1978

Minimum tillage trials summary -1978

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MINIMUM TILLAGE TRIALS

SUMMARY - 1978

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MINIMUM TILLAGE TRIALS 1978

Locations: Wongan Hills
Avondale
Merredin
Mt Barker
Esperance
Badgingarra

Sites: At all stations except Badgingarra, there is both a continuous and a rotational site (1 year crop : 1 year pasture). The 1978 crop was the third crop on the continuous sites. In 1979 the 1977 rotational site will be cropped again.

Two additional continuous trials began this year at Badgingarra and on a light land site at Merredin.

Treatments: Four basic systems were used and these were:-

1. Direct drilling (DD) with Triple Disc Drill (TDD)

   (i) Spray to kill weeds.
   (ii) Plant with T.D.D.

2. Cultivation and DD with TDD (Cult and TDD)

   (i) Cultivate.
   (ii) Spray to kill weeds.
   (iii) Plant with TDD.

3. Direct drill with combine (DD Comb)

   (i) Spray to kill weeds.
   (ii) Plant with combine.

4. District practice

   (i) Work up.
   (ii) Work back.
   (iii) Plant with combine.

At most sites, the first three systems were planted earlier than the fourth system. This is quite practical under farming conditions. At Avondale and Wongan Hills on the continuous sites, two additional treatments using systems one and three were included and planted at the same time as system four and these are listed as Treatments 5 and 6.

Measurements taken during the season include weed densities, wheat growth parameters, incidence of root diseases, monitoring of soil nitrogen levels and changes in soil physical conditions.

Weed Control

Pre-crop control: The basic herbicide mix is 2 l/ha Sprayseed plus 500 mls/ha 20% Dicamba. DDT is added for insect control where necessary. Dicamba is added to ensure a good clover kill. Rates of Sprayseed were increased to cope with larger than normal weeds.

Apart from special problems at Wongan Hills and Merredin, pre-crop weed control was excellent. At Merredin some very large plants which had germinated after summer rains were not killed. At Wongan Hills, weeds (mainly capeweed) on the late planted, direct drilled plots were also hard to control.

In-crop weed control on the continuous sites has been satisfactory, as the weeds are those that can be controlled by post-emergent sprays. The rotational crops are more of a problem, where Silver, Barley and Brome grasses dominate. Unless a good germination occurs prior to planting, problems occur in the crop.

Site: Merredin Research Station - Heavy land. 77M13, 77M56.

Schedule of Operations

Date	Operation	Comments
3/3	Tr 2, 4 cultivated	
18/5	Tr 4 worked back	
22,23/5	Tr 1, 2, 3, sprayed	2 l/ha Sprayseed + 500 mls/ha 20% Dicamba
23/5	Tr 1, 2, 3, seeded	50 kg/ha Gamenya, 60 kg/ha Super
15/6	Tr 4 seeded	50 kg/ha Gamenya, 60 kg/ha Super
1/7	Nitrogen topdressed	
26/7	Weed and wheat counts	
27/7	Tr 1, 2, 3, sprayed	2 l/ha Hoegrass, no wetter
9/8	Tr 1 sprayed	750 mls/ha Banex
	Tr 4 sprayed	2 l/ha Hoegrass, no wetter
24/8	Tr 2 (Rotational only)	750 mls/ha Banex

Subtreatments : Nitrogen application: Each plot was divided into four and the following rates of Agran 34:0 were applied:

(i) Nil
(ii) 12.5 kg/ha
(iii) 25 kg/ha
(iv) 50 kg/ha

Weed and Wheat counts

Continuous site

Treatment	1	2	3	4
Wheat plants/m	21	22	21	18
Grasses/sq m	84	42	134	42
Broadleaves/sq m	15	2	2	0

Rotational site

Treatment	1	2	3	4
Wheat plants/m	20	20	17	18
Grasses/ sq m	296	175	427	223
Broadleaves/sq m	15	7	1	2

