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The Field.

A New Grub-Harrow.

The implement shown in the accompanying illustration is a recent invention of the Messrs. Howard of the Britannia Iron Works, Bedford, England. As will be observed, it clears two rows of turnips at once, and works close up to the growing plants, cutting off the weeds. What is more important, the patentees state that "it checks the ravages of the fly; it has been found that these troublesome insects will not stay where this harrow is kept at work."

It may be used with advantage as soon as the young plants are above the ground, and also after heavy rains to break the crust and expose a fresh surface of earth. It is adapted for the flat as well as for the ridge, can be expanded or contracted to suit the rows, and with it a man and horse will grub about ten acres per day. The price of the implement is, we understand, £4 10s. sterling.

Familiar Talks on Agricultural Principles.

FERTILITY AND BARRENNESS.

SOME soils are naturally productive. Others are barren; not indeed absolutely so, for the poorest soil will produce something, unless it contains substances poisonous to plants. But we call that land barren, which will not produce useful plants in sufficient abundance to pay for their culture. A poor soil may be made productive by adding fertilizing material to it, but it will not always answer to do this. In some cases it would cost more to make a barren soil fertile, than it would to buy land already rich in plant food.

The presence or absence of those materials which are found in the ashes of cultivated plants, will show whether a given soil be productive or not. Sometimes, from various causes, a soil has never contained those materials which secure fertility; in other cases, land has been deprived of them by successive croppings. Every crop raised on a piece of land takes up a portion of this material which renders soil fertile. Successive crops consume the mineral and atmospheric elements that form the food of plants, and year after year, the yield grows smaller, and the land becomes poorer. It is the object of manuring to make

up the loss occasioned by the raising of crops, and if manure be supplied in sufficient quantity, a soil will retain its productiveness, and even grow more fertile, notwithstanding the harvests that are reaped from it. A soil may be barren for one plant, and yet productive for another. It may be unable to produce wheat, and yet bear an excellent crop of clover, beets, or carrots. There may not be enough of the particular material needed by one sort of plant, while a plant of another kind may find plenty of food suited to its wants. That may be succeeded by still a third description of crop, requiring different food from either of the other two. "Weathering" as it is called, will sometimes restore a particular element of fertility without a supply of manure furnished by the hand of man. It is on this principle that fallowing improves land. By leaving it idle, and allowing the weather to act upon it,—sun, air, moisture, and even the decay of weeds, help to restore a lost vitality. But it is far better to manure land at regular intervals, and then grow a succession of crops differing from each other in the kind of material craved by them. By this means without losing the use of the land while it lies fallow, its productive power is preserved.—This is the system of *rotation of crops* which is now pursued by all farmers worthy the name.

In our last "Talk" something was said about the mechanical texture, and leading characteristics of

soils. But stiffness or looseness, the predominance of sand or clay, and such things,—will not alone determine the question of fertility. A clay soil may be barren, and a sandy one productive. The character of a soil must be determined by the question "does it contain all the materials found in crops?" If it does, it will be productive whether it be stiff or loose in texture,—whether clay, sand, gravel, or lime be the chief ingredient in it.

The following table from Johnston, gives the ingredients of three different soils, with their relative properties:

COMPOSITION OF SOILS OF DIFFERENT DEGREES OF FERTILITY.

	Fertile without Manure.	Fertile with Manure.	Barren.
Organic matter.....	97	50	40
Silica, (in the sand and clay,).....	648	833	778
Alumina, (in the clay,).....	57	61	91
Lime.....	69	18	4
Magnesia.....	8½	8	1
Oxide of iron.....	61	30	81
Oxide of manganese.....	1	3	½
Potash.....	2	trace.	trace.
Soda.....	4		
Chlorine, } chiefly as common salt... {	2		
Sulphuric Acid.....	2	½	
Phosphoric Acid.....	4½	1½	
Carbonic Acid, (combined with the lime and magnesia,).....	40	4½	
Loss.....	14		4½
	1000	1000	1000

An attentive study of the foregoing table will suggest several valuable lessons.

1. It shows the difference between fertility and barrenness. The column devoted to the naturally fertile soil, shows a supply of all the substances found in the ashes of plants. The column exhibiting the soil fertile with manure, though deficient in some of the required material, is in a degree productive, and can be improved by the ordinary course of agriculture. The barren soil is, however, so defective, that it can hardly be made fertile, except at ruinous cost.

2. The true function of the soil is exhibited in the above table. It is not itself plant food, but only the store-house for that food. The soil both holds in readiness for use the material of which plants are formed, and gives protection and support to the plants while they grow. Crops do not devour the soil, but the nutriment of which the soil is a convenient reservoir and repository. The elements that form the ashes of plants exist in the soil in very different proportions from what they do in the plants. Moreover, some of the constituents of the soil, alumina for example, do not find their way into the plant at all.

3. It is possible to change a soil from fertility to barrenness without materially altering its apparent qualities. The weight, bulk, and mechanical texture of a soil may remain unchanged, and yet it may have lost, wholly or in great part, its productiveness. Those elements which exist in a very small proportion in fertile soils are very important, and their absence, will lead to the most disappointing results. This insensible and unapparent deterioration of soils, is a perfect trap to many unreflecting farmers. They

