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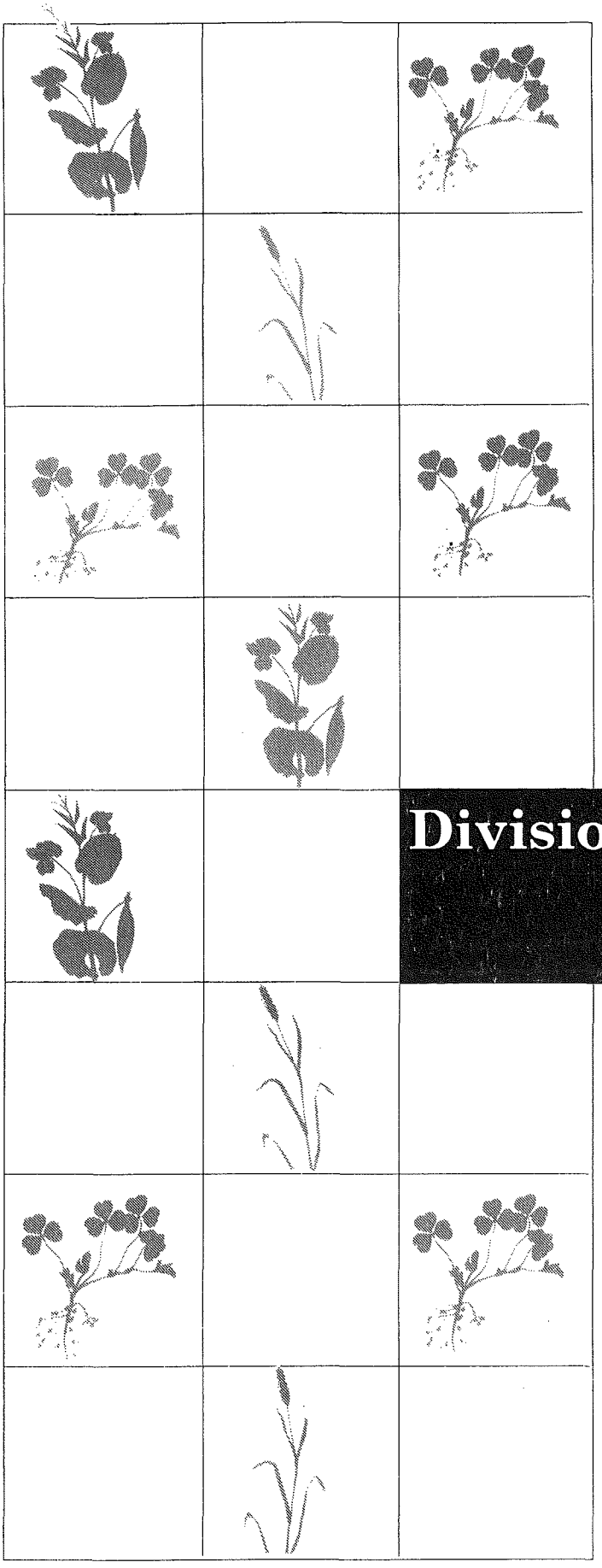
Timing of nitrogen fertilizer application for cereals

M G. Mason



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TIMING OF NITROGEN FERTILIZER APPLICATION FOR CEREALS

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SUMMARY

Results are presented for 206 trials carried out between 1959 and 1990, investigating the effect of time of application of nitrogen fertilizers on cereal grain yields. This set of data is the basis of recommendations made for timing of nitrogen fertilizer application for cereals in Western Australia. Attention is drawn to the variability of results obtained in different seasons and situations and the importance of seasonal conditions, particularly the incidence of leaching rains in relation to timing of nitrogen fertilizer application and the form of nitrogen present at the time of leaching rains.

INTRODUCTION

Nitrogen fertilizers increase cereal grain yields in many situations in Western Australia (Mason 1975). Because nitrogen fertilizers are expensive it is important to use the nitrogen efficiently by matching the nitrogen supply to the needs of the crop, both in terms of amount and timing of the nutrient supply. The efficient uptake and utilization of nitrogen by the crop also limits losses of nitrogen through processes such as leaching (Mason et al. 1972), which can be environmentally hazardous.

Timing of application of nitrogen is important because the cereal crop has greater needs for nitrogen at different stages of growth (Mason 1990). Many of the yield responses to nitrogen fertilizers are achieved by increasing the number of grain-bearing ears per unit area, i.e. by increased tillering (Halse et al. 1969, Feyter and Cosséns 1977). Tillering is influenced by nitrogen supply (Darwinkel 1983, Spiertz and De Vos 1983). Maximum effects on tiller formation and spikelet initiation are brought about by a source of nitrogen at the beginning of tillering (Darwinkel 1983), while Langer and Liew (1973) showed that spikelet numbers were only increased by early application of nitrogen - no later than the double ridge stage.

However, the popular concept that N fertilizers should be applied right at the stages of growth where elevated N supply has greatest effect on grain yield potential, has not been borne out in the multitude of trials in Western Australia. This is because wheat plants do not immediately take up a large proportion of the N suddenly offered to them. It takes time. For this reason N applied some weeks before the "critical" stages of growth is usually much more effective than applied at, or just a few days before, those stages.

Therefore an adequate supply of nitrogen is essential in the early stages of crop growth. Responses to later application of nitrogen fertilizer can often be brought about by promotion of tiller survival and leaf area duration (Spiertz and De Vos 1983). Profitable responses can sometimes be obtained to very late applications of nitrogen (Mason 1986b), but usually the response from earlier applications were far more profitable.

This need for an early supply of available nitrogen has to be balanced against the likelihood of leaching losses of early applied nitrogen. This will depend on soil type, rainfall and form of nitrogen present at the time of leaching rains, but in some situations severe losses of nitrate can occur due to leaching before the crop can develop an effective rooting system (Mason et al. 1972). Other factors which may affect the decision on timing of application include the possibility of volatilization losses of ammonia occurring with top-dressed urea (Gasser 1964, Nommik 1973, Simpson and Freney 1974) and also convenience. Some nitrogen sources, such as di-ammonium phosphate and other N-P compound fertilizers are designed for application at sowing because the phosphate is to be banded with the seed. In some cases ground conditions will not allow machinery onto the ground much after sowing.

Apart from possible volatilization losses from urea, most losses of nitrogen from the cropping system will occur due to the presence of nitrate nitrogen (leaching denitrification), though nitrogen can be readily leached as urea, though this rapidly hydrolyses to form ammonium-N. Therefore the success of the selected time of application will depend also on the degree of nitrification of ammonium N to nitrate N which has occurred at the time of the arrival of leaching rains, or the occurrence of waterlogging, which will result in denitrification losses of nitrogen. The rate of nitrification will depend on many factors including soil pH and type of fertilizer used (Mason, unpublished).

The best time of application in a particular situation will vary depending on both short-term and long-term conditions within a season. Recommendations are set out in a Farmnote (Mason 1986a) which outlines the most likely optimum strategy on average for each of the nominated rainfall zones.

MATERIALS AND METHODS

Table 1 sets out details of sites, soil types and paddock histories. Cereal variety, sowing date, basal fertilizer treatment, rainfall and rainfall zone are presented in Table 2.

Wheat was sown in these trials at 40-50 kg/ha. The fertilizers were generally topdressed by hand and the sources of nitrogen used varied. Details of sources are given in the results, but generally urea (46% N), ammonium nitrate (34% N), or ammonium sulphate (21% N), were used. The experimental designs were many and varied, but were generally randomized blocks.

RESULTS AND DISCUSSION

Grain yield results are set out in Appendix tables 1-74.

These trial results show the large variability in optimum time of application within rainfall regions in different seasons and situations. The relative success of any particular time of application not only depends on the entire seasonal growing conditions, but also particularly on the timing of leaching rains in relation to the fertilizer application time and the stage of nitrogen fertilizer transformation at that time. These data were used to formulate recommendations for time of application of nitrogen fertilizer set out in Mason (1986). This publication makes available all the results for perusal by the reader who may wish to reach his or her own conclusions.

Table 1. Details of sites, soil types and paddock histories in trials comparing time of application of nitrogen fertilizers

	Site	Soil type	Paddock history
1.	Nabawa	Red-brown loam	First crop after clover pasture on old land
2.	Wongan Hills	Elphin grey-yellow loamy sand	First crop after clover pasture on old land
3.	Beverley	Red-brown clay-loam	First crop after clover pasture on old land
4.	Mingenew	Grey-yellow sand over yellow loamy sand at 10 cm	First crop on new land - fallow
5.	Mingenew	Grey-yellow sand over yellow loamy sand at 15 cm - some gravel, increasing with depth	First crop after lupins on old land
6.	Dandaragan	Deep yellow sand	First crop after lupins on old land
7.	Wongan Hills	Elphin grey-yellow loamy sand	Second successive cereal crop on old clover land
8.	Fleming Grove	Light land	Second successive crop on new land
9.	Mingenew	Yellow loamy sand	Second successive crop on new land
10.	Badgingarra	Grey sand over coarse gravelly sand over clay	First crop on new land - fallow
11.	Popanyinning	Brown sandy gravelly loam	First crop on new land - fallow
12.	Pithara	Heavy land	Third successive crop on old land

Table 1 continued ...

Site	Soil type	Paddock history
13. Badgingarra	Gravelly sand over gravel	Second successive crop on new land
14. Mingenew	Red-brown sandy clay loam	Fifth successive crop on old land
15. Mingenew	Yellow loamy sand	Third successive crop on new land
16. Bakers Hill	Coarse gravelly sand	First crop on new land - fallow
17. Gibson	Sand over gravel	Second successive crop on old clover land
18. Muradup	Coarse gravelly sand	First crop on new land - fallow
19. Pingrup	Grey sand over gravel	First crop after old non-clover pasture
20. Pingrup	Grey-brown sandy loam over yellow sandy clay	First crop after old non-clover pasture
21. Toompup	Grey-brown sandy loam over grey-brown clay	First crop after non-legume pasture on old land
22. Wannamal	Buckshot sandy gravel	First crop on new land non-fallow
23. Canna	Grey-brown loamy sand	First crop on new land - fallow
24. Badgingarra	Grey sand over gravel	First crop on new land - fallow
25. Eradu	Deep yellow loamy sand	First crop after non-legume pasture on old land

Table 1 continued ...

Site	Soil type	Paddock history
26. Mingenew	Red-brown sandy clay loam	Sixth successive crop on old land
27. Ogilvie	Light land	First crop on new land - fallow
28. Pingrup	Sandy loam over clay	First crop on new land - fallow
29. Wamenusking	Gravelly sand over shallow clay	First crop after old non-legume pasture
30. Wongan Hills	Yellow loamy sand	First crop after clover pasture on old land
31. Wongan Hills	Yellow loamy sand	Second successive crop on old clover land
32. Gibson	Grey sand over gravelly clay	First crop after legume pasture on old land
33. Canna	Grey-brown loamy sand	First crop on new land - fallow
34. Eradu	Deep yellow loamy sand over gravelly yellow sand	First crop after old non-legume pasture
35. Mingenew	Red-brown sandy clay loam	Seventh successive crop on old land
36. Wongan Hills	Yellow loamy sand	Second successive crop on old clover land
37. Wongan Hills	Grey Mocardy sand	Second successive crop after old non-legume pasture
38. Wongan Hills	Yellow loamy sand	First crop after legume pasture

Table 1 continued ...

Site	Soil type	Paddock history
39. Jerramungup	Sand over clay	First crop on new land - non-fallow
40. North Chillinup	Sand over clay	First crop on new land - fallow
41. Pingrup	Sandy loam over clay	Second successive crop on new land
42. Pingrup	Sand over domed clay	First crop on new land - fallow
43. Canna	Grey-brown loamy sand	First crop on new land - fallow
44. Kalannie	Pale yellow-grey sand over yellow brown sand at 5-10 cm. Gravel at 15-30 cm	Second successive crop on new land
45. Kirwan	Fine sand with coarse grit and gravel	Second successive crop on new land
46. Mingenew	Red-brown sandy clay loam	Eighth successive crop on old land
47. Harrismith	Sand over gravel at 15 cm	First crop on new land - fallow
48. Tone River	Brown gravelly sandy loam over clay at 45 cm	First crop on new land - fallow
49. West Toodyay	Gravelly sandy loam	First crop on new land - fallow
50. Wongan Hills	Grey Elphin loamy sand	Second successive crop on old clover land
51. Ajana	Deep yellow sand	First crop on new land - fallow

Table 1 continued ...

Site	Soil type	Paddock history
52. North Kalannie	Pale yellow sand over yellow-brown sandy gravel at 30 cm	Third successive crop on new land
53. North Kalannie	Deep loamy sand - wodgil	Third successive crop on new land
54. North Kalannie	Heavy land	Third successive crop on new land
55. Kirwan	Yellow loamy sand with some gravel - wodgil	Second successive crop on new land
56. Badgingarra	Gravelly sand over gravel at 20-30 cm	First crop on new land - fallow
57. Grass Patch	Grey-brown sandy loam over domed grey-brown sandy clay	First crop on new land - fallow
58. Kulin	Sand over clay	Second successive crop on new land
59. Mingenew	Red-brown sandy clay loam	Ninth successive crop on old land
60. Beverley	Red-brown sandy clay loam	First crop after legume pasture
61. Boyup Brook	Brown sandy loam with some gravel over light brown sandy clay at 8 cm	First crop on new land - non-fallow
62. Condingup	Grey sand with some gravel over mottled orange-grey brown sandy clay at 40-45 cm	First crop on new land - fallow
63. Gibson	Gravelly sand over gravelly clay	First crop after legume pasture

Table 1 continued ...

Site	Soil type	Paddock history
64. Harrismith	Sand over gravelly sand at 15 cm	First crop on new land - fallow
65. Lancelin	Deep yellow sand	Third successive crop on new land
66. West Toodyay	Fine gravelly sandy loam	First crop on new land - fallow
67. Circle Valley	Fine sand over yellow-grey clay at 10 cm	First crop after non-legume pasture on old land
68. Circle Valley	Fine sand over yellow-grey clay at 10 cm	Second successive crop after non-legume pasture on old land
69. Circle Valley	Fine sand over yellow-grey clay at 10 cm	Third successive crop after non-legume pasture on old land
70. North Kalannie	Yellow sandy loam - wodgil	Third successive crop on new land
71. Kirwan	Yellow loamy sand with some gravel - wodgil	Second successive crop on new land
72. Grass Patch	Pale grey medium sand over grey-brown sandy clay at 15 cm	First crop on new land - fallow
73. Harrismith	Sand over gravelly sand at 15 cm	First crop on new land - non-fallow
74. Mingenew	Red-brown sandy clay loam	Tenth successive crop on old land
75. Lake Grace	Grey-yellow loamy sand over gravel	First crop after non-legume pasture on old land

Table 1 continued ...

