and the Southern States in the Mississippi Valley for some years succeeding the period of the Civil War. One hundred bushels an acre was at first an average crop. The yield does not now average over twenty bushels an acre for the peanut producing districts of the United States, and the industry in many districts, at the present time, is unprofitable. These low returns are brought about by bad methods in connection with rotation of crops and system of fertilization. Apart from this, the quality of the nut is much affected by environment: soil, moisture, and temperature. It is my impression that it would be folly for any farmer residing outside of the peach growing section of Ontario, to attempt the cultivation of this plant, except upon a purely experimental basis. This latter kind of work is always interesting though not always directly remunerative.

In speaking in this somewhat emphatic manner I do so from the standpoint of personal experience.

EXPERIMENTS AT OTTAWA.

Peanuts were tried here in a small way in 1892-3-4. Each year plants were started in pots in the greenhouse in April. These were set out in warm sandy loam about the time tomatoes are transplanted. Each year, the plants grew vigorously and produced a fair quantity of nuts, but only a small percentage of these were matured when the vines were killed by frost. Obviously, it would not pay to grow them under this method. Again, each season nuts were planted in well prepared warm soil after danger or frost was over. The plants, as in the case of those potted, grew vigorously, and each produced quite a number of partially developed, not to say mature, nuts before they were cut down by frost. The variety tried was the White Virginia nut. I believe the Tennessee Red is somewhat earlier, but I still doubt its ability to mature anything like a paying crop here, even under the most favourable circumstances. Peanuts, unlike tomatoes, or melons and other heat-loving plants, are easily preserved and may be readily transported at any time, so that, as in the case of cereals, distant localities are brought into direct competition with each other.

FODDER.

The fodder produced by the vine (after removing the nuts) of the peanut (Arachis hypogaea), like most of the members of the pulse family (pea, bean, clover, etc) is highly nutritious, comparing favourably with clover hay. The feeding value is greatly increased by allowing some of the nuts to remain on the vines. From this standpoint it might have some value in Canada.

EXPERIMENT SUGGESTED.

To those who are anxious to study the growth of this curious plant, which buries its fruit underground (1) after the latter begins to develop, I would suggest the purchase of a few nuts this spring through a trustworthy seedsman, so that seed of good vitality may be obtained. Plant these, after the danger of spring frost is past, a foot apart and two inches deep, in a warm, sandy corner of the garden. The soil should be mellow. If heavy, it may be improved by ridging. Give clean cultivation, scatter a little lime about the plants after setting out, watch the growth of the plant and the development of the nuts, and do not fail to report your success in the columns of the "Journal of Agriculture" next autumn. If you wish to increase your chances of testing a mature nut of your own growing, I would advise starting the seed in pots in the house, and *transplanting them about corn planting* time.

The above remarks have special reference to the province of Quebec.

(1) Hence its epithet: "Hypogaea." Ed.

DRAINING.

What land requires draining—How grain germinates—Effects of light, &c.—How water enters drain.

It is a remarkable fact, and one that is well worthy of consideration, that in those counties in the East of England where we find the earliest attempts at *thorough draining, the practice of this* remarkable art remained unimproved and was executed in a purely empirical manner; while over the rest of the country, men of really scientific attainments were conducting the operations, and producing ten times the beneficial effect with no additional outlay.

I observe, in an article written some *time ago, by a Canadian gentleman* well skilled in agriculture, that a drainer was imported at a great expense from Britain, and a large subsidy paid to a brickmaker to embark in tile-making; and an idea crept into my brain, that it would have been as well if, before importing the man, the importers had settled in their own mind *what he was to do. I have no doubt* he thoroughly understood his business at home: the climate, the soil and the rain-fall must, if he had gone to work here, have soon convinced him that his pre-conceived plans would need alteration.

I do not speak without having not only thought upon the subject deeply, *but also followed out my thoughts in* practice. I have drained several hundred acres of land on my own account, and inspected the drainage of several hundred acres more, besides having constantly watched the operations of Parkes, Morton, and other well known engineers, employed to superintend the works under the Commissioners of the *drainage-loans in England.*

I began with bushes, next went to stones, then to horse-shoe tiles and soles, afterwards to pipes, and ended with the most perfect of all, pipes and collars. I have drained all sorts of land: light quicksands, heavy London clay, and loam on gravel.

All depths, too, I have worked at, *from 20 inches, to 4 feet 6 inches, and* occasionally as deep as 9 feet, for springs.

I know the cost pretty well, and I know how absurd it would be to attempt to introduce our permanent system into general use here. We have neither men to execute the work, nor money to pay them with if they did it. But *there are cheap and effective ways of* draining land, in our climate and with our soil, that might be employed with the greatest advantage to the individual farmer, and to the nation at large. "Eight bushels and a half of wheat per acre!" (1) Really, the last sentence ought to be suspended in large character in every village in the Province of Quebec: it is *positively* frightful to contemplate such a yield. And why are we so shamefully behind other countries? I answer, because, amongst other faults, our land is undrained. Do you imagine that the crop of nearly 40 bushels of fall-wheat per acre, grown by Capt. Campbell at St. Hilaire, had kept its toes in cold *water all the spring? By no means;* (v., Sep. number 1880) the land was thorough-drained 25 years ago, and no signs of stagnant water are visible over the whole piece.

