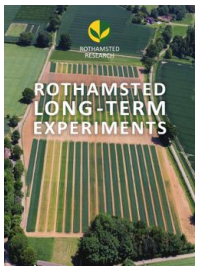
Guide to the Classical and Other Long-term Experiments, Datasets and Sample Archive



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Rothamsted Research

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60 years the difference was smaller at only 0.14 t ha^{-1}. With modern cultivars, and since its reversion to the original design in 1983, average yields of the wheat after a one-year fallow have been 1.6 t ha^{-1}. When expressed on the basis of the whole area (*i.e.* wheat plus fallow), the yield of 0.8 t ha^{-1} is slightly less than the 1.0 t ha^{-1} for continuous wheat on Broadbalk. Since autumn 2015, the whole experiment (both plots) has been sown to winter wheat. A small amount of N fertiliser (50 kg N ha^{-1}) is applied in spring (mid-April), but, to maintain the low soil P and K status, no other fertilisers are applied. No yields or crop samples have been taken since harvest 2015. It was in this field, in 1935, that symptoms caused by *Gibellina cerealis* were first recorded in the UK (Glynne *et al*., 1985).

Woburn Market Garden

The Market Garden experiment started in 1942, originally to look at the effects on crop yield and SOM of various organic inputs; namely FYM, compost and sewage sludge (Johnston & Wedderburn, 1975; Johnston, 1975). The experiment was in grass from 1974 to 1982. When concerns were expressed in the late 1970s about the heavy metal content of sewage sludges being applied to agricultural land, the experiment was "re-activated" to examine the fate of metals that had been applied in the sewage sludge between 1942 and 1961. Archived samples of soils and sewage sludges from the earlier phase of the experiment made it possible to compile, for various metals, a budget of the amount applied and the amount remaining in the soil (McGrath, 1984). Total zinc (Zn) and cadmium (Cd) concentrations in the topsoil were much higher in sludge-amended plots than in those testing other treatments. Calculations suggest that about 80% of the metal load applied between 1942 and 1961 remained in the soil, predominantly in the top 27cm. From 1983, crops potentially sensitive to heavy metals were grown and analysed, as was the soil. Uptakes of Zn and Cd by these crops were minimal, although concentrations of *e.g.* Cd in barley grain could exceed current guidelines when grown on soils with high Cd content. The heavy metals applied in the sludge also affected the soil microbial biomass; more than 20 years after the last application, the total amount of biomass in sludge-amended soils was half that in low-metal soils. It was also found that a strain of *Rhizobium* (*R. leguminosarum* biovar *trifolii*) involved in symbiotic N_2 fixation in clover (*Trifolium repens*) was ineffective in sludge-amended soils, but remained effective in FYM and control soils. Clover grown on the metal-contaminated plots yielded 60% less dry matter than clover grown on uncontaminated plots. Permitted levels of metals in sludges are now much lower than those used in the Market Garden experiment, but results from the experiment were used to help formulate EU legislation to prevent heavy metal contamination of soil.

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This was the only Classical in which crops were grown in rotation. From 1848 to 1951, three different manurial combinations (none, PKNaMg and NPKNaMg plus rape cake, castor meal) were applied to the root crops of two four-course rotations. The rotations differed only in their third course – roots, barley, fallow or legume, wheat. There were only six large plots and only one course of the rotation was present each year. The root crop was turnips or swedes, the legume clover or beans. From 1920, club-root (*Plasmodiophora brassicae*) became progressively more damaging to the

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