Site	Soil type	Paddock history
76. Condingup	Pale grey sand over gravel over clay	First crop on new land - fallow
77. Gibson	Gravelly sand over gravelly clay	First crop after legume pasture
78. Gibson	Gravelly sand over gravelly clay	Second successive crop after legume pasture
79. Moulyinning	Yellow loamy sand over ironstone	First crop after non-legume pasture on old land
80. West Toodyay	Very gravelly sand over gravel	First crop on new land - fallow
81. Jingalup	Gravelly sand over gravel	First crop on new land - non-fallow
82. Circle Valley	Fine sand over yellow-grey clay at 10 cm	Third successive crop after non-legume pasture on old land
83. Circle Valley	Fine sand over yellow-grey clay at 10 cm	Fourth successive crop after non-legume pasture on old land
84. Circle Valley	Fine sand over yellow-grey clay at 10 cm	Second successive crop after non-legume pasture on old land
85. Badgingarra	Gravelly sand over gravel	Second successive crop after legume pasture
86. Badgingarra	Gravelly sand over gravel	Second successive crop after legume pasture
87. Eneabba	Gravelly sand over gravel	Second successive crop on new land

Table 1 continued ...

Site	Soil type	Paddock history
88. Kulin	Sand over clay - medium mallee	Second successive crop after non-legume pasture on old land
89. Tammin	Deep yellow-grey sand	Second successive crop after legume pasture
90. Wongan Hills	Wongan yellow loamy sand	Second successive crop after legume pasture
91. Bakers Hill	Gravelly loamy sand over gravel at shallow depth	First crop on new land - non-fallow
92. Condingup	Sand over gravelly clay at 60 cm	First crop on new land - fallow
93. Condingup	Sand over gravel over clay at 15-45 cm	First crop on new land - fallow
94. Duranillin	Yellow-grey gravelly sand over yellow sand with fine gravel at 45 cm over mottled clay at 60 cm	First crop on new land - non-fallow
95. Gibson	Gravelly sand over gravelly clay	First crop after legume pasture
96. Gibson	Grey sand over gravelly clay	Second successive crop after legume pasture
97. Gibson	Grey sand over gravelly clay	Third successive crop after legume pasture
98. Lancelin	Deep yellow sand	Second successive crop on new land
99. Mount Barker	Gravelly loamy sand over gravel	First crop on new land - fallow

Table 1 continued ...

Site	Soil type	Paddock history
100. Wannamal	Gravelly sand over gravel at shallow depth	First crop on new land - non-fallow
101. Williams	Gravelly loamy sand over clay at 45 cm	Third successive crop after legume pasture
102. Circle Valley	Fine sand over yellow-grey clay at 10 cm	Third successive crop after non-legume pasture
103. Circle Valley	Fine sand over yellow-grey clay at 10 cm	Fourth successive crop after non-legume pasture
104. Circle Valley	Fine sand over yellow-grey clay at 10 cm	Fifth successive crop after non-legume pasture
105. Wongan Hills	Wongan yellow sand	Second successive crop after legume pasture
106. Bakers Hill	Gravelly loamy sand	Second successive crop on new land
107. Narrogin	Grey-brown loamy sand over clay	First crop after legume pasture
108. Narrogin	Grey-brown loamy sand over clay	First crop after legume pasture
109. Merredin	Grey-yellow loamy sand with mottling at 22 cm, over clay	Second successive crop after legume pasture
110. Badgingarra	Gravelly sand over gravel at 10-45 cm	Second successive crop after legume pasture
111. Newdegate	Grey-brown sand over gravel	Second successive crop after legume pasture

Table 1 continued ...

Site	Soil type	Paddock history
112. Bencubbin	Grey sand over yellow-grey sand with small gravel	First crop after one year legume pasture on old land
113. Binnu	Deep yellow sand	First crop after non-legume pasture on old land
114. Bruce Rock	Grey sand with some gravel over sandy gravel over yellow-red gravelly clay loam at 20-60 cm	First crop after legume pasture
115. Corrigin	Gravelly sand over clay at about 20 cm	First crop after legume pasture
116. Marchagee	Deep yellow sand	First crop after legume pasture
117. Mingenew	Grey sand over yellow loamy sand at 15 cm	Second successive crop after legume pasture
118. North Lake Grace	Gravelly loamy sand over dense gravel at 10 cm	First crop after non-legume pasture on old land
119. Beverley	Red-brown gritty loamy sand	First crop after legume pasture
120. Beverley	Red-brown clay loam	Second successive crop after legume pasture
121. Cordering	Grey-brown gravelly sandy loam over yellow sandy clay	Second successive crop after legume pasture
122. Gairdner River	Grey sand over gravelly grey-white sand at 20 cm over clay at 30 cm	Second successive crop after legume pasture
123. Gibson	Very gravelly loamy sand over gravel	First crop on new land - fallow

Table 1 continued ...

Site	Soil type	Paddock history
124. Highbury	Grey sand over sandy clay	Second successive crop after legume pasture
125. Jerramungup	Coarse grey sand over clay	Second successive crop after legume pasture
126. Katanning	Grey gravelly loamy sand over gravelly clay	First crop after legume pasture
127. Tunney	Red-brown loamy sand over gritty clay at 10-30 cm	First crop after legume pasture
128. Mount Barker	Brown loamy sand over gravel	Second successive crop after legume pasture
129. Merredin	Yellow-brown loamy sand over yellow loamy sand at 15 cm. Mottling at 45 cm.	First crop after legume pasture
130. Merredin	Red-brown gravelly loamy sand over gravel at 20 cm	Second successive crop after poor legume pasture
131. Salmon Gums	Grey sand over clay	Second successive crop after legume pasture
132. Badgingarra	Grey sand over gravel at 30 cm	Second successive crop after legume pasture
133. Nabawa	Red-brown loamy sand	First crop after legume pasture
134. Nabawa	Red-brown sandy loam	Second successive crop after legume pasture
135. Wongan Hills	Gravelly-loamy sand over gravel at 30 cm	First crop after legume pasture
136. Wongan Hills	Wongan yellow loamy sand	Second successive crop after legume pasture

Table 1 continued ...

Site	Soil type	Paddock history
137. Beverley	Red-brown loamy sand over gritty loamy sand at 25 cm	First crop after legume pasture
138. Gibson	Grey sand over gravelly clay	Second successive crop after legume pasture
139. Mount Barker	Grey gravelly loamy sand over yellow gravelly loamy sand at 5 cm over gravelly clay at 20 cm	First crop after legume pasture
140. Wongan Hills	Wongan yellow loamy sand	Second successive crop after legume pasture
141. Pingelly	Grey gritty sand over yellow gritty sand at 10 cm over yellow mottled sandy clay at 45 cm	Second successive crop after legume pasture
142. Nabawa	Red-brown loam	Second successive crop after legume pasture
143. Gibson	Grey gravelly sand over gravel at 15 cm	Second successive crop after legume pasture
144. Wongan Hills	Wongan yellow loamy sand	Second successive crop after legume pasture
145. Nabawa	Red-brown loamy sand to sandy loam	Second successive crop after legume pasture
146. Merredin	Yellow-brown loamy sand over orange-brown clay	First crop after legume pasture
147. Wongan Hills	Wongan yellow loamy sand	Second successive crop after legume pasture
148. Bramley	Dark grey sand over grey-yellow sand at 10 cm over dark brown sand at 50 cm	First crop after legume pasture

Table 1 continued ...

Site	Soil type	Paddock history
149. Kronkup	Dark grey-black fine sand over yellow-grey fine loamy sand over gravel with some clay at 15-30 cm	First crop after legume pasture
150. West Three Springs	Pale yellow sand over yellow sand at 20 cm	Second successive crop after legume pasture
151. Gibson	Grey gravelly sand over gravel at 15-20 cm	Second successive crop after legume pasture
152. Lancelin	Deep yellow sand	First crop after legume pasture
153. East Wannamal	Yellow-brown gravelly loamy sand over gravelly clay at 10-15 cm	Second successive crop after legume pasture
154. Darkan	Very gravelly yellow-brown loamy sand over clay at 40 cm	First crop after poor legume pasture
155. West York	Grey gravelly loamy sand over sandy gravel at 15 cm	First crop after legume pasture
156. Lowden	Pale yellow to white sand. Gravel at depth.	First crop after legume pasture
157. Bramley	Yellow-brown gravelly sand	First crop after legume pasture
158. Lancelin	Yellow sand	First crop after legume pasture
159. Beverley	Red-brown sandy loam	First crop after legume pasture
160. Merredin	Yellow loamy sand	Second successive crop after legume pasture

Table 1 continued ...

Site	Soil type	Paddock history
161. Newdegate	Grey-yellow loamy sand over orange mottled clay at 25 cm	Second successive crop after legume pasture
162. Kojonup	Grey loamy sand with some gravel over yellow loamy sand at 10 cm over gravel at 40 cm	First crop after legume pasture
163. Winnejup	Brown gravelly loamy sand over yellow-orange loamy gravel at 15 cm over orange-yellow gravelly clay at 50 cm	
164. Gibson	Grey gravelly loamy sand over gravelly clay at 30 cm	First crop after five years capeweed dominant pasture
165. Badgingarra	Very gravelly grey sand	Second successive crop after legume pasture
166. Wongan Hills	Yellow loamy sand over gravel at 25-45 cm	Second successive crop after legume pasture
167. Kojonup	Grey-brown gravelly loamy sand over brown clay at 10-50 cm	
168. West Goomalling	Yellow loamy sand over gravel at 30 cm	Second successive crop after legume pasture
169. Pingaring	Yellow loamy sand over gravel at 55 cm	Second successive crop after legume pasture
170. Pingaring	Very gravelly yellow loamy sand	First crop after legume pasture
171. Gibson	Grey gravelly sand over gravel at 15 cm	Second successive crop after legume pasture

Table 1 continued ...

Site	Soil type	Paddock history
172. Cunderdin	Grey sand over yellow sand at 10 cm over mottled grey clay at 15-90 cm	Second successive crop after poor legume pasture
173. Jingalup	Yellow loamy sand. Mottling or clay at 30 cm.	Third successive crop after legume pasture
174. Goomarin	Yellow gravelly loamy sand over gravel at 25-40 cm	First crop after non-legume pasture
175. Yilliminning	Grey-yellow loamy sand over yellow loamy sand at 15 cm with mottling at 35-50 cm	Second successive crop after good legume pasture
176. Keysbrook	Grey rocky gravelly sand over yellow gravelly loamy sand at 15 cm	Second successive crop after legume pasture
177. Nth Eneabba	Dark grey to dark brown sand over light brown gritty sand at 20 cm over gritty yellow-brown loamy sand at 40 cm	First crop after mediocre legume pasture
178. Perillup	Grey gravelly loam over brown gravelly loam at 20 cm over mottled yellow-brown clay loam at 45 cm	First crop after three years clover pasture
179. Badgingarra	Grey sand over gravel at 35-45 cm	First crop after poor clover on old land
180. Gibson	White-grey gravelly sand over gravel at 50 cm	First crop after grassy clover pasture
181. Lancelin	Deep yellow sand	First crop after clover on old land
182. Badgingarra	Grey sand over white gravelly sand at 35-60 cm	First crop after clover on old land

Table 1 continued ...

Site	Soil type	Paddock history
183. East Belka	Yellow-grey loamy sand over yellow loamy sand. Clay increasing with depth.	Second successive crop on old non-clover land
184. Merredin	Brown loamy sand over yellow loamy sand at 10 cm over gravel at 25-50 cm	Second successive crop on old non-clover land
185. West Narrogin	Grey gravelly sand over gravel at 15-20 cm	Fourth successive crop after clover on old land
186. Toolibin	Light grey-white sand over gravelly grey-white sand at 30 cm over orange gravelly very sandy clay at 50 cm	First crop after one year pasture on old clover land
187. Bullsbrook	Yellow-brown very gravelly sandy loam	First crop on old clover land
188. Bramley	Brown gravelly loam	First crop after a long period of clover on old land
189. Badgingarra	Grey sand over gravel	First crop after clover on old land
190. Gibson	Grey sand over gravelly clay	Second successive crop on old clover land
191. Wongan Hills	Yellow loamy sand	Second successive crop on old clover land
192. South Eneabba	Deep yellow sand	First crop after three years clover pasture on old land
193. Badgingarra	Gray sand over gravel	First crop after clover on old land

Table 1 continued ...

Site	Soil type	Paddock history
194. Nabawa	Brown loamy sand over red to yellow-brown sandy loam at 20 cm	Second successive crop on old clover land
195. Wongan Hills	Yellow loamy sand	Second successive crop on old clover land
196. Newdegate	Grey-yellow sand over gravel at 20-40 cm	Second successive crop on old clover land in 1:1 rotation
197. Gibson	Grey-yellow gravelly sand over gravel at 15-25 cm	Second successive crop on old clover land
198. Jerramungup	Grey loamy sand with some gravel over yellow-brown clay at 12 cm	First crop after clover on old land
199. Gairdner River	Grey sand over gravel at 15 cm	First crop after clover on old land
200. Gairdner River	Grey-yellow gravelly sand over gravel at 15 cm	First crop after clover on old land
201. Kwobrup	Grey sand with some gravel over grey clay at 12-15 cm	First crop after two years clover on old land
202. Kwobrup	Brown-yellow loamy sand with some gravel over yellow clay at 20-25 cm	First crop after clover on old land
203. Woodanilling	Yellow-brown gravelly loamy sand over yellow-orange mottled clay at 20-30 cm	First crop after four years clover on old land
204. Wongan Hills	Yellow loamy sand	Second successive crop on old clover land
205. Wongan Hills	Yellow loamy sand	Second successive crop on old clover land

Table 1 continued ...

