

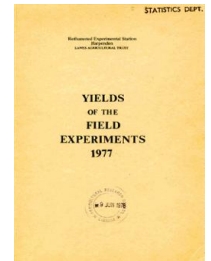
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77/W/B/1 Irrigation, P, K, and Root Growth - Barley

Rothamsted Research

Rothamsted Research (1978) *77/W/B/1 Irrigation, P, K, and Root Growth - Barley* ; Yields Of The Field Experiments 1977, pp 337 - 342 - DOI: <https://doi.org/10.23637/ERADOC-1-29>

77/W/B/1

SPRING BARLEY

IRRIGATION, P, K AND ROOT GROWTH

Object: To study the effects of sowing date, irrigation, phosphate and potash on root growth and yield - Butt Close II.

Sponsor: P.J. Welbank.

Design: 3 randomised blocks of 2 plots split into halves and eighths.

Whole plot dimensions: 15.2 x 30.5.

Treatments: All combinations of:-

Whole plots

1. SOW DATE Dates of sowing:

15 MARCH
26 MAY

Half plots

2. IRRIGTN Irrigation:

NONE None
FULL Full to maintain soil moisture deficit below 25 mm

Eighth plots

3. P205 Phosphate (kg P205) as superphosphate:

0
100

4. K20 Potash (kg K20) as muriate of potash:

0
120

NOTE: The second sowing was initially made on 25 April. These plots were severely damaged by birds and rabbits and were resown on 26 May.

Irrigation treatments (mm water):

First sowing		Second sowing	
2 June	19.0	29 June	25.0
30 June	25.0	11 July	12.5
11 July	12.5	27 July	12.5
		29 July	12.5
		10-12 Aug	50.0
Total	56.5		112.5

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Standard applications: Manures: 100 kg N as 'Nitro-Chalk'. Weedkiller: First sowing only: Dicamba with mecoprop and MCPA ('Tetralix Plus' at 5.6 kg in 340 l). Second sowing only: Paraquat at 0.84 kg ion in 280 l.

Seed: Julia, dressed with ethirimol, sown at 160 kg.

Cultivations, etc.:— Ploughed: 10 Nov, 1976. Spring-tine cultivated: 10 Mar, 1977. P and K treatments applied: 11 Mar. N applied for first sowing, all plots spring-tine cultivated, seed sown: 15 Mar. N applied for late sowing, these plots only spring-tine cultivated with crumbler attached: 25 Apr. Seed sown: 26 Apr. Dicamba with mecoprop and MCPA applied to first sowing only: 18 May. Paraquat applied to second sowing only: 25 May. Second sowing plots rotary cultivated and resown: 26 May. First sowing harvested by hand: 31 Aug. Second sowing harvested by hand: 22 Sept. Previous cropping: Fallow 1975, 1976.

- NOTES: (1) Plant counts were made on the first sowing date on 13 April and on the second sowing date on 29 June.
(2) Top and root samples were taken at weekly intervals for estimates of leaf area, shoot numbers, root lengths, crop and root dry weights and NPK content.
(3) Estimates of soil moisture content were made weekly.
(4) Because of an error in weighing, the yields from two plots with the following treatment combinations were lost:

SOW DATE	26 MAY	26 MAY
IRRIGTN	NONE	FULL
P205	0	100
K20	120	120

Estimated values were used in the analysis.

- (5) On one block of the second sowing date yields were not taken because the crop had been severely grazed by rabbits.

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GRAIN TONNES/HECTARE

SOW DATE 15 MARCH

***** TABLES OF MEANS *****

P205	0	100	MEAN
IRRIGTN			
NONE	4.02	4.91	4.47
FULL	6.00	5.84	5.92
MEAN	5.01	5.37	5.19

K20	0	120	MEAN
IRRIGTN			
NONE	4.42	4.51	4.47
FULL	5.55	6.28	5.92
MEAN	4.99	5.40	5.19

K20	0	120	MEAN
P205			
0	4.88	5.14	5.01
100	5.09	5.65	5.37
MEAN	4.99	5.40	5.19

P205	0	100	
K20	0	120	
IRRIGTN			
NONE	3.83	4.22	5.01
FULL	5.93	6.07	5.18

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	P205	K20	IRRIGTN* P205	IRRIGTN* K20
SED	0.210	0.210	0.297	0.297

TABLE	P205 K20	IRRIGTN* P205 K20
SED	0.297	0.420

* WITHIN SAME LEVEL OF IRRIGTN ONLY

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP.SSP	12	0.515	9.9

GRAIN MEAN DM% 88.7

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GRAIN TONNES/HECTARE

SOW DATE 26 MAY

***** TABLES OF MEANS *****

P205	0	100	MEAN
IRRIGTN			
NONE	1.50	1.59	1.54
FULL	1.54	1.66	1.60
MEAN	1.52	1.63	1.57

K20	0	120	MEAN
IRRIGTN			
NONE	1.63	1.46	1.54
FULL	1.58	1.62	1.60
MEAN	1.61	1.54	1.57

K20	0	120	MEAN
P205			
0	1.65	1.39	1.52
100	1.57	1.69	1.63
MEAN	1.61	1.54	1.57

P205	0	100	
K20	0	120	0
IRRIGTN			
NONE	1.77	1.23	1.49
FULL	1.52	1.55	1.65
			1.68

***** STANDARD ERRORS OF DIFFERENCES OF MEANS *****

TABLE	P205	K20	IRRIGTN* P205	IRRIGTN* K20
SED	0.160	0.160	0.226	0.226

TABLE	P205 K20	IRRIGTN* P205 K20
SED	0.226	0.319

***** STRATUM STANDARD ERRORS AND COEFFICIENTS OF VARIATION *****

STRATUM	DF	SE	CV%
BLOCK.WP.SP.SSP	4	0.319	20.3
GRAIN MEAN DM%	87.8		

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STRAW TONNES/HECTARE

SOW DATE 26 MAY

***** TABLES OF MEANS *****

P205	0	100	MEAN
IRRIGTN			
NONE	2.41	2.48	2.45
FULL	2.92	3.29	3.11
MEAN	2.67	2.89	2.78

K20	0	120	MEAN
IRRIGTN			
NONE	2.58	2.32	2.45
FULL	2.96	3.25	3.11
MEAN	2.77	2.78	2.78

K20	0	120	MEAN
P205			
0	2.75	2.59	2.67
100	2.79	2.98	2.89
MEAN	2.77	2.78	2.78

P205	0		100	
K20	0	120	0	120
IRRIGTN				
NONE	2.77	2.06	2.39	2.58
FULL	2.73	3.11	3.19	3.38

STRAW MEAN DM% 83.7

EIGHTH PLOT AREA HARVESTED 0.00012

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STRAW TONNES/HECTARE

SOW DATE 15 MARCH

***** TABLES OF MEANS *****

P205	0	100	MEAN
IRRIGTN			
NONE	4.74	5.22	4.98
FULL	6.68	6.61	6.64
MEAN	5.71	5.92	5.81

K20	0	120	MEAN
IRRIGTN			
NONE	4.89	5.08	4.98
FULL	5.91	7.37	6.64
MEAN	5.40	6.22	5.81

K20	0	120	MEAN
P205			
0	5.36	6.06	5.71
100	5.45	6.38	5.92
MEAN	5.40	6.22	5.81

P205	0	100	
K20	0	120	0
IRRIGTN			
NONE	4.46	5.03	5.33
FULL	6.26	7.10	5.57
			5.12
			7.65

STRAW MEAN DM% 89.3