The Connecticut Agricultural Experiment Station.

BULLETIN No. 78.

MAY, 1884.

Explanations Concerning the Analysis of Fertilizers and the Valuation of their Active Ingredients.

Revised.

Nitrogen is commercially the most valuable fertilizing element. *Organic nitrogen* is the nitrogen of animal and vegetable matters. Some forms of organic nitrogen, as those of blood and meat, are highly active as fertilizers; others, as found in leather and peat, are comparatively slow in their effect on vegetation, unless these matters are chemically disintegrated. *Ammonia* and *nitric acid* are results of the decay of *organic nitrogen* in the soil and manure heap, and are the most active forms of Nitrogen. They occur in commerce—the former in sulphate of ammonia, the latter in nitrate of soda. 17 parts of ammonia or 66 parts of pure sulphate of ammonia contain 14 parts of nitrogen. 85 parts of pure nitrate of soda also contain 14 parts of nitrogen.

Soluble Phosphoric acid implies phosphoric acid or phosphates that are freely soluble in water. It is the characteristic ingredient of Superphosphates, in which it is produced, by acting on "insoluble" or "reverted" phosphates, with oil of vitriol. Once well incorporated with the soil it gradually becomes reverted phosphoric acid.

Reverted (*reduced or precipitated*) *Phosphoric acid* means strictly, phosphoric acid that was once easily soluble in water, but from chemical change has become insoluble in that liquid. In present usage the term signifies the phosphoric acid (of various phosphates) that is freely taken up by strong solution of ammonium citrate, which is therefore used in analysis to determine its quantity. "Reverted phosphoric acid" implies phosphates that are readily assimilated by crops.

Recent investigation tends to show that soluble and reverted phosphoric acid are on the whole about equally valuable as plant-food and of nearly equal commercial value. In some cases, indeed, the soluble gives better results on crops, in others the reverted is superior. In most instances there is probably little to choose between them.

Insoluble Phosphoric acid implies various phosphates not soluble in water or ammonium citrate. In some cases the phosphoric acid is too insoluble to be readily available as plant food. This is especially true of Canada Apatite. Bone black, bone-ash, South Carolina Rock and Navassa Phosphate when in coarse powder are commonly of little repute as fertilizers though good results are occasionally reported from their use. When *very finely pulverized* ("floats") they more often act well, especially in connection with abundance of decaying vegetable matters. The phosphate of raw bones is nearly insoluble, because of the animal matter of the bones, which envelopes it; but when the latter decays in the soil, the phosphate remains in essentially the "reverted" form.

Potash signifies the substance known in chemistry as potassium oxide, which is the valuable fertilizing ingredient of "potashes" and "potash salts." It should be soluble in water and is most costly in the form of sulphate, and cheapest in the shape of muriate (potassium chloride).

The Valuation of a Fertilizer, as practised at this Station, signifies finding *the worth in money or trade-value, of its fertilizing ingredients.* This value, it should be remembered, is *not necessarily proportional to its fertilizing effects* in any special case.

Plaster, lime, stable manure and nearly all of the less expensive fertilizers have variable prices, which bear no close relation to their chemical composition, but guanos, superphosphates and similar articles, for which $30 to $60 per ton are paid, depend chiefly for their trade-value on the three substances, *nitrogen*, *phosphoric acid* and *potash*, which are comparatively costly and steady in price. The money-value per pound of these ingredients is reckoned from the current market prices of the standard articles which furnish them to commerce.

The consumer, in estimating the reasonable price to pay for high-grade fertilizers, should add to the *Trade Value of the above-named Ingredients*, a suitable margin for the expenses of manufacture, etc., and for the convenience or other advantage incidental to their use.

The average Trade-values or cost in market, per pound, of the ordinarily occurring forms of nitrogen, phosphoric acid and potash, as recently found in the New England, New York and New Jersey markets, are as follows :—

These Trade-values have been agreed upon by the Experiment Stations of Connecticut, New Jersey and Massachusetts for use in their several states.

TRADE VALUES OF FERTILIZING INGREDIENTS IN RAW MATERIALS AND CHEMICALS FOR 1884.

	Cents per lb.
Nitrogen in ammonia salts,	22
" in nitrates,	18
Organic nitrogen in dried and fine ground fish,	20
" " in guanos, dried and fine ground blood and meat,	18
" " in cotton seed, linseed meal and in castor pomace,	18
" " in fine ground bone,	18
" " in fine medium bone,	16
" " in medium bone,	14
" " in coarse medium bone,	12
" " in coarse bone, horn shavings, hair and fish scrap,	10
Phosphoric acid, soluble in water,	10
" " soluble in ammonium citrate,*	9
" " insoluble, in dry fine ground fish and in fine bone,	6
" " " in fine medium bone,	5½
" " " in medium bone,	5
" " " in coarse medium bone,	4½
" " " in coarse bone,	4
" " " in fine ground rock phosphate,	2½
Potash as high grade sulphate,	7½
" kainite,	4½
" muriate,	4½

The above trade-values are the figures at which on March 1st the respective ingredients could be bought at retail for cash, in our markets, in the *raw materials* which are the regular source of supply. They also correspond to the average wholesale prices for the six months ending March 1st, plus about 20 per cent. in case of goods for which we have wholesale quotations. The valuations obtained by use of the above figures will be found to agree fairly with the *reasonable retail price* in case of standard raw materials such as :—

* Dissolved from 2 grams of the unground Phosphate previously extracted with pure water, by 100 c.c. neutral solution of Ammonium Citrate, sp. gr. 1.09, in 30 minutes, at 40° C., with agitation once in five minutes. Commonly called "reverted" or "backgone" Phosphoric Acid.

