

be made sooner or later in the main arteries and outfalls. The depth of drains required by the commissioners, before a rent charge on the land is allowed must not be less than four feet.

From the above facts it appears that in Britain there is enormous scope for the improvement of wet lands for many years to come; drainage companies and agricultural engineers will all have abundant work on their hands; and it is equally plain that their labor will be facilitated and made successful on all clay lands by the agency of the steam plough.

Growth of Red Clover with Different Manures.

In the valuable paper on the culture of this valuable plant by the application of special manures, in a recent number of the *Journal of the Royal Agricultural Society of England*, by that scientific and extensive experimenter, Mr. J. B. Lawes, some very interesting and suggestive facts are stated; some of the more important of which we will state in a much abridged form.

The experiments on Mr. Lawes' farm satisfactorily show that some of the crops that are generally grown in rotation will yield a larger amount of produce year after year on the same land, on the application of certain constituents as manure. Thus, a part of the same field, in which the experiments on clover now in question were made, has grown barley for ten years in succession, and on some plots large crops have always been obtained. In like manner, in an adjoining field, wheat has been successfully grown for sixteen years consecutively. Nor is there at present anything in the results to lead to the supposition that these crops might not be so grown continuously for a century.

The results, however, of similar experiments with clover are very different. The practical conclusions derived from a careful comparison of the experiments may be thus very briefly stated:—When land is not what is called "clover sick," that is from exhaustion not

capable of producing a healthy crop at all, the produce of clover may frequently be increased by top-dressings of manure containing potash, gypsum, and super-phosphate of lime; but the high price of salts of potash, and the uncertainty of the action of manures upon the crop, render the application of artificial manures for clover a practice of doubtful economy. On land termed "clover sick," some of the ordinary manures, whether "artificial" or natural, can be much relied upon to secure a crop. So far as our present knowledge goes, the only means of ensuring a good crop of red clover is to allow some years to elapse before repeating the crop upon the same land.

In works on agriculture the failure of clover is accounted for in a great number of ways, among which the following assumed causes may be mentioned:—Exhaustion of the soil by over-cropping and non-manuring; the growth of parasitic plants, which strike their roots into the clover and exhaust its juices; destruction by insects; the injurious influence arising from the matter excreted by the roots of the former crop, or from the decay of the roots themselves; the growth of the young plant under the shade of a grain crop. Although the clover crop may be found to suffer from more than one of the above-mentioned causes, the phenomena which present themselves are nevertheless by no means satisfactorily explained; and so far as prevention is concerned, our knowledge is pretty nearly limited to that of the fact, that the only chance of growing the crop with success is to allow a certain number of years to elapse before repeating it on the same land.

Although clover is generally a more certain crop on this side of the Atlantic than in the old countries of Europe, still even here of late years it has become somewhat precarious on land that has been long under tillage in the ordinary way; and either special manures, or rest,—that is, repeating the crop at longer intervals,—must be given, in order to bring about the former state of productiveness. Much injury is often done the cultivated grasses as well as grains, by the foul state in which the former are often sown. *Clean seed*