trench. When planting the crowns, make a hole with a dibber right down to the manure at the bottom of the trench and then drop the crown to the bottom of the hole, and lightly cover up. The crown will soon find its way to the surface, and being placed so deep, will increase the length of the part that is used of the root. Should any of the growths show flower during the summer, these are best cut off as soon as the appear.

(*Eng. Ag. Gazette*)

Science.

Science and Farming — "Professor Shutt on Chemical Science in Relation to Agriculture," is the title of a pamphlet kindly sent the editor of this Journal by the author. It contains the evidence given by Prof. Shutt before the Select Committee of the House of Commons in June 1892.

Mr. Shutt, while allowing that the marvellous "improvement in agriculture in England is partially due to competition and kindred circumstances," naturally attributes it principally to "the results of agricultural chemistry, as worked out by Liebig and his followers.' The analysis of soils, carried on for the purpose of discovering their condition as regards plant-food has had much attention devoted to it. (1) The application of "muck," i. e., semi decomposed vegetable matter, whether alone or mixed with farm-yard manure is described, and its average contents in nitrogen valued: "a ton of average muck in the air-dried condition, contains about 35 lbs of nitrogen, worth, at 7 cents a pound, $2 45." As a ton of ordinary dung contains about 8 lbs. of nitrogen, it follows that, other things being equal, a ton of average air-dried muck contains as much nitrogen as 4½ tons of dung.

Mr. Shutt, in speaking of the fermentation of manure, takes the same view as the writer of this article has always held:

Q. You spoke of the compost heap Is there no danger of having too much fermentation with the manure?—A. Fermentation can go on too far, it is like the decomposition that takes place in a manure heap. It should be stopped at the proper stage. The nitrogen, by excessive fermentation, might be converted into ammonia, and in that case will be for the most part lost As long, however, as the heap is kept comparatively moist, I am convinced there is small danger of loss from the escape of ammonia.

EXPERIMENTS WITH BARN-YARD MANURE

In that connection I am trying this year an interesting experiment, to answer the question whether there is any loss in fertilising ingredients by exposing the manure upon the field before ploughing it in. In the spring, farmers often spread their manure some days before they plough it in The question has often been asked, whether during that interim there would not be some loss from the escape of ammonia. We have not data to enable us to answer that question definitely at the present time. I think a great deal depends upon the extent of fermentation to which the manure has arrived before being spread. Therefore, I have taken representative samples of manure at different stages of fermentation and analysed them accurately. I have also spread on panes of glass these two samples, and am exposing them to the sun every day for a month, taking the precaution that they should not be subjected to any rain. I shall then analyse these samples again, and ascertain if there has been any loss of ammonia during that three month's experience."

We shall be glad to see the results of the above experiments.

A very interesting part of the pamphlet is the description of the analysis of fodder-corn at the various stages of its growth:

There is a regular increase in the amount of real cattle food, as the plant advances in growth during the summer until it reaches the glazing condition That is very well brought out by the figures in the last column of the tables. We may consider the corn plant as consisting of two parts, water and dry matter. The latter, for our purposes, we will call cattle food. The water is of no commercial value. It makes the the food succulent and palatable, but we cannot place any monetary value upon it as a constituent of cattle food. Therefore, granting that the loss of water does not impair the digestibility of a food, that sample of corn fodder will be the most valuable which contains the smallest quantity of water, and consequently the largest quantity of dry matter or real cattle food. We found that the yield per acre increased in weight to a certain stage, and decreased after that period. That decrease in total weight does not mean, as we have seen, a lessening in value; it betokens only a decrease in the percentage of water. During the whole period of growth of the corn plant until it reaches maturity it is laying up material that can be termed cattle food. It is the richest in the glazing condition This, of course, points most emphatically to the value and necessity of allowing the corn to approach the glazing condition before cutting, for preservation in the dry condition, or storage in the silo.

Let us examine more closely the table for one moment. First of all, the yield per acre at the different stages of the four varieties is as follows: In the tasselling stage, 22 tons 1,320 lbs.; silking, 24 tons 52 lbs.; in the early milk stage, 22 tons 1,806 lbs.; in the late milk stage, 21 tons 759 lbs.; and in the glazing stage, 12 tons 1,154. Now we see there was an increase from the tasselling to the silking condition of nearly 2 tons per acre. It went from 22 tons 1 329 lbs. to 27 tons 52 lbs. but from the silking to the early milk condition there was a decrease from 24 tons 52 lbs. to 22 tons 1,806 lbs., and a still further decrease when we come to the late milk condition. That, at first sight, might indicate that the best stage to cut that corn would be the silking condition. But that would be altogether a wrong inference, because when we turn to the amount of dry matter, we see that it is increasing throughout. For, let us examine the pounds of dry matter per ton present in the different stages of growth. In the tasselling condition there was 285 lbs.; silking condition 323 lbs.; early milk, 399 lbs; late milk 443 lbs., and in the glazing, 524 lbs. Therefore, these figures bear out my statement that the real cattle food increases in pounds per ton throughout the whole period of growth Coming to the calculation of dry matter per acre, we have the following figures for the different stages of growth: Tasselling, 3 tons 468 lbs.; silking, 3 tons 1.770 lbs., early milk, 4 tons 1.138; late milk, 4 tons 1,467 lbs., and glazinz, 5 tons 1,298 lbs.

(1) Prof. Penhallow, of McGill, agrees with us in holding that the analyses of a soil, as a means of discovering the elements of a manure that will suit crops sown on that soil, is useless. Ed.

