

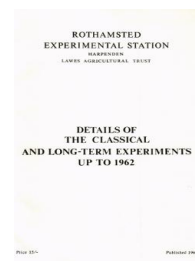
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Irrigation- Woburn

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IRRIGATION EXPERIMENT WOBURN, BUTT CLOSE, 1951 ONWARDS

The experiment tests the timing and intensity of irrigation treatments on (i) an arable rotation and (ii) a long-period grass ley. The treatments which are applied by overhead spray-lines, are decided by the Physics Department on the basis of meteorological data. The details of the irrigation treatments are published yearly in "Results of the Field Experiments".

The experiment consists of four series each divided into 12 main plots providing three randomised blocks of four irrigation treatments each. Three of these series carry in turn the crops of a three-course rotation, the fourth is laid down in long-period ley. For all crops except beans the main plots are split to test two levels of nitrogenous manuring. These dressings alternate on their half-plots in the arable crops, but cumulate on the grass plots.

Main plot size: Arable crops 0.0556 acre; grass 0.0528 acre.

First Period 1951-53.

Rotation: 1st Year Early potatoes (Ulster Chieftain) followed by winter cabbages (January King)
 2nd Year Sugar beet (Kleinwanzleben E)
 3rd Year Barley (Plumage Archer)
 Grass ley: Italian Ryegrass 6 lb., Cocksfoot (S.26) 16 lb., White Clover (S100) 4 lb., Alsike Clover 2 lb. per acre.

Main plot treatments: Four irrigation treatments as specified by the Physics Department. These treatments rotate on the arable plots, but on the grass plots they are cumulative.

Basal manuring:

	cwt. per acre			Supplied as compound fertiliser
	N	P ₂ O ₅	K ₂ O	
Early potatoes	0.5	0.5	0.75	7:7:10½
Cabbages ⁽¹⁾	-	-	-	
Sugar beet ⁽²⁾	0.4	0.4	0.6	7:7:10½
Barley	0.2	0.2	0.3	7:7:10½
Grass Ley	-	0.6	0.6	0:13:13

(1) Commencing in 1952 cabbages received 18 cwt. ground chalk per acre.

(2) Commencing in 1952 the sugar beet received 5 cwt. of agricultural salt per acre. The tops were carted off.

Sub-plot treatments in addition to any nitrogen in basal dressings:

Early potatoes 0 v. 0.5 cwt. N as sulphate of ammonia.

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Winter cabbage	0.5 v. 1.0 cwt. N as "Nitro-Chalk"
Sugar beet	0 v. 0.4 cwt. N as "Nitro-Chalk"
Barley	0 v. 0.2 cwt. N as sulphate of ammonia
Grass ley	0.15 v. 0.3 cwt. N as "Nitro-Chalk after each cut except the last.

In 1952 the winter cabbages failed owing to bird damage.

Second Period 1954-56.

The original scheme was modified as follows:-

The early potatoes followed by winter cabbage were replaced by maincrop potatoes (Majestic) which received a basal dressing of 15 tons of dung in addition to fertilisers as before. The fertilisers were applied on the flat and the potatoes were planted by machine. The variety of barley was changed from Plumage Archer to Herta. The original grass-clover mixture was ploughed up and the plots resown with Cocksfoot (S.27) 28 lb. per acre in spring 1954. The basal manuring for the grass was changed to 0.6 cwt. P₂O₅, 1.2 cwt. K₂O using compound fertiliser 0:10:20. The grass was cut when it reached a definite height, the nitrogen dressings being given independently according to the number of cuts taken from individual treatments. The nitrogen treatments, which now alternated on their half plots, were applied for every cut including the first instead of after every cut except the last.

The lime dressing was fixed at 10 cwt. CaO per acre given as ground chalk for sugar beet.

Third Period 1957-59.

A detailed survey for potato root eelworm made in 1956 had shown a serious build up of this pest on some blocks. Potatoes were consequently replaced by sugar beet.

The new rotation was 1st Year Sugar beet (Kleinwanzleben E)
2nd Year Spring wheat (Peko)
3rd Year Spring beans (Garton's Tick).

The existing Cocksfoot ley (S.37) sown in 1954 was retained. The N splits were changed from alternating to cumulative.

The basal manuring of the main plots was:

	cwt. per acre			
	N	P ₂ O ₅	K ₂ O	Fertiliser
Sugar beet ⁽¹⁾	0.6	0.6	0.9	7: 7:10½
Spring wheat	0.4	0.4	0.6	7: 7:10½
Spring beans	-	0.3	0.6	0:10:20 (placed)
Grass ley	-	0.6	1.2	0:10:20

⁽¹⁾ Also received 5 cwt. salt per acre.

