

the land. The roots of the couch and other weeds run from these places into the cultivated ground, where they are cut up into little bits by the plough, and extensively propagated. Couch can be picked out of land when there is a single plant or so in it; but it is exceedingly difficult to pick up all these small pieces, and they remain to become centres from which fresh plants are sent out to choke the growing crops.

2. With regard to our second point—the propagation of weeds by manure heaps—it is a very important question how farmers grow weeds from the seeds being scattered in the manure heaps.

Some two or three years ago I was on a farm upon which the farmer had commenced the growth of flax. In that flax was a quantity of black mustard seed—not the common charlock (*sinapis arvensis*), but that charlock with the smaller seed and flower, and usually a smaller plant, *sinapis nigra*. This is much more general than the other. I saw that there could not be a ready market for this flax, from the prevalence of the black mustard. The seed was thrashed out, the charlock seed was separated, but it was not burnt or destroyed as it should have been, and some of the refuse seed got into the fold yard, and it was mixed up in the manure heap. It is commonly supposed that if weeds are put into a manure heap, they will rot and decay; and so most plants will, but there is a vital principle in the seed that will resist decay (for it is the principle which is to bring about the new plant) longer than any other portion of the plant. The result was that in this case, where the manure containing the seed was carried and spread over the land, the next year it was quite covered with this charlock, while the other portions of the land were clear. But now what is a very remarkable circumstance respecting that farm is this: that whereas the common charlock was formerly the rule over that farm, now it was the black mustard. And this is easily explained when you remember that the common charlock will only produce some 4000 seeds, whereas the black mustard is so prolific as to produce about 8000 seeds to a plant; thus the greater fecundity of this plant enabled it to gain the entire mastery. If you take almost any crop you have threshed, barley, for instance, and having separated the barley, examine the tail barley that is left, you will find a quantity of seeds of weeds. I got a sample of tail barley the other day from Wiltshire, and counted in it no less than 20 different species of weeds: some of the black mustard, some of the common charlock, some of the climbing buckwheat, &c. I was brought to ask, What became of this refuse? "Well," said the farmer, "there's a quantity of barley in it, and it don't do to throw it away, so I throw it about the farm yard, and let the fowls pick it up;" and the result of that was that it got after all into the manure heap, and from thence the seeds were regularly and systematically planted over the farm. To give you some notion of the quan-

tity of weeds that may be found on a spot where manure has been placed, I will mention a striking fact. In Berkshire in 1859 I went into the middle of a grass field, and in a small spot upon which a manure heap had stood, I counted no less than 30 species of weeds which had taken root. Now what would a farmer usually tell me with regard to this? Why, that the weeds were natural to the soil. But the fact was, they were taken there with the manure. There were the common sow thistle, and the corn sow thistle, the gromwell, nettles, poppies, two or three species of chamomiles—in fact all the common agrarian plants, and not meadow plants. On another occasion I recollect going into a field that ought to have been turnips, but I could not see a turnip at all; the whole field had been taken possession of, from one end to the other, by the stinking chamomile. I was naturally curious to know how it got there. It was just this:—The manure heap from which those turnips had been manured was an old one, and on the top of it the stinking chamomile had been growing. This plant will grow better on the top of a manure heap than elsewhere; and each one will actually develop from 60,000 to 70,000 seeds. These, shed on the top of the heap in autumn, were regularly scattered and planted over the field. This shows how without care weeds may be scattered over our fields. If we know such facts as these, we have only to avoid such a means of weed cultivation.

3. Let us now consider the third point—the growing of weeds with crop seeds. I believe until I commenced investigating this matter its value was scarcely understood.

Very frequently with the seeds you buy at market from different seedsmen, you buy quite sufficient weed seeds to become a crop, and cover the ground; you will see that this is a very fertile source of weed cultivation. In one of six samples of clover I have sown I found 21 seeds of common weeds would be sown in every square yard; in another 32; in another of Dutch white clover, usually a foreign seed and very dirty, 66; and in another the enormous number of 174. Suppose you parcel out a square yard, and take 174 seeds, or a quarter of them, and dot them about, and when you are told that some of these will occupy several square yards to itself if it grows well, you can hardly expect a crop to grow, and you see plainly how you must be growing weeds. In order to show you that I do not speak without book I will give you some cases. I have entered very minutely into this matter. I took the trouble of taking pints of various kinds of clover (and a great deal of trouble it was), and ascertained by counting the number of seeds of weeds they contained, and the results arrived at were somewhat remarkable. Multiplying these pints into bushels gave some surprising figures. Here are six samples of red clover. In a bushel of one kind I found 1,085,415 weed seeds; in another 2,524,160. Without troubling you by going through the whole