

only .20 ‰, whereas, in the ripe grain we find 1.60 ‰, or eight times as much.

Mr. Hemming says he "does not of course refer to the organic portion of the crop as that does not affect the question under discussion." I, on the contrary, believing with Lawes and Gilbert and Boussingault, that plants derive their nitrogen from the soil, founded my statement mainly on that theory.

A. R. J. F.

TO THE EDITOR OF THE JOURNAL OF AGRICULTURE.

Sir,—In reading your interesting remarks *de omnibus rebus* published in the present May number of the Journal, I came across the following, where you are speaking of the corn crop for ensilage, viz.

"We must not forget that, *though corn sown thickly and cut green takes but little out of the ground*, it is a very different matter when the seed is allowed to form and nearly ripen."

I would like to know whether you have any authority for such a broad statement. I am aware that many years ago, before Liebig had revolutionized theoretical agriculture, it was the almost universally received opinion that all green crops, including root crops, *took but little out of the ground* and were supposed to obtain most of their sustenance from the air, but I had thought that the researches of chemists had since shown that this idea was untenable. I presume that it emanated from observing the wonderful effect that the introduction of turnip culture had in improving the sandy soils of Norfolk; although had the subject been rightly considered it ought, in my opinion, to have led to the opposite conclusion.

Some forty years ago my attention was first drawn to this subject by an occurrence that happened on my father's farm in Ireland, and which I referred to in a Prize Essay of mine treating on Agricultural Chemistry and practical farming, that was published in the Journal of the Royal Agricultural Society of England (vol. 13 p. 12) in the year 1853 (though written several years before) and in which I indicated the scheme of experiments since so successfully carried out by Messrs. Lawes and Gilbert. This occurrence is related in the following terms. "In the autumn of 1846 a field of about 3 acres was manured at the rate of 20 tons of farm yard manure per acre, and sown with rye for soiling in the following spring. It produced a very heavy crop, but on account of the stalks becoming too hard for the horses, we were obliged to allow half of the rye to remain for seed. The part of the field which had been soiled was immediately ploughed and sown with globe turnips, with a dressing of 3 cwt. of Peruvian guano per acre. The turnips were very fine and obtained a prize at our local show. After the seed rye was harvested and the turnips cleared, the whole 3 acres were ploughed and set with beans (horse) in the following February; and now comes the curious part of the affair; the beans came up well over the whole field, but we soon began to perceive a difference between those on the seed rye and turnip ground, the former looking much more luxuriant than the latter, but we were not prepared for what afterwards took place. The beans that followed the turnips actually stopped all growth when 6 inches high and of course did not seed, whereas after the seed rye they grew so luxuriantly as to injure the produce, and this difference extended to the line where we had discontinued cutting the green rye, the more conspicuous as we had stopped on the middle of a land. This result certainly astonished me, for it was in direct antagonism to all the preconceived notions of farmers, as it is usually thought by them that crops do not draw the ground, nearly to the same extent when cut

"green, as when allowed to ripen their seed. Turnips, too, are generally supposed to extract the greater portion of their nourishment from the atmosphere. But we find that beans actually refused to grow after the green rye and turnips, notwithstanding the application of 3 cwt. of guano; while where the rye was allowed to ripen its seed and do extra manure was applied, they grew luxuriantly." (1)

The foregoing experience would certainly not seem to support your theory, so far as practice is concerned, and on the other hand if we refer to the researches of the chemist we shall I think find that your theory is equally untenable in the broad terms in which it is stated. Of course I am perfectly willing to admit that a crop that has been grown for seed will not take so much out of the land when cut green as when the seed is allowed to form and mature, but I think it will be found that the only difference on this respect is the component parts of the grain itself, which of course is additional, but it does not at all follow, in my humble opinion, that if the crop had been *thickly* sown for the purpose of soiling or ensilage, that the matters extracted from the soil would not exceed that of the lighter crop which had been allowed to perfect its seed.

Let us see what the chemists have to say so far as this question is concerned.

I find by reference to the tables that are appended to my essay (A 4) that a heavy crop of wheat (32 bushels per acre) would extract 233 lbs. of inorganic matter from the acre of soil, of which the grain and chaff would extract 82 lbs. and the straw the balance, so that the ash from the grain and chaff is about one third of the whole. This is the result arrived at by Prof. Way, then chemist to the Royal Agricultural Society after about 40 separate analyses. A heavy crop of oats (56 bushels to the acre) gave, according to Prof. Norton 426 lbs. of ash extracted from the acre, of which 126 lbs. is to be assigned to grain and chaff. So that it would appear that the grain and chaff of a heavy crop of wheat or oats, if allowed to mature, cause an additional drain upon the land of something more than one third of the whole. It ought however to be mentioned that the grain extracts nearly 5 times as much phosphoric acid from the soil as the straw, while the straw extracts even a larger proportion of potash than the grain does of phosphoric acid.—My tables do not contain any analyses of Indian corn, that being a crop that is not grown in England, but by reference to the analysis of that crop to be found in the American Appendix to Stephen's Farmer's Guide, p. 19, it will be found that the amount of potash and phosphoric acid is relatively far greater in corn stalks than in straw, in consequence of the less quantity of silica.

If these analyses have any bearing on the question, it can I think be scarcely said with justice that these crops apart from the seed take but little out of the ground particularly when it is considered that the relative produce of grain is far less in this country than in England.

I now come to consider what according to same authority is extracted from the ground by green crops.

The only analysis of a soiling grain crop to be found in my tables is one of oats, cut when showing ear, and this for reasons therein stated is not very reliable. (Table D. 4.) It appears however by this analysis of the whole plant that about 270 lbs. of inorganic matter was extracted from the soil by a crop estimated at 6 tons in the green state. This, making allowance for the stalk that had not yet grown, would give about the same amount as the straw of the oat crop already referred to, showing that there was not much if any difference between the composition of the straw when green and

(1) A most extraordinary experience!