Grasses - Ryegrass

Broadleaves - a few surviving medics and doublegees

Continuous site

Wheat Yield kg/ha

Treatment	Agran applied kg/ha				Mean
	0	12.5	25	50	
1. DD with TDD	972	1025	1046	1154	1049
2. Cultivate and DD with TDD	2303	2250	2293	2352	2299
3. DD with combine	1738	1633	1676	1716	1691
4. District practice	2086	2062	2124	2127	2100

Rotational site

Wheat Yield kg/ha

Treatment	Agran applied kg/ha				Mean
	0	12.5	25	50	
1. DD with TDD	1221	1134	1078	1059	1123
2. Cultivate and DD with TDD	1358	1352	1477	1464	1413
3. DD with combine	1489	1595	1520	1514	1530
4. District practice	1601	1620	1950	1801	1743

Comments

Penetration by the triple-disc drill and coverage of seed in Treatment 1 was very poor. Although better crop establishment occurred in Treatment 3, crop growth was still slow. On the continuous site, Treatments 2 and 4 gave excellent germination and growth and the final yield difference probably reflects the three week difference in seeding dates.

Site: Merredin Research Station - Light land

Schedule of Operations

Date	Operation	Comments
8/5	Tr 2, 4 cultivated	
23/5	Tr 4 harrowed	
7/6	Tr 1, 2, 3 sprayed	3 l/ha Sprayseed & 750 ml/ha 20% Dicamba
7/6	Tr 1, 2, seeded	50 kg/ha Gamenya, Super 98 kg/ha
8/6	Tr 3, 4 seeded	50 kg/ha Gamenya, Super 98 kg/ha
29/6	Nitrogen topdressed	
27/7	Weeds & wheat counts	
10/8	Tr 2, 4 sprayed	700 ml/ha Banex

Subtreatments: Nitrogen application: Each plot was divided into four and the following rates of Agran 34:0 were applied:-

(i) Nil
(ii) 12.5 kg/ha
(iii) 25 kg/ha
(iv) 50 kg/ha

Weed and wheat counts

Treatment	1	2	3	4
Wheat plants/m	26	28	19	21
Grasses sq/m	10	9	5	7
Broadleaves/sq m	3	33	4	34

1978 78M25 Wheat Yield kg/ha

Treatment	Agran applied kg/ha				Mean
	0	12.5	25	50	
1. DD with TDD	537	545	590	645	579
2. Cultivate & DD with TDD	732	769	793	812	730
3. DD with combine	685	759	806	889	763
4. District practice	812	846	861	935	863

Comments: The crop appeared to be limited by nutrient deficiency. Nutrient analysis indicated severe deficiencies in potassium and nitrogen.

Site: Wongan Hills Research Station - 77WH17, 77WH88

Schedule of Operations

Date	Operation	Comments
24/5	Tr 2, 4 cultivated	
26/5	Tr 3 sprayed	2 l/ha Sprayseed + 500 mls/ha 20% Dicamba
31/5	Tr 1, 2 sprayed	" " " " " "
31/5	Continuous Tr 1,2,3 seeded	50 kg/ha Gamenya, 70 kg/ha Super
7/6	Rotational Tr 1,2,3 seeded	" " " "
8/6	Tr 4 worked back	
28/6	Tr 5, 6 sprayed	3 l/ha Sprayseed + 750 mls/ha 20% Dicamba
29/6	Tr 4,5,6 seeded	50 kg/ha Gamenya, 70 kg/ha Super
12/7	Nitrogen topdressed	
7/8	Continuous 1,2,3 sprayed	1.4 l/ha Buckshot
	Continuous 5, 6 sprayed	1.1 l/ha M.C.P.A. + 550 g/ha Linuron
	Rotational 1,2,3,4 "	700 mls/ha 20% Dicamba
28/8	Tr 5, 6 sprayed	1 l/ha Hoegrass

Subtreatments Nitrogen Application: Each plot was divided into four and the following rates of Agran 34:0 were applied:-

(i) Nil
(ii) 22.5 kg/ha
(iii) 45 kg/ha
(iv) 90 kg/ha

Weed and wheat counts

Continuous site

Treatment	1	2	3	4	5	6
Wheat plants/m	17	19	20	20	22	13
Grasses/sq m	23	49	32	16	34	40
Broadleaves/sq m	18	18	27	5	23	13

Grasses - 790% Ryegrass
Broadleaves - Doublegees, capeweed, turnip, radish

Weed control satisfactory.

