left much closer, say twenty inches between the rows and a foot from plant to plant; the culture may be confined to one thinning of the plants and once or twice cultivating or hoeing to destroy weeds. The return will be an immense mass of food, which fed with hay, or some dry fodder, will be highly nutritious.

In storing this root, when raised to a large extent, the farmers in England make small ridges and cover them with straw, the same as they do with potatoes, and cover the straw with soil, making a ditch round the pile and beating smooth with the shovel or spade; the latter is merely to keep the former in its place. I presume in many parts of America the above plan could not be adopted, on account of the severe winters and frost penetrating so deep into the soil. A much better, and in fact the only true way of successfully preserving these and all other roots, is to keep them in a storehouse or cellar, and keep them perfectly dark and dry, removing a few of them at a time, as they are wanted. I am well aware there are many people prejudiced against roots, such as mangel wurzel and turnips, as being nutritious for cattle, and the generality of these skeptics are men that have not raised them to any extent, if ever, to know their practical worth. I would like to hear from anyone who has raised these roots and tell me what they know about them.

If the above remarks will be of any benefit to those who have not tried to raise this root as food for cattle, I hope they will do so, and report the result. For myself, I find them of great benefit, not only in fattening, but likewise feed to cows when dry. To feed a small mess when dry to cows, with oats or barley straw, will keep them in good order and prove an acceptable food to those who are scarce of hay.—*Cor. Germantown Telegraph.*

Profits of Oats.

The following statements were submitted by two different farmers, at a recent meeting of the Lenawee Junction (Michigan) club. They are interesting as showing the cost per bushel of production, and the profit accruing from its sale; and they are also useful as demonstrating the simplicity with which an exact record may be kept of any and every crop raised on the farm. It is only when the agriculturist adopts and follows such a system that he will be able to say really how his land pays. With farmer No. 1 the account stood thus:

Oat Field, 20 Acres.

Dr.	
To five days with cultivator	$ 15 00
" two days with roller	6 00
" two days drilling	6 00
" Seed—1½ bushels per acre	18 00
" Harvesting	40 00
" Drawing, threshing and loading	50 00
Total cost of crop	$ 135 00
Cr.	
By 815 bushels of oats, at 39 cents	$317 85
" the straw he called worth	50 00
Total income	$ 367 85
Deducting the total cost	135 00
Profit on the crop	$ 232 85
Profit per acre	$11 59½
Cost of production per bushel	16½

Farmer No. 2 followed with his statement, which is as follows—the land under crops being two and a half acres:

Oat Field, 2½ Acres

Dr	
To three days ploughing	$ 9 00
" half day sowing and harrowing	1 50
" 12 bushels seed at 67 cents	8 04
" harvesting	7 50
" drawing to the barn	4 00
" threshing, all told	13 00
Total cost	$ 42 04
Cr	
By 235 bushels oats at 40 cents	$ 106 00
" straw	20 00
Total income	126 00
Deducting cost	43 04
Net profit	$ 82 96

This made $23.70 per acre. The next cost per bushel was only a fraction from 16½ cents.

Keeping Manure under Cover.

A learned professor, not long ago, in addressing one of our Canadian Farmers' Clubs, stated that the general treatment of manure, both in this country and the States, was simply disgraceful, and involved a loss of millions upon millions of dollars annually. He had seen it pitched here, there and everywhere, in the barnyard, in fence corners, on the roadside; uncovered and unprotected in any way; open to wind and rain, sunshine and storm from season to season; and yet there was no end of grumbling at the barren results that followed its application to the soil. Recently the same subject has been attracting considerable attention in Scotland, and although, as a rule, manure is well cared for there, the discussions prove interesting as showing how much more may be gained by further carefulness. Lord Kinnaird, at one of the Farmers' Club meetings, gave his experience thus:

Four acres of good soil were measured, and two of them were manured with ordinary barn yard manure, and two with an equal quantity of manure from the covered shed. The whole was planted with potatoes. The products of each acre were as follows:

Potatoes treated with barn yard manure:
One acre produced 272 bushels.
One acre produced 292 bushels.