Site	Soil type	Paddock history
206. Wickepin	Yellow loamy sand over yellow loamy gravelly sand at 15-25 cm	First crop after clover on old land

Table 2. Details of cereal variety, sowing date, basal fertilizer treatment, rainfall and rainfall zone for trials comparing times of application of nitrogen fertilizers

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
1. Gabo wheat	26/vi/59	Superphosphate 170 kg/ha	316	386	B
2. Gabo wheat	26/vi/59	Superphosphate 170 kg/ha	243	262	B
3. Gabo wheat	1/vii/59	Superphosphate 170 kg/ha	292	306	C
4. Gabo wheat	17/v/60	Copper-zinc superphosphate 240 kg/ha	314	347	B
5. Gabo wheat	13/vi/60	Copper-zinc superphosphate 210 kg/ha	314	347	B
6. Kondut wheat	23/vi/60	Superphosphate 170 kg/ha	514	559	B
7. Insignia wheat Kondut wheat Wongoondy wheat Gabo wheat	8/vi/60 2/vi/60 11/vi/60 11/vi/60	Superphosphate 170 kg/ha	303	262	B
8. Eureka wheat	10/vi/60	-	440	306	C
9. Gabo wheat	?	Superphosphate 200 kg/ha	349	347	B
10. Kondut wheat	?	Copper-zinc superphosphate 200 kg/ha	448	499	B
11. ? wheat	?	Copper-zinc superphosphate 200 kg/ha	428	371	C

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
12. Gabo wheat	?	?	456	263	A
13. Gabo wheat	?	Copper-zinc-molybdenum superphosphate 180 kg/ha	665	499	B
14. Gabo wheat	?	Superphosphate 125 kg/ha	500	347	B
15. Gabo wheat	?	Superphosphate 170 kg/ha	500	347	B
16. Avon oats	15/ v/63 6/vi/63 26/vi/63	?	733	527	C
17. Mengavi wheat	18/ vi/63 9/vii/63 30/vii/63	?	306	329	C
18. Avon oats	11/ v/63 31/ v/63 25/vi/63	?	562	432	C
19. Gabo wheat	?	?	378	267	B
20. Gabo wheat	?	?	378	267	B
21. Gabo wheat	?	?	382	267	C
22. Avon oats	7/ v/63 29/ v/63 18/vi/63	?	731	518	C
23. Gamenya wheat 56 kg/ha	?	Superphosphate 200 kg/ha	355	263	A

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
24. Kondut wheat 50 kg/ha	?	Copper-zinc superphosphate 235 kg/ha	642	499	B
25. Gamenya wheat 22 kg/ha	?	Superphosphate 200 kg/ha	554	305	B
26. Gamenya wheat 53 kg/ha	?	Superphosphate 134 kg/ha	425	347	B
27. Gamenya wheat 53 kg/ha	?	Copper-zinc superphosphate 200 kg/ha	388	334	A
28. Gamenya wheat	?	Copper-zinc superphosphate 200 kg/ha	326	267	B
29. Gamenya wheat 50 kg/ha	?	Copper-zinc superphosphate 170 kg/ha	347	295	B
30. Gamenya wheat 50 kg/ha	?	Superphosphate 125 kg/ha	272	262	B
31. Gamenya wheat 50 kg/ha	?	Superphosphate 170 kg/ha	272	262	B
32. Avon oats	25/ v/64 16/ vi/64 7/vii/64	?	422	329	C
33. Gamenya wheat	11/vi/65	Copper-zinc-molybdenum superphosphate 200 kg/ha	346	263	A

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
34. Gamenya wheat 46 kg/ha	4/vi/65	Copper-zinc-molydenum superphosphate 200 kg/ha	558	305	B
35. Gamenya wheat 56 kg/ha	11/vi/65	Superphosphate 112 kg/ha	439	347	B
36. Gamenya wheat 50 kg/ha	10/vi/65	Superphosphate 146 kg/ha	346	262	B
37. Gamenya wheat 50 kg/ha	10/vi/65	Superphosphate 146 kg/ha	346	262	B
38. Gamenya wheat 50 kg/ha	18/vi/65	Superphosphate 146 kg/ha	346	262	B
39. Falcon wheat 40 kg/ha	14/v/65	Copper-zinc superphosphate 212 kg/ha	364	267	C
40. Falcon wheat 37 kg/ha	13/v/65	Copper-zinc superphosphate 215 kg/ha	272	267	C
41. Gamenya wheat 34 kg/ha	24/v/65	Superphosphate 200 kg/ha	307	267	B
42. Gamenya wheat 34 kg/ha	24/v/65	Copper-zinc superphosphate 200 kg/ha	307	267	B
43. Gamenya wheat	20/v/66	Copper-zinc-molybdenum superphosphate 210 kg/ha	191	263	A

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
44. Gamenya wheat	24/v/66	Copper-zinc-molybdenum superphosphate 205 kg/ha	170	229	A
45. Gamenya wheat	17/v/66	Copper-zinc-molybdenum superphosphate 205 kg/ha	199	229	A
46. Gamenya wheat	14/vi/66	Superphosphate 125 kg/ha	249	347	B
47. Gamenya wheat	2/v/66	Copper-zinc-molybdenum superphosphate 180 kg/ha	305	281	C
48. Falcon wheat	27/v/66	Copper-zinc-molybdenum superphosphate 314 kg/ha	475	525	C
49. Avon oats	17/v/66	Copper-zinc-molybdenum superphosphate 298 kg/ha	382	456	C
50. Gamenya wheat	15/vi/66	Superphosphate 150 kg/ha	262	262	B
51. Gamenya wheat	25/v/67	Copper-zinc-molybdenum superphosphate 194 kg/ha	227	263	A
52. Gamenya wheat	24/v/67	Copper-zinc-molybdenum superphosphate 205 kg/ha	226	229	A

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
53. Gamenya wheat	23/v/67	Copper-zinc-molybdenum superphosphate 205 kg/ha	226	229	A
54. Gamenya wheat	24/v/67	Superphosphate 202 kg/ha	226	229	A
55. Gamenya wheat	25/v/67	Copper-zinc-molybdenum superphosphate 205 kg/ha	226	229	A
56. Gamenya wheat	22/vi/67	Copper-zinc-molybdenum superphosphate 270 kg/ha	583	499	B
57. Gamenya wheat	25/v/67	Superphosphate 202 kg/ha	178	254	B
58. Gamenya wheat	?	Copper-zinc-molybdenum superphosphate 171 kg/ha	267	266	B
59. Gamenya wheat	10/vi/67	Superphosphate 110 kg/ha	375	347	B
60. Gamenya wheat	5/vi/67	Superphosphate 134 kg/ha	363	306	C
61. Falcon wheat	14/v/67	Copper-zinc-molybdenum superphosphate 302 kg/ha	557	575	C

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
62. Gamenya wheat	8/vi/67	Copper-zinc-molybdenum superphosphate 250 kg/ha	298	510	C
63. Gamenya wheat	7/vii/67	Superphosphate 207 kg/ha	298	329	C
64. Gamenya wheat	5/v/67	Copper-zinc-molybdenum superphosphate 202 kg/ha	313	281	C
65. Gamenya wheat	8/v/67	Copper-zinc-molybdenum superphosphate	724	665	C
66. Avon oats	7/vi/67	Copper-zinc-molybdenum superphosphate 290 kg/ha	492	456	C
67. Gamenya wheat	30/v/68	Superphosphate 200 kg/ha	234	259	A
68. Gamenya wheat	30/v/68	Superphosphate 200 kg/ha	234	259	A
69. Gamenya wheat	30/v/68	Superphosphate 200 kg/ha	234	259	A
70. Gamenya wheat	1/v/68	Copper-zinc-molybdenum superphosphate 200 kg/ha	226	229	A
71. Gamenya wheat	25/v/68	Copper-zinc-molybdenum superphosphate 200 kg/ha	272	229	A

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
72. Gamenya wheat	1/vi/68	Superphosphate 200 kg/ha	278	254	B
73. Falcon wheat	23/v/68	Copper-zinc-molybdenum superphosphate 184 kg/ha	373	281	C
74. Gamenya wheat	8/vii/68	Superphosphate 125 kg/ha	408	347	B
75. Gamenya wheat	6/vi/68	Superphosphate 168 kg/ha	261	253	B
76. Gamenya wheat	12/vi/68	Copper-zinc-molybdenum superphosphate 250 kg/ha	690	510	C
77. Gamenya wheat	12/vii/68	Superphosphate 202 kg/ha	528	329	C
78. Swan oats	12/vii/68	Superphosphate 202 kg/ha	528	329	C
79. Gamenya wheat	7/vi/68	Superphosphate 218 kg/ha	280	258	C
80. Swan oats	14/v/68	Copper-zinc molybdenum superphosphate 314 kg/ha	476	456	C
81. Falcon wheat	10/v/68	Copper-zinc molybdenum superphosphate 302 kg/ha	425	446	C

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
82. Gamenya wheat	19/vi/69	Superphosphate 200 kg/ha	178	259	A
83. Gamenya wheat	19/vi/69	Superphosphate 200 kg/ha	178	259	A
84. Gamenya wheat	19/vi/69	Superphosphate 200 kg/ha	178	259	A
85. Kondut wheat	28/v/69	Copper-zinc molybdenum superphosphate 250 kg/ha	199	499	B
86. Kondut wheat	19/ v/69 9/vi/69	Superphosphate 224 kg/ha	199	499	B
87. Kondut wheat	21/v/69	Copper-zinc superphosphate 250 kg/ha	238	534	B
88. Gamenya wheat	27/vi/69		172	266	B
89. Gamenya wheat	10/vi/69		121	280	B
90. Gamenya wheat	26/ vi/69 9/vii/69	Superphosphate 224 kg/ha	182	262	B
91. Dampier barley	15/v/69	Copper-zinc superphosphate 400 kg/ha	420	527	C
92. Gamenya wheat	27/v/69	Copper zinc molybdenum superphosphate 250 kg/ha	402	510	C

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
93. Gamenya wheat	26/v/69	Copper zinc superphosphate 390 kg/ha	402	510	C
94. Dampier barley	5/vii/69	Copper zinc superphosphate 575 kg/ha	354	479	C
95. Gamenya wheat	25/vii/69	Copper zinc molybdenum superphosphate 200 kg/ha	230	329	C
96. Gamenya wheat	25/vii/69	Superphosphate 200 kg/ha	230	329	C'
97. Gamenya wheat	25/vii/69	Superphosphate 200 kg/ha	230	329	C
98. Dampier barley	29/v/69	Copper zinc Superphosphate 215 kg/ha	404	665	C
99. Dampier barley	30/vi/69	Copper zinc molybdenum manganese superphosphate 410 kg/ha	438	543	C
100. Darkan wheat	15/v/69	Copper zinc superphosphate 410 kg/ha	261	518	C
101. Dampier barley	3/vi/69	Copper zinc superphosphate 206 kg/ha	234	453	C
102. Gamut wheat	28/v/70	Superphosphate 200 kg/ha	173	259	A

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
103. Gamut wheat	28/v/70	Superphosphate 200 kg/ha	173	259	A
104. Gamnut wheat	28/v/70	Superphosphate 200 kg/ha	173	259	A
105. Gamenya wheat	8/vi/70	Superphosphate 168 kg/ha	260	262	B
106. Bussell barley	12/v/70	Copper zinc superphosphate 350 kg/ha	472	527	C
107. Bussell barley	25/v/70		459	409	C
108. Bussell barley	25/v/70		459	409	C
109. Gamenya wheat	8/vi/71	Superphosphate 190 kg/ha	140	214	A
110. Gamenya wheat	8/vi/71	Superphosphate 168 kg/ha	395	499	B
111. Gamenya wheat	14/vi/71	Superphosphate 175 kg/ha	202	264	B
112. Clipper barley	19/vi/72	Superphosphate 168 kg/ha	243	216	A
113. Clipper barley	6/vi/72	Superphosphate 169 kg/ha	332	284	A
114. Clipper barley	16/vi/72	Superphosphate 168 kg/ha	172	239	B
115. Clipper barley	21/vi/72	Superphosphate 174 kg/ha	349	284	B

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
116. Clipper barley	14/vi/72	Superphosphate 168 kg/ha	311	316	B
117. Clipper barley	28/vi/72	Superphosphate 169 kg/ha	329	345	B
118. Clipper barley	13/vi/72	Copper zinc molybdenum superphosphate 164 kg/ha	183	251	B
119. Clipper barley	28/vi/72	Superphosphate 100 kg/ha	218	306	C
120. Clipper barley	28/vi/72	Superphosphate 100 kg/ha	218	306	C
121. Clipper barley	31/v/72	Manganese superphosphate 195 kg/ha	411	564	C
122. Clipper barley	3/vii/72	Superphosphate 172 kg/ha	189	323	C
123. Clipper barley	14/vi/72	Copper zinc superphosphate 302 kg/ha	324	329	C
124. Clipper barley	14/vi/72	Superphosphate 174 kg/ha	229	343	C
125. Clipper barley	27/vi/72	Superphosphate 170 kg/ha	183	263	C
126. Clipper barley	20/vi/72	Superphosphate 157 kg/ha	184	373	C

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
127. Clipper barley	16/vi/72	Superphosphate 174 kg/ha	231	344	C
128. Darken wheat Clipper barley	19/vi/72	Superphosphate 135 kg/ha	415	543	C
129. Clipper barley	20/vi/73	Superphosphate 157 kg/ha	269	214	A
130. Clipper barley	19/vi/73	Superphosphate 157 kg/ha	269	214	A
131. Clipper barley	7/vi/73	Superphosphate 100 kg/ha	261	204	A
132. Clipper barley	7/vi/73	Superphosphate 120 kg/ha	652	499	B
133. Clipper barley	19/vi/73	Superphosphate 96 kg/ha	406	386	B
134. Clipper barley	19/vi/73	Superphosphate 96 kg/ha	406	386	B
135. Clipper barley	26/vi/73	Superphosphate 124 kg/ha	315	262	B
136. Clipper barley	21/vi/73	Superphosphate 124 kg/ha	315	262	B
137. Clipper barley	20/vi/73	Superphosphate 100 kg/ha	354	306	C
138. Clipper barley	11/vii/73	Superphosphate 100 kg/ha	362	329	C

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
139. Clipper barley	24/v/73	Superphosphate 101 kg/ha	528	543	C
140. Gamenya wheat	24/vi/73	Superphosphate 124 kg/ha	315	262	B
141. Gamenya wheat	1/vi/73	Superphosphate 126 kg/ha	450	367	C
142. Gamenya wheat	11/vi/74 25/vi/74	Superphosphate 130 kg/ha	534	386	B
143. Gamenya wheat	7/vi/74 21/vi/74	Superphosphate 130 kg/ha	282	329	C
144. Clipper barley	12/vi/74	Superphosphate 105 kg/ha	394	262	B
145. Gamenya wheat	12/vi/75	Superphosphate 118 kg/ha	387	386	B
146. Gamenya wheat	26/vi/75	Superphosphate 122 kg/ha	244	214	A
147. Gamenya wheat	10/vi/75	Superphosphate 120 kg/ha	267	262	B
148. Swan oats	21/vi/77		797	951	D
149. West oats	20/vi/77		893	850	D
150. Gamenya wheat	15/vi/78	Superphosphate 155 kg/ha	475	453	B

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
151. Madden wheat	7/vii/78	Superphosphate 120 kg/ha	362	329	C
152. Gamenya wheat	12/vi/78	Copper zinc molybdenum superphosphate 153 kg/ha	590	665	C
153. West oats	12/vi/78	Manganese superphosphate 168 kg/ha	265	444	C
154. Egret wheat	9/vi/78	Manganese superphosphate 178 kg/ha	457	475	C
155. Clipper barley	21/vi/78	Manganese superphosphate 178 kg/ha	389	515	C
156. West oats	15/vi/78	Superphosphate 200 kg/ha	764	853	D
157. West oats	15/vii/78	Superphosphate 200 kg/ha		951	D
158. Gamenya wheat	6/vi/79	Copper zinc superphosphate 183 kg/ha + Muriate of potash 105 kg/ha	494	665	C
159. Gamenya wheat	13/vi/79	Superphosphate 100 kg/ha	224	306	C
160. Gamenya wheat	14/vi/79	Superphosphate 101 kg/ha	202	214	A

