rally have a considerable mixture of other substances, by which their quality is greatly ameliorated.

The best mode of improving the texture of such a soil, deficient in retentive or adhesive properties, is, by a mixture of clay, marl, warp, (the sediment of navigable rivers), seaooze, sea-shells, peat, or vegetable earth; and it frequently happens, that under the sand itself, or in its immediate neighbourhood, the materials may be found which are requisite for its improvements. Even light sandy soils are thus rendered retentive of moisture and manure; and when judiciously treated, are considered to be more profitable, than the wheat lands in their neighbourhood.

In some parts of Norfolk, they have availed themselves of these auxiliaries, for improving a sandy soil, in an eminent degree: they have thus entirely changed the nature of the soil, and by the continuation of judicious management, have given a degree of fame to the husbandry of that district, far surpassing that of others naturally more fertile.

The improvement of a sandy soil is generally accomplished by fossil manures: but vegetable substances are likewise effectual. Top-dressings of peat and black muck have been tried for that purpose, and the experiments were attended, not only with immediate good effects, but with permanent benefit.

Though sandy soils are not naturally valuable, yet being easily cultivated, and well calculated for sheep, that most profitable species of stock, they are often farmed with considerable advantage.

Sandy soils, however, of a good quality, under a regular course of husbandry, are invaluable. They are easily worked, and at all seasons; they are cultivated at a moderate expense; are not so liable to injury from the vicissitudes of the weather; and in general they have a dry soundness, accompanied by moisture, which secures excellent crops even in the driest summers.

The crops raised on sandy soils are numerous, such as common turnips,—potatoes,—carrots—barley—rye—buckwheat—pease—Indian corn—clover—sainfoins, and other grasses. This species of soil, in general, has not strength enough for the production of Swedish turnips, beans, wheat, flax, or hemp, in any degree of perfection, without much improvement in its texture, the addition of great quantities of enriching manure, and the most skilful management.*

When under a course of cultivation, it is a great advantage to sandy soils, either to fold sheep upon them, or to consume the crops of turnips upon the ground where they are raised. These practices, greatly contribute to the improvement of such soils; and they are thus enabled to produce luxuriant crops not only by the dung and urine thus deposited, but by the consolidation and firmness of texture which the treading of the sheep occasions. When cultivated, manure should be frequently applied, and the vegetable matter should be less decomposed or rotted, than on other soils. Some farmers likewise insert the putrescent manure they employ, at a considerable depth, (8, 10, or 12 inches), to prevent a too rapid decomposition.

The carrot husbandry, in the "Sandlings" of Suffolk, as they are called, is one of the most interesting objects to be met with in British agriculture. After defraying all expenses, the profit is considerable. Some prefer to fatten bullocks with them; while others, who have the advantage of water-carriage, think it most beneficial to send their carrots to the London market. Carrots are likewise an admirable preparation for other crops†.

In Norfolk and Suffolk, it is found that poor sandy soils, not worth 5*s.* per acre for any other purpose, under sainfoin, will produce, after the first year, about two tons per acre, of excellent hay, for several years, with an after-grass, extremely valuable for weaning and keeping lambs. How much more beneficial, than any crops of grain that such soils usually yield‡!

The management of sandy land, according to the system adopted by the celebrated Duckett of Petersham and Esher, in Surrey, has been strongly recommended by an eminent author. It was founded on three principles: 1. Ploughing very deep, by which a due degree of moisture was preserved in his light land, and the crops were flourishing in seasons of drought, which destroyed those where the ploughing had been shallow;—2. Ploughing seldom, but effectually, by a trench plough, or what he called a skim-coulter plough, with which he buried the weeds that grew on the surface: he has been known to put in seven crops with only four ploughings; and,—3 Occasionally raising a crop of turnips the same season, after a crop of wheat, or of tares.

