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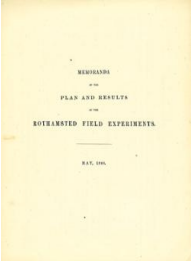
Memoranda of the Plan and Results of the Rothamsted Field Experiments, May 1866



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Experiments on the Growth of Leguminous Crops

Rothamsted Research

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EXPERIMENTS ON THE GROWTH OF LEGUMINOUS CROPS.

I.—Beans, Peas, and Tares.

Experiments on the growth of Leguminous corn-crops, with different descriptions of manure, were commenced in 1847, about 9 acres being devoted to the purpose.

Experiments with Beans were continued for thirteen consecutive seasons, to 1859 inclusive; but, during the later years, the crop fell off very much, and the land became very foul.

In 1860 the land was fallowed.

In 1861 a crop of wheat, without manure, was taken.

In 1862 beans were again sown, but with some variation in the manuring.

In 1863 the land was fallowed.

In 1864, and since, beans have been grown with much the same manures on the same plots as in 1862.

The general result of the experiments with Beans was, that mineral constituents added as manure (more particularly potass, and, to some extent, phosphoric acid also), increased the crop very much during the early years; and, to a certain extent, afterwards, whenever the season was favourable for the crop. Ammonia-salts, on the other hand, produced very little effect; notwithstanding that a Leguminous crop contains two, three, or more times as much nitrogen as a Graminaceous one grown under parallel circumstances. Nitrate of soda, however, has produced very striking effects. But Leguminous crops grown too frequently on the same land seem to be peculiarly subject to disease, which no combination of manuring that we have hitherto tried seems to obviate.

Experiments with Peas were soon abandoned, owing to the difficulty of keeping the land free from weeds; and an alternation of Beans and Wheat was substituted; the beans being manured much as in the experiments with the same crop above described.

In alternating Wheat with Beans, the remarkable result has been obtained, that nearly as much wheat, and nearly as much nitrogen, were yielded in 8 crops of wheat in alternation with the highly nitrogenous beans, as in 16 crops of wheat grown consecutively without manure, and also nearly as much as were obtained in another field in 8 crops alternated with bare fallow.

Experiments with Tares were also soon abandoned, for the same reason; beans being at first substituted, with some variation in the description of the manures employed; but of late this experiment has likewise been abandoned.

II.—Red Clover (*Trifolium pratense*).

Experiments on the growth of Clover, with different descriptions of manure, were commenced in 1849, and, with the occasional interposition of a corn-crop, or fallow, have been continued up to the present time. As with beans, the result was, that mineral constituents applied as manures (particularly potass, and, more or less, phosphoric acid also), considerably increased the early crops; whereas ammoniacal-salts had little or no effect. But since the first few years, all attempts to grow Clover year after year on this land have failed to give anything like a fair crop, or a plant that would stand the usual time on the ground; notwithstanding that fresh seed has been sown again and again. In one year, a portion of the land was trenched two feet deep; one-third of the manure being applied at a depth of 16 inches, one-third at a depth of 8 inches, and the remainder on the surface.

The general result of the experiments is, that neither ammoniacal-salts, nor nitrate of soda, nor organic matter rich in carbon as well as other constituents, nor mineral manures, nor a complex mixture, has availed to restore the clover-yielding capabilities of the land.

It is, however, worthy of remark that, in 1854, Red Clover was sown in a kitchen-garden only a few hundred yards distant from the experimental field, on soil which has been under ordinary garden cultivation for, probably, two or three centuries, and it has every year since shown very luxuriant growth; and, after re-sowing twice during the period (in 1860 and 1865), there is, at the present time, little or no indication of failure.

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