



Department of
Primary Industries and
Regional Development

Research Library

Experimental Summaries - Plant Research

Research Publications

1979

Long term rotation trials

I Rowland

Follow this and additional works at: <https://researchlibrary.agric.wa.gov.au/rqmsplant>



Part of the [Agronomy and Crop Sciences Commons](#), [Fresh Water Studies Commons](#), [Soil Science Commons](#), and the [Weed Science Commons](#)

Recommended Citation

Rowland, I. (1979), *Long term rotation trials*. Department of Agriculture and Food, Western Australia, Perth. Report.

This report is brought to you for free and open access by the Research Publications at Research Library. It has been accepted for inclusion in Experimental Summaries - Plant Research by an authorized administrator of Research Library. For more information, please contact jennifer.heathcote@agric.wa.gov.au, sandra.papenfus@agric.wa.gov.au, paul.orange@dpird.wa.gov.au.

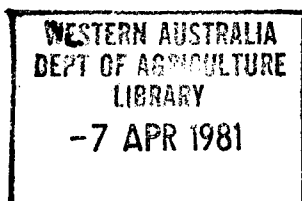
DEPARTMENT OF AGRICULTURE
Western Australia

SUMMARY OF EXPERIMENTAL RESULTS FROM 1979

LONG TERM ROTATION TRIALS

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

I. Rowland
PLANT RESEARCH DIVISION



66M29/2083EX

LOCALITY : Paddock 5AE on Merredin Research Station.
SOIL TYPE : Merredin sandy clay loam.
HISTORY : An old land site, cleared in 1909. First sown to Cyprus Barrel medic in 1955, grazed and topdressed. Cropped 1962 and 1964. Medic resown in 1965.
RAINFALL : in mm.

MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
38.6	46.4	23.7	62.4	8.4	2.3	181.8

WHEAT YIELDS : Madden sown on 15th June 1979.

ROTATION	CROP	KG GRAIN/HA
Control	14th	848
1 crop : 1 pasture	1	993
1 crop : 2 pasture	1	1095
1 crop : 4 pasture	1	1306
2 crop : 2 pasture	1st	983
	2nd	1029
2 crop : 4 pasture	1st	926
	2nd	1064
3 crop : 3 pasture	1st	1078
	2nd	877
	3rd	1167

1. The continuous crop has a severe infestation of wild oats which was not controlled during the growing season.
2. Annual ryegrass is starting to build-up in the 1:1 rotation and may be starting to effect yields. Hoegrass will be used to control it next year.
3. There were no obvious reasons for other yield differences.

67C13/2332EX

LOCALITY : Paddock 19B on Chapman Research Station (Nabawa).
SOIL TYPE : Red brown loamy sand.
HISTORY : An old land site, cleared in 1903. Sown to Dwalganup sub clover in 1964, topped each year until the start of the trial in 1967.
RAINFALL : in mm.

MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
53.5	70.6	16.2	14.6	4.2	4.2	163.3

WHEAT YIELDS : (Gamenya) sown on 13th June 1979. Banex on 8th August.

ROTATION	CROP	KG/HA
Control	13th	900
1 crop : 1 pasture	1	1746
1 crop : 2 pasture	1	1915
1 crop : 4 pasture	1	1736
2 crop : 2 pasture	1st	1691
	2nd	1295
2 crop : 4 pasture	1st	2019
	2nd	1711
3 crop : 3 pasture	1st	1687
	2nd	1463
	3rd	1696

1. Annual ryegrass has become very bad in the control successive crop and is reducing yield.
2. Second crop in a 2:2 rotation also had enough annual ryegrass to reduce the yield.
3. The centre of the 1:4 rotation was slightly water-logged and this would have depressed the yield from this plot.

67N4/2333EX

LOCALITY : Newdegate Research Station.
 SOIL TYPE : Grey sand over gravel at 20-30 cms.
 HISTORY : An old land site, cleared in 1951 and in pasture (Dwalganup sub clover) from 1963 to 1967.
 RAINFALL : in mm.

MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
25.2	68.3	39.9	55.2	17.1	6.2	211.9

WHEAT YIELD : (Gamenya) sown on 12th June 1979. Hoegrass on 25th July 1979. Banex on 13th August 1979.

ROTATION	CROP	KG/HA	# RYEGRASS PER/M ²
Control	13th	212	119
1 crop : 1 pasture	1	685	270
1 crop : 2 pasture	1	1168	5
1 crop : 4 pasture	1	1740	9
2 crop : 2 pasture	1st	1140	19
	2nd	802	52
2 crop : 4 pasture	1st	1241	0
	2nd	601	1
3 crop : 3 pasture	1st	1099	19
	2nd	910	9
	3rd	568	1

1. Annual ryegrass in the 1:1 rotation was so heavy that the Hoegrass (at 1 l/ha) did not give complete control, and had a large effect on grain yield.
2. Sorrel was a problem in the 1:1 and 1:2 crops. Although it was sprayed on the 13th August early competition has probably effected the yields.
3. All crops sown into stubble had patch germination caused by blocking of the combine by the crowns of the previous crop. The stubble was burnt but this did not prevent blockage.
4. The crop after 4 years of pasture (in a 1:4 rotation) did relatively better because of a high soil nitrogen level, 0.063% compared to 0.047% for a 1:2 rotation. This level of soil nitrogen is unusual for this trial, even after 4 years of pasture, the average for the previous 5 years is 0.052% before a crop in a 1:4 and 0.049% in a 1:2.

5. Use of a high rate of nitrogen fertiliser, 100 kg urea/ha applied on each of three dates (2.8.78, 29.8.78 and 3.10.78) to one half of the 1978 crop has shown a marked residual effect on the 1979 crop.

ROTATION 1979	1979 WHEAT YIELD KG/HA		
	+ N in 1978	No N in 1978	% increase due to 1978 N fert.
13th crop	493	212	133
2 crop : 2 pasture 2nd	1085	802	35
2 crop : 4 pasture 2nd	873	601	45
3 crop : 3 pasture 2nd	1302	910	43
3rd	833	568	47

It must be remembered that in 1978 a total of 300 kg urea/ha was applied from the beginning of August and with no heavy rain after the last application in October there was every chance of a residual nitrogen effect.

PASTURE : From samples taken on 15th August 1979

Regenerating pasture after 1978 wheat crops

	TOTAL DM KG/HA	CLOVER %	WEEDS %	GRASS %
1:1	1678	13	85	2
1:2	647	21	61	18
1:4	1950	5	95	0
2:2	992	17	76	7
2:4	1610	9	89	2
3:3	513	8	39	53

1. Weeds are mainly erodium and/or capeweed. In the rotations with longer pasture phases erodium is the main weed component, while it is about half of each for the others. In the 3:3 grass forms the major pasture component and is half annual ryegrass.
2. A false break in Feb./March reduced the amount of clover in the pastures and allowed the buildup of erodium and capeweed which seem able to survive a dry period.

68E5/2474EX

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

SOIL TYPE : Fleming gravelly sand.

HISTORY : Cleared in 1951 and sown to clover, cropped in 1961 and 1962 then Woogenellup sub clover and Brome grass were sown in 1963, topdressed until the start of the trial in 1968. Lupins were sown in trial in 1974.

RAINFALL : in mm.

MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
88.3	79.2	114.4	70.1	72.1	23.6	447.7

LUPIN YIELDS : (Marri) sown on 31st May 1979
 Simazine sprayed 2 l/ha on 5th June
 DDT sprayed 2.2 l/ha on 5th June
 Hoegrass sprayed 1.5 l/ha on 10th July

ROTATION	KG/HA
Control : 6th lupin	800
1 lupin : 1 clover	1867
1 lupin : 1 wheat	1444
2 clover : 1 lupin : 1 wheat	1236
2 clover : 1 wheat : 1 lupin	1352
4 clover : 1 lupin : 1 wheat	1900
4 clover : 1 wheat : 1 lupin	1474*

WHEAT YIELDS : (Madden) sown on 22nd June 1979

Control : 12th cereal	510
1 wheat : 1 lupin	1513
2 clover : 1 lupin : 1 wheat	1002*
2 clover : 1 wheat : 1 lupin	2036
4 clover : 1 lupin : 1 wheat	2048
4 clover : 1 wheat : 1 lupin	2094

* Lupin plot waterlogged at one end.
 * Wheat plot waterlogged for one half of plot.

