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## Report for 1930

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### Effects of Farmyard Manure : How Long Do They Last

#### Rothamsted Research

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may winter on the grasses and pass over to the cereals as soon as spring appears; they do not survive on clover, however. Usually the seeds ley receives no manure except what may be given to the barley. Our general experience has been that a dressing of sulphate of ammonia may depress the clover while potash may help it. In the Long Hoos experiment (Rotation II) fertiliser is given to the clover itself as a top dressing in spring, and here quite a different result was obtained; nitrogen greatly increased the yield, potash slightly increased it, but phosphate had no effect. The yields of dry matter were, in cwt. per acre:

Rothamsted heavy soil.

Varying Nutrient.	Dry matter cwt. per acre Doses of Nutrient.				
	0	1	2	3	4
Nitrogen ..	22	33	34	42	47
Phosphate ..	36	35	36	36	39
Potassium ..	33	37	36	37	36

To convert these figures into hay they should be raised by about one-fifth.

In another experiment on Hoos Field the unmanured clover yielded 12 cwt. dry matter per acre (equal to about 15 cwt. hay), while a dressing of superphosphate, muriate of potash, and 2 cwt. sulphate of ammonia raised it to 22 cwt. dry matter or about 26 cwt. hay and heavier dressings yielded as much as 42 cwt. dry matter or 50 cwt. hay per acre.

Evidently if ever hay were needed there would be great scope for manuring the seeds ley.

These results appear to be contradictory to those given by the earlier experiments where the manuring was given to the barley. There is, however, no contradiction. A mixture of barley and clover responds very differently from pure barley or pure clover to manures. Sulphate of ammonia favours the barley more than it does the clover, so causing the young barley to make more vigorous growth and to crowd out the clover. With the pure clover this element of competition is absent, and so long as the crop is not too weedy there seems the possibility that it could advantageously receive nitrogenous manure. Possibly there would be less fixation of nitrogen from a manured crop than from one receiving no nitrogen, but in these days of cheap nitrogenous fertilisers that point is of less importance than it was.

#### EFFECTS OF FARMYARD MANURE: HOW LONG DO THEY LAST?

Two sets of experiments, one at Rothamsted and one at Woburn, give useful information on this subject. The remarkable result is the persistence of the effect when the farmyard manure has been given sufficiently often. Of three plots of barley on Hoos Field, two had farmyard manure every year from 1852 to 1871, both being treated exactly alike, the third had no manure. This unmanured plot and one of the manured plots have remained under the same

treatment down to the present day. In 1872, however, one of the manured plots ceased to receive its farmyard manure and it has been unmanured ever since. That was nearly 60 years ago, and yet this plot gives a 50 per cent higher yield than the one which had had no farmyard manure during those early years. The results in bushels of grain per acre are given in Table IX.

TABLE IX.—Hoos Field permanent Barley : average yields of dressed corn, bushels per acre.

Years	20 years 1852- 1871	5 years 1872- 1876	5 years 1877- 1881	10 years 1882- 1891	10 years 1892- 1901	10 years 1902- 1911	10 years 1913- 1922	8 years 1923- 1930
Farmyard manure each year, 1852- 1931	48.3	49.6	50.8	47.6	44.3	44.3	39.2	25.1
Farmyard manure each year, 1852- 1871								
Unmanured since 1872 .. ..		39.1	29.2	26.5	20.3	18.3	21.0	9.4
Unmanured all the time .. ..	22.0	13.5	14.4	15.8	10.4	9.7	14.3	5.3

For 1929 and 1930 the yields are total corn in 56lb. bushels.

There is no evidence, however, that applications of farmyard manure made only once in four or five years persist for any length of time.

*Comparison of Farmyard Manure with Artificials.* It is much more difficult from the Rothamsted and Woburn data to compare the values of nitrogen in farmyard manure with that in the artificial fertilisers. Over the early period in the Broadbalk wheat field (1852-1864) before the weed complication became serious, a dressing of farmyard manure containing 200 lb. nitrogen per acre gave a greater yield of wheat than 43 lb. of nitrogen in sulphate of ammonia, but a little less than 86 lb., and distinctly less than 129 lb.; the equivalent values seem to be 80 in sulphate of ammonia and 200 in farmyard manure, *i.e.*, 1 in sulphate of ammonia to 2.5 in farmyard manure.

On Barnfield mangolds the equivalents are 125 in sulphate of ammonia and 200 in farmyard manure, *i.e.*, 1 in sulphate of ammonia to 1.6 in farmyard manure.

#### ORGANIC MATTER AND SOIL FERTILITY: A NEW CONTINUOUS EXPERIMENT. ROTATION I. FOUR COURSE ROTATION

It has long been recognised that the return of straw to the soil in the form of farmyard manure is a most valuable method of maintaining and increasing soil fertility, while straw ploughed under the soil without previous rotting is harmful.

Investigations in the Bacteriological Department described in previous reports, have shown that the harmful effect results from an absorption of soil nitrate and ammonia by the organisms decomposing the straw, and can therefore be avoided by decomposing the straw before ploughing it under.