Nobody knows better than I do, that large sums of money have been thrown away, by men having more money than judgment, in attempting to drain land *in this country without having the* least idea of what they were about. I have seen drains, the conduits of which were scraped by the plough at the ordinary furrow depth! I have seen drains, laid by those who ought to have calculated expenditure a little more closely, 14 inches deep and 14 inches wide, with large stones for top, bottom *and sides. No wonder the ordinary* farmer, seeing these follies, sneered at their perpetrators, and determined, if this were drainage, to have nothing to do with it. And how to win these properly disgusted men back to a calmer view I do not see; but I will try to show them how land may be drained cheaply and effectively with materials *to be found on their own farms, and if* I can induce one farmer in every county of the Province to attempt to follow out as much of my plans as may seem reasonable to him, I shall be satisfied: for I am sure that if the work be done in a careful, painstaking fashion it will not be long before his example is followed by his neighbours.

And first, let us see what land wants draining, and why.

To understand this question thoroughly, we must consider what things are necessary to the germination and growth of the seeds we commit to the bosom of the earth. They are, as far as we know, three in number, viz., air, heat, and moisture. A seed in a *healthy state is a living object, in a* state of repose, but ready to spring into active life the moment it meets with the three concurrent necessaries above mentioned. What is the exciting cause of the vitality of seeds we do not know—it is one of Nature's secrets which she has not yet imparted to man; but we do know what is necessary to ex*cite this vital spark into action, and it* is our business, as farmers, to take care that we foster, and not impede, the efforts of the great mother for our advantage.

If any of my readers have access to a malting establishment, an inspection of the barley on the floor and couch will give them a better idea of the ger*mination of seeds than the longest des*cription. They will see that, on the third or fourth day after the grain has been taken out of the "steep," i. e. a tub of water in which the barley lies for 48 or 72 hours, according to its quality; they will see, I say, a small white bud springing from one end of the grain which, having just seen the light, *shrinks from it, and, turning back, pro*ceeds under the husk to find itself, on its exit at the other end, a green shoot or "plumule". Immediately after the appearance of this bud, the small white rootlets show themselves, and the plant is ready to take advantage of any food within its reach—up to this time it has been fed entirely with the starch con*tained in the seed, which, to secure its* more facile imbibition by the infant germ, has been converted into dextrin, or gum, and then into sugar, by what is called the "Diastase," a substance formed from the "albumen", or nitrogenous portion of the grain. Hence, the sweet taste of malt compared with the original barley: the starch of the one has been partially converted into the sugar of the other; and the maltster takes care to place his "pieces" on the *kiln to dry, before the plumule shoots* forth into the green leaf, and begins to feed upon this substance. "With the assistance of this saccharine secretion," says Lindley, "the root, at first a mere point, or rather rounded cone, extends and pierces the earth in search of food; the young stem rises and unfolds its cotyledons, or rudi*mentary leaves, which, if they are* exposed to light, decompose carbonic acid, fix the carbon, become green, and form the matter by which all the preexisting parts are solidified. Thus, a plant is born into the world, its first act having been to deprive itself of a principle (carbon), which, in superabundance, prevents its growth, but, in some other *proportion, is essential to its existence.*"

We now see why light is not only not necessary to the healthy germinations of plants, but absolutely injurious. In light, the leaves absorb carbonic acid

Fig. 1.

and give off oxygen, and seeds exposed to the light follow the same rule; but in a healthy process, the reverse takes place, carbonic acid is given off, and oxygen absorbed; and how can we better exclude light than by covering the seed with earth? But, as we observed at starting, the earth in which we bury the seed must be in a peculiar condition: it must, first of all, contain air. Though, at a casual inspection, the soil seem to be too closely packed to admit the air, looked at more narrowly it is not so, but the interstices between the particles of the mould will be found to occupy a fourth part of the whole mass. Hence, 100 cubic inches of soil, finely pulverised, contain 25 cu-

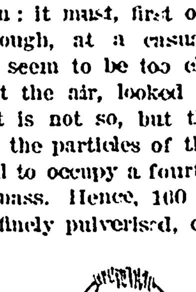

Fig. 2.

bic inches of air; the depth of ploughing being taken at 8 inches, the number of cubic inches of air on an acre will be 12,545,280; and as every additional inch of depth pulverised brings into ac*tivity 200 tons of fresh soil, the ploughing* one inch deeper will introduce into the soil 1,600,000 cubic inches more air.

(1) See Mr. Barnard's Prize Essay July No. 1879, p. 35.