The half plot tests of nitrogen treatments in addition to any nitrogen in the basal dressing were:

Sugar beet	0 v. 0.6 cwt. N as "Nitro-Chalk"
Spring wheat	0 v. 0.4 cwt. N as "Nitro-Chalk"
Spring beans	0 v. 12 tons dung ⁽¹⁾

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Grass ley 0.3 v. 0.6 cwt. N as "Nitro-Chalk" for every cut.

(1) Half plots for dung taken at right angles to the original nitrogen splits.

Since 1957 the spring beans have been used to test demeton methyl as a spray against aphids. The treatments have been (0 v. irrigation) x (0 v. spray). No spraying was done in 1958. In 1957 the outside rows of certain plots were used to test the effect of hormone sprays for setting the flowers. Spring beans and wheat have been combine harvested since 1957.

Commencing in 1958 a test of extra muriate of potash has been made on whole plots of the grass ley, to find out whether the high level of nitrogen on some plots requires a high level of potassium. The treatments which are cumulative are (0 v. irrigation) x (0 v. 0.6 cwt. K_2O). The potash dressing is repeated on several occasions according to the season.

Liming: Ground chalk at the rate of 10 cwt. CaO was applied to sugar beet in 1957. From 1958 to 1960 the dressing was raised to 46 cwt. ground chalk.

Fourth Period Commencing 1960.

The rotation is 1st Year Early potatoes (Arran Pilot) followed by trefoil green manure

2nd Year Barley

3rd Year Winter beans

The Cocksfoot ley was ploughed up and the plots sown down with Italian Ryegrass S. 22 in autumn 1959.

The basal manures on whole plots are as follows:-
cwt. per acre

	N	P_2O_5	K_2O	Material
Early potatoes	-	0.75	1.5	0:14:28 on flat
Barley	0.2	0.2	0.3	12:12:18 in seedbed
Winter beans	-	0.4	0.8	0:14:28 placed
Grass ley	-	0.6	1.2	0:14:28 spring top dressed

The nitrogen splits on half plots are:
cwt. N per acre

Early potatoes	0.6 v. 1.2	Sulphate of ammonia on flat
Barley	0 v. 0.2	"Nitro-Chalk 21" in seedbed
Beans	None	
Grass ley	0.3 v. 0.6	"Nitro-Chalk 21"

The early potatoes carry an additional test on main plots (0 v. irrigation) x (pre-emergence spray, no cultivations v. ordinary inter-row cultivations). After the potatoes are lifted certain plots are immediately sown with trefoil to test trefoil green manure for the following barley crop. The treatments for trefoil are no irrigation v. irrigation before sowing and again before ploughing in.

See Penman, H. L. Woburn Irrigation, 1951-59. I. Purpose, design and weather. *J. Agric. Sci.*, 1962) 58, 343-348. II Results for grass. *Ibid.* (1962) 58, 349-364. III Results for rotation crops. *Ibid.* (1962) 58, 365-382.

Table 56
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3-year means

	O	C	Mean	O	C	Mean	O	C	Mean	O	C	Mean
1951-53	Grass/Clover, dry matter: cwt per acre	72.5	94.5	83.5	Early potatoes, total tubers: tons per acre	6.99	10.58	8.79	Sugar beet, total sugar: cwt per acre	61.9	64.9	63.4
										Barley, grain (at 85% dry matter): cwt per acre	25.0	27.4
1954-56	Grass, dry matter: cwt per acre	54.7	69.3	62.0	Maincrop potatoes, total tubers: tons per acre	14.00	16.95	15.48	Sugar beet, total sugar: cwt per acre	47.4	50.8	49.1
										Barley, grain (at 85% dry matter): cwt per acre	32.7	34.2
1957-59	Grass (same), dry matter: cwt per acre	61.9	79.5	70.7	Spring beans, grain (at 85% dry matter): cwt per acre	14.1	24.9	19.5	Sugar beet, total sugar: cwt per acre	55.9	64.5	60.2
										Wheat, grain (at 85% dry matter): cwt per acre	23.0	28.0
1960-62	Grass (new), dry* matter: cwt per acre	67.2	91.0	79.1	Early potatoes, total tubers: tons per acre	5.58	9.16	7.37	Beans (at 85% dry matter): cwt per acre	19.0	32.2	25.6
										Barley, grain (at 85% dry matter): cwt per acre	24.6	32.4

O = No irrigation
C = Full irrigation.

* 1960-61 (2 years)

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