

should not be allowed to ripen before cutting for hay. The comparison of the food value of all the grasses examined is a matter of such extreme detail, that I fear it will be impossible for me, this morning, to enter upon it. In conclusion, I may say, that the examination of our Canadian grasses is not yet completed, but during the present summer we hope to do a considerable amount of work to increase our knowledge of this subject, which is of very great importance to farmers and dairymen, and to bring this investigation to a conclusion.

VALUE OF LEGUMINOUS PLANTS FOR GREEN MANURING.

In my report for 1893 will be found the analyses of several leguminous fodder plants. The botanical family, leguminosae, is one comprising the pea, bean, clover, vetch, and some others of a similar character. I wish to call particular attention to this class of plants, because whether we grow them as foddors or for the purpose of green manuring, they are extremely valuable and important. As foddors, they exceed in food value the ordinary bulky foddors, such as Indian corn and the grasses. They are very much more valuable, weight for weight, than these, and their cultivation improves the soil, not only a tilth, but also in the elements of fertility. A few words in explanation of this may not, here, be out of place. It has long been known that by turning under a crop of growing clover, the soil may be very much enriched, but until quite recently the reason for this has not been rightly understood. It was thought that owing to the fact that clover was a deep-rooted plant, which drew its nourishment largely from the sub-soil, by the turning under of the clover, this nourishment drawn from the sub-soil was added to the surface soil, to be used by subsequent crops. This is but a small part of the truth. We know now that clover and pease, and the rest of the class to which these belong, obtain their nourishment as far as one important constituent is concerned—in a very large measure, from the atmosphere. It is for this very reason that these plants are of so much importance, from an economic standpoint, both as sources of cattle food and for the purpose of green manuring. A further word of explanation may be added to make that clear. We all understand now that the essential elements of plant food, necessary to be returned to the soil if fertility is to be maintained, are three in number, viz., nitrogen, phosphoric acid and potash. Of these three, nitrogen is the most costly. In the form of commercial fertilizers it costs about 15 cents a pound; phosphoric acid and potash cost from 5 to 7 cents a pound. Nitrogen therefore is the most expensive of all plant foods. The same is true when we come to consider animal foods. The most important and the most costly constituent of foddors are the albuminoids, the characteristic element of which is nitrogen. So that whether we feed plants or animals, to do so economically, we have to look for a cheap source of nitrogen. Now the legumes, alone of all classes of plants, are able to appropriate, absorb, assimilate, and convert into their own tissues the free nitrogen of the atmosphere. All other plants have to take their store of nitrogen from the soil. This is one of the greatest and most important of recent discoveries of agricultural science, and it is one that when widely known and practised must certainly prove of the utmost value to our farmers. Plants may, therefore, now be divided into two great class—the NITROGEN COLLECTORS, viz., clover, pease, beans, vetches, lupines; and the NITROGEN CONSUMERS, which class includes all other farm crops.

In many parts of the world where this knowledge has been disseminated, accepted and put into practice by the farmers, agriculture has been revolutionized, and this is more particularly the case where the soils so improved have been originally of a light and sandy character. The growing of the legumes, it is to be understood, then, affords a means of taking a large amount of free nitrogen from the air and converting it within its tissues into a very important and valuable material, which, when turned under, furnishes readily assimilated food for succeeding crops, at the same time the humus or the vegetable matter thus added to the soil very materially improving its tilth. In light and sandy soils it increases the capacity of the soil for moisture, and fermentative changes also take place which not only improve the tilth but finally result in a setting free of mineral plant food. I must not further