

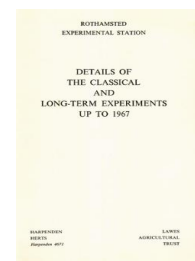
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Details of the Classical and Long-term Experiments Up to 1967

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Deep-cultivation Rotation - Rothamsted

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DEEP-CULTIVATION ROTATION EXPERIMENT, LONG HOOS I AND II, 1944-57

The objects of the experiment were: (1) to compare deep ploughing with shallow ploughing; (2) to test farmyard manure ploughed in at the two depths; (3) to test superphosphate and muriate of potash broadcast on the seedbed or ploughed in before preparing the seedbed. These treatments were tested factorially on a rotation of crops: sugar beet, barley, one-year seeds mixture, wheat, potatoes, spring oats. There were six series, one for each crop of the rotation. Each series had 16 main plots for the combinations of the ploughing, farmyard manure, phosphate and potash treatments. The main plots were split to test the method of application of the phosphate and potash fertilisers. The treatments were repeated on their plots.

System of replication. Two blocks of eight plots each in each series, the four-factor interaction of main plot treatments being confounded with block differences.

Treatments. Whole plots: all combinations of:

- (1) Shallow (6 in.) v. deep (12 in.) ploughing. Ploughing done on stubbles in autumn for sugar beet and potatoes, and on the hay stubble in summer for wheat.

	Sugar beet	Potatoes
(2) No FYM v. FYM ploughed in	10 tons	20 tons
(3) No phosphate v. superphosphate	0.6 cwt P_2O_5	0.8 cwt P_2O_5
(4) No potash v. muriate of potash	0.6 cwt P_2O_5	1.0 cwt K_2O

Half plots: sugar beet and potatoes only:

P or K or PK ploughed in v. P or K or PK in seedbed for sugar beet and in furrows for potatoes.

Size of plots. 0.0132 acre.

Basal dressings. Applied in the furrows for potatoes, as a top dressing to wheat and in the seedbed for other crops:

	Sugar beet (Klein- wanzeleben)	Barley (Plumage Archer)	Ley*	Wheat (Yeoman)	Potatoes (Majestic)	Oats (Star)
Sulphate of ammonia (cwt N)	0.8	0.3	—	0.5	0.6	0.2
Basic slag (cwt P_2O_5)	—	0.6	—	—	—	—

* Seeds mixture: varied slightly but usually 18 lb perennial ryegrass, 8 lb late flowering red clover, 2 lb Alsike clover per acre.

Since 1952 ground chalk providing 10 cwt CaO was applied for barley.

DEEP-CULTIVATION ROTATION

Non-experimental cultivations. These were carried out over the whole of any series, with the proviso that they must not be deeper than 6 in., except that deep-ploughed plots might be worked to a depth of below 6 in. for the root crops.

Ploughing. The plough used for deep cultivations was a Ransome Solo-trac giving a depth of 12 in. at least. In 1944 a Massey Harris Grub Breaker was used which did not always reach 12 in., the actual depth in that year being 9–12 in. Until 1947 the whole of the seeds area was ploughed 6 in. deep after the hay was carted, the deep ploughing being carried out subsequently at the same time as the stubbles were deep ploughed for roots. In autumn 1946 the second ploughing of the seeds could not be carried out owing to wet conditions, so there was no test of deep ploughing on wheat in 1947. In summer 1947 and subsequently the deep and shallow ploughing treatments were carried out directly on the hay stubble.

References

For a summary of results 1944–49 see *Rep. Rothamsted exp. Stn for 1949*, 140.
For a summary of results 1944–56 see *Rep. Rothamsted exp. Stn for 1957*, 193.

TABLE 34
Deep-cultivation rotation experiment
Effects, means over 12 years, 1944–55

Response to	Ploughing			FYM		Phosphate		Potash	
	Mean	Shallow	Deep	Absent	Present	Absent	Present	Absent	Present
Sugar beet, total sugar: cwt, mean yield 45.2									
Deep ploughing	+2.9	—	—	+3.7	+2.1	+2.5	+3.3	+3.3	+2.5
FYM	+6.8	+7.6	+6.0	—	—	+7.8	+5.8	+8.3	+5.3
Phosphate	+1.1	+0.7	+1.5	+2.1	+0.1	—	—	+1.2	+1.1
Potash	+2.2	+2.6	+1.8	+3.7	+0.7	+2.2	+2.1	—	—
Potatoes, ware tubers: tons, mean yield 8.88									
Deep ploughing	0.00	—	—	+0.14	−0.13	+0.23	−0.22	−0.11	+0.12
FYM	+2.66	+2.80	+2.52	—	—	+2.55	+2.76	+3.60	+1.72
Phosphate	+0.62	+0.85	+0.40	+0.52	+0.73	—	—	+0.46	+0.79
Potash	+1.53	+1.41	+1.64	+2.47	+0.59	+1.37	+1.69	—	—

TABLE 35
Deep-cultivation rotation experiment, residual effects
Mean yields, cwt, and increases for deep ploughing, FYM, and P and K
Means over 12 years: barley and oats, 1945–56; hay, 1946–57

	Barley	Oats	Hay	Wheat
Mean yield	32.1	32.2	59.8	33.4
Residuals	1st year	1st year	2nd year	3rd year
Deep ploughing	+0.2	−1.2	−0.2	−0.5*
FYM	+1.8	+1.2	+4.0	+1.4†
Phosphate	+0.6	+0.9	+0.9	+0.2†
Potash	+0.6	+0.1	+1.9	+0.5†

* Direct effect of deep ploughing, 1946 and 1948–57.

† 1947–57.