Rotational site

Treatment	1	2	3	4
Wheat plants/m	21	20	23	22
Grasses/sq m	22	20	22	9
Broadleaves/sq m	15	18	19	11

Grasses - Ryegrass, with some odd brome, etc.
Broadleaves - Doublegees with a little clover.

Continuous site Wheat Yield kg/ha

Treatment	Agran applied kg/ha				Mean
	0	22.5	45	90	
1. DD with TDD	1454	1637	1701	1829	1655
2. Cultivate & DD with TDD	1679	1890	1946	1704	1805
3. DD with combine	1733	1691	1722	1835	1745
4. District practice	1756	1715	1744	1928	1786
5. DD with combine-late	1128	1091	1134	1162	1129
6. DD with TDD-late	759	778	846	895	820

Rotational site Wheat Yield kg/ha

Treatment	Agran applied kg/ha				Mean
	0	22.5	45	90	
1. DD with TDD	1762	1623	1654	1759	1700
2. Cultivate & DD with TDD	1466	1315	1327	1327	1359
3. DD with combine	1904	2154	1883	1781	1931
4. District practice	1969	1978	1920	2000	1969

Comments: On the rotational site, the yield of Treatments 1, 2 and 3 was expected to have been severely reduced by a dry period during anthesis.

Large weeds present at seeding on Treatments 5 and 6 in continuous site gave some problems in crop establishment. This may have contributed, to some extent, to the poor yields obtained from these treatments.

Site: Avondale Research Station

Schedule of Operations

Date	Operation	Comments
22/5	Tr 2 scarified	
31/5	Tr 4 ploughed	
1/6	Tr 1,2,3 sprayed	2 l/ha Sprayseed + 500 mls/ha 20% Dicamba
1/6	Tr 1,2,3 seeded	50 kg/ha Gamenya + 70 kg/ha Super
20/6	Tr 5, 6 sprayed	
21/6	Cont - 4,5,6 seeded	
	Rot - worked back & seeded	
11/7	Nitrogen topdressed	
12/7	Weed & wheat counts	
24/7	Cont - Tr 1,2,3 sprayed	2 l/ha Hoegrass
	Rot - Tr 1,2,3 sprayed	0.7 l/ha Banex
7/8	Cont - 4,5,6 sprayed	2 l/ha Hoegrass
	Rot - 4 sprayed	0.7 l/ha Banex

Subtreatments: Nitrogen application: Each plot was divided into four and the following rates of Agran 34:0 were applied:-

(i) Nil
(ii) 27.5 kg/ha
(iii) 55 kg/ha
(iv) 110 kg/ha

Weed and wheat counts

Continuous site

Treatment	1	2	3	4	5	6
Wheat plants/m	29	26	48	23	23	26
Grasses sq/m	61	85	63	65	70	61
Broadleaves/sq m	3	6	1	31	10	9

Grasses - Wild oats, Ryegrass
Broadleaves - Turnip, Radish, Doublegees. The higher level in Treatment 4 is due in part to a very high level in one replicate.

Rotational site

Treatment	1	2	3	4
Wheat plants/m	31	29	23	17
Grasses/sq m	99	93	90	90
Broadleaves/sq m	10	65	30	98

Grasses - Barley grass, Brome grass, Silver grass.
Broadleaves - Doublegees. Note the stimulation of germination by cultivation

Continuous site

Wheat Yield kg/ha

Treatment	Agran applied kg/ha				Mean Yield
	0	27.5	55	110	
1. DD with TDD	2583	2704	2589	2685	2640
2. Cultivate & DD with TDD	2345	2443	2409	2593	2447
3. DD with combine*	2585	2617	2609	2469	2570
4. District practice	2757	2902	2835	2965	2865
5. DD with combine - late	2530	2682	2619	2895	2681
6. DD with TDD - late	2391	2493	2557	2567	2502

*Sown at 190 kg/ha seed.