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
161. Gamenya wheat	11/vi/79	Superphosphate 100 kg/ha	206	264	B
162. Egret wheat Tincurrin wheat	25/vi/79	Superphosphate 180 kg/ha	306	426	C
163. West oats	5/vi/79	Manganese superphosphate 178 kg/ha			C
164. Egret wheat	26/vi/79	Superphosphate 100 kg/ha	284	329	C
165. Miling wheat	6/vi/80	Superphosphate 158 kg/ha	449	499	B
166. Gamenya wheat	18/vi/80	Superphosphate 123 kg/ha	207	262	B
167. Egret wheat	12/vi/80	Copper zinc Superphosphate 240 kg/ha	396	426	C
168. Gamenya wheat	13/vi/80	Superphosphate 150 kg/ha	246	362	B
169. Halberd wheat	11/vi/81	Superphosphate 112 kg/ha	219	244	B
170. Halberd wheat	11/vi/81	Superphosphate 143 kg/ha	219	244	B
171. Egret wheat	8/vii/81	Superphosphate 102 kg/ha	309	329	C
172. Miling wheat	7/vi/81	Superphosphate 150 kg/ha	299	276	B

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
173. Egret wheat	15/vi/81	Superphosphate 147 kg/ha	276	422	C
174. Gamenya wheat	6/vi/81	Copper zinc molybdenum superphosphate 153 kg/ha	201	206	A
175. Egret wheat	26/vi/81	Superphosphate 151 kg/ha	283	335	C
176. West oats	22/ v/81 19/vi/81	Superphosphate 208 kg/ha + Muriate of potash 68 kg/ha	776	880	D
177. Miling wheat	24/vi/82	Superphosphate 90 kg/ha	395	470	B
178. Forrest barley	24/vi/82	Superphosphate 153 kg/ha	373	482	C
179. Miling wheat	14/vi/82	Superphosphate 130 kg/ha	450	499	B
180. Egret wheat	18/vi/82	Superphosphate 120 kg/ha	338	329	C
181. Gamenya wheat	15/vi/82	Copper zinc superphosphate 190 kg/ha	540	665	C
182. Miling wheat	16/vi/82	Superphosphate 130 kg/ha	450	499	B
183. Gamenya wheat	10/vi/82	Superphosphate 153 kg/ha	209	234	A

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
184. Gamenya wheat	24/vi/82	Superphosphate 120 kg/ha	197	214	A
185. Gamenya wheat	21/vi/82	Superphosphate 150 kg/ha	304	428	C
186. Gamenya wheat	15/vi/82	Superphosphate 290 kg/ha top dressed			C
187. West oats	17/v/82 14/vi/82	Superphosphate 180 kg/ha + Muriate of potash 50 kg/ha	532	588	D
188. Moore oats	15/ vi/82 13/ vii/82 23/viii/82	Superphosphate 150 kg/ha	887	929	D
189. Miling wheat	27/vi/83	Superphosphate 89 kg/ha	563	499	B
190. Miling wheat	14/vi/83	Superphosphate 92 kg/ha	189	329	C
191. Eradu wheat	20/vi/83	Superphosphate 90 kg/ha	332	262	B
192. Canna wheat	4/vi/84	Superphosphate 150 kg/ha	416	534	B
193. Canna wheat	5/vi/84	Copper zinc superphosphate 260 kg/ha	477	499	B
194. Eradu wheat	25/vi/85	Superphosphate 70 kg/ha	295	386	B

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
195. Eradu wheat	19/vi/85	Superphosphate 110 kg/ha	260	262	B
196. Gutha wheat	10/vii/85	Superphosphate 120 kg/ha	198	264	B
197. Aroona wheat	20/vi/85	Superphosphate 145 kg/ha	345	329	C
198. Egret wheat	29/v/86	Superphosphate 100 kg/ha	333	267	C
199. Aroona wheat	5/vi/86	Superphosphate 100 kg/ha	386	315	C
200. Kite wheat	2/vi/86	Superphosphate 200 kg/ha	386	315	C
201. Aroona wheat	4/vi/86	Copper zinc molybdenum superphosphate 100 kg/ha	202	310	C
202. Spear wheat	24/v/86	Copper zinc molybdenum superphosphate 100 kg/ha	202	310	C
203. Cranbrook wheat	17/vi/86	Copper zinc molybdenum superphosphate	257	359	C
204. Eradu wheat	29/v/88	Superphosphate 50 kg/ha	351	262	B
205. Reeves wheat	29/v/90	Superphosphate 120 kg/ha	268	262	B

Table 2 continued ...

Cereal variety and site number	Sowing date	Basal fertilizer treatment	Rainfall (May-October) Trial year (mm)	Rainfall (May-October) Long-term average (mm)	Rainfall zone[A]
206. Corrigin wheat	17/v/90	Double superphosphate 70 kg/ha	267	319	C

[A] From Mason (1986).

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Appendix Table 1. Effect of time of application of nitrogen fertilizer on wheat yield at Nabawa, Wongan Hills and Beverley (sites 1-3) in 1959

Time of application	Rate of ammonium sulphate (kg/ha)	Wheat yield (t/ha) Nabawa (1)	Wongan Hills (2)	Beverley (3)
All in June	27	2.54	2.38	2.55
	54	2.62	2.50	2.34
	108	2.57	2.51	2.22
	213	2.51	2.60	2.15
	427	2.49	2.44	2.30
	1,707	2.11	2.26	2.51
All in August	27	2.68	2.49	2.30
	54	2.38	2.46	2.10
	108	2.65	2.88	2.25
	213	2.68	2.93	2.39
	427	2.71	2.86	2.34
	1,707	2.49	2.91	2.27
Half in June and Half in August	27	2.82		2.32
	54	2.59		2.34
	108	2.71		2.47
	213	2.79		2.57
	427	2.49		2.59
	1,707	2.19		2.30
	Nil	2.61	2.42	2.14

Appendix Table 2. Effect of time of application of nitrogen fertilizers on wheat yield at five sites (4-8) in 1960

Time of application	Rate of ammonium sulphate (kg/ha)	Mingenew (site 4)	Mingenew (site 5)	Dandaragan (site 6)	Wongan Hills (site 7)	Fleming Grove (site 8)
At sowing	61	1.01	1.62	0.71		0.85
	123	1.31	1.83	0.77	1.69	1.11
	184					1.25
	245	1.54	2.03	0.74	1.90	
	491				2.20	
Four weeks after sowing	61		1.61			
	123		1.84			
	245		2.00			
Seven weeks after sowing	61			0.66		0.79
	123			0.72	1.40	0.81
	184					0.97
	245			0.54	1.48	
	491				1.85	
Eight weeks after sowing	61	0.97				
	123	1.19				
	245	1.34				
	Nil	0.67	1.43	0.62	1.65	0.54

Appendix Table 3. Effect of time of application of nitrogen fertilizer on wheat yield at three sites (9-11) in 1962

Time of application	Rate of ammonium sulphate (kg/ha)	Wheat yield (t/ha) Mingenew (site 9)	Badgingarra (site 10)	Popanyinning (site 11)
At sowing	63	0.71	1.19	1.28
	125	0.89	1.27	1.22
	188		1.36	1.45
	251	1.24	1.41	1.57
Two weeks after sowing	63		1.26	1.20
	125		1.32	1.22
	188		1.35	1.55
	251		1.36	1.55
Four weeks after sowing	63		1.26	1.19
	125		1.29	1.32
	188		1.34	1.55
	251		1.31	1.40
Six weeks after sowing	63	0.83		
	125	1.16		
	251	1.24		
Eight weeks after sowing	63		1.28	1.25
	125		1.26	1.28
	188		1.35	1.24
	251		1.35	1.50
	Nil	0.50	1.12	1.09

Appendix Table 4. Effect of time of application of nitrogen fertilizer on wheat yield at five sites (12, 13, 19-21) in 1963

Time of application	Rate of urea (kg/ha)	Wheat yield (t/ha) Pithara (site 12)	Badgingarra (site 13)	Pingrup (site 19)	Pingrup (site 20)	Toompup (site 21)
At sowing	28	2.14	0.65	0.42	1.63	1.28
	56	1.94	0.60	0.40	1.57	0.96
	84	2.24	0.67	0.60	1.55	0.56
	112	2.22	0.67	0.81	1.57	1.34
	140	2.39	0.71	0.76	1.79	1.28
	168	2.41	0.74	0.89	1.75	1.32
Two weeks after sowing	28	1.83	0.54	0.42	1.34	0.62
	56	2.20	0.60	0.49	1.34	0.94
	84	2.33	0.62	0.76	1.48	1.20
	112	2.39	0.73	0.79	1.41	0.79
	140	2.49	0.66	1.19	1.68	0.79
	168	2.39	0.85	0.83	1.63	0.94
Four weeks after sowing	28	2.11	0.69	0.62	1.46	0.96
	56	2.16	0.73	0.56	1.50	0.96
	84	2.18	0.69	0.74	1.66	1.03
	112	2.24	0.63	1.03	1.77	0.99
	140	1.87	0.73	1.03	1.57	0.89
	168	2.37	0.74	0.99	1.59	1.32
Six weeks after sowing	28	1.90	0.49	0.32	0.94	1.01
	56	1.94	0.69	0.56	1.50	0.92
	84	2.39	0.73	0.72	1.50	1.08
	112	2.52	0.80	0.67	1.30	0.99
	140	2.43	0.81	0.85	1.55	0.65
	168	2.33		0.85	1.81	1.16
Eight weeks after sowing	28	1.81	0.62	0.49	1.34	1.16
	56	1.96	0.71	0.40	1.30	0.85
	84	2.47	0.85	0.56	1.50	0.89
	112	2.30	0.81	0.54	1.57	1.14
	140	2.26	0.80	0.62	1.63	1.10
	168	2.30		0.42	1.66	1.14
Ten weeks after sowing	28	1.94	0.69	0.47	1.36	0.65
	56	1.96	0.79	0.58	1.50	0.96
	84	1.81	0.80	0.25	1.36	0.94
	112	2.07	0.79	0.72	1.59	0.87
	140	1.94	0.80	0.62	1.59	1.12
	168	1.96	0.88	0.65	1.48	0.29
	Nil	1.83	0.51	0.33	1.28	0.73

Appendix Table 5. Effect of time of application of nitrogen fertilizer on oat or wheat yields at different sowing times at four sites (16-18, 22) in 1963

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Bakers Hill (site 16)#	Gibson (site 17)##	Muradup (site 18)#	Warnamal (site 22)#
		Sown 15/5	Sown 18/6	Sown 11/5	Sown 7/5
At sowing	56	1.05	2.92	2.03	1.55
	112	1.32	2.86	2.17	1.77
Three weeks after sowing	56	1.03	2.57	1.94	1.56
	112	1.51	2.69	2.25	1.69
	Nil	0.69	2.53	1.78	1.17
		Sown 6/6	Sown 9/7	Sown 31/5	Sown 29/5
At sowing	56	0.87	2.26	1.41	1.12
	112	1.08	2.47	1.54	1.57
Three weeks after sowing	56	0.99	2.14	1.29	1.20
	112	1.24	2.35	1.43	1.25
	Nil	0.50	2.44	1.18	0.83
		Sown 26/6	Sown 30/7	Sown 25/6	Sown 18/6
At sowing	56	0.56	2.04	0.70	0.87
	112	0.90	2.02	0.95	1.44
Three weeks after sowing	56	0.81	1.91	0.69	1.13
	112	0.71	2.18	0.83	1.53
	Nil	0.19	1.67	0.60	0.60

\# Oats.
Wheat.

Appendix Table 6. Effect of time of application of nitrogen fertilizers on wheat yields at four sites (15, 24, 30, 31) in 1963 and 1964

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Mingenew (site 15)	Badgingarra (site 24)	Wongan Hills (site 30)	Wongan Hills (site 31)
At sowing	28		0.63		1.73
	56		0.86	3.27	1.82
	112		0.87	3.90	2.01
	168			4.12	1.96
	224		1.03	4.25	
	448			3.90	
Three weeks after sowing	28				1.54
	56				1.87
	112				2.28
	168				2.61
Four weeks after sowing	28	0.40	0.63		
	56	0.56	0.74	3.13	
	112	0.77	0.72	3.80	
	168			3.80	
	224		0.53	3.85	
	448			3.98	
Eight weeks after sowing	28	0.52			
	56	0.66			
	112	0.85			
	Nil	0.22	0.51	3.27	1.34
Analysis of variance	N				***
	Times				n.s.
	N x T				n.s.

n.s. Not significant.
*** $P < 0.001$.

Appendix Table 7. Effect of time of application of nitrogen fertilizers on wheat yields at four sites (23, 25, 27, 28) in 1964

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Canna (site 23)	Eradu (site 25)	Ogilvie (site 27)	Pingrup (site 28)
At sowing	37	0.94	0.19	1.36	1.14
	75	1.08	0.35	1.64	1.16
	112	1.33	0.50	2.02	
2½ weeks after sowing	37	0.87	0.42	1.49	0.93
	75	0.99		1.55	1.09
	112	0.96	0.58	1.73	1.30
Five weeks after sowing	37	0.92	0.31	0.99	1.02
	75	0.92	0.46	1.79	1.11
	112	0.92	0.66	1.76	1.20
7½ weeks after sowing	37	0.77	0.31	1.42	0.97
	75	0.87	0.42	1.73	1.18
	112	0.71	0.46	1.82	0.72
Ten weeks after sowing	37	0.69		1.34	0.99
	75	0.74	0.46	1.65	1.02
	112	0.56	0.31	1.49	1.23
12½ weeks after sowing	37	0.56	0.04	1.02	0.99
	75	0.58	0.23	1.27	1.02
	112	0.62	0.35	1.36	1.04
	Nil	0.68	0.11	0.99	0.77

Appendix Table 8. Effect of time of application of nitrogen fertilizer on wheat yields at Mingenew in six seasons (sites 14, 26, 35, 46, 59, 74)

Time of application	Rate of urea# equivalent (kg/ha)	Grain yield (t/ha) 1963	1964	1965	1966	1967	1968
At sowing	28	0.64					
	34						1.08
	56	0.64					
	67						1.06
	112	1.08	1.00	1.67	0.94	1.91	
	123						1.23
	168	1.18	1.12	2.20	1.18	2.08	
	190						0.96
	224		1.24	2.39	1.20	1.94	
	280		1.18	2.25			
	336				1.29	1.75	
Three weeks after sowing	28	0.67					
	34						0.89
	56	1.00					
	67						1.10
	112	1.40	1.14	1.44	0.85	1.83	
	123						1.10
	168	1.58	1.38	1.85	0.89	1.87	
	190						1.34
	224		1.52	2.09	0.99	1.99	
	280		1.59	2.23			
	336				1.13	1.95	
	Nil	0.49	0.46	0.52	0.66	1.28	0.73
Analysis of variance	N Rate		**	***	***	***	*
	Time		***	*	***	n.s.	n.s.
	N x T						

n.s. Not significant.
* $P < 0.05$.
*** $P < 0.01$.
\# Ammonium sulphate in 1963 and 1964.

