

or witch grass, and see if all the underground parts of these are roots or if some of them are stems.

You have all tried to pull plants out of the ground ; and in doing so, you have noticed that some pull up quite easily and others with much difficulty. Pull up, for example, a corn plant or an oat plant and then pull up a burdock or a clover plant. Why is it so much easier to pull up the corn or oat plant than the burdock or clover plant ? If you will dig down into the earth you will see that the clover and burdock plants have a long main root extending deep down into the earth, and that other smaller roots branch off from this at different depths and extend out into the earth in all directions, whereas the oat and corn plants have no such main root, having only the smaller roots extending out from the base of the stem. Hence the oat and corn plants are much

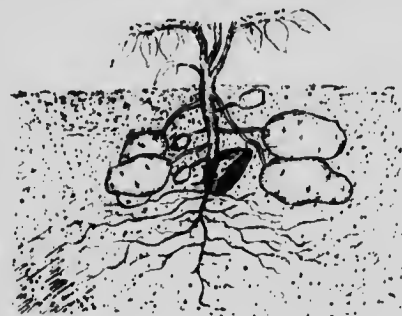


Fig. 10. Showing the tubers arising from the stem and quite distinct from the roots of the potato plant.

more shallow-rooted than the clover or burdock. If you will pull up a number of plants you will find some like the corn and others like the burdock or clover, some with very deep and others with very shallow roots. This is one of the many reasons why a good farmer grows different crops and not always the same crops, or, as it is called, follows a "rotation of crops" on the same field from year to year. One year he may grow deep-rooted plants, and these will feed upon the food that is deep down in the earth, and the next year he will grow more shallow-rooted plants, which will feed in another part of the soil; and thus the plants are not so likely to use up all the food from any one part of the soil.

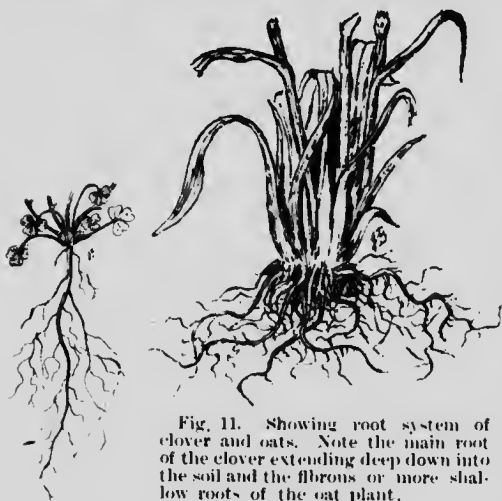


Fig. 11. Showing root system of clover and oats. Note the main root of the clover extending deep down into the soil and the fibrous or more shallow roots of the oat plant.

This main root, which you noticed in the clover or burdock is called the primary root. The smaller roots growing from the primary root are called secondary roots. These in turn may branch, producing third or tertiary roots, and so on until the whole root system of the plant is formed. When the primary root is very much larger than the secondary roots, as we have already seen in the beet, carrot, turnip, and dandelion,

it is called the tap root. In the case of the corn or oat plant, you will not have noticed any primary roots. As a matter of fact, if you were