

first and second I have myself frequently tried with manifest success. The third is given on the authority of Mr. Worthington G. Smith.

1. SULPHATE OF COPPER, also called "BLUESTONE" or "BLUE VITRIOL."

This substance can usually be procured in any part of Canada from Druggists or General-store Keepers, at about 10 cents per lb. so that the cost of treating seed with the strongest solution recommended below, would not exceed 2½ cents per bushel. The different methods of applying this substance to the grain vary slightly; but the differences are merely with regard to the extent to which it is deemed advisable to wet the seed. Some advise soaking the grain; but it would appear from the results of many experiments that this is not necessary. Mr. Worthington G. Smith advises the following: "1 lb. of bluestone dissolved in 5 quarts of boiling water is sufficient for a sack of four imperial bushels. The wheat is soaked for 10 minutes, or the 10 pints of solution may be poured over till all is absorbed."

2. BRINE AND LIME.

A remedy generally available at country farm houses and from which good results have been secured, is to soak the grain for 10 or 15 minutes in brine of the ordinary strength used for pickling pork (i. e. in which a fresh egg will float). If well stirred many of the smut spores, smutty and imperfect grains, &c., will rise to the surface, and can be skimmed off and destroyed. After the brine is poured off, the wheat must be dried by dusting lime over it until all the grains are white.

It is claimed that sprinkling the brine on the grain instead of soaking it as above, before dusting it with lime has been found successful; but I have never tried this method.

3. ALKALINE WATER.

It might happen that none of the above-mentioned materials were obtainable and in such case the mere washing of the seed would be beneficial. Mr. Smith says "as the spores are lighter than water steeping in brine or even pure water is often effectual, as the spores float, and are easily washed away. Some alkaline ley should be added if water is used, as the oil on the surface of the spores combines with the alkali and forms a soapy substance which is fatal to effectual spore germination."

An alkaline ley suitable for the above purpose may be made by adding to three or four gallons of boiling water, in any suitable vessel, one gallon of hard-wood ashes and stirring frequently until the alkaline properties of the ashes are extracted; or an alkaline solution of sufficient strength may be made by dissolving about 2 lbs. of ordinary washing soda in a pailful of water. (1).

Review.—"Petit Traité sur le Dessèchement et le Drainage des terres," by Ed. A. Barnard, Director of Agriculture, P. Q.; with 35 engravings, pp. 36, Senécal & Fils, rue Saint-Vincent, Montreal, 1887.

This short elementary work on drainage has been forwarded to us rather late in the day, as it has been in circulation for some 10 months.

Mr. Barnard's great experience, extending over more than thirty years of practical farm-life, twenty of which have been devoted to the public service, should be a sufficient testimony to his fitness for the composition of a treatise on drainage, and accordingly we welcome the appearance of this little work, feeling sure that the principles therein laid down must be in accordance with the opinions of those who are known as authorities on the subject.

(1) Chamber-ey can always be had, and is all the better for being kept till the fumes irritate the nose.

A. R. J. F.

The pamphlet being written in the author's native language—a tongue, alas, studied by but a small number of our Anglo-Canadians,—obliges me to translate the passages I propose to quote from the work.

I may as well say at once, that with the exception of one or two very trifling passages, Mr. Barnard's views agree perfectly with those that I have always held from the time I first inspected the Government loan expenditure at Chislehurst, the Regent's Park, and Chesterford—all in England—as may be seen more thoroughly set forth in the series of articles on drainage in the Journal for the months of November, December and January, 1880, '81.

9. "Land is said to be *permeable*, when no water stands in the furrows between the ridges 24 hours after the heaviest rains." A good deal of our lighter soils are in this condition, and for the convenience of the mower, &c., should be ploughed in very wide divisions, or laid in one piece by means of the turn wres, the Brabant, or other plough made for that purpose.

10. "All soils that do not fulfil the above conditions must be drained. They are qualified as *impermeable*." Impermeable is merely a term used to denote great tenacity of texture, owing to which the rain has great difficulty in making its way through such soil. No land, not even our heaviest English Oxford-clay, is really impermeable, if it were, how could the rain-water get into the drain-pipes four feet and upwards below the surface.

11. "Three things are indispensable to the germination of seeds, warmth, air, humidity. To allow the entrance of the two first, the superfluous water must be removed, the necessary amount of moisture will remain." We hear some times people talking about land being *over-drained*—even the late Philip Pusey fell into this error.—There is no such thing, believe me. If meadows look *thinner* after drainage it is because of the removal of the sub-aquatic plants.

15. "Land surcharged with water will remain cold. The sun, while warming the surface, will evaporate part of the water contained in the soil, which evaporation will cause the land to become much colder." Mr. Barnard should have said, "the sun, while *trying* to warm, &c." The warmth only succeeds to the evaporation and does not accompany it.

23, 24, 25. *E seq.*—These numbers refer to the management of the ditch-sides, &c.

In drawing out water-furrows, the team should follow the farmer, who walking across the ridges can easily take the most suitable line for the plough to out. Draw the water-furrows last of all, after having passed the double mould board plough between the ridges, and when done, let a man follow behind and with a narrow shovel throw out the crumbs, and clear the intersections of the furrows and the water-furrows.

35. On the width of ridges. I am glad to see that, though the author recommends a general width of 10 to 15 feet for ridges, he admits the necessity of a width of 5 or 6 feet for some very heavy soils. In such soils, the harrows should be made to cover the whole ridge, so that the horses never set foot on the ridge, but walk in the furrows, and thus avoid tramping the land. The "Roothings" in Essex, England, are all in 3 feet six inches ridges; produce nothing but beans, and wheat alternately, with a fallow every third year, and clover every eighth year; crops enormous, except in very wet seasons.

40. "Drainage is costly." Yes, and here it is very costly, as the ordinary labourer does not in the least know how to set about it. An acre of heavy land would cost:

80 rods of four feet drains at, say, 30 cent... \$24.00
Pipe-tiles for do. 1400 at \$8 p. thousand..... 12.00

\$36.00

I do not think less should be allowed for cartage, freight, &c., than \$2.00 more, and I doubt very much whether any