Sulphate of Ammonia,	Azotin,
Nitrate of Soda,	Dry Ground Fish,
Muriate of Potash,	Cotton Seed,
Sulphate of Potash,	Castor Pomace,
Dried Blood,	Bone,
Plain Superphosphate.	Ground So. Car. Rock.

Trade Values in Superphosphates, Special Manures, and Mixed Fertilizers of High Grades.

The Organic Nitrogen in these classes of goods will be reckoned at the highest figure laid down in the Trade-Values of Fertilizing Ingredients in Raw Materials, namely, 20 cents per pound, it being assumed that the organic nitrogen is derived from the best sources, viz: bone, blood, animal matter, Peruvian guano or other equally good form and not from leather, shoddy, hair or any low-priced inferior forms of vegetable matter, unless the contrary is ascertained.

Insoluble Phosphoric acid will be reckoned at 4½ cents, it being assumed that it is from bone or similar source and not from rock phosphate, unless found otherwise. In this latter form the insoluble phosphoric acid would be worth commercially only 2¼ cents per pound or but one-half as much as if from fine bone. Potash will be rated at 4¼ cents, if sufficient chlorine is present in the fertilizer to combine with it to make muriate. If there is more Potash present than will combine with the chlorine, then this excess of Potash is reckoned as sulphate.

In most cases the valuation of the Ingredients in Superphosphates and Specials will fall considerably below the retail price of these goods. The difference between the two figures, represents the manufacturer's charges for converting raw materials into manufactured articles. These charges are for grinding and mixing, bagging or barreling, storage and transportation, commission to agents or dealers, long credits, interest on investment, bad debts, and finally, profits.

In 1883, the selling price of superphosphates and specials in Connecticut was, on the average, 18 per cent. greater than the Station valuations, or 38 per cent. in advance of the wholesale cost of the fertilizing elements in the raw materials.

The average cost of Ammoniated Superphosphates and Guanos was about $41.50, the average valuation was $35, and the difference $6.50—an advance of 18.6 per cent. on the valuation.

In case of Specials the average cost was $50, the average valuation, $42.50, and the difference $7.50, or 17.6 per cent. advance on the valuation.

To obtain the Valuation of a Fertilizer (i. e. the money-worth of its fertilizing ingredients), we multiply the pounds per ton of Nitrogen, etc., by the trade-value per pound. We thus get the values per ton of the several ingredients, and adding them together we obtain the total valuation per ton.

In case of *Ground Bone*, the fineness of the sample is graded by sifting, and we separately compute the nitrogen-value of each grade of bone which the sample contains, by multiplying the pounds of nitrogen per ton in the sample, by the per cent. of each grade, taking $\frac{1}{100}$th of that product, multiplying it by the trade-value per pound of nitrogen in that grade, and taking this final product as the result in cents. Summing up the separate values of each grade, thus obtained, together with the values of each grade for phosphoric acid, similarly computed, the total is the Valuation of the sample of bone.

The uses of the "Valuation" are twofold:

1, To show whether a given lot or brand of fertilizer is worth, as a commodity of trade, what it costs. If the selling price is not higher than the valuation, the purchaser may be quite sure that the price is reasonable. If the selling price is several dollars per ton more than the valuation, it may still be a fair price; but in proportion as the cost per ton exceeds the valuation there is reason to doubt the economy of its purchase.

2, Comparisons of the valuations and selling prices of a number of similar fertilizers will generally indicate fairly which is the best for the money.

But the valuation is not to be too literally construed, for analysis cannot always decide accurately what is the *form* of nitrogen, etc., while the mechanical condition of a fertilizer is an item whose influence cannot always be rightly expressed or appreciated.

For the above first-named purpose of valuation, the trade-values of the fertilizing elements which are employed in the computations should be as exact as possible, and should be frequently corrected to follow the changes of the market.

For the second-named use of valuation, frequent changes of the trade-values are disadvantageous, because two fertilizers cannot be compared as to their relative money-worth, when their valuations are deduced from different data.

Experience leads to the conclusion that the trade-values adopted at the beginning of a year should be adhered to as nearly as possible throughout the year, notice being taken of considerable changes in the market, in order that due allowance may be made therefor.

The Agricultural value of a fertilizer is measured by the benefit received from its use, and depends upon its fertilizing effect, or crop-producing power. As a broad, general rule, it is true that Peruvian guano, superphosphates, fish-scraps, dried blood, potash salts, plaster, etc., have a high agricultural value which is related to their trade value, and to a degree determines the latter value. But the rule has many exceptions, and in particular instances the trade-value cannot always be expected to fix or even to indicate the agricultural value. Fertilizing effect depends largely upon soil, crop and weather, and as these vary from place to place, and from year to year, it cannot be foretold or estimated except by the results of past experience, and then only in a general and probable manner.