Rotational site

Wheat Yield kg/ha

Treatment	Agran applied kg/ha				Mean
	0	27.5	55	110	
1. DD with TDD	1546	1491	1537	1590	1541
2. Cultivate & DD with TDD	1657	1497	1540	1667	1590
3. DD with combine*	1537	1568	1719	1904	1682
4. District practice	920	803	766	1056	886

Comments: The low grain yield from Treatment 4 on the rotational site reflected the poor growth of the crop through the season. The level of take-all was higher in this treatment.

Site: Mt Barker Research Station

Schedule of Operations

Date	Operation	Comments
10/5	Tr 2, 4 ploughed	
10/5	Tr 2 harrowed to level plots	
24/5	Tr 4 scarified	
24/5	Tr 1,2,3 (Rotational) sprayed	2 l/ha Sprayseed + 500 mls 20% Dicamba + 1 l 25% DDT
29/5	Tr 1,2,3 (Continuous) sprayed	2 l/ha Sprayseed + 500 mls 20% Dicamba
29/5	Tr 1,3 (Rotational) spray repeated	
30/5	All treatments seeded	Cont: 44 kg/ha West, 144 kg/ha Super, Rot: 49 kg/ha Clipper, 144 kg/ha Super
23/6	Nitrogen topdressed	
2/7	Continuous sprayed - all treatments	Buckshot 1.4 l/ha
6/7	Weed and cereal counts	

Subtreatment: Nitrogen application: Each plot was divided into four and the following rates of Agran 34:0 were applied:-

(i) Nil
(ii) 22.5
(iii) 45
(iv) 90

Weed and cereal counts

Continuous site

Treatment	1	2	3	4
Oats plants/m	16	16	19	18
Grasses/sq m	111	54	88	102
Broadleaves/sq m	16	20	23	36

Grasses - Winter grass, Brome grass some Ryegrass.
Broadleaves - Capeweed, Sorrel, Rapeseed, Erodium, Chickweed.
Broadleaves were well controlled by application of "Buckshot". The crop appeared to compete strongly with weeds.

Rotational site

Treatment	1	2	3	4
Barley plants/m	14	15	16	20
Grasses/sq m	184	177	213	141
Broadleaves/sq m	22	13	11	13

Grasses - Total ground cover in all treatments by the end of the season. Principally; Silver grass, Brome grass and Winter grass
Broadleaves - Mouse-eared chickweed, Clover.

Continuous site

Oats Yield kg/ha

Treatment	Agran applied kg/ha				Mean
	0	22.5	45	90	
1. DD with TDD	2597	2668	2868	2958	2772
2. Cultivate & DD with TDD	2543	2600	2683	2823	2663
3. DD with combine	2462	2488	2600	2830	2595
4. District practice	2468	2621	2605	2773	2617

Rotational site

Barley Yield kg/ha

Treatment	Agran applied kg/ha				Mean
	0	22.5	45	90	
1. DD with TDD	1562	1493	1569	1536	1540
2. Cultivate & DD with TDD	1681	1579	1745	1779	1696
3. DD with combine	1562	1631	1374	1200	1442
4. District practice	1557	1486	1636	1438	1529

Comments: On the rotational site in Treatment 1 the rear disc of the triple disc drill tended to seal the front slots and prevent emergence. The yields from the rotational site would have been reduced by areas of Manganese deficiency and by the very heavy weed population.

