topdressed by drill immediately before sowing. 1980 pasture cuts averaged 2350kg/ha (range 2150 - 2500kg/ha). 1980 lupin seed yields averaged 1525kg/ha (range 773-1935kg/ha) and rapeseed yields averaged 288kg/ha (range 253-363kg/ha). Few weeds.

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Nitrogen Requirement of Wheat After Clover, Lupins and Cereal

Newdegate Research Station

Treatment 1978 and 1980	Treatment on Wheat 1979 and 1981	Vegetative Yield (kg/ha)	Grain Yield (kg/ha)
Daliak Subclover Pasture	Nil	374	252
	Ammonium Nitrate 40kg/ha	490	314
	Ammonium Nitrate 82kg/ha	701	348
	Ammonium Nitrate 118kg/ha	606	348
	Ammonium Nitrate 150kg/ha	752	352
	Ammonium Nitrate 230kg/ha	985	357
	Ammonium Nitrate 460kg/ha	796	348
Lupins (Unicrop 1978, Illyarrie 1980)	Nil	386	390
	Ammonium Nitrate 40kg/ha	410	362
	Ammonium Nitrate 82kg/ha	452	357
	Ammonium Nitrate 118kg/ha	641	438
	Ammonium Nitrate 150kg/ha	722	362
	Ammonium Nitrate 230kg/ha	912	467
	Ammonium Nitrate 460kg/ha	950	471
West Oats	Nil	411	371
	Ammonium Nitrate 40kg/ha	580	457
	Ammonium Nitrate 82kg/ha	693	476
	Ammonium Nitrate 118kg/ha	783	486
	Ammonium Nitrate 150kg/ha	821	395
	Ammonium Nitrate 230kg/ha	897	510
	Ammonium Nitrate 460kg/ha	1048	567

Soil Type: Yellow gravelly loamy sand over gravel at 10 - 25cm.

History Prior to 1978: 1974 - 75 Barley Crop. 1976 - 77 Daliak subclover.
Stubble of 1980 crops grazed off.

Crop: Gamanya wheat 50kg/ha.

Sowing Date: 2.7.81

Basal: Superphosphate 190kg/ha.

Vegetative Sampling Date: 30.9.81 (Feekes 10).

Comments: Ammonium nitrate rates top dressed by drill immediately before sowing. 1980 pasture cuts averaged only 886kg/ha (range 536 - 1150kg/ha), with an average 22% clover (range 7 - 38%). 1980 lupin dry matter averaged only 514kg/ha (range 444 - 627kg/ha). Lupin and oat crops too poor to harvest. Crop affected by windblasting. A fair amount of wild turnip early-sprayed.

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Nitrogen Fertiliser Requirement in Alternate Crop-Pasture Rotation

Badgingarra Research Station

Pasture Blocks (Sampled 21.9.81)

Block	Rotation	1980 Treatment	Percent of Total Pasture				Total Pasture Dry Matter (kg/ha)		
			<AN456	*AN456	<AN456	AN456	<AN456	AN456	
1	2:1	Crop	28	15	12	6	60	79	2788
2	2:1	Pasture	48	36	23	30	28	34	1663
4	1:1	Crop	0	13	48	52	52	36	2331
8	2:1	Pasture	50	48	28	32	22	20	1896
9	2:1	Crop	23	1	17	10	59	89	2657
10	1:1	Crop	20	4	50	62	30	35	2130

1981 Crop Blocks

Rotation	1981 Treatment on Crop	Vegetative Yield (kg/ha)	Grain Yield (kg/ha)
2 years pasture : 1 year Crop	Nil	684	
	Ammonium Nitrate 38kg/ha	661	Plots
	Ammonium Nitrate 76kg/ha	1074	
	Ammonium Nitrate 114kg/ha	1204	Eaten
	Ammonium Nitrate 152kg/ha	1553	
	Ammonium Nitrate 228kg/ha	1449	By Sheep
1 year pasture : 1 year crop	Nil	520	1571
	Ammonium Nitrate 38kg/ha	537	1619
	Ammonium Nitrate 76kg/ha	753	1905
	Ammonium Nitrate 114kg/ha	1027	2190
	Ammonium Nitrate 152kg/ha	1149	2143
	Ammonium Nitrate 228kg/ha	1333	2095
	Ammonium Nitrate 456kg/ha	1342	1952

* AN = Rate of Ammonium nitrate on last crop.