In the Pays de Waes in Flanders, sand is likewise cultivated to great perfection. The soil of that district, which was originally a barren white sand, by a slow, but sure process, has at last been converted into a moist fertile loam. The surface, to the depth of three or four inches, was at first alone cultivated, but the soil was gradually deepened, as it became progressively enriched; and now the ground, at the commencement of every rotation, is trenched by a *shovel*, (the soil being very loose), to the depth of from fifteen to eighteen inches, the exhausted surface is buried, and fresh earth brought up, enriched by the manure washed down into it, during the seven preceding years. It is then subjected to the following course of crops: 1. Potatoes; 2. Wheat, manured, sown in November; 3. Flax manured, and sown with clover-seed, for the next crop; 4. Clover; 5. Rye or wheat, Oats after the rye; and, 7. Buck-wheat; at the end of which period the ground is again trenched.

The double crops raised in the sandy soils of Flanders, in the course of the same year, are attended with much advantage. The Flemish farmers thus obtain a greater quantity of manure, than they could produce under any other system, and by this are enabled to extract so much produce from soils, which were originally sterile, and which would soon revert to their former state of barrenness, without the greatest industry, and the most unwearied attention.

In the management of sandy soils, three rules are to be observed: 1. Never to pick off any small stones that may be found in them, as they answer many valuable purposes: they shelter the young stalk in bad weather; they preserve moisture, and prevent the crops from being burnt up by scorching heats; they hinder the evaporation of the enriching juices; and, by these means, greatly assist the progress of vegetation.* 2. Frequently to renovate the strength of such soils, by laying them down with grass-seeds, and pasturing them for a few years, as they are so apt to be exhausted by tillage, if corn crops are too frequently repeated; and, 3. When farm-yard dung is applied to this description of soil, always to give it in a state of compost, with a view of adding to the tenacity of the soil, and to prevent the manure from being dissipated in a dry season, or washed down by rain.

It may be added as a general maxim, that the fertility of sandy, or siliceous soils, is in proportion to the quantity of rain that falls, combined with the frequency of its recurrence. As a proof of this, in the rainy climate of Turin, the most prolific soil has from 77 to 80 per cent. of siliceous earth, and from nine to fourteen of calcareous; whereas in the neighbourhood of Paris, where there is much less rain, the silex is only in the proportion of from 26 to 50 per cent. in the most fertile parts.

2. *Gravel.*—Gravelly soils differ materially from sandy, both in their texture, and modes of management. They are frequently composed of small soft stones, sometimes of flinty ones; but they often contain granite, limestone, and other rocky substances, partially, but not very minutely decomposed. Gravel, being more porous than even sand, is generally a poor, and what is called, *a hungry soil*, more especially when the parts of which it consists, are hard in substance and rounded in form. Gravelly soils are easily exhausted, for the animal and vegetable matters they contain, not being thoroughly incorporated with the earthy constituent parts of the soil (which are seldom sufficiently abundant for that purpose), are more liable to be decomposed by the action of the atmosphere, and carried off by water.

Gravelly soils are improved by draining, where they are troubled with springs, though this rarely occurs;—by deep ploughing;—by mixing them with large quantities of clay, marl, peat, or other earth; by frequent returns of grass crops;—by repeated applications of manure;—and by irrigation, if the water be full of sediment, and judiciously applied.

Sometimes the ground is so covered with small stones, that hardly any mould is to be seen. Land of this description is very troublesome to work, and is injurious to the implements of husbandry employed in the cultivation; but with proper management, it can often be rendered highly productive. The stones on the surface, by sheltering and keeping warm, in the cold seasons, any small quantity of soil which is amongst them; and by protecting it from the scorching influence of the sun, in the hot season, frequently produce abundant crops.

* The best method of raising wheat on sandy lands is on a clover ley when the soil has got an artificial solidity of body, and is thereby rendered capable of sustaining this grain till it arrives at maturity.—*Brown's Treatise on Rural Affairs*, vol. i. p. 101. Wheat also may be successfully raised on sandy lands after turnips, eaten on the ground by sheep, which consolidates the soil.

† Suffolk Report, p. 125.

‡ Young's Calendar, p. 123.

* Remark by Edward Burroughs, Esq. This of preserving stones, is by some extended rule beyond sandy soils, more especially in hot climates. Even in this country, stones are said to be of use in promoting the depth of thin soils; in rendering the texture of clays less compact, and less apt to subside, and where the soils are *puffy*, in collecting the shifting looseness of the materials.