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Hoosfield Alternate Wheat and Fallow

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RESERVED AND DISCONTINUED EXPERIMENTS

Barnfield

This was the first of what became the “Classical” experiments, with treatments applied in spring 1843 for a crop of turnips sown in July. The treatments and cropping, although mainly roots, differed until 1876 when a period of continuous cropping with mangolds was started that lasted until 1959 (sugar beet were also grown, on half-plots, from 1946).

Treatments during the first two years were on long narrow plots, as on Broadbalk. However, the design was modified in 1856 when strips testing minerals and FYM, including FYM + PK, were crossed at right angles by series comparing no N fertiliser with both inorganic and organic forms of N supplying 96 kg ha⁻¹ (Warren & Johnston, 1962). Before 1968 this was the only Classical in which N was applied in combination with FYM and FYM + PK fertiliser.

Because yields of continuous roots were declining, perhaps because of increasing amounts of cyst nematodes (*Heterodera schachtii*), the cropping has been progressively modified since 1959 and has included a range of arable crops, with an increased range of N dressings, and grass. From 1977 to 1983 the series that had never received N fertiliser was kept fallow. It was sown to a grass-clover ley in 1984. The remainder has been in grass since 1975.

A feature of the continuous roots and subsequent arable crops was the larger yields on soils given FYM, even where large rates of N were applied in combination with the minerals. This may have been because the extra organic matter had greatly improved soil structure on this field, which is one of the most difficult on the farm to cultivate. Yields of the grass, grown more recently, were also larger on FYM-treated

soils, although no FYM was applied after sowing the grass. This was perhaps because more of the N applied to grass on minerals-treated soils was being used to increase soil organic matter. Accordingly, from 1983 to 2000 a range of N dressings (75, 100, 125, 150 kg N ha⁻¹ per cut) was tested on the grass. The yields with minerals plus optimum N nearly equalled those from FYM. With neither minerals nor FYM there was no benefit from increasing N above 75 kg ha⁻¹.

No treatments have been applied and no yields measured since 2001, but the soil within the different plots still contain different nutrient concentrations, reflecting their past inputs. Consequently, the site is a useful resource for studies on plant nutrient dynamics and was used recently to investigate the responses of wheat roots to supplies of soil P.

Hoosfield Alternate Wheat and Fallow

From 1856 to 1932, this 0.4 ha area, which has received no applications of fertiliser or manure since 1851, was divided into two strips that alternated between wheat and fallow in successive years. From 1934 to 1982, a modification allowed a yearly comparison of a one-year and a three-year fallow but the effects were small and, in 1983, the experiment reverted to the original design. It does receive chalk, when needed, and pesticides.

The cultivar grown has usually been the same as on Broadbalk and the effects of fallowing may be roughly estimated by comparing yields of wheat on Hoosfield with continuous, unmanured wheat on Broadbalk. In the first 10 years of the experiment the one-year fallow gave an extra 0.6 t ha⁻¹, but, over the next