Site: Esperance Downs Research Station

Schedule of Operations

Date	Operation	Comments
12/5	Tr 2 cultivated (combine)	
15/5	Tr 4 ploughed	
26/5	Tr 3 sprayed	3 l/ha Sprayseed & 500 mls 20% Dicamba
29/5	Tr 1 sprayed	" " " " " " "
31/5	Tr 2 sprayed	" " " " " " "
1/6	Tr 1,2,3 seeded	Continuous 50 kg/ha Clipper, 140 kg/ha Super; Rotational 55 kg/ha Madden, 120 kg/ha Super
	Tr 4 worked back	
15/6	Tr 4 seeded	As above
	DDT misted across all plots	At a rate sufficient for red-legged earthmite control.
2/7	Rotation misted DDT	In response to cutworm attack on Tr 1
4/7	Rotation misted DDT	
5/7	Weed and cereal counts	
20/7	Continuous sprayed	1 l/ha Hoegrass

Subtreatments: Nitrogen application: Each plot was divided into four and the following rates of Agran 34:0 were applied:-

(i) Nil
(ii) 27.5 kg/ha
(iii) 55 kg/ha
(iv) 110 kg/ha

Weed and cereal counts

Continuous site

Treatment	1	2	3	4
Barley plants/m	15	16	15	14
Grasses/sq m	10	33	34	37
Broadleaves/sq m	2	2	2	4

Grasses - mainly Ryegrass
Broadleaves - Erodium, Sow-thistle

Rotational site

Treatment	1	2	3	4
Wheat plants/m	18	20	17	18
Grass weeds/sq m	5	6	12	1
Broadleaf weeds/sq m	18	5	13	6

Grasses - Silver grass, Brome grass, Ryegrass
Broadleaves - Clover, Erodium

Continuous

Barley Yield kg/ha

Treatment	Agran applied kg/ha				Mean
	0	27.5	55	110	
1. DD with TDD	1758	1933	2037	2058	1946
2. Cultivate & DD with TDD	1638	1821	1989	2159	1902
3. DD with combine	1585	1938	2080	2444	2012
4. District practice	1453	1830	1791	2318	1848

Rotational

Wheat Yield kg/ha

Treatment	Agran applied kg/ha				Mean
	0	27.5	55	110	
1. DD with TDD**	1873 (2200)	2061 (2473)	2088 (2727)	2333 (2873)	2089 (2568)
2. Cultivate & DD with TDD	2349	2546	2827	3227	2737
3. DD with combine	2430	2394	2579	2979	2596
4. District practice	2676	3067	2961	3297	3000

**This treatment severely attacked by cutworm soon after germination. Yields from an unaffected replication shown in brackets.

Comments: On the continuous site it was estimated that 30-40% of heads were dropped before harvest. This would have tended to even out the yields.

Treatment 1 on the rotational site was attacked by cutworms soon after emergence. Neighbouring treatments were not affected. This contributed to the dense growth of clover on Treatment 1 observed during the season.

Site: Badgingarra Research Station

Schedule of Operations

Date	Operation	Comments
18/5	Tr 2 cultivated	
24/5	Tr 4 cultivated	
26/5	Tr 3 sprayed	2 l/ha Sprayseed + 500 mls 20% Dicamba
31/5	Tr 1, 2 sprayed	2 l/ha Sprayseed + 500 mls 20% Dicamba
	Tr 1,2,3 seeded	50 kg/ha Darkan, 120 kg/ha Super
6/6	Tr 4 seeded	50 kg/ha Darkan, 120 kg/ha Super
14/6	Nitrogen topdressed	55 kg/ha Agran 34:0
18/7	Weed and wheat counts	

Subtreatments of nitrogen were not applied.

Weed and wheat counts

Treatment	1	2	3	4
Wheat plants/m	16	16	24	21
Grasses/sq m	106	18	14	18
Broadleaves/sq m	26	24	10	6

Grasses - Silver grass, Brome grass, some Barley grass - important only on Treatment 1.
Broadleaves - Clover, Erodium, odd Capeweed.

Wheat Yield kg/ha

Treatment	1	2	3	4
Kg/ha	1650	2103	2274	2136

Comments: The lower yield on Treatment 1 was a result of its greater weed population.