

these manures and their relative value and suitability for different purposes.

Nitrate of Soda.—This manure must be considered first because it is now the commonest and cheapest form in which nitrogenous manure may be bought. Another great advantage in the use of nitrate of soda is that it also contains its nitrogen in the only form in which it can be taken up by plants—in the form of nitrate—for so far as our present knowledge goes it is only in this nitrate form that crops can take up the nitrogen which they require. Hence it is that nitrate of soda is a quick-acting manure, being very soluble in water it is taken up by plants readily if a shower of rain succeeds a top dressing with this salt and its stimulating effects are almost immediately seen. That nitrate of soda acts not only as a food but as a stimulant there can be no doubt. It forces the crop to take an increased amount of mineral matter out of the land, but the increased crop far more than compensates for the expense of applying mineral manures the following season. It is owing to the quick stimulating effect which nitrate of soda exerts upon a growing crop that a dressing of it is so valuable as an antidote to the attacks of the turnip-fly, or of the beet-fly, which is much too prevalent this season. Such a dressing causes these root crops to grow rapidly beyond the power of the fly to destroy them, for, especially in the case of turnips, it is only when the plants are small and as it were, at the beginning of their growth that the attacks of the fly are so deadly.

Nitrate of soda does best with meadow grasses, with Italian ryegrass especially, and with cereal crops. Mangels, too, need it, and indeed there is probably no field crop which will not benefit at some period of its growth by the judicious application of this manure.

Nitrate of soda is chiefly obtained from Peru and Bolivia, and after purification it is put upon the market.

Sulphate of ammonia.—The sulphate of ammonia of commerce is obtained from the ammonia liquor of the gasworks. It is the most valuable nitrogenous manure known, if we except the muriate of ammonia, which is obtained from the same source. Sulphate of ammonia when pure, contains 25.5 per cent, of ammonia, but an average sample will contain about 1 per cent. less. It is useful as a top dressing in the same way as nitrate of soda, but does not act so quickly as the latter, because the ammonia which it contains must be transformed into the nitrate condition before a crop can make use of it.

This transformation is effected by means of the nitrifying bacteria of the soil, the study of which is an extremely complex and difficult one. However, it had been demonstrated that the microorganisms which take part in the work of nitrification exist in most soils in great numbers, and are of two kinds. The action of bacteria of the first kind is to convert the nitrogenous matter in the soil, whether it exists in the form of ammonia salt or as nitrogenous organic matter, at first into an intermediate acid called nitrous acid, and it would appear that these particular bacteria cannot carry the change further. There is, however, a bacterium of another kind present which has the power of completing the transformation and converting the nitrous acid into nitric acid by some process of oxidation. Hence, where the two kinds of bacteria are present together in a soil (as they generally are) the two changes will go on simultaneously.

It is generally said that sulphate of ammonia does better in a wet season than nitrate of soda, because the former is not so easily washed out of the soil as is the latter, but for the last fifteen years at Woburn the nitrate has the advantage. Of the permanent wheat plots that getting mineral and nitrate gives an average increase of 2.3 bushels dressed corn and 4.7 cwt. straw over the plot receiving the equivalent

amount of ammonia salts and mineral manures. Similar results are obtained from the permanent barley plots, here the figures being 1.9 bushels dressed corn and 3.4 cwt. straw.

Arranged in tabular form, the results can be compared much more easily. The mixed minerals consisted of 200 lb sulphate of potash, 100 lb. sulphate of soda, 100 lb. sulphate of magnesia, and 3½ cwt. superphosphate. These quantities were used year after year, not from any idea that they were all wanted in such quantities, but to ensure that there was no essential mineral constituent deficient in the soil. Note that 200 lb. ammonia salts contains the same value of ammonia as 275 lb. nitrate of soda.

EXPERIMENT ON PERMANENT WHEAT AND BARLEY AT WOBURN.
AVERAGE OF 15 YEARS—1887-1891 INCLUSIVE.

Plot	Manure per Acre.	Permanent Wheat.		Permanent Barley.	
		Bush. Dress'd Corn	Cwt. Straw.	Bush.	Cwt. Straw.
1	Unmanured	16.2	16.8	24.6	14.1
2	200 lb ammonia salts	25.1	24.0	37.7	21.4
3	275 lb nitrate of soda	24.9	25.4	38.6	23.2
4	Mixed mineral manures	16.7	17.5	23.2	12.6
5	Mixed minerals and 200 lb ammonia salts	31.1	30.0	42.1	24.8
6	Mixed minerals and 275 lb nitrate of soda	33.4	34.7	44.0	28.2

SQUITCH.

“**Squitch**, or couchgrass, is one of the closest friends a farmer has. The poorer the farmer gets, the greater will be the number of his friends of this class. The poorer the squitch is, the harder will it be for the farmer to get rid of it. Good, healthy, fat squitch is comparatively easy to exterminate, especially when it grows in good long pieces, a foot or more long; but that nasty, short, thin, half-starved stuff is an abominable nuisance. If a piece only half-an-inch long is overlooked, it will take root and spread away like anything. Just let a piece of squitch get its head under the soil, and it will burrow away like a mole and spread in all directions. It is wonderful what vitality there is in a piece of dried and withered-looking squitch. Though to all appearances quite as dead as the proverbial mutton, just let it haug its head and the dried-up stuff grows away like a willow. The great question is how to get rid of it. The cultivator is far preferable to the plough, as it pulls it up and does not cut it like the coulter of the plough. I have seen land so full of squitch that the coulter could not cut it, and the plough had to be stopped once in eighty yards or so to take it off, but I have seen this only once or twice, and then the land was in a fearfully dirty state.

“The great thing is always to keep it on the top. Cultivate the land once or twice if necessary, but always clear away all that is on the top before you plough up more. When the cultivator has got it up, then harrow it well, first with heavy (medium) harrows, and then with light harrows, and then, as a finish, run the chain harrow over it, as by the last process it knocks all the soil from about it, and leaves it in cigarette-like rolls. The next step is do to it exactly the same as you do to a cigarette—namely, convert it into smoke and ash! This is the safest plan, and, when it is being burned, see that it all is burnt, as if this burning is carelessly done the out-