

as a food either by pasturing it or cutting and feeding in the barn. In either case, under proper management the excreta of the animals consuming the crop will be worth as manure about three-fourths as much as the entire crop would be worth if incorporated in the soil. If we turn the crop under, then in the one case we get its full manurial value. If, on the other hand, we feed it and carefully save and apply the excreta, or if we pasture and so manage that the droppings are evenly distributed, we have the food value and about three-fourths of the manurial value. The sum of these two in the great majority of instances will be greater than the full manurial value. There are, of course, conditions under which the crop cannot be profitably fed, either because of the absence of stock necessary to consume it or because of the location of the field. In such cases, the turning under of the entire crop may be wisest.

There can be no doubt that the latter practice is much more often in place upon light and sandy soils than upon the better soils. Upon the light and poor soils, legumes, not finding nitrogen in the soil, are forced to take it from the air. Upon the richer soils they would take it from the soil itself and there would be no essential increase in this element as a result of green manuring. This has been very strikingly shown by Julius Kuhn. Kuhn's experiments were carried out in 1891 at Haile, Germany. The soil was a good medium loam. It had produced wheat in 1890. After the wheat was harvested a mixture of 194 lbs of peas, 44 lbs of vetch and 35 lbs of yellow lupine seed per acre was sown. The resulting crop was plowed under the last of October and rye was sown. The quantity of green material plowed in amounted to 8650 lbs per acre. This supplied about 50 lbs of nitrogen. In the spring of 1892 the field was sown to barley, and also an adjoining field not green manured. The crops were practically equal under the two methods of treatment. In this case, then, green manuring produced no appreciable benefit. Kuhn estimated that the crop plowed in would have been worth for feeding about \$13 per acre. On the other hand, the same experimenter found that on a sandy loam, green manuring with field peas sown in the rye stubble after harvesting increased the crop of barley the following year to the same extent as an application of about 175 lbs of nitrate of soda. In the latter case, green manuring paid, while in the first it was attended with loss.

FERTILIZING INGREDIENTS IN ROOTS AND STUBBLE IN ONE ACRE.

Plant analyzed.	Depth of soil from which roots taken.	Roots & stubble (water free), lbs.	Nitrogen, lbs.	Phos acid, lbs.	Potash, lbs.
Timothy and red top.....	3 ft	8223	90.1	25.2	55.8
Buckwheat.....	1 ft	483	4.4	1.3	3.8
Cowpea.....	28 in	1904	25.9	7.5	20.6
Clover.....	3 ft	2806	60.2	15.1	45.4
Vetch.....	22 in	1555	27.2	7.2	27.7
Yellow lupine.....	30 in	1429	15.7	4.9	23.4
Blue lupine.....	30 in	1256	10.7	2.9	12.5
White lupine.....	30 in	1034	11.0	1.9	10.7
Horse bean.....	22 in	1759	51.8	6.1	19.5
Soy bean.....	22 in	701	8.6	2.2	5.7

Numerous experiments in the United States establish beyond a doubt the possible benefits of green manuring upon the lighter and poorer soils. It is important to point out that even when the crop is fed the manurial value of its stubble and roots may be considerable. Especially is this true concerning the legumes (clover-like plants). A great deal of work to determine the manurial value of the stubble of different crops has been carried out at the Storrs school experiment station, Ct. Some of the leading results of Prof Wood's investigations are shown in the table.

It seems desirable to remark, in connection with this table, that while the work was no doubt accurately done it appears doubtful, in view of known facts and the results of others, whether the results of these investigations do justice to the plants of the clover family. Indeed, in his report the author quotes results of other investigators, showing several times more nitrogen in roots and stubble of clover than his own investigation discovers. Thus, for example. Dr Voelcker of England is quoted as reporting 100 lbs of nitrogen per acre in the roots only of clover, while Dr Weiske of Germany is quote as reporting 180 lbs in the roots and stubble. Dr. Weiske is also quoted as reporting in the roots and stubble of rye 62 lbs of nitrogen per acre, of barley 22 lbs. of oats 25 lbs. of buckwheat 45 lbs. of peas 53 lbs and of lupines 58 lbs. Though differing in detail, all these results demonstrate in a striking manner the fact that stubble and roots have a large manurial value. It would seem, therefore, in the great majority of instances that the feeding of the crop, the careful saving and application of the excreta of the animals consuming it, together with the manurial value of the stubble and roots, will give us the largest possible returns.—*Homestead.*