

like effects in the many pests to which our grain crops are found liable to become the victims. Could our soils at some times be freed from too great humidity, at others furnished with sufficient moisture and otherwise fed, strengthened and supplied by judicious cultivation, the plague of rust and mildew, and the ravages of the midge and other insects would have little power to affect them. In order successfully and effectually to accomplish the former of these operations, there has been invented, developed, and perfected the science, I may call it, of underdraining, which has been thoroughly and admittedly adopted and accepted in the old countries of England, Scotland, and Ireland, as the only sure basis of successful Agricultural Improvement. The use of this method of work has only been adopted generally during the last few years, though the idea itself is by no means new, and the wonder is, not that it was so long before being discovered, but that, having been discovered, so long a period has elapsed before being received into practical favor. It is even said that drain tiles have been found in old Roman excavations, but however this may be, we have handed down to us a treatise dedicated to the Protector Cromwell, fully expounding the principles which are now strictly followed in the treatment of lands affected with too much moisture. This was by Captain Walter Bligh, and he says:—"For thy drayning trench, it must be so deep that it go to the bottom of the cold spewing moyst water that feeds the flagg and the rush; for the wideness of it use thine own liberty, but be sure to make it so wide as thou mayst go to the bottom of it, which must be so low as any moysture lyeth, which moysture usually lyeth under the over and second swarth of earth in some gravel and sand, or else when some greater stones are mixed with clay, under which thou mayest go half a spades grass deep at least. Yea, suppose this corruption that feeds and nourishes the rush or flagg should lie a yard or four foot deep, to the bottom of it thou must goe." On the filling in of drains he speaks of using—"Good green taggots or pebbles or flint stones, and fill then into about fifteen inches high, and take thy turf and plant it aforesaid, the green sward downwards being cut very fit for the trench, so as it may joyne close as it is layd down, and then having covered it all over with earth and made it even as the other ground, *waite and expect a wonderful effect through the blessing of God.*" Bligh's suggestions do not seem to have been adopted. And although some instances of thorough draining have occurred during a period of more than a century ago, yet no system was introduced till, in 1764, Joseph Elkington, a Warwickshire farmer, discovered a system of strata draining by deep trenches and boring, which, in some soils is most successful; and subsequently, Smith, of Deanston, introduced the system of shallow and frequent drains, when land was not affected so much by springs as by the stagnation of rain water. From these beginnings, the system has progressed to its present perfection of deep tile drainage, with cylindrical pipes, introduced under the auspices of Josiah Parkes, within the last twenty years. Although even this is not entirely new, as some lands are now to be seen which were drained deep with tiles 40 years ago, to which they owe their present excellent condition, the work having been carefully done, and still remaining effective.

The two systems introduced by Elkington and Smith have each of them their extreme advocates, as is the case with every other subject. This discrepancy of opinion with regard to them arises probably from want of varied experience. The man who deals solely with light and springy lands and subsoils, does not perceive that the treatment he successfully applied in his experience, would utterly fail and be useless in denser soils, and when the trouble did not arise from under-water. He on the other hand who found it necessary to use shallow and frequent drains, on account of the heavy and retentive nature of his soil, injured only by stagnant top water, would fail to appreciate the capability of water to permeate through any stratum to any greater distance than the few inches in depth and feet in width affected in his own experience.

Elkington's system was accidentally discovered by himself, while digging an

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