



From *Bell's Weekly Messenger*.

THE TILLAGE OF THE SOIL.

It is an observation of an excellent Surrey farmer, the result of long-continued and successful practice, that "a farmer should never be contented until all his land has been trenched, and turned over with the plough a foot in depth."—The evidence in favour of this almost universally applicable advice is every season becoming more decisive, and it is at such a period of the year as this, when the rain has now penetrated in some degree through the hard substratum, when the labour of accomplishing this deepening of the soil is thus reduced, that such improvements may be best accomplished. It is hardly needful, in this advanced period of agricultural knowledge, to explain the scientific reasons why deepening the soil increases the productiveness of the land. That the roots of most of the farmer's crops penetrate in deeply loosened ground to a much greater depth than in the shallow soils of former generations of cultivators, and *profitably* too, is a conclusion to which few persons with whom we have to do will dispute. It is now about a century since the great Jethro Tull (he died in 1745) first laboured to establish in England a deeper and a better tillage of the land. His proposition was met, as a matter of course, with all the arguments that the indolent and the bigoted could collect together. It was said that to plough deeper would merely bring on to the surface the inert subsoil—that it would let in the drought—that the land would be *chilled*—that the seeds of new varieties of weeds, hitherto dormant in the soil, would be ploughed up—the labour of ploughing increased, and that the deeper the soil the more manure would it require. It was in vain that Tull laboured, amid the ill-informed cultivators of those days, to show that his own experience was an answer to all these objections. The day had not yet dawned when science was able to show the pretty general correctness of Tull's conclusions, and the baseless nature of the objections with which he was met—objections, it may be remarked, that we still find occasionally employed by the few remaining sticklers for that state of agriculture so tersely described by an honest yeoman of Dorsetshire, when he said of some farmers who thus reasoned and acted, "They are too fond of letting things be as they be."

The chemical researches carried on during the present century have demon-

strated that, with few exceptions, the proportions of the earthy portion of the surface soil, and that of the substratum on which it rests, are nearly identical. That, in fact, as most cultivated soils are composed of merely the more finely divided earths of which the substratum is composed, so the chief distinction between the two is, that the surface soil contains a much larger proportion of organic and decomposing matters than the rock on which it rests. When, therefore the objection is raised as to the *merit* of the subsoil, it may be pretty safely concluded that, in the far greater majority of instances, this deficiency arises from the subsoil not being furnished with decomposing organic matters, a deficiency speedily supplied by its being so far broken up as to allow the roots of plants to gradually penetrate into it. It is also a well ascertained fact that, by deepening the soil, its temperature is raised even at a distance from the surface, an advantage to the roots of the plant, on most soils well understood by the farmer. In some experiments of Mr. Parkes made on Chat-moss, in Lancashire, this fact was clearly demonstrated (*Jour. R.A.S. v. 5, p. 141.*) His observations were made at nine o'clock in the morning, in the month of June, 1837. He found that on the *unstirred soil* the constant temperature from 12 inches to 30 feet was 46 degrees, but on the *well and deeply stirred soil* the temperature was at different depths as follows:—

	At 7 inches.	At 13 inches.	At 19 inches.
June 10	53 0	50 0	48 6
— 15	57 6	53 0	50 6
— 17	53 0	55 6	52 8

Stirring the soil, therefore, raises its temperature; and this effect is produced only by letting into the soil the warmer air of the atmosphere. And we may note that by so doing another good result is produced, since this more copious root supply of the gases and aqueous vapour of the atmosphere increases the health and the vigorous growth of the plants with which the improved soil thus is tenanted. They are better supplied with the carbon which they chiefly derive from the atmosphere; and they are, to an increased extent, preserved from the ill effects of long-continued dry weather. That plants, in fact, derive their chief supply of moisture at such periods from the insensible vapour always copiously present at all seasons in the atmosphere, is a truth not nearly so well understood by the young farmer as the value of the practical application of the truth renders desirable.—

Admitting then the correctness of the principle that in the far larger proportion of soils the increase of their depth materially adds to their productiveness, it remains only for the farmer to consider how that deeper tillage can be accomplished in a *practical and profitable* manner. On many soils the better use of the ordinary plough is only needed to deepen the soil to a much greater extent than at present. It is but on a very limited extent of land that the bringing a portion of the under soil on to the surface is productive of so large a growth of weeds, such as the white mustard, or charlock, &c., as to injure for a time the farmers' crops: On the majority of lands, the raising the substratum with the surface soil does not produce results like these, and it is easy to avoid the error of raising too much to the surface at once. In any case, however, where this effect is apprehended—where, from *want of air and warmth*, the seeds of other crops are suspected to lie hid in the subsoil, without the power of germinating; or where, from want of deeper and better drainage, water, and that, too, perchance, surcharged with mineral substances, is known to exist. In either of these cases, all these difficulties and dangers may be readily surmounted, by the use of some implement by which the subsoil is effectually broken up, *without being raised to the surface*. For by this plan the seeds which the subsoil may contain vegetate, and are destroyed, and the saline or other mineral substances are in the course of a season or two drained off (for it is idle to talk of deepening the soil, if for want of drainage, we only deepen it into water); and, as this recedes from the surface, the roots of the cultivated plants penetrate deeper into the soil, and these gradually supply by their death and decomposition a supply of those substances so necessary to the fertility of all soils.

From the *Berwick and Kelso Warder*.

HIGHLAND AGRICULTURAL SOCIETY.

Mr. MITCHELL briefly alluded to the various theories propounded, and gave reasons for thinking that the failure could not be ascribed to insects, parasitic fungi, or degeneracy in the plant. Insects of the description referred to did not generally prey upon healthy plants; and at all events they had not been seen on the potato plant till after it had shown symptoms of disease. The advocates of the fungus theory had never been able to decide whether the fungus was the cause of