1987

Nitrogenous Fertilizers for Cereals Results from 1987 Trials

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78C3/876EX

Effect of Stubble Treatment on Nitrogen Fertilizer Requirement

Chapman Research Station, Nabawa

Stubble treatment	Nitrogen treatment	Vegetative yield (kg/ha)	Grain yield (kg/ha)
Burnt	Nil	938	1,021
	Ammonium nitrate 39 kg/ha	1,606	1,246
	Ammonium nitrate 75 kg/ha	1,868	1,577
	Ammonium nitrate 110 kg/ha	1,934	1,667
	Ammonium nitrate 150 kg/ha	2,234	1,651
	Ammonium nitrate 225 kg/ha	2,325	1,511
	Ammonium nitrate 458 kg/ha	2,114	1,243
Not burnt	Nil	822	91821
	Ammonium nitrate 39 kg/ha	1,363	1,132
	Ammonium nitrate 75 kg/ha	1,770	1,373
	Ammonium nitrate 110 kg/ha	1,858	1,450
	Ammonium nitrate 150 kg/ha	2,188	1,616
	Ammonium nitrate 225 kg/ha	2,322	1,709
	Ammonium nitrate 458 kg/ha	2,099	1,347

Soil type: Brown loamy sand

History: Eleventh successive crop on old clover land

Crops: Eradu wheat 50 kg/ha

Sowing date: 23/6/87

Sampling date: 10/9/87

Basal: Superphosphate 120 kg/ha

Comments:

Ammonium nitrate rates topdressed by drill immediately before sowing. Very few weeds in burnt blocks. Very bad ryegrass in non-burnt blocks. At highest rate of nitrogen there were many stunted and "burnt-off" plants.

Vegetative yields increased with ammonium nitrate application up to 225 kg/ha with both burnt and not burnt stubble. In the case of grain yields, while there was still a response up to 225 kg/ha with not-burnt stubble, there was only a response up to 110 kg/ha where the stubble was burnt. Dry matter yields were higher after burnt stubble than after not burnt stubble. This was also the case with grain yields except at the highest rates of ammonium nitrate where the position was reversed.

78WH3/876EX

Effect of Stubble Treatment on Nitrogen Fertilizer Requirement

Wongan Hills Research Station

Stubble treatment	Nitrogen treatment	Vegetative yield (kg/ha)	Grain yield (kg/ha)
Burnt	Nil	1,817	1,473
	Ammonium nitrate 46 kg/ha	3,030	1,933
	Ammonium nitrate 79 kg/ha	3,343	2,165
	Ammonium nitrate 119 kg/ha	3,787	2,276
	Ammonium nitrate 154 kg/ha	4,064	2,419
	Ammonium nitrate 230 kg/ha	4,908	2,610
	Ammonium nitrate 344 kg/ha	4,202	2,448
	Ammonium nitrate 460 kg/ha	3,950	2,279
Not burnt	Nil	1,376	1,248
	Ammonium nitrate 46 kg/ha	2,227	1,698
	Ammonium nitrate 79 kg/ha	2,413	1,832
	Ammonium nitrate 119 kg/ha	2,945	2,124
	Ammonium nitrate 154 kg/ha	3,358	2,222
	Ammonium nitrate 230 kg/ha	3,477	2,356
	Ammonium nitrate 344 kg/ha	3,584	2,451
	Ammonium nitrate 460 kg/ha	3,468	2,105

Soil type: Yellow-gray loamy sand over gravel at 20-25 cm

History: Eleventh successive crop on old clover land

Crops: Eradu wheat 49 kg/ha

Sowing date: 14/6/87

Sampling date: 24/9/87

Basal: Superphosphate 118 kg/ha

Comments:

Ammonium nitrate topdressed by drill immediately before sowing. Some weeds in plots - wild oats and wireweed - much worse in non burnt blocks. Some yellow leaf spot on wheat.

Vegetative yields increased with ammonium nitrate application up to 230 kg/ha where the stubble was burnt and to 344 kg/ha where it was not burnt. Dry matter yields were consistently higher after burnt stubble than where the stubble was not burnt.

Grain yields were higher where the stubble was burnt than where it was not burnt. With stubble burning there was a response to nitrogen up to 230 kg/ha ammonium nitrate, while there was a response up to 344 kg/ha when the stubble was not burnt.