Potatoes manured from the covered sheds:
One acre produced 442 bushels.
One acre produced 471 bushels.

The next year the land was sown with wheat, when the crop was as follows:

Wheat on land treated with barn yard manure.
One acre produced 48 bushels, 18 pounds (of 61 pounds per bushel.)
One acre produced 42 bushels, 38 pounds (of 61 pounds per bushel.)

Wheat on land manured from covered sheds:
One acre produced 55 bushels, 5 pounds (of 61 pounds per bushel.)
One acre produced 53 bushels, 47 pounds (of 61 pounds per bushel.)

The straw also yielded one-third more upon the land fertilized with the manure from the covered sheds, than upon that to which the ordinary manure was applied.

There is no other treatment claimed in these experiments than that of simply keeping the manure under cover and our readers will agree with us that the gain is remarkable. Had Lord Kincaid saturated his covered heaps plentifully with plaster or some other such substance to seize upon and fix the escaping ammonia, he would have found the differences in results still greater.

To Mend a Broken Tug.

No one should go from home with a buggy or a waggon without a small coil of copper wire and a *'multum in parvo'* pocket knife. This knife, as its name implies, has many things in a little space, and, amongst other useful things,

FIG. 1.—Repairing Tug.

has a contrivance for boring holes in leather straps. In case a strap or a leather trace breaks, while one is on a journey, and at a distance from any house, he would be in an awkward "fix" if without any means of repairing damages. With the copper wire and an implement for boring some holes, repairs can be made in a very few minutes. The ends of the broken strap or tug may be laid over each other or spliced; a few holes bored in the manner shown in fig. 1, and some stitches of wire passed through in the way known among the ladies as "back-stitching." The ends of the wire are twisted together, and the job will be finished almost as quickly as this may be read. If a buckle breaks, or the tongue of the buckle is drawn through, and made useless, the end of the strap may be turned back over the loop of the buckle, and the wire passed through the holes in the strap, as shown in fig. 2, and the ends fastened. If it is a chain that breaks, the next links may be brought together and wire wound around them in place of the broken link, which will make the chain serviceable until home is reached. In fact, the uses of a piece of wire are almost endless. Nothing holds a button upon one's working clothes so securely as a piece of wire, and once put on in this manner, there is never any call upon the women of the house at inconvenient times

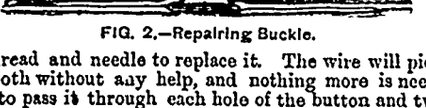

FIG. 2.—Repairing Buckle.

for thread and needle to replace it. The wire will pierce the cloth without any help, and nothing more is needed than to pass it through each hole of the button and twist the ends to secure them, cutting them off close with the knife. There is scarcely any little thing that will be found of so great use about a farm, or a workshop, or in a mill, or even in a house, as a small stock of soft copper wire.

Professor Stockbridge's Experiments.

Professor Stockbridge, of Massachusetts, continues to publish his formulas and experiments with commercial fertilizers, awakening a degree of interest in the subject, hitherto unknown. It is a mistake, however, to claim his theory as original. More than a quarter of a century ago the idea of fertilizing chemically for a special crop, and for a definite quantity per acre of that crop, was promulgated by a Parisian chemist, who had conducted his experiments successfully in ordinary flower pots. Prof. Stockbridge, therefore, is entitled to credit not for the theory itself, but for its elaboration, and more extended practical application. It would appear from his experiments, which are certainly interesting, that three, and only three ingredients are absolutely essential to the nourishment and growth of plants, all other necessary conditions being already supplied naturally in the soil and air.

