refer to works on botany and vegetable physiology. In these also he will find descriptions and explanations more or less satisfactory of other interesting phenomena, such as the sleep of plants during the night, accompanied by the drooping and folding of leaves, as well as notices of their decay, and the gorgeous coloring that often characterises the change, terminating in the death and fall of the leaf.

How to Exterminate the Thistle.

To the Editor of THE CANADA FARMER:

SIR,—The first number, and the leading article of last year's issue, opened with a broadside on the invading Canada thistle; and I have carefully watched every paper since, to see how the war would be conducted, and with what success. I confess I have been entirely disappointed with the year's campaign. I have heard of timid farmers quitting their homesteads round Fort Erie on account of the invading Fenians, and I have heard of farmers quitting their homes (or rather driven from them) by the bold and still advancing enemy, the Canada Thistle.

Peter Shisler recently favoured us with his methods, also his experience, in the 1st of November number, which, taken in connection with the first of this year's issue, offers a good opportunity for fair criticism. In the first number, the aid of the steam-plough was enlisted to do battle, but in this last case Peter Shisler drops this potent power, and is content with the cavalry plough, which for all plans of a wholesale character is the only one thing needed. The expense of ploughing for a summer fallow, say four times, $4 per acre, cultivating, harrowing and rolling, say another $4—and all to get rid of the thistle. I will now propose a system entirely opposed to ploughing or fallowing; for by observation, I feel certain, fallowing is, and has been for many years, the most certain and infallible way to propagate the thistle by wholesale; for that state or condition of soil which, under the effects of fallowing, makes a good seed bed for wheat, makes also the same for the thistle, and at exactly the same time; for at this time we frequently see (like a little summer snow storm) the thistle with its downy wings floating in the breeze, and settling on the fallow. Some of this seed is ploughed in, some harrowed, and some remains upon the top till stripped of its wings, in any case it seeks no better home. Old meadows in England have had their patches of thistles for (perhaps) more than a century, and they never seem to increase, but how widely different is the case in arable lands the fields of the Canadian farmer can sadly demonstrate.

In looking over *Loudon's Encyclopedia*, I find some very interesting and instructive information respecting the numerous species of the thistle tribe, and the Canada thistle, as it is now called, has its full share of remark. One experiment was made by planting a slip in a garden in the spring, and in the fall it was carefully dug up, the roots collected, washed and weighed. They amounted to five and a half lbs., but with all the care to collect all the roots, sixty plants sprang from pieces unseen. Then again, this plant has been known to send its roots down nineteen feet, and some say much further. It delights to grow on ploughed fields; and, according to Loudon, the best way to subdue them is to lay or seed the land down with grass, and then to cut them off continually for six or seven years, and this plan is recommended as far better than ploughing, &c. Now, before the steam ploughs can be brought to bear upon this question generally, should we not look ahead for thirty years? Then, taking Loudon's seven years, and the steam plough's thirty, I would ask, "Is this seven-and-thirty year system satisfactory?" The thistle is in every sense a perennial. It does not often flower the first year, unless the seed vegetates early in the fall. Now, if we watch its growth, maturity, and decay, we shall find that here, as with other perennials, a provision of organic matter has been stored in the roots for the reproduction of new formed shoots and leaves. If we carefully remove the soil from the collar of the plant, we shall find a healthy spike, some one or two inches long, to remain dormant till spring, and if we examine the asparagus in like manner, we shall find the same provision at the base of each matured stalk, but in greater numbers. These embryo buds are exactly analogous to buds on the branches of trees. Now, if we can ascertain to a certainty from whence these buds (either above or below the ground) derive their formation, we can then (by removing that cause) destroy any plant, or tree.

I have heard men that have been assessed at $12,000 a year, and whose matured age is indicated by grey locks, speak gravely on this important question thus! "There is a time (an exact time) in the age of a certain moon, but they are not quite sure which day or hour, or whether it happens by day or night, when, if they are cut down, they will surely be killed." Other men of like age will stand with folded arms and look contemptuously. If you ask why they grow so many thistles, and tell them they can be destroyed as well as cultivated, they will reply in this wise: "Don't you think to tell me anything about thistles; I tell you they can't be killed. I have now cultivated this land turned forty years, and they are just as bad now as ever, and I think a little worse, and I have tried all sorts of ways and find it no use, and I have left off for years bothering myself about them." This class of men can only be convinced by actual demonstration. Let me, then, endeavor to convince one and all that the process of exterminating thistles in ploughed fields is much easier and more certain than has hitherto been generally admitted, and instead of losing $8 per acre, besides a year's crop, the farmer shall be convinced that he is a clear gainer by adopting such a process. Peter Shisler speaks of *three* ways that have proved successful; first, cutting off below the surface so as to leave a hollow, which will cause them to rot; the second is to salt them; the third is frequent ploughings. The latter plan has been shown to be the principal if not the only way to rapid extension; while it occasionally destroys the old stock, it ensures a more numerous young one. The second is to pickle them, which as soon as proposed is abandoned by reason of its inapplicability. The first is the correct one to meet all cases, including that of thistles growing round stumps, line fences, &c. To make it clearly understood, the writer should have stated at what time or times this operation should be performed. I will endeavor to supplement this defect.