78M2/876EX

Effect of Stubble Treatment on Nitrogen Fertilizer Requirement

Merredin Research Station

Stubble treatment	Nitrogen treatment	Vegetative yield (kg/ha)	Grain yield (kg/ha)
Stubble burnt - Fallow 1986	Nil	2,615	981
	Ammonium nitrate 38 kg/ha	3,097	1,137
	Ammonium nitrate 76 kg/ha	2,757	1,387
	Ammonium nitrate 114 kg/ha	3,404	1,298
	Ammonium nitrate 152 kg/ha	3,501	1,098
	Ammonium nitrate 228 kg/ha	3,028	1,378
	Ammonium nitrate 456 kg/ha	2,754	1,041
Stubble burnt - Crop 1986	Nil	1,595	937
	Ammonium nitrate 38 kg/ha	1,922	1,025
	Ammonium nitrate 76 kg/ha	2,676	1,098
	Ammonium nitrate 114 kg/ha	2,847	1,076
	Ammonium nitrate 152 kg/ha	2,804	1,165
	Ammonium nitrate 228 kg/ha	2,992	1,130
	Ammonium nitrate 456 kg/ha	2,055	686
Stubble ploughed in - Fallow 1986	Nil	2,451	1,362
	Ammonium nitrate 38 kg/ha	2,834	1,254
	Ammonium nitrate 76 kg/ha	2,834	1,375
	Ammonium nitrate 114 kg/ha	3,122	1,241
	Ammonium nitrate 152 kg/ha	2,881	1,273
	Ammonium nitrate 228 kg/ha	2,994	1,257
	Ammonium nitrate 456 kg/ha	2,585	1,387
Stubble ploughed in - Crop 1986	Nil	1,549	1,067
	Ammonium nitrate 38 kg/ha	2,017	1,044
	Ammonium nitrate 76 kg/ha	2,588	1,286
	Ammonium nitrate 114 kg/ha	2,670	1,098
	Ammonium nitrate 152 kg/ha	2,870	1,073
	Ammonium nitrate 228 kg/ha	3,365	1,229
	Ammonium nitrate 456 kg/ha	2,175	1,079

Soil type: Yellow-gray loamy sand with some gravel over gravel at 20-35 cm

History: Ninth successive crop on old non-clover land - continuous crop blocks

Crops: Gutha wheat 50 kg/ha

Sowing date: 5/6/87

Sampling date: 30/9/87

Basal: Superphosphate 120 kg/ha

Comments:

Ammonium nitrate rates topdressed by cone seeder the day before sowing. Some capeweed in plots. Many plants stunted and "burnt-off" in plots with highest N rate - even early in the season.

Vegetative yields increased with application of ammonium nitrate, up to 152, 228, 114 and 228 kg/ha for the situations - stubble burnt and fallowed, stubble burnt and continuously cropped, stubble not burnt and fallowed and stubble not burnt and continuously cropped respectively. Dry matter yields were higher after fallow than after non fallow. Where fallowing was carried out dry matter yields were higher where the stubble was burnt than where it was ploughed in. However, in the absence of fallow there was no consistent difference between burnt and not-burnt stubble.

There were no large increases in grain yield from nitrogen application. Where the stubble was burnt there were responses up to 76 kg/ha ammonium nitrate. There was little response to nitrogen where the stubble was not burnt. Yields were greater with a year of fallow than with continuous crop. With continuous cropping, grain yields were a little higher with no burnt stubble than where it was burnt. There was little consistent effect of stubble treatment where fallow was included.

*84WH46/876EX

Nitrogen Rate on Continuous Wheat with Varying Levels of Retained Stubble

Wongan Hills Research Station

Stubble treatment	Nitrogen treatment	Grain yield (kg/ha)
Burnt	Nil	1,911
	Urea 33 kg/ha	1,821
	Urea 65 kg/ha	1,804
	Urea 98 kg/ha	1,786
	Urea 130 kg/ha	2,045
	Urea 196 kg/ha	2,107
	Urea 261 kg/ha	1,964
	Urea 49 kg/ha - at sowing + 49 kg/ha - 4 weeks after sowing	2,000
	Urea 65 kg/ha - at sowing + 65 kg/ha - 4 weeks after sowing	2,205
Straw left as long as possible	Nil	1,902
	Urea 33 kg/ha	1,643
	Urea 65 kg/ha	1,750
	Urea 98 kg/ha	1,714
	Urea 130 kg/ha	1,607
	Urea 196 kg/ha	1,884
	Urea 261 kg/ha	2,018
	Urea 49 kg/ha - at sowing + 49 kg/ha - 4 weeks after sowing	1,714
	Urea 65 kg/ha - at sowing + 65 kg/ha - 4 weeks after sowing	1,875
Harvest at 20 cm above ground - cut straw removed	Nil	1,696
	Urea 33 kg/ha	1,545
	Urea 65 kg/ha	1,634
	Urea 98 kg/ha	1,857
	Urea 130 kg/ha	1,929
	Urea 196 kg/ha	1,929
	Urea 261 kg/ha	1,937
	Urea 49 kg/ha - at sowing + 49 kg/ha - 4 weeks after sowing	1,973
	Urea 65 kg/ha - at sowing + 65 kg/ha - 4 weeks after sowing	1,973

* Also with F. Fiévez and J. Ferguson.

