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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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74/W/RN/16

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.

74/W/RN/16

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.

74/W/RN/16

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

74/W/RN/16

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
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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