Soil Type: Grey gravelly sand over gravel at about 15 to 20cm.

History: Old clover land. All blocks were in Clover pasture in 1977.

Crop: Miling wheat 45kg/ha

Sowing Date: 26.6.81

Sampling Dates: Pasture 21.9.81, Wheat 21.9.81 (Feekes 9 - 10)

Basal: Superphosphate 90kg/ha.

Comments: Ammonium nitrate rates topdressed by drill immediately before sowing. Both reps of 2:1 rotation and one rep. of 1:1 rotation eaten by sheep before harvest. Some Wimmera ryegrass in plots (sprayed). Some rows missing in crop plots.

Nitrogen Fertiliser Requirement in Alternate Crop-Pasture RotationWongan Hills Research StationPasture Blocks (Sampled 23.9.81)

Block	Rotation		Percent of Total Pasture			Total Pasture Dry Matter (kg/ha)
	1980 Treatment		Clover	Grass	Others	
1	2:1	Crop	0	46	54	3608
2	2:1	Pasture	0	97	3	4583
4	1:1	Crop	0	64	36	3248
8	2:1	Pasture	0	83	17	2898
9	2:1	Crop	0	63	37	3478
10	1:1	Crop	2	61	39	1532

1981 Crop Blocks

Rotation	1981 Treatment on Crop	Vegetative Yield (kg/ha)	Grain Yield (kg/ha)
2 years pasture : 1 year Crop	Nil	2101	2476
	Ammonium Nitrate 38kg/ha	2053	2405
	Ammonium Nitrate 76kg/ha	2611	2314
	Ammonium Nitrate 114kg/ha	3263	2438
	Ammonium Nitrate 153kg/ha	3433	2071
	Ammonium Nitrate 228kg/ha	3092	2214
1 year pasture : 1 year crop	Ammonium Nitrate 455kg/ha	3338	1867
	Nil	1482	1300
	Ammonium Nitrate 38kg/ha	1886	1524
	Ammonium Nitrate 76kg/ha	2444	1410
	Ammonium Nitrate 114kg/ha	2392	1471
	Ammonium Nitrate 153kg/ha	2903	1671
	Ammonium Nitrate 228kg/ha	2509	1476
	Ammonium Nitrate 455kg/ha	2990	1343

Soil Type: Wongan yellow loamy sand

History: Old clover land. All blocks were in clover pasture in 1977

Crop: Gamenya wheat 50kg/ha

Sowing Date: 25.6.81

Sampling Dates: Pasture 23.9.81, Wheat 23.9.81 (Feekes 10.3)

Basal: Superphosphate 95kg/ha

Comments: Ammonium nitrate rates topdressed by drill immediately before sowing. Some doublegee in plots (Sprayed). some missing rows in crop plots.

Nitrogen Fertiliser Requirement in a Lupin - Wheat RotationG. Jones, Pingaring

Treatment	Grain Yield (kg/ha)
Nil	1912
Ammonium Nitrate 38kg/ha	2033
Ammonium Nitrate 82kg/ha	1912
Ammonium Nitrate 109kg/ha	2033
Ammonium Nitrate 175kg/ha	1945
Ammonium Nitrate 233kg/ha	1905
Ammonium Nitrate 466kg/ha	1738

Soil Type: Yellow loamy sand over gravel at depth.

History: Second successive crop on new land. Stubble of previous crop ploughed in.

Crop: Halberd wheat 45kg/ha

Sowing Date: 19.5.81

Basal: Superphosphate 250kg/ha + Molybdenum Trioxide 180gm/ha.

Comments: Ammonium nitrate rates topdressed by drill immediately before sowing. Wheat showed copper deficiency, particularly at the high nitrogen rates.