Soil type: Wongan yellow loamy sand to yellow sand

History: Fifth successive crop on old clover land

Crops: Eradu wheat 50 kg/ha

Sowing date: 11-12/6/87

Basal: Nil

Comments:

The response to nitrogen is erratic. The control treatment generally gave higher yields than lower rates of urea. However, except for the situation where maximum straw was left, there was a response to higher rates of urea. Yields were generally highest where the stubble was burnt.

87C1/1378EX

Rates of Nitrogen on Continuous Wheat on Heavier Land

Daisy Downs Block, North Mullewa

Treatment	Vegetative yield (kg/ha)	Grain yield (kg/ha)
Nil	1,158	447
Ammonium nitrate 41 kg/ha	1,241	438
Ammonium nitrate 81 kg/ha	1,214	406
Ammonium nitrate 122 kg/ha	1,341	364
Ammonium nitrate 163 kg/ha	1,210	369
Ammonium nitrate 244 kg/ha	1,301	364
Ammonium nitrate 365 kg/ha	1,358	364

Soil type: Red sandy loam

History: Third successive crop on old non-clover land. Stubble of previous crop heavily grazed

Crops: Eradu wheat 50 kg/ha

Sowing date: 22/5/87

Sampling date: 9/9/87

Basal: Superphosphate 150 kg/ha

Comments:

Ammonium nitrate rates topdressed by drill immediately before sowing. A little barley grass in plots. Crop subject to moisture stress.

There was a small vegetative response to ammonium nitrate to 41-122 kg/ha. Grain yields were very low and there was no grain response to nitrogen under these very dry conditions.

*87M04/3317EX

Rates of Nitrogen on Wheat on Heavy Land

L. Isbister, Barberton

Treatment	Vegetative yield (kg/ha)	Grain yield (kg/ha)
Nil	1,411	881
Ammonium nitrate 40 kg/ha	2,224	1,095
Ammonium nitrate 80 kg/ha	3,154	1,482
Ammonium nitrate 120 kg/ha	3,014	1,571
Ammonium nitrate 160 kg/ha	4,375	2,101
Ammonium nitrate 240 kg/ha	5,665	2,446
Ammonium nitrate 480 kg/ha	7,251	3,179

* Also with G. Brown.

Soil type: Brown clay loam over brown clay with limestone at 25-30 cm (Salmon Gum)

History: Fourth successive crop on old land, previously in a 1:1 rotation. Stubble of previous crop, burnt Gypsum applied 1985 (2.5 t/ha) and 1986 (1.25 t/ha)

Crops: Aroona wheat 50 kg/ha

Sowing date: 25/5/87

Basal: 105 kg/ha Superphosphate

Vegetative sampling date: 5/10/87

Comments:

Ammonium nitrate treatments topdressed by cone seeder immediately before sowing. Few weeds. Glean 5 g/ha and Sprayseed 1 L/ha at sowing.

As in a similar trial in 1986 in the same paddock there was a marked response to nitrogen on this heavy land. Both vegetative and grain yields increased with rate of ammonium nitrate up to the highest rate used (480 kg/ha).

87BA3/5392EX

Nitrification of Sources of Nitrogen on Slightly Acid to Neutral Soil

Badgingarra Research Station

Rate of nitrogen (kg/ha)	Source of nitrogen	Vegetative yield (kg/ha)	Grain yield (kg/ha)
0	Nil	208	50
25	Urea	731	299
25	Ammonium nitrate	670	372
25	Ammonium sulphate	761	227
75	Urea	844	354
75	Ammonium nitrate	831	263
75	Ammonium sulphate	815	304

Soil type: Deep yellow sand

History: Second successive cereal crop on new land. Stubble of previous crop not burnt - too light

Crops: Cranbrook wheat 50 kg/ha

Sowing date: 24/6/87

Vegetative sampling date: 22/9/87

Basal: Superphosphate 239 kg/ha (drilled) + Muriate of Potash 100 kg/ha (topdressed)

Comments:

Nitrogen treatments topdressed by hand three weeks after sowing. Some oats in the wheat plots. Weekly soil samples were taken from the nil and the 75 kg N/ha treatments as well as a similar set of treatments on bare plots. The soil samples were analyzed for ammonium and nitrate nitrogen to follow the course of the nitrification process.

Both vegetative and grain yields were very poor on this site. There were both vegetative and grain yield increases with application of nitrogen. At these low yields it is difficult to determine any meaningful source differences.

