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Yields of the Field Experiments 1974

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74//W/RN/16 Effects of Deep P K - Wheat, Sugar Beet, Barley, Potatoes

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EFFECTS OF DEEP PK

Object: To study the effects of subsoiling, and of incorporating a large dressing of PK in either the subsoil or topsoil, on yields of a rotation of crops - Woburn Butt Furlong.

Sponsor: J. McEwen.

The first year, winter wheat, sugar beet, spring barley, potatoes.

Design: 4 series of 3 randomised blocks of 4 plots.

Whole plot dimensions: 4.27 x 2.59. Area harvested: Wheat, sugar beet, barley: 0.00033, potatoes: 0.00043.

Treatments: Extra PK and subsoil treatment:-

PK SUB

Extra PK

Subsoil (25-50 cm) treatment

None

None

- -

None

Subsoiled

- Sub

To topsoil (0-25 cm)

None

PKTop -

To subsoil

Subsoiled

- PKSub

- NOTES: (1) The rates of P and K were 1930 kg P₂O₅, as superphosphate and 460 kg K₂O as muriate of potash. These quantities, applied to subsoil, were chosen to equalize available P and K in top and sub soil.
- (2) Subsoiling was done by spade, after removing the topsoil which was then replaced. PK to subsoil was worked in by forking.
- (3) PK to topsoil was applied half before ploughing in autumn half soon after on the plough furrow.

Standard applications: All series: Manures: K₂O at 288 kg as muriate of potash.

Series I: Winter wheat: Manures: (0:20:20) at 290 kg, combine drilled.

N at 100 kg as 'Nitro-Chalk'. Weedkillers: Ioxynil at 0.63 kg plus

mecoprop at 1.9 kg in 340 l. Fungicide: Tridemorph at 0.53 kg in 340 l.

Series II: Sugar beet: Manures: (0:14:28) at 750 kg. N at 180 kg as 'Nitro-

Chalk'. B₂O₃ at 6.7 kg in 340 l. as 'Solubor'. Insecticide: Demeton-s-methyl at 0.25 kg in 340 l.

Series III: Barley: Manures: (20:15:15) at 450 kg combine drilled. Weed-

killers: Ioxynil at 0.63 kg plus mecoprop at 1.9 kg in 340 l.

Fungicide: Tridemorph at 0.53 kg in 340 l.

Series IV: Potatoes: Manures: (13:13:20) at 1940 kg. Weedkiller: Linuron

at 1.2 kg in 360 l. Insecticide: Demeton-s-methyl at 0.25 kg in 340 l.

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Seed: Winter wheat: Cappelle, sown at 190 kg.
Sugar beet: Klein E, sown at 8 kg.
Barley: Julia, dressed with ethirimol, sown at 160 kg.
Potatoes: Pentland Crown.

Cultivations, etc.: - All crops: Deep-tine cultivated: 2 June, 1973. Basal K applied: 8 Aug. Spring-tine cultivated: 9 Aug. Ploughed: 11 Aug. Applied half PK to plots for PK applied to topsoil: 5 Oct. Ploughed: 12 Oct. Applied second half PK to plots for PK applied to topsoil: 18 Oct.

Series I: Winter wheat: Hand dug and PK applied to subsoil plots: 13-23 Aug, 1973. Seed sown: 22 Oct. N applied: 9 Apr, 1974. Weedkiller applied: 29 Apr. Fungicide applied: 4 June. Hand harvested: 21 Aug.

Series II: Sugar beet: Hand dug and PK applied to subsoil plots: 29 Aug - 7 Sept, 1973. Spring-tine cultivated with crumbler: 26 Mar, 1974. N and PK applied: 1 Apr. Spring-tine cultivated and power harrowed: 2 Apr. Seed sown: 3 Apr. Singled: 30 May. Insecticide applied twice: 4 June, 11 July. 'Solubor' applied with insecticide: 11 July. Hand lifted: 22 Oct.

Series III: Barley: Hand dug and PK applied to subsoil plots: 17-26 Sept, 1973. Spring-tine cultivated with crumbler: 26 Mar, 1974. Seed sown: 27 Mar. Rolled: 1 Apr. Weedkiller applied: 8 May. Fungicide applied: 4 June. Hand harvested: 20 Aug.

Series IV: Potatoes: Hand dug and PK applied to subsoil plots: 1-5 Oct, 1973. Spring-tine cultivated with crumbler: 26 Mar, 1974. Spring-tine cultivated: 1 Apr. NPK applied, spring-tine cultivated: 8 Apr. Rotary cultivated, potatoes planted: 9 Apr. Ridges rolled: 18 Apr. Weedkiller applied: 29 Apr. Insecticide applied twice: 4 June, 11 July. Hand lifted: 9 Oct.

Previous crops: Fallow 1972, 1973.

- NOTES: (1) Samples of wheat and barley grain, potato tubers and sugar beet roots and tops were taken for analysis of N, P, K, Na, Ca and Mg.
(2) Spring barley. 4 plots, PKSub --, - Sub, and PKTop - (two) were badly damaged by birds. No yields were taken and estimated values were used in the analysis. As the standard error per plot was estimated from only 2 d.f. it is not presented.

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Standard errors per plot.

Winter wheat, grain, tonnes/hectare:	1.062 or 18.3% (6 d.f.)
Sugar beet, Roots (washed): tonnes/hectare:	2.14 or 6.5% (6 d.f.)
Total sugar: tonnes/hectare:	0.347 or 6.8% (6 d.f.)
Tops: tonnes/hectare:	5.08 or 15.9% (6 d.f.)
Spring barley, grain, tonnes/hectare:	not presented (2 d.f.)
Potatoes, total tubers, tonnes/hectare:	1.68 or 2.4% (6 d.f.)

TABLES OF MEANS

PK SUB

- -	- Sub	PKTop -	- PKSub	Mean
WINTER WHEAT. GRAIN: TONNES/HECTARE				
5.56	6.52	5.23	5.85	5.79
WINTER WHEAT. STRAW: TONNES/HECTARE				
9.03	10.84	10.89	11.04	10.45
Mean D.M. %	Grain: 81.6			
	Straw: 54.2			
SUGAR BEET. ROOTS (WASHED): TONNES/HECTARE				
31.2	32.6	32.0	35.6	32.8
SUGAR BEET. SUGAR PERCENTAGE				
15.9	15.4	15.8	15.4	15.6
SUGAR BEET. TOTAL SUGAR: TONNES/HECTARE				
4.95	5.03	5.07	5.49	5.14
SUGAR BEET. TOPS: TONNES/HECTARE				
29.2	32.6	27.1	39.0	32.0

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PK SUB

- -	- Sub	PKTop -	- PKSub	Mean
	SPRING BARLEY. GRAIN: TONNES/HECTARE			
4.89	5.23	4.53	6.21	5.22
	SPRING BARLEY. STRAW: TONNES/HECTARE			
4.91	5.43	4.89	5.30	5.13

Mean D.M. % Grain: 77.7
Straw: 58.8

POTATOES. TOTAL TUBERS: TONNES/HECTARE				
68.8	65.1	72.1	78.5	71.1

STANDARD ERRORS OF DIFFERENCES

	PK SUB
Winter wheat. Grain	0.867
Sugar beet. Roots (washed)	1.75
Sugar beet. Total sugar	0.283
Sugar beet. Tops	4.15
Potatoes. Total tubers	1.37