Appendix Table 9. Effect of time of application of nitrogen fertilizers on wheat and oat yields at four sites in 1964, 1965 and 1966 (sites 29, 41, 42, 49)

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Wamenusking (site 29)	Pingrup (site 41)	Pingrup (site 42)	West Toodyay# (site 49)
At sowing	28				
	37		0.69	1.40	
	56	1.05			1.34
	74		0.66	1.87	
	84	1.33			1.63
	112	0.91	1.23	1.85	1.55
	140	1.26			
	168	1.51			
Two weeks after sowing	28	0.63			
	37		0.63		
	56				1.44
	74		0.91	1.67	
	84				1.41
	112	1.33	1.22	1.73	1.31
	140	1.22			
	168	1.61			1.31
Four weeks after sowing	28				
	37		0.64	1.41	
	56				1.36
	74		0.82		
	84	0.95			1.39
	112	0.87	1.23	1.79	1.63
	140	1.22			
	168	1.47			1.65
Six weeks after sowing	28	0.95			
	37		0.89	1.44	
	56	1.30			1.23
	74		0.75	1.69	
	84	1.30			1.55
	112	1.51	1.30		
	140	1.13			
	168	1.57			1.46
Eight weeks after sowing	28	0.73			
	37		0.74	1.42	
	56	0.77			1.71
	74		0.87	1.62	
	84				1.49
	112	1.05	1.00	1.62	1.79
	140	1.22			
	168	1.30			1.68

Appendix Table 9 continued ...

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Wamenusking (site 29)	Pingrup (site 41)	Pingrup (site 42)	West Toodyay# (site 49)
Ten weeks after sowing	28				
	37		0.53	1.43	
	56				1.57
	74		0.76	1.56	
	84	1.05			1.87
	112	0.70	0.96	1.72	1.90
	140	1.26			
	168	1.30			1.73
Twelve weeks after sowing	56				1.79
	84				1.31
	112				1.68
	168				1.73
	Nil	0.41	0.57	1.22	1.19

Oats.

Appendix Table 10. Effect of time of application on nitrogen fertilizer on oats at Gibson (site 32) in 1964

Sowing date	Time of application	Rate of urea (kg/ha)	Grain yield (kg/ha)
25/5	At sowing	56	1.99
		112	2.14
	Three weeks after sowing	56	2.04
		112	2.24
		Nil	1.89
16/6	At sowing	56	2.19
		112	2.34
	Three weeks after sowing	56	2.29
		112	2.24
		Nil	1.69
7/7	At sowing	56	1.99
		112	2.14
	Three weeks after sowing	56	1.89
		112	2.19
		Nil	1.74

Appendix Table 11. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (33, 34, 43) in 1965 or 1966

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Canna (site 33)	Eradu (site 34)	Canna (site 43)
At sowing	37	1.88	0.24	1.31
	75	2.27	0.26	1.46
	112	2.38	0.30	1.65
2½ weeks after sowing	37	1.78	0.42	1.23
	75	1.78	0.62	1.29
	112	2.29	0.59	1.50
Five weeks after sowing	37	1.84	0.36	1.25
	75	1.40	0.46	1.16
	112	2.10	0.61	1.38
7½ weeks after sowing	37	1.75	0.40	1.20
	75	1.88	0.45	1.29
	112	1.94	-	1.24
Ten weeks after sowing	37	1.37	0.44	1.02
	75	1.45	0.59	1.07
	112	1.45	0.48	1.03
12½ weeks after sowing	37	1.59	0.22	1.04
	75	1.35	0.26	0.98
	112	1.41	0.44	1.03
	Nil	1.43	0.16	0.99
l.s.d. $p < 0.05$				0.26

Appendix Table 12. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (36, 37, 38) in 1965

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Wongan Hills (site 36)	Wongan Hills (site 37)	Wongan Hills (site 38)
At sowing	57	1.08	0.86	3.57
	102	1.47	1.14	3.57
	133	1.75	1.35	3.34
Two weeks after sowing	57			3.43
	102			3.38
	133			3.50
Three weeks after sowing	57	1.10	1.26	
	102	1.38	1.08	
	133	1.59	1.33	
Four weeks after sowing	57			3.36
	102			3.50
	133			3.50
	Nil	0.60	0.85	3.08
l.s.d. $p < 0.05$		0.36		

Appendix Table 13. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (39, 40, 48) in 1965 or 1966

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Jerramungup (site 39)	North Chillinup (site 40)	Boyup Brook (site 48)
At sowing	45	1.16		
	56		1.57	1.30
	84			1.85
	90	1.14		
	112		1.82	1.97
	134	1.39		
	168			2.47
	224	1.34		
Three weeks after sowing	45	1.02		
	56		1.63	1.28
	84			1.54
	90	1.31		
	112		1.98	
	134	1.20		
	168			1.97
	224	1.14		
Six weeks after sowing	45			
	56		1.63	1.51
	84			1.45
	90	1.13		
	112		1.96	
	134	0.99		
	168			2.35
	224			
Nine weeks after sowing	45			
	56		1.49	
	84			
	90	0.93		
	112		1.94	1.65
	134	1.18		
	168			2.03
	224	1.09		
Twelve weeks after sowing	45	1.01		
	56		1.59	1.13
	84			
	90	0.95		
	112		1.53	
	134	0.87		
	168			
	224	1.14		
	Nil	0.80	1.10	0.73

Appendix Table 14. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (44, 45, 60) in 1966 or 1967

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Kalannie (site 44)	Kirwan (site 45)	Beverley (site 60)
At sowing	28	1.44	0.71	1.96
	56	1.71	0.91	2.09
	84	1.73	1.01	1.96
	112	1.90	0.97	2.20
	168			2.22
Four weeks after sowing	28	1.51	0.60	1.90
	56	1.77	0.91	2.03
	84	1.74	0.94	2.16
	112	1.98	0.91	2.11
	168			2.24
Seven weeks after sowing	28	1.71	0.67	
	56	1.66	0.77	
	84	1.84	0.87	
	112	2.07	0.71	
	168			
Ten weeks after sowing	28	1.16	0.60	
	56	1.50	0.67	
	84	1.55	0.81	
	112	1.61	0.87	
	168			
	Nil	1.23	0.53	1.60
l.s.d. $p < 0.05$				0.18

Appendix Table 15. *Effect of time of application of nitrogen fertilizer on wheat yields at four sites (47, 57, 61, 64) in 1966 or 1967*

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Harrismith (site 47)	Grass Patch (site 57)	Boyup Brook (site 61)	Harrismith (site 64)
At sowing	28	0.70	0.82		0.65
	56	0.74	1.21	1.13	0.55
	84	0.65	1.24	1.46	0.98
	112	0.87	1.30	1.49	0.85
	168			1.72	
2½ weeks after sowing	28	0.73	0.98		0.67
	56	0.70	1.26	1.46	0.75
	84	0.73	1.40	1.49	0.79
	112	0.76	1.62	1.63	0.79
	168			1.69	
Five weeks after sowing	28	0.79	0.66		
	56	0.79	1.03	1.26	0.81
	84	0.77	1.30	1.46	0.66
	112	0.53	1.32	1.32	
	168			1.63	
7½ weeks after sowing	28	0.83	0.87		0.76
	56	0.76	1.21	1.16	
	84	0.83	1.16	1.13	0.65
	112	0.71	1.46	1.49	0.92
	168				
Ten weeks after sowing	28	0.69	0.94		0.82
	56	0.73	0.94	1.03	0.77
	84	0.69	1.18	1.36	1.03
	112	0.79	1.19	1.32	0.92
	168			1.29	
	Nil	0.64	0.59	0.93	0.64

Appendix Table 16. Effect of time of application of nitrogen fertilizer on wheat yields at four sites (50, 56, 75, 79) in 1966, 1967 or 1968

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Wongan Hills (site 50)	Badgingarra (site 56)	Nth Lake Grace (site 75)	Moulyinning (site 79)
At sowing	57	1.51	0.99	0.69	1.18
	102	1.68	0.84	0.93	1.37
	133	1.81	1.00	1.14	1.28
Three weeks after sowing	57	1.22	0.85	0.62	1.15
	102	1.39	1.04	0.75	1.23
	133	1.30	0.87	1.00	1.30
	Nil	1.30	0.78	0.28	0.60
l.s.d. $p < 0.05$		0.29		0.19	0.28

Appendix Table 17. Effect of time of application of nitrogen fertilizer on wheat or oats yields at three sites (51, 66, 80) in 1967 or 1968

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Ajana (site 51)	West Toodyay (site 66 - oats)	West Toodyay (site 80 - oats)
At sowing	28	1.46		
	56	1.59	0.43	1.48
	84	1.70	0.64	1.65
	112	1.92	0.85	2.11
	168	1.99	0.96	
Two weeks after sowing	28	1.01		
	56	1.26	0.50	1.46
	84	1.50	1.03	1.48
	112	1.57	1.03	1.59
	168	1.76	1.14	2.02
Four weeks after sowing	28			
	56		0.60	
	84		0.92	1.68
	112		0.96	1.74
	168		0.96	1.71
Six weeks after sowing	28			
	56		0.64	1.59
	84		0.71	
	112		0.71	
	168		1.07	1.87
Eight weeks after sowing	28			
	56		0.48	1.62
	84		0.53	
	112		0.55	1.74
	168		0.68	
Ten weeks after sowing	28			
	56		0.34	1.46
	84		0.50	1.71
	112		0.25	
	168		0.50	1.87
Twelve weeks after sowing	28			
	56		0.22	1.55
	84		0.28	1.68
	112		0.06	
	168		0.20	1.76

Appendix Table 17 continued ...

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Ajana (site 51)	West Toodyay (site 66 - oats)	(site 80 - oats)
	Nil	0.78	0.04	1.15
l.s.d. $p < 0.05$		0.15		

Appendix Table 18. Effect of time of application of nitrogen fertilizer on wheat yields at four sites (52, 53, 54, 55) in 1967

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Kalannie (site 52)	Kalannie (site 53)	Kalannie (site 54)	Kirwan (site 55)
At sowing	28	1.13	0.95	1.39	0.61
	56	1.10	1.02	1.01	0.72
	84	1.67	1.40	1.64	0.72
	112	1.57	1.30	1.36	0.62
Three weeks after sowing	28	1.10	0.92	1.36	0.65
	56	1.20	1.02	1.18	0.65
	84	1.57	1.23	1.23	0.69
	112	1.36	1.16	1.20	0.79
Six weeks after sowing	28	1.23	0.72	1.31	0.58
	56	1.23	1.23	1.39	0.58
	84	1.57	1.02	1.18	0.72
	112	1.30	1.13	1.18	0.65
Nine weeks after sowing	28	1.20	0.95	1.07	0.58
	56	1.10	1.23	1.34	0.69
	84	1.33	1.16	1.23	0.65
	112	1.23	1.30	1.15	0.60
	Nil	0.87	0.79	1.18	0.54
l.s.d. $p < 0.05$					

Appendix Table 19. Effect of time of application of nitrogen fertilizer on wheat yields at four sites (58, 67, 68, 69) in 1967 or 1968

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Kulin (site 58)	Circle Valley (site 67)	Circle Valley (site 68)	Circle Valley (site 69)
At sowing	28	0.44	1.76	0.81	0.75
	56	0.62	1.81	0.94	0.87
	84	0.62	1.92	1.15	0.79
	112	0.73	1.89	1.15	0.99
2½ weeks after sowing	28	0.37	1.61	0.83	0.80
	56	0.41	1.90	0.94	0.88
	84	0.66	1.52	1.12	1.02
	112	0.81	1.51	1.18	0.99
Five weeks after sowing	28	0.47	1.59	0.89	0.85
	56	0.51	1.67	0.96	0.93
	84	0.42	1.92	0.94	1.09
	112	0.50	1.44	1.09	1.01
7½ weeks after sowing	28	0.38	1.87	0.91	0.85
	56	0.51	1.79	0.96	1.02
	84	0.44	1.49	1.06	1.01
	112	0.54	1.67	1.17	1.02
Ten weeks after sowing	28	0.32	1.61	0.80	0.87
	56	0.44	1.49	1.04	0.91
	84	0.72	1.87	1.10	1.10
	112	0.58	1.63	0.96	1.23
	Nil	0.34	1.52	0.79	0.64

Appendix Table 20. Effect of time of application of nitrogen fertilizer on wheat yield at Condingup (site 62) in 1967

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha)
At sowing	69	0.91
	105	1.03
	140	0.98
	211	1.05
Three weeks after sowing	69	0.91
	105	1.07
	140	1.30
	211	1.44
Six weeks after sowing	69	0.98
	105	1.19
	140	1.45
	211	1.31
Nine weeks after sowing	69	0.99
	105	1.09
	140	1.26
	211	
Twelve weeks after sowing	69	1.09
	105	1.31
	140	1.40
	211	1.38
	Nil	0.64

Appendix Table 21. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (63, 70, 71) in 1967 or 1968

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Gibson (site 63)	Nth Kalannie (site 70)	Kirwan (site 71)
At sowing	28		0.66	1.14
	56	1.18	0.71	1.20
	84	1.26	0.79	1.20
	112	1.12	0.88	1.28
Three weeks after sowing	28	1.12	0.82	1.06
	56	1.20	0.80	1.20
	84	1.13	1.08	1.22
	112	1.14	0.94	1.09
Six weeks after sowing	28	1.20	0.64	1.01
	56	1.11	0.77	1.17
	84		0.81	1.25
	112	1.09	0.99	1.17
Nine weeks after sowing	28	1.16	0.56	1.08
	56	1.11	0.71	1.23
	84	1.13	0.66	1.20
	112	1.18	0.91	1.20
Twelve weeks after sowing	28			
	56	1.12		
	84	1.09		
	112	0.96		
	Nil	1.18	0.46	0.85

Appendix Table 22. Effect of time of application of nitrogen fertilizer on wheat at Lancelin (site 65) in 1967

Treatment	Grain yield (t/ha)
Nil	0.33
Urea 168 kg/ha - at sowing	0.53
Urea 168 kg/ha - two weeks after sowing	0.77
Urea 168 kg/ha - four weeks after sowing	1.08
Urea 168 kg/ha - six weeks after sowing	0.95
Urea 168 kg/ha - eight weeks after sowing	1.33
l.s.d. $p < 0.05$	0.18

Appendix Table 23. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (72, 73, 83) in 1968 or 1969