87A1/5392EX

Nitrification of Sources of Nitrogen on Medium Soil

Avondale Research Station, Beverley

Rate of nitrogen (kg/ha)	Source of nitrogen	Vegetative yield (kg/ha)	Grain yield (kg/ha)
0	Nil	2,038	1,690
25	Urea	3,399	2,440
25	Ammonium nitrate	3,707	2,458
25	Ammonium sulphate	3,807	2,399
75	Urea	5,955	3,107
75	Ammonium nitrate	5,542	2,869
75	Ammonium sulphate	5,181	2,667

Soil type: Red-brown sandy loam

History: Second successive cereal crop on old clover land. Stubble of previous oat crop burnt

Crops: Cranbrook wheat 45 kg/ha

Sowing date: 8/6/87

Vegetative sampling date: 30/9/87

Basal: Superphosphate 80 kg/ha topdressed

Comments:

Nitrogen treatments topdressed by cone seeder immediately before sowing. Some barley grass in plots. Weekly soil samples were taken from the nil and the 75 kg N/ha treatments as well as a similar set of treatments on bare plots. The soil samples were analyzed for ammonium and nitrate nitrogen to follow the course of the nitrification process.

Dry matter yields increased with application of nitrogen fertilizer and yields were higher with 75 kg N/ha than with 25 kg N/ha. Differences between sources were not consistent, the order being reversed from low N rate to high N rate.

Grain yields also increased with application of nitrogen and were higher with 75 kg N/ha than 25 kg/ha. Ammonium sulphate gave the poorest results. Urea yielded better than ammonium nitrate at the higher rate of N but not at the lower rate.

87M3/5392EX

Nitrification of Sources of Nitrogen on Very Acid Soil

Merredin Research Station

Rate of nitrogen (kg/ha)	Source of nitrogen	Vegetative yield (kg/ha)	Grain yield (kg/ha)
0	Nil	1,657	No
25	Urea	2,150	results
25	Ammonium nitrate	1,959	due
25	Ammonium sulphate	1,979	to
75	Urea	2,230	harvesting
75	Ammonium nitrate	2,561	error
75	Ammonium sulphate	2,200	

Soil type: Yellow loamy sand

History: Second successive cereal crop after lupins on old land. Stubble of previous crop burnt

Crops: Gutha wheat 47 kg/ha

Sowing date: 5/6/87

Vegetative sampling date: 14/9/87

Basal: Molybdenum superphosphate 150 kg/ha

Comments:

Nitrogen treatments topdressed by cone seeder immediately before sowing. A little wimmera ryegrass in plots. Weekly soil samples were taken from the nil and the 75 kg N/ha treatments as well as a similar set of treatments on bare plots. The soil samples were analyzed for ammonium and nitrate nitrogen to follow the course of the nitrification process.

There was an increase in vegetative yield with increasing nitrogen rate. The differences between sources were not consistent.

87WH1/5392EX

Nitrification of Sources of Nitrogen on Moderately Acid Soil

Wongan Hills Research Station

Rate of nitrogen (kg/ha)	Source of nitrogen	Vegetative yield (kg/ha)	Grain yield (kg/ha)
0	Nil	1,122	865
25	Urea	1,887	1,476
25	Ammonium nitrate	1,909	1,313
25	Ammonium sulphate	2,225	1,397
75	Urea	2,678	1,758
75	Ammonium nitrate	2,632	1,702
75	Ammonium sulphate	2,363	1,833

Soil type: Wongan yellow loamy sand to sand

History: Second successive crop on old clover land. Stubble of previous crop burnt

Crops: Eradu wheat 50 kg/ha

Sowing date: 15/6/87

Vegetative sampling date: 24/9/87

Basal: Superphosphate 100 kg/ha

Comments:

Nitrogen treatments topdressed by cone seeder immediately before sowing. Weed free. Some yellow leaf spot disease. Weekly soil samples were taken from the nil and the 75 kg N/ha treatments as well as a similar set of treatments on bare plots. The soil samples were analyzed for ammonium and nitrate nitrogen to follow the course of the nitrification process.

There was a marked increase in dry matter production due to application of nitrogen and the dry matter yield increased with increasing rate of nitrogen. Source effects were not consistent.

There was a grain yield response to nitrogen and yields were higher with nitrogen at 75 kg/ha than at 25 kg/ha. Ammonium nitrate gave the lowest yields of the three N sources at both rates of N.