In proof of this position test results are recounted wherein water was used as a medium instead of earth, and successful vegetation followed. These three ingredients are Nitrogen, which may usually be purchased in the form of Sulphate of Ammonia; Potash, as Muriate of Potash, and Phosphoric Acid, contained in the Superphosphate of Lime. Analytical tables are then given, showing the proportion of each of these ingredients contained in the various grains and vegetables, as for instance, in the fresh or air dry substances per 1000 lbs. each of

	Nitrogen.	Potash.	Phosphoric acid.
Wheat grain	20.8	5.5	8.2
Rye grain	17.6	5.4	8.2
Buckwheat grain	14.4	2.3	4.8
Oats grain	19.2	4.2	5.5
Indian corn grain	16.2	3.3	5.5
Beans	40.8	12.0	11.6
Swedish turnips	2.5	39.4	11.8
English flat "	1.2	38.4	12.5
Potato tubers	3.2	5.6	1.8
Red clover	21.3	20.0	6.0
Timothy hay	13.0	14.0	6.0
Corn stalks	4.8	16.6	7.6
Wheat straw	3.2	5.7	2.7
Rye "	2.4	8.9	2.2
Buckwheat straw	1.0	24.0	6.0
Bean straw	15.3	31.5	6.0
Potato tops	.4	2.3	1.0
Turnip tops	2.0	3.2	1.3
Tobacco	40.0	55.0	8.6

from which it will be seen that the fertilizers to be applied for any special crop must vary according to the analysis of that crop, and so on. Thus formulas are calculated and applied, as published in our last number. We subjoin a few of the published results from different parts of the States, merely observing before doing so that, from the table in our March number, any one can make out his own formula and test the matter for himself.

Mr. H. C. Comins, of Hadley, procured enough of the materials recommended to produce fifty bushels of corn, and applied them to a measured acre of fertile meadow land that had not been ploughed or manured for six years. The result was a yield of ninety-three bushels. A. C. Parsons, of Northfield, applied thirty dollars' worth of the complete fertilizer to an acre of poor sandy soil which had formerly borne nothing. Through the season he top-dressed it with forty bushels of unleached ashes per acre. The yield was one hundred and three bushels. H. L. Phelps, of Southampton, applied fertilizers for two tons of hay per acre, and harvested three and a half. E. H. Judd, of South Hadley, experimented for potatoes, and produced four hundred bushels per acre. By mistake he used the *muriate* instead of the *sulphate* of potash. H. Smith, of Springfield, fertilized a twenty acre cornfield for fifty bushels to the acre. Half the land was a stiff clay and quite rough: the other half good, ordinary soil. The result was an average of forty-five bushels per acre over all.

C. F. Fowler, of Westfield, used the potato fertilizer, aiming to produce 100 bushels above the natural yield. The soil was a *coarse sand, with an open gravelly sub-soil.* The crop started finely, made a good growth of tops early in the season, but at harvest time only about 40 bushels of tubers were harvested. The cause was probably due to the soluble condition of the fertilizing material, which in this sieve-like soil was rapidly leached through by the rain waters before the crops could benefit from them. If the fertilizer had been composted with loam, Mr. F. would have achieved more satisfactory results.

In these experiments the materials named have been usually employed as sources of the essential substances. But any neutral form will answer. The nitrogen may be obtained from any substance containing it in ready availability, though due importance should be attached to the fact that nitrates waste more readily than the salts of ammonia. The muriate of potash is the cheapest source of potash, but is unsuitable for tobacco, beans and root crops, injuring the burning qualities of the former, and the starch contents of the latter. In the experiment of E. H. Judd, he used the muriate, and though the yield was very large, the potatoes were quite inferior for table use.

The grades containing the percentages indicated may not always be easily obtained. But this is immaterial. The quantity of the chemicals to be used is based upon the percentage of nitrogen, potash or phosphoric acid they contain, and this being certainly known, the amount can be readily estimated by simple calculation. As a general rule, however, the higher grades are cheaper, on account of the saving in transportation and absence of injurious constituents.