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Grass Patch (site 72)	Harrismith (site 73)	Circle Valley (site 83)
At sowing	28	1.81	0.98	0.85
	56	1.98	1.07	0.84
	84	2.24	1.22	1.03
	112	2.22	1.17	0.93
2½ weeks after sowing	28	1.79	0.92	1.10
	56	2.02	1.02	0.94
	84	2.14	1.10	0.97
	112	2.24	1.17	0.96
Five weeks after sowing	28	1.71	0.80	0.92
	56	2.02	1.02	0.84
	84	1.97	0.96	0.86
	112	2.13	1.17	0.91
7½ weeks after sowing	28	1.73	1.03	0.89
	56	1.90	1.32	0.85
	84	2.08	1.05	0.77
	112	2.05	1.27	0.96
Ten weeks after sowing	28	1.67	1.06	0.87
	56	1.67	1.32	0.87
	84	1.81	1.32	0.93
	112	1.92	1.32	0.99
	Nil	1.49	0.86	0.88
l.s.d. $p < 0.05$			0.18	

Appendix Table 24. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (82, 84, 88) in 1969

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Circle Valley (site 82)	Circle Valley (site 84)	Kulin (site 88)
At sowing	28	1.13	0.96	0.62
	56	1.15	1.16	0.79
	84	1.10	1.06	0.70
	112	1.13	1.07	0.90
2½ weeks after sowing	28	1.01	0.90	0.65
	56	1.06	0.99	0.77
	84	1.09	0.99	0.42
	112	1.10	0.98	0.90
Five weeks after sowing	28	1.09	0.97	0.72
	56	1.08	0.97	0.81
	84	1.05	1.01	0.72
	112	1.07	0.95	0.83
7½ weeks after sowing	28	1.06	0.91	0.72
	56	1.05	0.94	0.77
	84	0.97	0.74	0.74
	112	1.03	0.95	0.70
Ten weeks after sowing	28	1.06	0.94	0.57
	56	1.06	0.87	0.72
	84	0.98	0.93	0.57
	112	1.06	1.04	0.37
	Nil	1.03	0.93	0.53

Appendix Table 25. Effect of time of application of nitrogen fertilizer on wheat and oat yields at four sites (76, 77, 78, 81) in 1968

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Condingup (site 76)	Gibson (site 77)	Gibson (site 78 - oats)	Jingalup (site 81)
At sowing	28		2.15	2.02	
	56	1.15	2.25	1.74	1.68
	84	1.38	2.22	1.92	
	112	1.51	2.42	1.85	1.46
	168	1.65			1.85
Three weeks after sowing	28		2.19	1.84	
	56	0.98	2.45	2.07	1.63
	84	1.34	2.49	2.16	
	112	1.46	2.59	2.16	1.71
	168	1.43			2.06
Six weeks after sowing	28		2.20	1.87	
	56	1.22	2.35	2.21	1.59
	84	1.38	2.61	2.12	
	112	1.43	2.08	2.16	1.99
	168	1.34			2.00
Nine weeks after sowing	28		2.45	1.94	
	56	1.12	2.33	2.01	1.99
	84	1.15	2.26	2.02	
	112	1.31	2.20	2.14	1.98
	168	1.38			1.99
Twelve weeks after sowing	28		2.45	1.65	
	56	1.12	2.15	1.88	1.71
	84	1.20	2.02	1.85	
	112	1.22	2.28	1.85	1.76
	168	1.22			2.07
	Nil	0.61	2.27	1.74	1.09

Appendix Table 26. Effect of time of application of nitrogen fertilizer on wheat (W) and barley (B) yields at four sites (85, 98, 99, 101) in 1969

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Badgingarra (site 85 - W)	Lancelin (site 98 - B)	Mount Barker (site 99 - B)	Williams (site 101 - B)
At sowing	76	1.10	0.45	0.93	1.58
	152	1.29	0.64	1.17	1.96
	227	1.23	0.94	1.51	2.41
Three weeks after sowing	76	0.97	0.72	0.91	1.46
	152	1.12	1.01	1.22	1.97
	227	1.20	1.16	1.44	2.35
Six weeks after sowing	76	0.99	0.63	0.86	1.58
	152	1.25	0.85	1.14	1.84
	227	1.12	1.14	1.52	2.18
Nine weeks after sowing	76	0.99	0.87	0.90	1.54
	152	1.12	0.97	1.06	1.86
	227	1.06	0.90	1.38	1.99
Twelve weeks after sowing	76	0.98	0.58	0.64	1.11
	152	0.95	0.59	1.12	1.24
	227	1.06	0.60	1.42	1.28
	Nil	0.85	0.27	0.34	1.02
l.s.d. $p < 0.05$		0.18	0.18	0.23	0.21

Appendix Table 27. Effect of time of application of nitrogen fertilizer on wheat yields at two sites (86, 90) in 1969

Time of application	Rate urea (kg/ha)	Grain yield (t/ha) Badgingarra (site 86)		Wongan Hills (site 90)	
		Sown 19/5	Sown 9/6	Sown 6/6	Sown 9/7
At sowing	56	1.28	1.09	1.97	1.53
	84	1.01	1.12	2.02	1.63
	112	1.32	1.22	1.95	1.67
	168	1.42	1.24	2.20	1.74
	224	1.43	1.10	2.21	1.69
Three weeks after sowing	56	1.26	0.93	1.94	1.69
	84	1.08	1.06	1.87	1.57
	112	1.23	1.06	1.79	1.65
	168	1.36	1.09	2.08	1.65
	224	1.36	1.09	2.08	1.65
	Nil	0.95	0.89	1.88	1.58
l.s.d. $p < 0.05$		0.19	0.18		

Appendix Table 28. Effect of time of application of nitrogen fertilizer on wheat (W) and barley (B) yields at three sites (87, 91, 100) in 1969

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Eneabba (site 87 - W)	Bakers Hill (site 91 - B)	Wannamal (site 100 - W)
At sowing	56	1.04	2.13	1.34
	112	1.24	2.58	1.82
	168	1.49	2.86	1.89
Three weeks after sowing	56	1.10	1.92	1.47
	112	1.35	2.54	1.73
	168	1.44	2.75	1.94
Six weeks after sowing	56	1.13	1.85	1.47
	112	1.44	2.77	1.43
	168	1.41	2.65	1.63
Nine weeks after sowing	56	1.26	1.44	1.14
	112	1.42	2.34	0.85
	168	1.42	2.35	1.46
Twelve weeks after sowing	56	1.10	1.98	0.79
	112	1.14	1.71	1.14
	168	1.12	2.00	1.10
	Nil	0.82	1.23	0.98
l.s.d. $p < 0.05$		0.24	0.39	0.22

Appendix Table 29. Effect of time of application of nitrogen fertilizer on wheat yields at four sites (92, 95, 96, 97) in 1969

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Condingup (site 92)	Gibson (site 95)	Gibson (site 96)	Gibson (site 97)
At sowing	28		0.34	2.01	0.87
	56	0.53			
	84	0.69	0.81	2.15	1.16
	112	0.60		1.70	1.22
Three weeks after sowing	28		0.58	2.02	1.42
	56	0.45	0.83	2.11	1.38
	84	0.97	0.65	2.11	1.42
	112	0.74		1.57	1.36
Six weeks after sowing	28		1.14	2.00	1.30
	56	0.73	0.69	2.06	1.45
	84	0.75		1.48	1.20
	112	0.82	0.52	2.05	1.49
Nine weeks after sowing	28		0.73	2.00	1.22
	56	0.87		1.81	1.11
	84	0.62	1.22	1.87	1.14
	112	0.62	0.75	2.12	1.34
Twelve weeks after sowing	28			1.35	0.97
	56	0.98	0.66	1.96	1.36
	84	0.75	0.65	2.11	1.32
	112	0.98	0.54	1.97	1.42
	Nil	0.59	0.86	1.98	1.10

Appendix Table 30. Effect of time of application of nitrogen fertilizer on wheat (W) or barley (B) yields at two sites (93, 94) in 1969

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Condingup (site 93 - W)	Duranillin (site 94 - B)
At sowing	56	1.18	1.00
	112	1.17	1.22
	168	1.53	1.43
	224		1.62
Four weeks after sowing	56	0.78	0.97
	112	0.99	1.24
	168	0.91	1.47
	224		1.60
Eight weeks after sowing	56		0.95
	112		1.27
	168		1.32
	224		1.32
Twelve weeks after sowing	56		0.74
	112		1.10
	168		1.08
	224		0.98
	Nil	0.89	0.63
l.s.d. $p < 0.05$		0.26	0.34

Appendix Table 31. Effect of time of application of nitrogen fertilizer on wheat yield at three sites (102, 103, 104) in 1970

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Circle Valley (site 102)	Circle Valley (site 103)	Circle Valley (site 104)
At sowing	28	0.77	0.75	0.72
	56	0.77	0.80	0.75
	84	0.79	0.85	0.89
	112	0.62	0.96	0.97
2½ weeks after sowing	28	0.59	0.93	0.69
	56	0.81	1.08	0.72
	84	1.08	1.20	1.01
	112	1.23	1.39	1.23
Five weeks after sowing	28	0.79	0.91	0.66
	56	1.04	0.97	0.88
	84	1.15	1.06	1.01
	112	1.23	1.23	1.18
7½ weeks after sowing	28	0.88	0.87	0.64
	56	1.20	1.09	0.96
	84	1.18	1.36	1.23
	112	1.38	1.34	1.18
Ten weeks after sowing	28	0.66	0.80	0.43
	56	0.81	0.94	0.85
	84	1.17	0.96	0.87
	112	1.15	0.69	0.91
	Nil	0.45	0.59	0.49

Appendix Table 32. Effect of time of application of nitrogen fertilizer on wheat (W) and barley (B) yields at two sites (105, 106) in 1970)

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Wongan Hills (site 105 - W)	Bakers Hill (site 106 - B)
At sowing	56	1.88	2.32
	112	1.88	2.69
	168		2.77
Two weeks after sowing	56	1.76	
	112	1.84	
	168		
Three weeks after sowing	56		2.16
	112		2.59
	168		2.82
Four weeks after sowing	56	1.83	
	112	1.77	
	168		
Six weeks after sowing	56	1.87	2.46
	112	1.98	2.85
	168		3.02
Eight weeks after sowing	56	1.85	
	112	1.88	
	168		
Nine weeks after sowing	56		2.43
	112		2.80
	168		2.80
Twelve weeks after sowing	56		2.35
	112		2.63
	168		2.65
	Nil	1.63	1.85
l.s.d. $p < 0.05$		0.29	0.22

Appendix Table 33. Effect of time of application of nitrogen fertilizer on barley yields at two sites (107, 108) in 1970

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Narrogin (site 107)	Narrogin (site 108)
At sowing	38	4.09	3.56
	76	3.96	3.86
	114	3.93	3.68
	152	4.04	3.93
Six weeks after sowing	38	4.13	3.91
	76	4.03	3.82
	114	4.07	3.87
	152	4.08	3.91
	Nil	3.89	3.56

Appendix Table 34. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (109, 110, 111) in 1971

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Merredin (site 109)	Badgingarra (site 110)	Newdegate (site 111)
At sowing	56	2.41	2.10	1.77
	112	2.55	2.37	1.78
	168	2.36	2.31	1.77
Three weeks after sowing	56	2.35	2.14	1.83
	112	2.40	2.52	1.82
	168	2.26	2.45	1.99
	Nil	2.09	1.80	1.60
l.s.d. $p < 0.05$		0.21	0.47	0.23

Appendix Table 35. Effect of time of application of nitrogen fertilizer on barley yields at four sites (112, 114, 115, 116) in 1972

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Bencubbin (site 112)	Bruce Rock (site 114)	Corrigin (site 115)	Marchagee (site 116)
At sowing	38	0.27	1.49	1.15	2.38
	76	0.29	1.58	1.12	2.51
	151	0.14	1.54	1.10	2.65
Three weeks after sowing	38	0.17	1.50	1.01	2.31
	76	0.18	1.48	1.16	2.83
	151	0.22	1.52	1.04	2.85
Half A.S. + Half 3WAS	76	0.19	1.50	1.01	2.69
	151	0.14	1.52	1.05	2.63
	Nil	0.13	1.37	1.03	2.09
Analysis of variance	Rate	n.s.	n.s.	n.s.	**
	Time	n.s.	n.s.	n.s.	n.s.
	R x T	n.s.	n.s.	n.s.	n.s.
	Split	n.s.	n.s.	n.s.	n.s.

n.s. Not significant.
** $P < 0.01$.

Appendix Table 36. Effect of time of application of nitrogen fertilizer on barley yields at four sites (113, 117, 118, 120) in 1972

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Binnu (site 113)	Mingenew (site 117)	Nth Lake Grace (site 118)	Beverley (site 120)
At sowing	76	0.98	1.67	1.19	1.30
	151	1.24	2.46	1.25	1.12
	228	1.62	2.15	1.24	1.01
Three weeks after sowing	76	1.21	2.26	1.27	1.16
	151	1.58	2.50	1.25	1.05
	228	1.90	2.16	1.17	0.90
½ - A.S. + ½ - 3WAS	151	1.51	2.38	1.21	1.04
$^2/_3$ - A.S. + $^1/_3$ - 3WAS	228	1.78	2.59	1.22	0.93
$^1/_3$ - A.S. + $^2/_3$ - 3WAS	228	1.88	2.36	1.27	0.98
	Nil	0.53	1.78	0.93	1.23
Analysis of variance	Rate	***	*	n.s.	***
	Time	***	n.s.	n.s.	*
	R x T	n.s.	n.s.	n.s.	n.s.
	Split	n.s.	n.s.	n.s.	n.s.

n.s. Not significant.
* $P < 0.05$.
*** $P < 0.001$.

Appendix Table 37. Effect of time of application of nitrogen fertilizer on barley yields at three sites (119, 124, 126) in 1972

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Beverley (site 119)	Highbury (site 124)	Katanning (site 126)
At sowing	38	1.19	3.27	1.69
	76	1.03	3.30	1.79
	151	1.07	3.14	1.74
Three weeks after sowing	38	1.14	2.96	1.88
	76	1.13	3.12	1.75
	151	1.03	3.03	1.68
Half - A.S. + Half - 3WAS	76	1.08	3.04	1.85
	151	1.00	3.10	1.71
	Nil	1.14	2.99	1.70
Analysis of variance	Rate	**	n.s.	n.s.
	Time	n.s.	*	n.s.
	R x T	n.s.	n.s.	n.s.
	Split	n.s.	n.s.	n.s.

n.s. Not significant.
* $P < 0.05$.
** $P < 0.01$.