1. The 6th lupin crop is showing signs of disease build-up with about 20% of plants being effected by root and/or collar rot. Annual ryegrass is also very bad.
2. Both the lupin and wheat phase of the 1:1 rotation have a ryegrass problem which was controlled in the lupins with Hoegrass. This was not used in the wheat, resulting in a yield drop in the wheat.
3. The two rotations with 2 years of clover both yielded less lupin grain than expected from the vegetative samples taken on 16th October. Yield of the tops from these two treatments, was double other treatments, at 7 tonnes dry matter/ha. This resulted in a harvest index of 0.19 for these two compared to an average of 0.47 for other treatments.

68SG5/2475EX

LOCALITY : Paddock H5 on Salmon Gums Research Station.

SOIL TYPE : Complex of Kumarl loam (heavy) and Circle Valley/Beete calcareous sandy loam (lighter).

HISTORY : Cleared in 1962, then cropped until the start of the trial in 1968. Two of the four blocks were sown to Cyprus Barrel medic which is topdressed with superphosphate. The other two blocks regenerate volunteer pasture which is not topdressed.

RAINFALL : in mm.

MAY	JUNE	JULY	AUG	SEPT	OCT	TOTAL
47.8	40.0	38.8	31.3	25.8	6.2	189.9

WHEAT YIELDS : Madden sown on 15th May 1979
 Treflan on 10th May
 Hoegrass on 6th July
 2.4-D amine 19th July

16th crop - No. N fert. 1182 kg grain/ha
 16th crop - + 54 kg Agran 34/ha 1172 kg grain/ha.

		PASTURE	
		MEDIC	VOLUNT.
1 crop : 1 year pasture	1st crop	1443	1135
1 crop : 3 year pasture	1st crop	1570	1310
3 crop : 3 year pasture	1st crop	1490	1415
	2nd crop	1573	1405
	3rd crop	1597	1424

1. Pasture in the 1:1 (volunteer) is mainly annual ryegrass with some barley grass. This results in a problem of ryegrass in the crop phase which reduces yields.
2. Other yield differences maybe due to a response of the wheat to an increase in soil fertility from the medic pasture given a reasonable growing season (for Salmon Gums).

73SG16/3229EX

LOCALITY : Davies' lease, Salmon Gums

SOIL TYPE : Circle Valley sand.

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

WHEAT YIELDS : Madden sown on 16th May 1979
 Hoegrass on 21st June
 2.4.D amine on 5th July

ROTATION	KG GRAIN/HA				
	1	2	3	4	MEAN
1 crop : 1 medic	1416	1513	1393	1703	1506
2 crop : 2 medic 1st	1455	1186	1404	1663	1427
2nd	742	934	760	988	856
1 crop : 3 medic	1482	1756	1533	1586	1589

5% LSD = 202

1. Yield of second crops were significantly reduced. This was in part due to poor seeding caused by blocking of the combine even though the stubble had been fire harrowed. The presence of "take-all" has also reduced yield:

ROTATION	INCIDENCE OF TAKE-ALL
1 crop : 1 medic	3%
2 crop : 2 medic 1st	10%
2nd	39%
1 crop : 3 medic	12%

2. Although the 1:1 had the lowest levels of "Take-all", yields were probably reduced by annual ryegrass which was worst in the 1:1 rotations.
3. "Take-all" in the 1:3 rotation is not as severe as expected, probably because of the poor seasons in 1976 and '77 which prevented growth of grasses (especially barley grass). It is the presence of these grasses which helps build-up "Take-all" during longer pasture phases.