

where it is of importance as an article of animal food. On continents 46° 4' deg. temperature is sufficient, but on islands generally the increased humidity requires to be compensated for by increased temperature in summer. Barley, however, is cultivated as an alimentary plant as far north as either oats or rye; towards the lower latitudes it loses its importance; its cultivation languishes, and ceases altogether on the plains within the tropics, as it suffers more from intense heat than either of the other cereals. It will grow, too, at an elevation far above the range of wheat cultivation. Humboldt met with barley growing at an elevation of 13,500 feet on the Andes, and in Switzerland it may be seen growing at an altitude of 1,950 metres (6,530) above the sea-level; while in our own country we see it cultivated in many districts where wheat cannot profitably be grown. In the south of Europe, Sicily, Italy, and Spain, two crops of barley are obtained in the twelve months; the one sown in autumn is ready for harvesting in the early spring, and the second is then got speedily into the ground, and comes to the sickle at the ordinary harvest time. This variety of barley was known to the Romans, and is fully described by Pliny. It came to maturity in April.

ROTATION.

The evidence already adduced shows that barley requires a large amount of available food (manurial matter) in the surface soil, and that from its habit of sending out its principal rootlets in a lateral direction through the surface soil in search of food, the soil must be kept in a comparatively loosened state during its period of growth, and be left so after the crop is harvested, and the roots have submitted to the usual process of decay. Hence we may assume that place in the rotation to be the best suited for barley in which the preceding crop has left a large amount of fertilizing matter on, or close to the surface, and in which the crop that follows it may not be prejudiced by the loose and open state of the soil it leaves behind it.

This order of cropping is seen in what is termed the four-course, or Norfolk rotation, which is especially adapted for the lighter descriptions of soils on which the finer qualities of barley are generally grown. Here we have barley grown between turnips and clover—wheat being the fourth crop, and preceding the turnips. The turnips, to which a considerable amount of manure has been given, are fed off on the land; and their manurial produce, fre-

quently enriched by the addition of oil-cake or corn, transformed into the shape of solid and liquid excrements from the sheep, is absorbed and mixed up with the surface soil. On such soils, especially after the deep ploughing and extra tillage of the turnip crop, a fine tilth, so necessary for the seed-bed, is readily obtained, and the roots are able to spread themselves quickly through the soil. The clover crop, which follows the barley, has large fleshy roots; these naturally thrive better in a loosened soil than if it were compact and hard, through which roots—those of wheat, for instance—could far more easily penetrate. As the clover roots are developed, the soil gradually becomes firmer and more consolidated; and by the time the crop is finally consumed the pressure on the surface has neutralized the loosening property of the barley, and given the land that compactness which is so desirable for the succeeding crop—wheat. The wheat stubble is ploughed up deep, and left for the weathering influence of the winter months, the manure being either ploughed in with it, or left for the spring ploughing; and the land is then well prepared and in condition for the turnip crop.

If we were to reverse the position of the two grain crops, neither of them would meet with such suitable conditions. The soil would be too loosened by the preceding crops of barley and turnips to suit the requirements of the wheat, while the clover would leave it too firm and compact in texture to be adapted for the growth of barley.

Neither would the chemical conditions of the soil be more suitable than the mechanical. The food would be supplied in the surface soil to the wheat, which has root-power sufficient to seek for it low down in the subsoil; while the barley, whose habit it is to throw out its roots near to the surface, would find the supplies there more scanty than it would like. Thus this place in a rotation is both chemically and mechanically that best adapted to the special habits and requirements of barley.

We see it, however, frequently very differently arranged. The two and the three course systems are only followed on strong clay soils, which in themselves are not suited for barley cultivation. In the five and six course systems, on soils suitable to barley, the same arrangement can be advantageously carried out. Here, however, it is that we meet with variable practices. Sometimes we find it following another grain crop—wheat commonly—where the soil is supposed to be in high condition, and the present rather than the future crops occupy the farmer's attention, the temptation