Appendix Table 38. Effect of time of application of nitrogen fertilizer on barley (B) and wheat (W) yields at two sites (121, 128) in 1972

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Cordering (site 121 - B)	Mount Barker (site 128 - W)	Mount Barker (site 128 - B)
At sowing	38	2.27		
	76	2.52	3.06	3.65
	151	2.80	3.28	3.76
	228	3.09	2.88	3.63
Two weeks after sowing	76		3.26	3.57
	151		3.22	3.68
	228		3.34	3.62
Three weeks after sowing	38	2.40		
	76	2.49		
	151	2.69		
	228	2.98		
Four weeks after sowing	76		3.60	3.65
	151		3.36	3.57
	228		3.36	4.58
Six weeks after sowing	76		2.99	3.60
	151		3.47	3.49
	228		3.22	3.79
Eight weeks after sowing	76		3.18	3.46
	151		3.30	3.68
	228		3.33	3.47
	Nil	2.23	2.71	3.12
Analysis of variance	Rate	***	n.s. (nil vs rest ***)	n.s. (nil vs rest *)
	Time	n.s.	**	n.s.
	R x T	n.s.	*	n.s.

n.s. Not significant.
* $P < 0.05$.
** $P < 0.01$.
*** $P < 0.001$.

Appendix Table 39. Effect of time of application of nitrogen fertilizer on barley yields at four sites (122, 123, 125, 127) in 1972

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Gairdner River (site 122)	Gibson (site 123)	Jerramungup (site 125)	Tunney (site 127)
At sowing	76	0.86	1.51	1.08	2.07
	151	1.13	1.68	1.09	1.81
	228	1.42	1.74	0.95	2.00
Three weeks after sowing	76	1.02	1.47	1.18	2.10
	151	1.08	1.70	1.16	2.06
	228	1.24	1.61	1.05	2.11
½ - A.S. + ½ - 3WAS	151	1.22	1.64	1.21	1.84
$^{2}/_{3}$ - A.S. + $^{1}/_{3}$ - 3WAS	228	1.43	1.67	0.98	1.94
$^{1}/_{3}$ - A.S. + $^{2}/_{3}$ - 3WAS	228	1.33	1.71	0.99	1.97
	Nil	0.56	1.17	0.94	1.77
Analysis of variance	Rate	***	*	**	n.s.
	Time	n.s.	n.s.	*	n.s.
	R x T	*	n.s.	n.s.	n.s.
	Split	n.s.	n.s.	n.s.	n.s.

n.s. Not significant.
* $P < 0.05$.
** $P < 0.01$.
*** $P < 0.001$.

Appendix Table 40. Effect of time of application of nitrogen fertilizer on barley yields at three sites (129, 131, 133) in 1973

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Merredin (site 129)	Salmon Gums (site 131)	Nabawa (site 133)
At sowing	38	2.92	1.85	4.02
	75	2.92	1.79	3.96
	150	2.87	1.75	4.21
Three weeks after sowing	38	2.91	1.74	3.88
	75	3.01	1.60	3.64
	150	2.92	1.60	3.69
Half - A.S. + Half - 3WAS	75	2.98	1.64	4.09
	150	2.89	1.54	3.96
	Nil	2.68	1.69	4.04
Analysis of variance	Rate	n.s. (nil vs rest **)	n.s.	n.s.
	Time	n.s.	n.s.	***
	R x T	n.s.	n.s.	n.s.
	Split	n.s.	n.s.	*

n.s. Not significant.
* $P < 0.05$.
** $P < 0.01$.
*** $P < 0.001$.

Appendix Table 41. Effect of time of application of nitrogen fertilizer on barley yields at three sites (130, 132, 134) in 1973

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Merredin (site 130)	Badgingarra (site 132)	Nabawa (site 134)
At sowing	75	1.97	0.48	3.50
	150	2.32	0.63	3.99
	225	2.27	0.72	4.10
Three weeks after sowing	75	1.93	0.53	3.56
	150	2.27	0.63	4.05
	225	2.24	0.95	4.17
½ - A.S. + ½ - 3WAS	150	2.36	0.74	4.12
$^2/_3$ - A.S. + $^1/_3$ - 3WAS	225	2.39	0.75	3.81
$^1/_3$ - A.S. + $^2/_3$ - 3WAS	225	2.26	0.88	4.25
	Nil	1.08	0.25	2.74
Analysis of variance	Rate	***	***	***
	Time	n.s.	n.s.	n.s.
	R x T	n.s.	n.s.	n.s.
	Split	n.s.	n.s.	n.s.

n.s. Not significant.
*** $P < 0.001$.

Appendix Table 42. Effect of time of application of nitrogen fertilizer on barley yields at three sites (135, 137, 139) in 1973

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Wongan Hills (site 135)	Beverley (site 137)	Mount Barker (site 139)
At sowing	38	3.06	3.15	2.87
	75	3.09	3.13	3.14
	150	3.50	3.19	3.18
Three weeks after sowing	38	3.07	3.10	2.88
	75	3.26	3.19	2.93
	150	3.68	3.15	3.33
Half - A.S. + Half - 3WAS	75	3.15	3.13	3.01
	150	3.61	3.16	3.14
	Nil	2.60	2.98	2.81
Analysis of variance	Rate	***	n.s.	**
	Time	n.s.	n.s.	n.s.
	R x T	n.s.	n.s.	n.s.
	Split	n.s.	n.s.	n.s.

n.s. Not significant.
** $P < 0.01$.
*** $P < 0.001$.

Appendix Table 43. Effect of time of application of nitrogen fertilizer on barley yields at two sites (136, 138) in 1973

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Wongan Hills (site 136)	Gibson (site 138)
At sowing	75	3.44	2.59
	150	3.64	2.64
	225	3.56	2.67
Three weeks after sowing	75	3.35	2.40
	150	3.77	2.54
	225	3.49	2.51
½ - A.S. + ½ - 3WAS	150	3.67	2.64
$^{2}/_{3}$ - A.S. + $^{1}/_{3}$ - 3WAS	225	3.38	2.60
$^{1}/_{3}$ - A.S. + $^{2}/_{3}$ - 3WAS	225	3.68	2.73
	Nil	3.04	2.46
Analysis of variance	Rate	* (nil vs rest ***)	n.s.
	Time	n.s.	n.s.
	R x T	n.s.	n.s.
	Split	n.s.	n.s.

n.s. Not significant.
* $P < 0.05$.
*** $P < 0.001$.

Appendix Table 44. Effect of time of application of nitrogen fertilizer on wheat yields at two sites (140, 141) in 1973

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Wongan Hills (site 140)	Pingelly (site 141)
At sowing	76	3.37	3.78
	152	4.18	4.21
Two weeks after sowing	76	3.50	3.90
	152	3.91	4.14
Four weeks after sowing	76	3.71	3.97
	152	4.02	3.94
Six weeks after sowing	76	3.71	3.63
	152	4.01	3.76
Eight weeks after sowing	76	3.45	3.25
	152	4.11	4.20
	Nil	3.42	3.27
Analysis of variance	Nil vs rest	*	*
	Rate	***	*
	Time	n.s.	n.s.
	R x T	n.s.	n.s.

n.s. Not significant.
* $P < 0.05$.
*** $P < 0.001$.

Appendix Table 45. Effect of time of application of nitrogen fertilizer on wheat yields at two sites (142, 143) in 1974

Time of sowing	Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Nabawa (site 142)	Gibson (site 143)
11/6 (Nabawa)	At sowing	56	1.38	1.11
		112	1.56	1.16
	Two weeks after sowing	56	1.47	1.04
		112	1.36	1.05
21/6 (Gibson)	Four weeks after sowing	56	1.36	1.03
		112	1.52	1.00
		Nil	1.01	1.14
25/6 (Nabawa)	At sowing	56	1.01	0.96
		112	1.21	0.90
	Two weeks after sowing	56	1.04	0.85
		112	1.23	0.91
7/6 (Gibson)	Four weeks after sowing	56	1.03	0.85
		112	1.19	0.83
		Nil	0.84	0.88
Analysis of variance (early sowing)	Nil vs rest		***	n.s.
	Rate		*	n.s.
	Time		n.s.	*
	R x T		n.s.	n.s.
Analysis of variance (late sown)	Nil vs rest		***	n.s.
	Rate		***	n.s.
	Time		n.s.	*
	R x T		n.s.	n.s.

n.s. Not significant.
* $P < 0.05$.
*** $P < 0.001$.

Appendix Table 46. Effect of time of application of nitrogen fertilizer on wheat (W) and barley (B) yields at four sites (144, 145, 146, 147) in 1974 and 1975

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Wongan Hills (site 144 - B)	Nabawa (site 145 - W)	Merredin (site 146 - W)	Wongan Hills (site 147 - W)
At sowing	76	1.59	2.60	1.93	3.06
	152	1.78	2.74	2.11	3.26
Two weeks after sowing	76	1.64			
	152	1.68			
Four weeks after sowing	76	1.54	2.58	2.16	3.10
	152	1.38	2.70	2.20	3.43
Six weeks after sowing	76	1.32			
	152	1.26			
Eight weeks after sowing	76	1.44	2.74	2.27	3.18
	152	1.33	2.92	2.12	2.99
	Nil	1.51	2.22	1.65	2.48
Analysis of variance	Nil vs rest	n.s.	***	n.s.	***
	Rate	n.s.	*	n.s.	*
	Time	***	**	n.s.	n.s.
	R x T	n.s.	n.s.	n.s.	n.s.

n.s. Not significant.
* $P < 0.05$.
** $P < 0.01$.
*** $P < 0.001$.

Appendix Table 47. Effect of time of application of nitrogen fertilizer on oat yields at four sites (148, 149, 156, 157) in 1977 and 1978

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Bramley (site 148)	Kronkup (site 149)	Lowden (site 156)	Bramley (site 157)
At sowing	68			1.38	
	135			1.40	2.83
	406			1.65	
Three weeks after sowing	68	1.06	1.81		2.74
	135	1.26	1.93	1.94	2.52
	406	1.64	2.09	2.48	2.02
Six weeks after sowing	135	1.40	2.03	2.19	2.64
	406	1.53	2.04	3.03	2.14
Nine weeks after sowing	135	1.61	2.45		2.62
	406	1.39	2.33		2.62
Half - A.S. + Half - 3WAS	135			1.78	
	406			2.25	
Half - A.S. + Half - 6WAS	135			2.05	
	406			2.52	
Half - 3WAS + Half - 6WAS	135	1.25	1.99	2.00	2.50
	406	1.62	1.98	2.37	1.95
Half - 3WAS + Half - 9WAS	135	1.19	2.37		2.57
	406	1.36	2.22		2.19
Half - 6WAS + Half - 9WAS	135	1.62	2.31		2.60
	406	1.65	2.42		2.10
	Nil	0.73	1.66	1.44	2.67
Analysis of variance: Nil vs rest		***	**	***	*
Rate		*	n.s.	***	***
Time		*	*	***	**
R x T		*	n.s.	n.s.	n.s.

n.s. Not significant.
* $P < 0.05$.
** $P < 0.01$.
*** $P < 0.001$.

Appendix Table 48. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (150, 151, 152) in 1978

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) West Three Springs (site 150)	Gibson (site 151)	Lancelin (site 152)
At sowing	54	0.47	2.30	1.04
	109	0.71	2.26	1.07
Two weeks after sowing	54	0.66	2.11	1.07
	109	1.00	2.09	1.38
Four weeks after sowing	54	0.76	2.21	1.44
	109	1.21	2.13	1.68
	217	1.50	2.17	1.71
	326	1.50	2.15	1.84
Six weeks after sowing	54	0.73	2.20	1.37
	109	1.05	2.19	1.64
	Nil	0.42	2.04	0.84
Analysis of variance	Nil vs rest	**	n.s.	***
	Rate	***	n.s.	***
	Time	**	n.s.	n.s.
	R x T	n.s.	n.s.	n.s.

n.s. Not significant.
** $P < 0.01$.
*** $P < 0.001$.

Appendix Table 49. Effect of time of application of nitrogen fertilizer on wheat (W), oats (O) or barley (B) yields at three sites (153, 154, 155) in 1978

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) East Wannamal (site 153 - O)	Darkan (site 154 - W)	West York (site 155 - B)
At sowing	54	1.68	2.49	2.59
	109	1.66	3.01	2.68
Two weeks after sowing	54	1.54	2.31	2.62
	109	1.64	2.96	3.02
Four weeks after sowing	54	1.65	2.48	2.67
	109	1.59	3.07	2.76
	217	1.28	3.35	2.71
	326	1.84	2.98	3.08
Six weeks after sowing	54	1.63	2.46	2.71
	109	1.74	2.57	2.84
	Nil	1.33	2.29	2.57
Analysis of variance	Nil vs rest	**	**	n.s.
	Rate	n.s.	***	*
	Time	n.s.	n.s.	n.s.
	R x T	n.s.	n.s.	n.s.

n.s. Not significant.
* $P < 0.05$.
** $P < 0.01$.
*** $P < 0.001$.

Appendix Table 50. Effect of time of application of nitrogen fertilizer on wheat yields at Lancelin (site 158) in 1979

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha)
At sowing	50	1.24
	100	1.77
Four weeks after sowing	25	0.93
	50	1.48
	75	1.70
	100	1.81
	150	1.74
	300	2.42
Six weeks after sowing	25	
	50	1.52
	75	
	100	1.84
	150	2.34
	300	2.58
Urea 50 kg/ha - at sowing - rest four weeks after sowing	75	1.58
	100	1.51
	150	2.00
Urea 50 kg/ha - at sowing - rest at six weeks after sowing	75	1.82
	100	1.90
	150	2.51
$^2/_3$ at sowing + $^1/_3$ - 4WAS	150	1.89
$^2/_3$ at sowing + $^1/_3$ - 6WAS	150	2.30
Urea 50 kg/ha - at 4WAS - rest at six weeks after sowing	75	
	100	2.11
	150	2.14
Urea 50 kg/ha - at 4WAS - rest at eight weeks after sowing	75	1.32
	100	1.65
	150	1.99
Urea 50 kg/ha - at 6WAS - rest at eight weeks after sowing	75	
	100	1.61
	150	2.02
	Nil	0.86

Appendix Table 51. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (159, 160, 161) in 1979

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Beverley (site 159)	Merredin (site 160)	Newdegate (site 161)
At sowing	54	3.17	1.63	1.35
	109	2.89	1.61	1.25
Three weeks after sowing	54	3.00	1.58	1.19
	109	3.00	1.68	1.48
Six weeks after sowing	54	2.83	1.58	1.34
	109	2.76	1.67	1.40
	Nil	3.07	1.43	1.36
Analysis of variance	Nil vs rest	n.s.	**	n.s.
	Rate	*	n.s.	n.s.
	Time	n.s.	n.s.	n.s.
	R x T	n.s.	n.s.	n.s.

n.s. Not significant.
* $P < 0.05$.
** $P < 0.01$.