*86BA2/5160EX

Rate of Nitrogen Fertilizer x Inoculation x Time of Sowing Lupins and Peas

Badgingarra Research Station

1986 Treatment				1987	Vegetative	Grain
Sowing date	Crop	Inoculation	Rate of ammonium nitrate (kg/ha)	Rate of ammonium nitrate (kg/ha)	yield (kg/ha)	yield (kg/ha)
17/5/86	Lupins	+	0	0	787	322
			40		873	259
			160		864	254
		-	0	0	914	259
			40		922	336
			160		854	340
	Peas	+	0	0	540	240
			40		635	231
			160		831	236
		-	0	0	457	245
			40		598	218
			160		587	263
13/6/86	Lupins	+	0	0	736	227
			40		685	190
			160		660	231
		-	0	0	606	218
			40		684	231
			160		649	263
	Peas	+	0	0	479	404
			40		535	363
			160		526	413
		-	0	0	474	358
			40		573	435
			160		498	345

Table continued ...

1986 Treatment				1987	Vegetative	Grain
Sowing date	Crop	Inoculation	Rate of ammonium nitrate (kg/ha)	Rate of ammonium nitrate (kg/ha)	yield (kg/ha)	yield (kg/ha)
				0	202	308
				40	438	200
				80	831	204
13/6/86	Oats		160	120	698	277
				160	731	263
				240	1,008	395
				360	800	449
				480	798	317

* Also with G. Walton and I. Rowland.

Soil type: Deep yellow sand

History: Third successive crop on new land. Stubble of previous crop not burnt - too light

Crops: Cranbrook wheat 50 kg/ha

Sowing date: 23/6/87

Vegetative sampling date: 5/10/87

Basal: Superphosphate 239 kg/ha (drilled) + Muriate of Potash 100 kg/ha (topdressed)

Comments:

Rates of ammonium nitrate topdressed by hand four weeks after sowing. Few weeds in plots. Previous buffer plots (oats 1986) fairly roughly sown.

There was a dry matter increase up to 240 kg/ha ammonium nitrate in wheat following oats, although dry matter yields were poor. In terms of vegetative yield there was a benefit from the previous legume crops. The effect was greater following lupins than peas and greater following early sown 1986 crops than the later ones. In comparison with the nitrogen rates on wheat following oats the early sown lupins were worth 160-240 kg/ha ammonium nitrate, early sown peas 80-120 kg/ha, late sown lupins 120 kg/ha and late sown peas 40-80 kg/ha amonium nitrate.

The beneficial effect of previous crop on vegetative yield was not reflected in grain yields, which were extremely poor. There was very little grain yield response to ammonium nitrate added to wheat following oats.

*80WH3/3831EX

Effects of Agras No. 1 on Soil pH and Wheat Yield

Wongan Hills Research Station

Treatment	Grain yield (kg/ha)
Continuous Cropping:	
Nil	1,317
Ground limestone 2.67 tonnes/ha (1980)	1,438
Ground limestone 2.67 tonnes/ha + Mg + K + Mo (Muriate of Potash 150 kg/ha + magnesium sulphate 50 kg/ha + Molybdenum trioxide 140 gm/ha) (all 1980)	1,365
Agras No. 1 - 103 kg/ha	2,022
Ground limestone 2.67 tonnes/ha (1980) + Agras No. 1 - 103 kg/ha	2,035
Ground limestone 66 kg/ha + Agras No. 1 - 103 kg/ha	1,946
Ground limestone 2.67 tonnes/ha (1980) + Mg + K + Mo (1980) + Agras No. 1 - 103 kg/ha	2,022
Agras No. 1 - 202 kg/ha	2,152
Ground limestone 2.67 tonnes/ha (1980) + Agras No. 1 - 202 kg/ha	2,302
Ground limestone 139 kg/ha + Agras No. 1 - 202 kg/ha	2,279
Ground limestone 2.67 t/ha (1980) + Mg + K + Mo (1980) + Agras No. 1 - 202 kg/ha	2,352

* Also with W. Porter.

Soil type: Wongan yellow loamy sand

History: Eighth successive crop on old clover land. Stubble of previous crop burnt

Crops: Eradu wheat 49 kg/ha

Sowing date: 13/6/87

Basal: Superphosphate 160 kg/ha topdressed onto all blocks. Superphosphate 168 kg/ha drilled on all cropped non-Agras plots

Comments:

Low limestone rates topdressed by drill immediately before sowing. A few weeds in plots - bromegrass, wild radish and capeweed. Some yellow leaf spot disease.

There was a yield response to Agras up to the higher rate. There appears to be a response to lime when applied at 2.67 t/ha (1980) in the presence of Agras at 202 kg/ha/year, but no response to Mg + K + Mo above the effect of lime. There could also be a small response to the small annual application of lime with Agras 202 kg/ha.

