Nitrogen.—Nitrate of soda, sulphate of ammonia, and dried blood, are valued commercially on their percentage of nitrogen alone. Dried flesh, dried fish, and tankage, are regarded chiefly as sources of nitrogen, but also contain considerable quantities of phosphoric acid. Cotton-seed meal and similar products, in addition to several per cent. of both nitrogen and phosphoric acid, furnish small amounts of potash; as this potash is insoluble in water it is generally overlooked in analyses made for the fertilizer trade.

Nitrate of soda is mined and purified in the rainless regions of the Pacific coast of South America. It is used in complete fertilizers, and to a limited extent, in a unmixed state, as a top dressing for grain and grass.

Sulphate of ammonia can be obtained in paying quantities wherever bituminous coal is distilled, either for illuminating gas or for coke, and wherever bones are manufactured into bone black. The domestic supply is drawn principally from the large cities in our Eastern and Western States. (1)

Dried blood, ammonite and tankage are products from abattoirs and pork packing establishments. The ammonite from South America consists mainly of dried wastes from the manufacture of Liebig's Beef Extracts, and similar products.

Dried fish is the pomace from the fish oil presses now so numerous along the Atlantic coast.

Cotton seed meal as its name indicates, comes at present from the Southern cotton belt; but as soon as its value as stock food is generally recognized it will disappear from the fertilizer market.

The supply of the very rich Peruvian guano, formerly one of the leading sources of nitrogen, is now said to be nearly exhausted.

Phosphoric Acid.—The chief sources of phosphoric acid are bone ash from South America, spent bone black from sugar refineries, guanos from islands in the Carribean Sea, and from portions of the coast of Peru, the mineral apatite from Canada and phosphate rock from South Carolina.

When finely ground and treated with oil of vitriol, any one of the above materials yields a superphosphate rich in phosphoric acid but free from nitrogen and potash. (2)

Bone ash and bone black superphosphates, when properly made, are fine dry products with seventeen per cent. and more of soluble, and traces of insoluble phosphoric acid. These superphosphates do not change or revert if stored under shelter.

Excellent superphosphates can also be made from Canadian apatite and South Carolina rock. Frequently, however a considerable portion of their phosphoric acid is insoluble in water, and under certain conditions and limitations the longer such superphosphates are stored the lower their percentage of soluble acids becomes. Of this insoluble phosphoric acid a certain amount can be dissolved in a solution of citrate of ammonia; to this the name reverted phosphoric acid has been applied.

Although opinions differ, it is but fair to state that many regard soluble and reverted phosphoric acid equally valuable both from the commercial and agricultural stand-point. German farmers, on the other hand, buy soluble phosphoric acid only, and refuse to pay for that which does not dissolve in water.

Potash.—Potash was formerly obtained entirely from wood ashes, and Canada still furnishes the market with considerable quantities from this source. Its price however is too high to allow it to compete for agricultural uses with the products from the Prussian mines at Stassfurt.

The grades of salts exported by these mines are: Kainit—with from twelve to thirteen per cent., sulphate of potash with twenty-three to twenty five per cent., and muriate of potash with fifty per cent. and more of actual potash.

When nitrate of soda, sulphate of ammonia, dried blood and similar nitrogenous matters are mixed with superphosphates and potash salts, a complete fertilizer is formed which (1) contains all the chemical elements known to exist in stable manure.

Repeated trials by farmers and market gardeners, in some cases embracing a period of eight or ten years, have proven the high agricultural value of these fertilizers. Some market gardeners now use such fertilizers exclusively, instead of buying manures at the stables of street car companies. This statement is not intended to excuse the careless manner in which barnyard manure is generally saved. Its aim is solely to show that when the farm supply is exhausted it is better to purchase concentrated fertilizers than to pay high prices for freighting, carting, and spreading the bulky manures bought at distant stables (2)

Prosperous and thoughtful farmers are well aware of this fact, and those who have conducted carefully planned field experiments on their own farms are most favorably impressed with these concentrated fertilizers, particularly when they have found that a single element of plant food, for instance potash, is the only thing which they need to buy for a certain crop. (Bosh! A. R. J. F.) Such men are not in the habit either of asking advice from others, as to what their own fields require, or of laying any weight on the statement that artificial fertilizers will exhaust their farms.

The bulletin from which the above statements are quoted, gives the analyses of a large number of fertilizers offered in market, in which it is interesting to observe how near the composition guaranteed by the manufacturers accords with the results obtained by analysis; and also the slight variation of the real market value thus obtained, from the prices at which they are sold. The inferior and worthless stuff formerly offered in the several States where stations for analysis have since been established, have thus been driven from the market, and these stations have conferred an immense benefit on the farmers who purchase commercial manures.

Prof. Cook gives the following as the cost of the different fertilizers, as obtained from the average prices of the manufacturers in 1884, which are 14 per cent. lower than 1883:

	Cost per lb.
Nitrogen from nitrate of soda	16 9c.
Nitrogen from sulphate of ammonia	17.1
Nitrogen from dried blood	18 3
Nitrogen from ammonite and tankage	15.8
Soluble phosphoric acid from bone black	7 3
Soluble phosphoric acid from S. C rock	8 6
Reverted phosphoric acid from bone black	6 7
Reverted phosphoric acid from S. C. rock	7 8
Insoluble phosphoric acid from bone black	2 9
Insoluble phosphoric acid from S. C. rock	1 9
Potash from high grade sulphate	7 2
Potash from kainit	4.
Potash from Muriate (3)	3 7

(1) Here, at Sorel, all the ammoniacal water is wasted, the plant for the conversion of the carbonate into the sulphate being considered too costly for so small a concern as our gas-works. A. R. J. F.

(2) For mangels and for cereals, add from 120 lbs to 200 lbs of suphate of ammonia, or from 160 lbs. to 220 lbs. of nitrate of soda to the superphosphate Complete manures are generally humbug. A. R. J. F.

(1) Potash is hardly ever wanted on heavy land. A. R. J. F.

(2) Fond as I am of artificial manures, I am sure no gardener will ever neglect a copious use of dung, with all its mechanical effects, without paying dearly for his folly. It is the dung that causes the so rapid vegetation in our market-gardens. A. R. J. F.

(3) Expense of manuring one acre of wheat, then, would be: forty lbs. of nitrogen at 17c (sulph. am.) \$6.80. 30 lbs. soluble phos. as. (Carolina rock) at 8 5=\$2.55: in all \$9 35 A. R. J. F.