By Mr. Carpenter:

Q. You did not give us the relative value of the different varieties of corn you considered the best for ensilage purposes. Have you tested that? That is of great importance. Our object is to get information from you for our benefit.—A. In the first place, I can assure you that between one variety of Indian corn and another there is very little difference in the chemical composition, if we consider them at the same stage of growth. I have satisfied myself that the corn to grow for ensilage purposes is that which yields the largest weight per acre, arriving at the glazing condition before there is danger of frost That is the whole thing in a nutshell. The climate of the grower's locality must be considered. We have found here that Pearce's Prolific and Longfellow come to the glazing condition before there is any danger from frost. The other two are later corns, and give a much larger yield, but in the vicinity of Ottawa do not mature sufficiently early, as a rule, to make good ensilage.

Mr. Carpenter.—I am glad you have stated that, as a great many believe that there was a large difference between the varieties in their food value.

ROOT FOODS.

I have yet to say a few words regarding another branch of fodder analysis. Samples of carrots, turnips, mangels and sugar beets have been analysed to ascertain their relative value for feeding purposes. Roots form a very important ingredient of all cattle rations. Though exceedingly watery, and consequently not equal to hay or meal in feeding properties, they serve a very useful purpose in supplying a succulent and palatable food during the winter months. They are very easily digested, and, moreover, possess medicinal properties which assist in the digestion and assimilation of other foods. Roots are not rich in albuminoids (flesh-formers), and therefore are not a complete ration in themselves; for a properly balanced and economical ration, their use must be supplemented with other and more highly nitrogenous fodders."

The best preventive of *smut in grain*, according to Prof. Shutt, is *copper sulphate*; but care must be taken not to immerse the grain longer than momentarily in the solution; this should be made at the rate of 1 lb of the sulphate to 8 gallons of water.

The spraying of apple trees with Paris green for the destruction of the *codling* moth caused a panic in the English fruit-market. People were afraid of arsenical poisoning. Mr. Shutt made a careful analysis of some of the sprayed apples, and did not find a trace of arsenic. The report of the work published in some of the English papers allayed the fears of the consumers, and the market for Canadian apple is once more firm.

Mr. R. W. Shepherd, of Montreal, treated of apple-growing in the province. The profits are smaller now on account of the McKinley bill, and because Ontario floods Quebec with inferior fruit that will not pay for exportation to Europe. The Famouse was not a paying apple for the foreign trade, as he had seen five fine Famouses sold in Liverpool for a penny.

M. Auguste Dupuis, and others followed Mr. Shepherd, but the report in the evening papers of Montreal renders it very difficult to find out whether they did or did not recommend fruit-growing in the Eastern part of the province, though we feel pretty sure that M. Dupuis was favourable to it

Monsieur Charbonneau, from Lake St. John, said that the colonisation interests of the province were being neglected. Whereupon a special committee on that subject was appointed.

Manures.

Fertilisers for mangels. — Some of the readers of the Journal may remember an article, published some years ago, on certain experiments made by the late Philip Pusey, M. P. for Berkshire, England on the manure best suited to the mangel crop. Pusey was really an *agronome*, as the French style it, an educated practical farmer, as well as for some years, President of the Royal Agricultural Society. The conclusions he arrived at were that, after a certain amount of farm yard dung was given to the mangels, any addition, even up to the doubling of the number of the loads to the acre, had but a trifling effect; but, if to the ordinary dressing of dung 3 cwt. of Peruvian grains, containing 14 % of nitrogen (17 % of ammonia were added, the produce was enormously increased. The soil on which the trial was made was a sandy peat, and two years previously, that is, before Mr. Pusey took the farm in hand, was utterly run out; we remember the district well, the subsoil was a nasty *moor band* through which the roots of plants could not penetrate.

The manures were used on 4 plots—not tiny ones, but 2 acres each—and divided as follows:

No. 1.—Fourteen tons of dung;
No 2.—Twenty-eight tons of dung,
No. 3.—Three (gross) cwts. of Peruvian guano = 42 lbs of nitrogen,
No. 4.—Three cwts. of Peruvian guano and fourteen tons of dung.

The yield of long red mangels from those dressings, on this really vile land, was:

No. 1 . . . 18 tons;
" 2 . . . 21 "
" 3 . . . 17 "
" 4 . . . 33 "

Without denying the utility of the phosphates and potash in the guano, we may fairly attribute the extra yield of No 4 to the nitrogen it contained, as similar results have been obtained on the mangel crop from that constituent in nitrate of soda and sulphate of ammonia. So, we conclude that the addition of about 300 lbs of nitrate of soda, or 400 lbs of sulphate of ammonia to a fair dressing of good dung will produce a full crop of mangel, if the land has been will prepared for the reception of the seed, and the subsequent operations of singling, horse-hoeing and *hand-hoeing* properly performed.

Rye-grass.

M. Evans tells us he has genuine "Paceys perennial rye-grass for sale, but no cow grass, as the latter was almost a failure in England last year.

Now, it must be remembered that *perennial* is a relative term. If *Paceys* ryegrass is treated as it should be, we see no reason to doubt that it will stand as long as any grass that is not native to the country will stand. But, it all depends upon the treatment. If it is allowed to grow up for hay and to form its seed, its life will be short, and the *native* grasses will soon overpower it, particularly on light, dry sands; whereas, in moist districts, and on good heavy loams, it will lie out for years, and, if invariably fed off by cattle, will prove to be truly perennial or everlasting.

In laying down permanent pastures, the cow-grass, or perennial red-clover, should always be used, as the common red soon dies out of a meadow. A