*80M1/3831EX

Effects of Agras No. 1 on Soil pH and Wheat Yield

Merredin Research Station

Treatment	Grain yield (kg/ha)
Continuous Cropping:	
Nil	939
Ground limestone 3 tonnes/ha (1980)	1,166
Ground limestone 3 t/ha (1980) + Mg + K + Mo (Muriate of Potash 150 kg/ha + magnesium sulphate 50 kg/ha + Molybdenum trioxide 140 gm/ha) (all 1980)	1,087
Agras No. 1 - 100 kg/ha	1,100
Ground limestone 3 t/ha (1980) + Agras NO. 1 - 100 kg/ha	1,245
Ground limestone 70 kg/ha + Agras No. 1 - 100 kg/ha	1,061
Ground limestone 3 t/ha (1980) + Mg + K + Mo (1980) + Agras No. 1 - 100 kg/ha	1,258
Agras No. 1 - 200 kg/ha	1,153
Ground limestone 3 t/ha (1980) + Agras No. 1 - 200 kg/ha	1,238
Ground limestone 140 kg/ha + Agras No. 1 - 200 kg/ha	1,159
Ground limestone 3 t/ha (1980) + Mg + K + Mo (1980) + Agras No. 1 - 200 kg/ha	1,320

* Also with W. Porter.

Soil type: Yellow loamy sand over gravel

History: Eighth successive crop after poor legume pasture. Stubble of previous crop burnt

Crops: Gutha wheat 50 kg/ha

Sowing date: 5/6/87

Basal: Molybdenum superphosphate 133 kg/ha topdressed onto all blocks. Superphosphate 164 kg/ha drilled on all non cropped agras plots

Comments:

Low limestone rates topdressed by drill immediately before sowing. A lot of wimmera ryegrass in rep 3, otherwise only a little wimmera ryegrass in plots.

There was a yield response to Agras rate, though the response to the second rate above the lower rate was small. There was a response to 3 t/ha lime applied in 1980. In contrast to previcus results the response was greatest with nil Agras and least with the higher Agras rate. This response was obtained despite the basal molybdenum treatment applied to all plots. This suggests that the response is due to factors other than availability of molybdenum being increased by the lime induced pH effect. The response may be due to the alleviation of Aluminium toxicity. Except at the highest rate of Agras there was no effect on K + Mg + Mo applied in 1980. There was no effect of small annual applications of lime.

*86M8/4892EX

Grazing Lupins and Nitrogen on Wheat

Merredin Research Station - South Carrabin Block

1986 Treatment	Rate of ammonium nitrate on wheat - 1987	Biological yield (kg/ha)	Grain yield (kg/ha)
Oats - harvest and graze stubble	Nil	854	460
	Ammonium nitrate 30 kg/ha	1,189	676
	Ammonium nitrate 60 kg/ha	1,583	797
	Ammonium nitrate 90 kg/ha	1,840	902
	Ammonium nitrate 120 kg/ha	2,026	883
	Ammonium nitrate 240 kg/ha	2,330	1,225
	Ammonium nitrate 480 kg/ha	2,500	1,203
Lupins - harvest and graze stubble	Nil	1,683	921
	Ammonium nitrate 30 kg/ha	1,724	978
	Ammonium nitrate 60 kg/ha	1,901	1,063
	Ammonium nitrate 90 kg/ha	1,808	1,029
	Ammonium nitrate 120 kg/ha	2,131	1,086
	Ammonium nitrate 240 kg/ha	2,314	1,184
	Ammonium nitrate 480 kg/ha	2,185	1,244
Lupins - harvest but stubble not grazed	Nil	1,523	900
	Ammonium nitrate 30 kg/ha	1,649	905
	Ammonium nitrate 60 kg/ha	1,549	933
	Ammonium nitrate 90 kg/ha	1,730	990
	Ammonium nitrate 120 kg/ha	1,766	978
	Ammonium nitrate 240 kg/ha	1,946	1,067
	Ammonium nitrate 480 kg/ha	2,417	1,222
Lupins - not harvested but grazed	Nil	1,753	933
	Ammonium nitrate 30 kg/ha	1,600	1,102
	Ammonium nitrate 60 kg/ha	1,927	1,076
	Ammonium nitrate 90 kg/ha	2,094	1,162
	Ammonium nitrate 120 kg/ha	1,952	1,114
	Ammonium nitrate 240 kg/ha	2,155	1,210
	Ammonium nitrate 480 kg/ha	2,142	1,324
Lupins - not harvested and not grazed	Nil	2,197	1,114
	Ammonium nitrate 30 kg/ha	1,666	924
	Ammonium nitrate 60 kg/ha	2,121	1,048
	Ammonium nitrate 90 kg/ha	1,777	1,229
	Ammonium nitrate 120 kg/ha	2,490	1,200
	Ammonium nitrate 240 kg/ha	2,954	1,352
	Ammonium nitrate 480 kg/ha	3,095	1,257

* Also with W. Bowden and I. Rowland.