Appendix Table 52. Effect of time of application of nitrogen fertilizer on wheat yields at Kojonup (site 162) in 1979

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Egret wheat	Tincurrin wheat
At sowing	50	2.91	3.64
	100	2.86	3.67
	150	2.93	3.43
Three weeks after sowing	50	2.91	3.52
	100	2.88	3.29
	150	3.00	3.60
Six weeks after sowing	50	3.02	3.57
	100	2.81	3.41
	150	2.71	3.10
Half - A.S. + Half - 3WAS	100	2.69	3.43
Half - A.S. + Half - 6WAS	100	2.91	3.45
Half - 3WAS + Half - 6WAS	100	3.05	3.43
	Nil	2.93	3.29
Analysis of variance	Variety	***	
	Rate	*	
	Time	*	
	R x T	**	
	V x T	n.s.	

n.s. Not significant.
* P < 0.05.
** P < 0.01.
*** P < 0.001.

Appendix Table 53. Effect of time of application of nitrogen fertilizer on oat yields at Winnejup (site 163) in 1979

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha)
At sowing	40	1.65
	80	1.89
Four weeks after sowing	40	1.74
	80	1.85
Six weeks after sowing	40	1.82
	80	1.75
Eight weeks after sowing	40	1.60
	80	1.67
Ten weeks after sowing	40	1.93
	80	2.09
Twelve weeks after sowing	40	2.06
	80	1.85
Fourteen weeks after sowing	40	1.90
	80	2.04
Sixteen weeks after sowing	40	1.72
	80	1.64
Half - 4WAS + Half - 10WAS	80	1.88
Half - 4WAS + Half - 12WAS	80	1.91
	Nil	1.52
Analysis of variance	Nil vs rest	**
	Rate	**
	Time	*
	R x T	n.s.

n.s. Not significant.
* $P < 0.05$.
** $P < 0.01$.

Appendix Table 54. Effect of time of application of nitrogen fertilizer on wheat yields at two sites (164, 171) in 1980 and 1981

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Gibson (site 64)	Gibson (site 171)
At sowing	76	1.71	2.46
	152	2.00	2.60
	228	1.91	2.57
	456	1.81	2.41
Three weeks after sowing	76	1.83	2.51
	152	1.86	2.50
	228	1.74	2.63
	456	1.71	2.30
Six weeks after sowing	76	1.87	2.55
	152	1.95	2.66
	228	1.80	2.52
	456	1.79	2.42
	Nil	1.52	2.41
Analysis of variance	Nil vs rest	***	***
	Rate	***	n.s.
	Time	n.s.	n.s.
	R x T	n.s.	n.s.

n.s. Not significant.
*** $P < 0.001$.

Appendix Table 55. Effect of time of application of nitrogen fertilizer on wheat yield at Badgingarra (site 165) in 1980

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha)
At sowing	150	2.79
Two weeks after sowing	150	2.83
Four weeks after sowing	150	2.89
Six weeks after sowing	150	2.79
Eight weeks after sowing	150	3.14
	Nil	2.54
l.s.d. $P < 0.05$		0.25

Appendix Table 56. Effect of time of application of nitrogen fertilizer on wheat yields at three sites (166, 167, 168) in 1980

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Wongan Hills (site 166)	Kojonup (site 167)	West Goomalling (site 168)
At sowing	76	0.72		
	152	0.76		
Four weeks after sowing	38	1.11		
	76	0.91		
	114	0.99		
	152	0.99		
	228	1.06		
	456	0.90		
Six weeks after sowing	38	1.00		
	76	1.04		
	114	1.20		
	152	1.10		
	228	1.11		
	456	1.03		
Eight weeks after sowing	38	1.03	2.23	1.00
	76	1.09	2.67	1.00
	114	1.13		
	152	1.00	2.93	1.00
	228	0.89	3.18	1.06
	456	0.74		
Ten weeks after sowing	38	1.03	1.58	0.97
	76	0.99	1.75	1.06
	114	0.84		
	152	0.80	1.63	0.97
	228	0.86	2.07	1.05
	456	0.84		
Twelve weeks after sowing	38	1.14	1.70	1.07
	76	0.97	1.88	0.98
	114	1.06		
	152	1.09	2.09	1.13
	228	1.24	2.09	1.00
	456	1.10		
	Nil	1.02	1.71	1.03

Appendix Table 57. Effect of time of application of nitrogen fertilizer on wheat yields at two sites (169, 170) in 1981

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Pingaring (site 169)	Pingaring (site 170)
At sowing	30	1.27	0.88
	60	1.30	1.00
Four weeks after sowing	30	1.11	0.94
	60	1.28	1.04
Eight weeks after sowing	30	1.11	0.84
	60	1.15	0.92
	Nil	0.91	0.75
l.s.d. $p < 0.05$		0.11	0.06

Appendix Table 58. Effect of time of application of nitrogen fertilizer on wheat yields at four sites (172, 173, 174, 175) in 1981

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Cunderdin (site 172)	Jingalup (site 173)	Goomarin (site 174)	Yilliminning (site 175)
At sowing	76	0.95			
	152	1.08			
Six weeks after sowing	38	1.05	1.77	0.66	
	76	1.00	1.91	0.67	
	152	1.19	2.48	0.68	
	228	1.05	2.95	0.71	
Eight weeks after sowing	38	1.12	1.54	0.50	1.33
	76	1.32	1.60	0.55	1.44
	152	1.50	2.36	0.62	1.31
	228	1.77	2.61	0.60	1.22
Ten weeks after sowing	38	0.57	1.37	0.79	1.44
	76	0.95	2.02	0.81	1.48
	152	1.05	2.50	0.82	1.52
	228	0.86	2.76	0.77	1.31
	Nil	0.75	1.25	0.58	1.37

Appendix Table 59. Effect of time of application of nitrogen fertilizer and time of sowing on oat yields at Keysbrook (site 176) in 1981

Time of application	Rate of ammonium nitrate (kg/ha)	Sown 22/5	Sown 19/6
Four weeks after sowing	150	1.27	0.71
	300	1.30	0.94
Eight weeks after sowing	150	1.05	0.90
	300	0.97	0.85
Twelve weeks after sowing	150	0.81	0.47
	300	0.78	0.62
) - 4WAS +) - 8WAS	150	1.45	0.70
) - 4WAS +) - 12WAS	150	1.02	0.91
) - 8WAS +) - 12WAS	150	0.88	0.67
	Nil	0.71	0.46

Appendix Table 60. Effect of time of application of nitrogen fertilizer on wheat yield at North Eneabba (site 177) in 1982

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha)
Two weeks after sowing	50	1.19
	100	1.33
	200	1.18
Four weeks after sowing	50	1.19
	100	1.27
	200	1.21
	Nil	0.89
l.s.d. $p < 0.05$		0.12

Appendix Table 61. Effect of time of application of nitrogen fertilizer on wheat yield at four sites (178, 179, 180, 181) in 1982

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Perillup (site 178)	Badgingarra (site 179)	Gibson (site 180)	Lancelin (site 181)
At sowing	50	1.65	2.40	1.55	1.00
	100	1.81	2.76	1.72	1.27
Two weeks after sowing	50	1.84	2.11	1.58	1.10
	100	1.94	2.58	1.66	1.27
Four weeks after sowing	50	1.80	2.49	1.57	1.36
	100	1.80	2.60	1.63	1.56
Eight weeks after sowing	50	1.56	2.72	1.56	1.04
	100	1.69	2.54	1.62	1.35
) - A.S. +) - 4WAS	50	1.76	2.21	1.54	1.20
	100	1.94	3.12	1.63	1.62
	Nil	1.32	2.04	1.62	0.63
l.s.d. $p < 0.05$		0.30	0.63	0.16	0.18

Appendix Table 62. Effect of time of application of nitrogen fertilizer on wheat yield at three sites (182, 183, 184) in 1982

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Badgingarra (site 182)	East Belka (site 183)	Merredin (site 184)
At sowing	35	1.88	0.60	1.14
	70	1.74	0.54	
Two weeks after sowing	35		0.57	
	70		0.55	
Four weeks after sowing	35	2.42	0.58	1.19
	70	1.83	0.58	
Eight weeks after sowing	35	2.20		1.19
	70	2.14		
Twelve weeks after sowing	35	1.99		1.06
	70			
	Nil	1.55	0.53	1.08
l.s.d. $p < 0.05$		0.54	0.09	0.09

Appendix Table 63. Effect of time of application of nitrogen fertilizer on wheat yield at West Narrogin (site 185) in 1982

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha)
Three weeks after sowing	43	2.50
	87	2.31
	130	2.48
	261	2.81
Four weeks after sowing	43	2.14
	87	2.43
	130	2.50
	261	2.67
Five weeks after sowing	43	2.17
	87	2.52
	130	2.33
	261	2.17
	Nil	2.10
l.s.d. $p < 0.05$		0.39

Appendix Table 64. Effect of time of application of nitrogen fertilizer on wheat yield at Toolibin (site 186) in 1982

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha)
At sowing	50	0.72
	100	0.65
	210	0.66
Three weeks after sowing	50	0.64
	100	0.58
	210	0.97
	Nil	0.61
l.s.d. $p < 0.05$		0.25

Appendix Table 65. Effect of time of application of nitrogen fertilizer on oat yields at Bullsbrook (site 187) in 1982

Sowing date	Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha)
17/5	Four weeks after sowing	150	2.86
		300	2.90
	Eight weeks after sowing	150	3.17
		300	3.07
	Twelve weeks after sowing	150	2.79
		300	2.84
	) - 4WAS -) - 8WAS	150	3.41
	) - 4WAS -) - 12WAS	150	3.84
	) - 8WAS -) - 12WAS	150	2.89
		Nil	2.52
	l.s.d. $p < 0.05$		0.94
14/6	Four weeks after sowing	150	2.89
		300	2.91
	Eight weeks after sowing	150	2.75
		300	3.05
	Twelve weeks after sowing	150	2.75
		300	3.05
	) - 4WAS -) - 8WAS	150	2.55
	) - 4WAS -) - 12WAS	150	2.95
	) - 8WAS -) - 12WAS	150	2.91
		Nil	2.42
	l.s.d. $p < 0.05$		0.94

Appendix Table 66. Effect of time of application of nitrogen fertilizer on oat yields at Bramley (site 188) in 1982

Sowing date	Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha)
15/6	At sowing	70	1.64
		140	1.34
		210	1.35
		420	1.38
	Three weeks after sowing	70	1.01
		140	2.04
		210	1.80
		420	1.61
		Nil	1.50
13/7	At sowing	70	1.86
		140	1.88
		210	2.03
		420	1.97
	Three weeks after sowing	70	1.99
		140	1.91
		210	1.92
		420	1.94
		Nil	1.64
23/8	At sowing	70	0.93
		140	1.13
		210	1.03
		420	1.16
	Three weeks after sowing	70	1.04
		140	1.03
		210	1.14
		420	0.85
		Nil	0.87
	Analysis of variance		n.s.

n.s. No significant treatment effects.

Appendix Table 67. Effect of time of application of nitrogen fertilizer on wheat yields at four sites (189, 190, 192, 193) in 1983 and 1984

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Badgingarra (site 189)	Gibson (site 190)	South Eneabba (site 192)	Badgingarra (site 193)
At sowing	50	0.97	1.63		
	100	0.99	1.62	1.37	3.08
Two weeks after sowing	50	1.01	1.68		
	100	1.09	1.83	1.48	3.22
Four weeks after sowing	50	1.00	1.60		
	100	1.31	1.50	1.28	3.19
Eight weeks after sowing	50	0.99	1.54		
	100	1.08	1.66	1.36	2.65
) - A.S. +) - 4WAS	50	0.85	1.57		
	100	1.18	1.63	1.69	3.59
	Nil	0.71	1.54	0.71	2.47
l.s.d. $p < 0.05$		0.34	0.19	0.23	0.37

Appendix Table 68. Effect of time of application of nitrogen fertilizer on wheat yield at Wongan Hills (site 191) in 1983

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha)
At sowing	30	1.35
	60	1.34
	90	1.79
Five weeks after sowing	30	1.38
	60	1.43
	90	1.76
Ten weeks after sowing	30	1.18
	60	1.36
	90	1.62
	Nil	0.99
l.s.d. $p < 0.05$		0.23

Appendix Table 69. Effect of time of application of nitrogen fertilizer on wheat yield at four sites (194, 198, 199, 200) in 1985 and 1986

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Nabawa (site 194)	Jerramungup (site 198)	Gairdner River (site 199)	Gairdner River (site 200)
4WAS#	88	1.84	1.85	1.80	1.30
6WAS	88	1.69	1.86	1.91	1.17
8WAS	88	1.54	1.82	1.73	1.28
	Nil	1.51	1.45	1.44	1.04
l.s.d. $p < 0.05$		0.25	0.17	0.36	0.22

#WAS = Weeks after sowing.

Appendix Table 70. Effect of time of application of nitrogen fertilizer on wheat yield at three sites (201, 202, 203) in 1986

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha) Kwobrup (site 201)	Kwobrup (site 202)	Woodanilling (site 203)
4WAS#	88	1.86	1.90	1.80
6WAS	88	1.90	1.86	1.79
8WAS	88	2.20	1.78	1.88
	Nil	1.73	1.48	1.62
l.s.d. $p < 0.05$		0.28	0.19	0.28

#WAS = Weeks after sowing.

Appendix Table 71. Effect of time of application of nitrogen fertilizer on wheat yield at Wongan Hills (site 195) in 1985

Time of application	Rate of ammonium nitrate (kg/ha)	Grain yield (t/ha)
At sowing	118	2.38
	235	2.32
Two weeks after sowing	118	2.41
	235	2.34
Four weeks after sowing	118	2.32
	235	2.33
Six weeks after sowing	118	2.38
	235	2.56
Eight weeks after sowing	118	2.44
	235	2.68
	Nil	2.04
l.s.d. $p < 0.05$		0.20

Appendix Table 72. Effect of time of application of nitrogen fertilizer on wheat yield at two sites (196, 197) in 1985

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Newdegate (site 196)	Gibson (site 197)
At sowing	100	1.22	3.39
Five weeks after sowing	100	1.20	4.10
Ten weeks after sowing	100	1.20	3.47
	Nil	1.07	2.52
l.s.d. $p < 0.05$		0.19	0.35

Appendix Table 73. Effect of time of application of nitrogen fertilizer on wheat yield at two sites (205, 206) in 1990

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha) Wongan Hills (site 205)	Wickepin (site 206)
At sowing	50	2.03	3.24
	75	2.17	3.33
	100	2.28	3.49
	150	2.52	3.14
Eight weeks after sowing	50	1.90	3.14
	75	2.18	2.95
	100	2.25	3.13
	150	2.29	3.24
Half at sowing + half eight weeks after sowing	75	2.22	3.32
	100	2.23	3.19
	Nil	1.79	2.89

Appendix Table 74. Effect of time of application of nitrogen fertilizer on wheat yield at Wongan Hills (site 204) in 1988

Time of application	Rate of urea (kg/ha)	Grain yield (t/ha)
Four weeks after sowing	40	2.47
	80	2.77
Six weeks after sowing	40	2.52
	80	2.86
Eight weeks after sowing	40	2.52
	80	2.79
	Nil	2.16

	TITLE	AUTHOR	PUBLICATION DATE
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