combined nitrogen coming down in rain, and the ninor deposits from the atmosphere. Part, if not the whole, of this increase is probably derived from the subsoil by deep rooted plants, which afterwards leave a nitrogenous residue with the surface soil; or, possibly, some of it may have its source in the nitrogen of the atmosphere, brought into combination within the soil, under the influence of microorganisms, or other low forms.

In laying down arable land to grass, especially if hay is to be removed, it is essential to supply, not only nitrogenous, but an abundance of mineral manures, and especially of potash, (1) a large quantity of which is removed in the crops, and must be returned. When the grass is not mown, but fed, the exhaustion is much less, but it is greater when consumed for the production of milk than when for that of store or fattening increase.

A. H. PLUMMER.

Compton, Sept., 1898.

(To be continued)

## LUCERNE

Origin-Suitable soil and climate-Seed-bed-Time for cutting

The name of this plant is generally supposed to be derived from the canton or town of Lucerne, in Switzerland. But some great authorities controvert this opinion, although they are at a loss to account for its appellation. Lucerne was known to the ancient Greeks and Romans as a forage plant. We read of it in Virgil, and at the beginning of the Christian era it is written of by several agricultural writers. In Persia and other Eastern countries the plant is still used for horses.

This plant has been pretty extensively grown in England, but a few wet summers have diminished its culture although with the advent of drier seasons there is no doubt it will be much restored to favour. But at the same time the British farmer has never appreciated its merits to the same extent as his continental brethren. In part, no doubt, this is owing to climate, and in part to soil.

Lucerne is essentially a plant for dry climates and dry soils. Cold dry air has no bad effect upon it; but moisture, with or without heat, is directly prejudicial. Its duration depends more upon the subsoil than upon the surface; indeed, the nature of the surface is of small account so long as the subsoil is calcareous. In some parts of the European Continent lucerne remains as good a crop twentyfive years after sowing as in the third year of its existence, but five years is the usual term, and seven years may be considered the fair limit of its vigorous life even on suitable land.

It is interesting to notice the different soils on which Lucerne thrives, but investigation will always prove that whatever the nature of the surface may be there is a substantial agreement in the subsoils where this plant flourishes.

The depth to which the tap-root penetrates is almost incredible. In the first season they will often go down two feet or more.

In many localities Lucerne cannot be cultivated successfully, and it will only be waging a fruitless war against Nature to attempt to grow it on impervious clay, or on any cold adhesive land.

Warm and calcareous soils are highly favourable to its growth, and a sheltered field, sloping to the south, will suit it to perfection, provided always that lime can be reached, (1) for this it must have.

Sometimes there is a strong desire to grow Lucerne on soil deficient in lime. To meet the requirements of the plant a heavy liming should be applied about six months before sowing; but the process is costly, and at best the effects are only temporary. The richer the soil the earlier will Lucerne come to full development, and land should be chosen in which the roots will be able to strike down without undue resistance.

The principal point in the culture of Lucerne is to secure a thoroughly clean seed-bed. Weeds soon ruin the plant, and therefore farm-yard or stable manure, although good in itself, is dangerous from the seeds it may contain. Ash of all kinds is beneficial, and, of course, artificial manures can be freely resorted to. Three hundred weight of superphosphate per acre is a good dressing. The best preparation is a crop of potatoes. As a rule, April is the best time for sowing, and the seed must not be deeply buried. In England, Lucerne is almost always sown alone, (2) while on the Euro-

<sup>(1)</sup> Fairly manured land, unless in the case of very light ands or gravels, needs no potash.—ED.

<sup>(1)</sup> There is lime enough in almost all soils, except barren sands for plant-food. ED.

<sup>(2)</sup> Not in our experience. Our dear friend and farm tutor, Wm. Rigden, who never had less than 30 to 40 acres, always sowed it with a grain-crop. ED.