Soil type:	Yellow loamy sand (pH in water 5.5 (0-10 cm) 4.5 (30-45 cm)
History:	Third successive crop on new land
Crops:	Eradu wheat 45 kg/ha
Sowing date:	25/5/87
Vegetative sampling date:	1/10/87
Basal:	Superphosphate 200 kg/ha. Seed treated with sodium molybdate

Comments:

Ammonium nitrate treatments topdressed by cone seeder immediately before sowing. Few weeds in previous lupin blocks, but there were a lot of oats in the wheat plots following oats. 1986 lupins averaged 359 kg/ha seed. The 1986 oat crop yielded 633 kg/ha.

*87M7/4860EX

Nitrogen x Phosphorus x Season Interaction on Wheat

Merredin Research Station - South Carrabin Block

Water treatment	Rate of phosphorus (as triple super) (kg/ha)	Rate of nitrogen (as urea) (kg/ha)	Biological yield (kg/ha)	Grain yield (kg/ha)
	0	0	1,071	468
		10	1,519	683
		20	1,786	866
		40	2,271	1,051
		80	1,743	836
		160	2,459	1,209
	10	0	1,405	678
		10	1,955	927
		20	2,314	1,144
		40	2,257	1,110
		80	2,988	1,471
		160	2,354	1,177
Extra water added at end of season (Sept.-Oct.)	20	0	2,457	1,191
		10	3,123	1,533
		20	3,007	1,468
		40	3,919	1,903
		80	4,030	1,934
		160	3,385	1,723
	40	0	2,635	1,355
		10	2,907	1,483
		20	4,090	2,098
		40	3,990	2,003
		80	3,800	2,005
		160	3,281	1,698
	80	0	3,376	1,761
		10	2,633	1,420
		20	3,502	1,818
		40	4,169	2,198
		80	4,059	2,161
		160	3,819	2,016

Table continued ...

Water treatment	Rate of phosphorus (as triple super) (kg/ha)	Rate of nitrogen (as urea) (kg/ha)	Biological yield (kg/ha)	Grain yield (kg/ha)
No extra water	0	0	1,121	491
		10	1,128	518
		20	1,345	578
		40	1,105	493
		80	1,540	718
		160	1,202	535
	10	0	1,240	572
		10	1,550	717
		20	1,931	922
		40	2,602	1,213
		80	2,312	1,066
		160	1,828	835
	20	0	1,640	771
		10	1,952	938
		20	2,562	1,241
		40	2,047	982
		80	2,745	1,313
		160	2,309	1,054
	40	0	1,850	909
		10	1,728	862
		20	1,950	991
		40	3,154	1,535
		80	3,102	1,451
		160	3,457	1,563
	80	0	2,138	1,081
		10	1,695	838
		20	2,174	1,130
		40	2,702	1,378
		80	2,304	1,139
		160	3,264	1,672

* Also with W. Bowden.

Soil type: Yellow loamy sand

History: Third successive crop on old land. Stubble of previous crop very thin and cultivated in

Crops: Gutha wheat 50 kg/ha

Sowing date: 16/6/87

Vegetative sampling date: 3/12 (mature)

Basal: Copper sulphate and zinc sulphate sprayed just before sowing. Molybdenum applied as a seed dressing

Comments:

Triple superphosphate rates drilled with seed. Rates of ammonium nitrate topdressed by hand immediately after sowing. No weeds. Extra water applied - 1/9 - 12 mm, 16/9 - 13 mm, 1/10 - 21 mm, 12/10 - 17 mm, 22/10 - 17 mm.

Biological yields were higher where extra water was applied. There were marked responses to nitrogen and phosphorus, but the rates of each nutrient giving maximum biological yield varied according to the level of the other nutrient. The same comments are valid for the grain yield.

There did not appear to be an interaction between watering and rate of nitrogen and phosphorus needed for maximum dry matter or grain yields and in terms of magnitude of response the interaction did not appear to be strong.

*87MT46/5413EX

Nitrogen Nutrition and Time of Sowing Long Season Wheats

Mount Barker Research Station

Wheat variety	Rate of nitrogen area urea (kg/ha) Early (double ridge stage)	Late (elongation)	Vegetative yield (kg/ha)	Grain yield (kg/ha)
	0	0	3,321	1,996
	0	50	4,352	1,623
Aroona	50	0	4,311	1,955
	50	50	4,867	1,915
	100	0	3,676	1,613
	100	50	4,930	1,472
	0	0		
	0	50	3,251	2,278
Osprey	50	0	4,464	1,996
	50	50	4,603	2,167
	100	0	3,521	1,724
	100	50	4,651	2,026

* Also with W. Smith.

