The Agricultural Revolution

During the Middle Ages, the open field system initially used a two-field crop rotation system where one field was left fallow or turned into pasture for a time to try to recover some of its plant nutrients. Later, a three-year three-field crop rotation routine was employed, with a different crop in each of two fields, e.g. oats, rye, wheat, and barley with the second field growing a legume like peas or beans, and the third field fallow. Usually from 10–30% of the arable land in a three-crop rotation system is fallow. Each field was rotated into a different crop nearly every year. Over the following two centuries, the regular planting of legumes such as peas and beans in the fields that were previously fallow slowly restored the fertility of some croplands. The planting of legumes helped to increase plant growth in the empty field due to the bacteria on legume roots' ability to fix nitrogen from the air into the soil in a form that plants could use. Other crops that were occasionally grown were flax and members of the mustard family. The practice of convertible husbandry, or the alternation of a field between pasture and grain, introduced pasture into the rotation. Because nitrogen builds up slowly over time in pasture, plowing pasture and planting grains resulted in high yields for a few years. A big disadvantage of convertible husbandry, however, was the hard work that

had to be put into breaking up pastures and difficulty in establishing them.

It was the farmers in Flanders (in parts of France and current-day Belgium) that discovered a still more effective four-field crop rotation system, using turnips and clover (a legume) as forage crops to replace the three-year crop rotation fallow year. The four-field rotation system allowed farmers to restore soil fertility and restore some of the plant nutrients removed with the crops. Turnips first show up in the probate records in England as early as 1638 but were not widely used until about 1750. Fallow land was about 20% of the arable area in England in 1700 before turnips and clover were extensively grown. Guano and nitrates from South America were introduced in the mid-19th century and fallow steadily declined to reach only about 4% in 1900. Ideally, wheat, barley, turnips, and clover would be planted in that order in each field in successive years. The turnips helped keep the weeds down and were an excellent forage crop—ruminant animals could eat their tops and roots through a large part of the summer and winters. There was no need to let the soil lie fallow as clover would add nitrates (nitrogen-containing salts) back to the soil. The clover made excellent pasture and hay fields as well as green manure when it was plowed under after one or two years. The addition of clover and turnips allowed more animals to be kept through the winter, which in turn produced more

milk, cheese, meat, and manure, which maintained soil fertility.

Charles ‘Turnip’ Townshend, agriculturalist who was a great enthusiast of four-field crop rotation and the cultivation of turnips.

Townshend is often mentioned, together with Jethro Tull, Robert Bakewell, and others, as a major figure in England’s Agricultural Revolution, contributing to

adoption of agricultural practices that supported the increase in Britain's population between 1700 and 1850.