The writer of the steam plough remedy, mentions one plan that will not kill them, namely, that "you may hoe or cut them off ten times without effect." Here we have two plans brought forward, one that will, and one that will not kill the thistle. Peter Shisler, I think, is astray when he says, "the subject of his letter has become almost threadbare." It will be time enough to drop the subject when we see field after field stripped of this invading scourge as fast as we now see them taken possession of. This year I have seen crops of grain, the bulk of which has been made up of fully fifty per cent. of thistles. Permit me to give the results of my limited experience, and to indulge in the hope that it may be useful to younger men, and, perhaps, even to the aged and grey-headed. To exterminate either weed, useful plant, or tree, I am persuaded the most effective method is the exhaustive principle, reduced to simple practice. During the first spring of my residence in Canada, I planted about four hundred rhubarb plants, and by August following they had attained a large size, and vigorous growth. An old female neighbor came to make some purchases, and passing this particular plantation of rhubarb, she at once drew up, and in an earnest, but friendly manner, requested of me to pluck it, and take it to market and make something of it, as the frost would come by and by, and destroy it all. I demurred, but she insisted. I said, "what shall I do for a crop next year?" She replied, "It will grow again; I have some roots this year, and I have plucked the last leaves off this very day." After the growing season had commenced next year, I asked my kind adviser how her rhubarb was growing. She replied, "Ah, man, it never grew any more." Last year, I cultivated a piece of mangold wurtzel for a farmer, choosing as foul a piece of land for thistles as Canada can exhibit. In starting, I said, "Now if this simple process of mine annihilates the thistle what will you say?" "Say," he replied, "why, that it is effectual; but I don't believe it." I saw him this fall, and without asking him, he told me that not one thistle has made its appearance since. I had applied the exhaustive system, and fully succeeded. Last year, also, a young farmer asked me to go with him to look at a piece of carrots. I found it an excellent crop, and about two inches high; also a perfect crop of thistles about fifteen inches high. They had been neglected for want of time. He then took me to another field where there was growing a crop of early potatoes, telling me this piece of ground was quite as bad as what I had seen; yet here there were no thistles. I enquired how he had managed. He said he had to keep the ground hoed down to save his crop. I asked if he allowed any of the tops of the thistles to ripen; he said no. Now, this young man had no idea that hoeing them had destroyed them. Twenty years ago, there was an interesting subject discussed in the *Gardener's Chronicle*, (edited by that master mind, Dr. Lindley). The subject was, the Brake-Fern. In a district of England, there was a common, on which the native crop consisted principally of the brake-fern. This plant yielded every fall, when ripe, a crop for bedding for cattle, etc. The demand gradually increased. Different parties (to secure their supply) began to mow them before they were ripe, and this continued till they effected the destruction of the plant, and so cut off their supply, without knowing the reason why. So in like manner if you mow off the asparagus stalks just as they have attained their full growth, (say, at the end of August,) it will not live to bear the second repetition, because the source whence the supply of newly organized matter comes is removed, and no buds are formed around the base of the stalks.

Since reading of the destruction of the brake-fern I have experimented (and doubtless thousands of others have also) on some of the most obstinate of weeds, and find no weed, plant, or tree, that will not succumb to the treatment of only removing its green leaves. Take, for instance, a seedling of any of the Brassica tribes, as turnips, and remove its first pair of leaves, and you at once destroy the plant. Although the roots are perfectly healthy, they possess no power or faculty of preparing any food even for their own extension. But when the bulb is formed, they will put forth, and bear the removal of many leaves; yet the end is certain—namely, Exhaustion. There are many plants, the roots of which take much more time to exhaust of their store of organic matter than the thistle; for instance, parsley, cloves, horse-raddish, couch-grass, brake-fern, and the common dock.

The conclusion of this article must, for want of space, be deferred till another issue.

Notes on Tree Plantations.

In a sugar orchard, with the trees in straight rows, about 6 feet apart both ways, an acre, at this distance, would contain 1210 trees. This would not be too close planting, as there are many places in the woods where full-grown maples can be found as close as this—the tall, clear, straight, and finest specimens are where the trees grow thick. Light troughs could be suspended along each row for the collection of the sap, and all running into one or more common receptacle, would dispense with the necessity of having a sap-pail to every tree. One row should be omitted at certain distances, as a roadway, for convenience in passing through the plantation with teams. On a rich soil, if the trees are planted and cultivated like Indian corn for a few years, until they completely shade the ground, they would be, in ten or fifteen years, large enough to yield some return, and after that period there would be few, if any, as valuable acres on any farm. The incisions, in tapping the trees, are invariably made too large. A mere gimlet hole is every way as good as a larger opening, and will quickly heal over. Many sugar orchards are being ruined by this cause. The trees are literally girdled to death.

Why is the opinion so prevalent that a tree is a thing of slow growth? It must be more from not giving thought to the subject than from lack of knowledge. A writer in the *Prairie Farmer*, in recommending the European larch as a timber tree for that region, gives the result of an experiment, showing its rapidity of growth. Trees at three years of ago were set out at four feet each way, and after growing eight years more, ranged from five to six inches in diameter at the base, and three to four inches, ten feet above the ground, and they were eighteen to twenty feet high. These measurements accord very nearly with others taken in New York, where trees, after growing ten years from transplanting, are about twenty-five feet high, and eight inches in diameter at the base. Everything connected with the growth of timber will soon become a matter of general interest even in Canada, as our forests are melting rapidly away, and necessity will compel us to raise timber plantations. J. F. C.