Soil type: Brown gravelly loamy sand

History: Second successive crop on old clover land. Rape in 1986

Crops: Sown at 80 kg/ha

Sowing date: 23/6/87

Vegetative sampling date: 6/10/87 (Aroona), 21/10/87 (Osprey) - both at anthesis

Basal: Copper, zinc, molybdenum superphosphate No. 1 - 150 kg/ha

Comments:

Urea treatments topdressed by hand 4 weeks after sowing. A few weeds in the plots. The site was non-wetting so the crop was patchy. The early sowing was abandoned due to the non-wetting.

Unfortunately the control treatment for Osprey was omitted from the trial. There were, however, dry matter responses to applied nitrogen. Highest dry matter yields were obtained with the highest rate of application of nitrogen (100 kg/ha at double ridge stage + 50 kg/ha at elongation), followed by 50 kg/ha + 50 kg/ha.

There did not appear to be a grain yield response to nitrogen.

*87MT1/5413EX

Nitrogen Nutrition and Time of Sowing of Winter and Spring Barleys

Mount Barker Research Station

Barley variety	Rate of nitrogen as urea (kg/ha) Early (double ridge stage)	Late (elongation)	Grain yield (kg/ha)
Stirling	0	0	2,790
	0	50	3,019
	50	0	2,924
	50	50	2,638
	100	0	2,952
	100	50	2,790
WA 3073 (Winter type)	0	0	2,981
	0	50	2,762
	50	0	2,457
	50	50	2,314
	100	0	2,257
	100	50	2,229

* Also with K. Young.

Soil type: Brown gravelly loamy sand

History: Second successive crop on old clover land. Rape in 1984

Crops: Sown at 50 kg/ha

Sowing date: 23/6/87

Basal: Copper, zinc, molybdenum superphosphate No. 1 - 150 kg/ha

Comments:

Urea treatments topdressed by hand 4 weeks after sowing. Some weeds in the plots. The site was non-wetting so the crop was patchy. The early sowing was abandoned due to this non-wetting.

Results were variable due to the patchiness caused by non-wetting. With the winter type barley highest yields were obtained with the nil nitrogen treatment and yields decreased with increasing nitrogen rate. Response to nitrogen on Stirling was variable and differences were probably not significant. Overall yields were higher with Stirling than the winter type when nitrogen was applied. The winter type gave a higher yield in the absence of nitrogen.

*86WH4/5157EX

Interaction Between Deep Ripping, Time of Sowing and Nitrogen Rate

Wongan Hills Research Station

1986 Treatment				
Sowing date	Deep ripping treatment	Rate of ammonium nitrate (kg/ha)	Vegetative yield (kg/ha)	Grain yield (kg/ha)
		0	2,419	1,294
		40	3,064	1,405
		80	3,014	1,397
	+	120	2,958	1,397
		160	2,889	1,262
		240	3,624	1,627
		480	4,551	1,683
		120 - 4 weeks after sowing	2,905	1,381
11/6/86				
		0	1,571	778
		40	1,368	635
		80	1,440	762
	-	120	1,778	825
		160	1,656	683
		240	1,568	714
		480	1,728	810
		120 - 4 weeks after sowing	1,449	714
		0	3,606	1,825
		40	4,529	1,683
		80	3,002	1,563
	+	120	3,746	1,746
		160	5,352	2,095
		240	5,164	2,032
		480	6,876	2,738
		120 - 4 weeks after sowing	4,723	2,111
11/7/86				
		0	2,288	968
		40	2,332	1,058
		80	2,166	952
	-	120	2,316	1,175
		160	3,036	1,214
		240	2,604	1,325
		480	3,678	1,587
		120 - 4 weeks after sowing	2,523	1,079

* Also with R. Jarvis.

Soil type: Wongan yellow loamy sand

History: Third successive crop on old clover land. Stubble of previous crop burnt

Crops: Eradu wheat 50 kg/ha

Sowing date: 11/6/87

Vegetative sampling date: 12/10/87

Basal: Nil fertilizer

Comments:

These plots were sown without any 1987 treatments. No weeds. Some yellow leaf spot disease.

There was a residual effect of nitrogen applied in 1986, particularly at higher rates. There was also a large residual effect of 1986 deep ripping treatment. Dry matter yields were also considerably higher following the late sown 1986 crop than after the early sown crop, presumably due to the greater residual nitrogen and possibly moisture following the poorer crop with late sowing in 1986. The residual effect of 1986 nitrogen was greater following the late sown 1986 crop than the early sown one. However, the residual nitrogen effect was also greater after deep ripping then in the absence of ripping.

The effects of treatments on grain yields were the same as for vegetative yields.