

which is known as albumen. One of their essential constituents is nitrogen. Albuminoids differ from starch, etc., in the possession of nitrogen, which these latter substances do not contain.

Just as nitrogen is essential for the animal so it is, curiously enough, for the plant, and just as it is the most expensive element which we have to purchase, when buying foods for our cattle—because it is these concentrated foods which are sold at high prices that contain the largest amount of nitrogen, and which really in a large measure gives them their value—so it is that these forms of plant food or fertilizers, which contain large quantities of nitrogen, which cost the most.

By observing the brackets on the above chart you will notice that nitrogen is placed among the air-derived elements and also among the soil-derived elements.

What do I mean by that? I mean that under ordinary circumstances, that is, with most of our farm crops, nitrogen is a soil-derived element, but that under certain circumstances, as with the clovers, it may be an air-derived element. This is a very important fact, and one which we should thoroughly understand. The air which we breathe consists mainly of oxygen and nitrogen—practically four-fifths nitrogen and one-fifth oxygen. It also consists of small quantities of carbonic acid gas. The latter is given off from our lungs, and exists in the atmosphere at the rate of four parts per ten thousand. This apparently small quantity of carbonic acid gas furnishes a large portion of the food of plants. But I wish specially to refer to the part that atmospheric nitrogen plays in agriculture. There is only one class of plants, as far as present known, which is able to appropriate or assimilate or build up into their tissues this atmospheric nitrogen. Although there is a very large quantity of atmospheric nitrogen, yet for the majority of our farm crops it is absolutely useless. For cereals and roots and grass we have to give from ten to fourteen cents a pound for nitrogen when we purchase commercial fertilizers. The nitrogen of the atmosphere is quite valueless for the classes of plants I have just mentioned. But it is different with the pod-bearing plants or the legumes. These comprise clover, peas, beans, vetches, etc.

I should like to indicate how it is that these plants are able to assimilate this atmospheric nitrogen. It has been said by some one who was able to take the birdseye view of the progress of the world, that electricity and clover culture are revolutionizing the world. That expression really gives voice to a truth. I believe that this discovery, which is quite a recent one, is revolutionizing our agriculture. Its application is certainly lessening the cost of production of our other farm crops. By the aid of certain bacteria or germs that exist in the nodules or the roots of clover, peas, etc., this atmospheric nitrogen is appropriated and assimilated. In turning under such a crop we enrich the soil with nitrogen for the use of future crops.

We are speaking to-night more particularly upon the resource of plant food for orchards. Apple trees must take their nitrogen from the soil. They cannot absorb it from the atmosphere. It must be furnished in some available

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