FERTILIZER ANALYSES.

Nitrate of Soda and Sulphate of Ammonia.

1192. Nitrate of Soda. Sold by Geo. B. Forrester, N. Y. City. Sampled and sent by M. S. Baldwin, Naugatuck.

1182. Nitrate of Soda. Sold by Mapes' F. & P. G. Co., N. Y. City. From stock bought by T. N. Bishop, Plainville.

1176. Nitrate of Soda. Sold by Mapes' F. & P. G. Co., N. Y. City. Sampled and sent by C. H. Cables, Thomaston.

1173. Sulphate of Ammonia. From factory of E. H. Wardwell, in New Haven. Purchased in New York, sampled and sent by J. J. Webb, Hamden.

	1192		1182		1176		1173
	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.
Nitrogen	16.02	16.1	15.90	15.6	15.95	15.8	20.37
Equivalent nitrate of soda	97.30		96.55		96.84		
Equivalent ammonia							24.74
Cost per ton at purchaser's depot	$56.00		52.50		54.50		62.50
Nitrogen costs per lb.	17.8 cts.		16½ cts.		17.0 cts.		15.3 cts.

Potash Salts.

1174. Muriate of Potash. Sold by H. J. Baker & Bro., N. Y. City. Sampled and sent by J. J. Webb, Hamden.

1181. Muriate of Potash. Sold by Mapes' F. & P. G. Co., N. Y. City. From stock purchased by C. H. Cables, Thomaston.

1189. "Bisulphate of Potash." Sold by G. B. Forrester, N. Y. City. Sampled and sent by M. S. Baldwin, Naugatuck.

1183. Kainite. From Bowker Fertilizer Co. Purchased of Usher & Tinker, Plainville, by T. N. Bishop.

	1174		1181		1189		1183	
	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.
Potash	50.22	50.5	53.78	50.0	33.87		12.12	12–14
Equivalent muriate	79.54		85.18					
Equivalent sulphate					62.63	70		
Cost per ton at purchaser's depot	$36.50		42.00		56.00		15.00	
Potash costs per lb.	3.6 c.		3.9 c.		8.2 c.		6.2 c.	

Plain Superphosphates.

1165. H. J. Baker & Bro's Pure Dissolved Bone. Sampled by D. H. Van Hoosear from lot purchased by him in New York.

1172. H. J. Baker & Bro's Pure Dissolved Bone. Sold by H. J. Baker & Bro., N. Y. City. From stock bought by J. J. Webb, Hamden; and sampled by him.

1184. Bowker's Acid Phosphate. From stock of Usher & Tinker, Plainville.

1170. Bradley Fertilizer Co's Dissolved Bone Black. Sampled by C. H. Cables, Thomaston, from lot purchased in Boston.

1190. G. B. Forrester's Dissolved Bone Black. Purchased in New York and sampled by M. S. Baldwin, Naugatuck.

1134. North Carolina Acid Phosphate. Received from N. C. Department of Agriculture.

1180. Mapes' High Grade Superphosphate. From stock purchased in New York by C. H. Cables, Thomaston.

Plain Superphosphates.

(F *signifies, Found by Analysis.* G *signifies, Guaranteed by the Dealer.*)

	1165	1172	1184		1170		1190		1134	1180	
	F	F	F	G	F	G	F	G	F	F	G
Soluble phosphoric acid	13.91	9.82	10.82	10–12	17.13	10–12	17.29	17	10.85	32.64	33–35
Reverted phosphoric acid	.24	7.11	1.11		.00		.00		.52	1.38	
Insoluble phosphoric acid	.35	3.93	3.13		.09		.11		.47	.64	
Cost per ton at purchaser's depot	$30.00	28.00	25.00		34.50		29.50		----	*69.50	
Valuation per ton	$28.57	34.20	25.05		34.30		34.63		----	68.34	

* $65.00 in New York or Hartford.

Bone.

1127. Meat and Bone. From stock of Adams & Thomas (Tripe Manufacturers), Springfield, Mass. Sampled and sent by Geo. Wilcox, Shaker Station.

1156. Swift-Sure Bone Meal. From stock of F. Ellsworth, Hartford.

	1127	1156
Nitrogen	4.92	6.62
Phosphoric acid	15.88	19.82
Cost per ton	----	$45.00
Valuation per ton	$36.77	$45.23

Mechanical Analysis.

	1156
Finer than $\frac{1}{10}$ inch	59 per cent.
" " $\frac{1}{25}$ "	31 "
" " $\frac{1}{12}$ "	10 "
" " $\frac{1}{6}$ "	"
Coarser than $\frac{1}{6}$ "	"
	100

Superphosphates (Ammoniated.)

1191. Home-made Superphosphate for Potatoes. Made, sampled and sent by M. S. Baldwin, Naugatuck.

1124. Home-made Phosphate. Sampled and sent by Fred. B. Hatheway, Suffield.

1188. Home-made Superphosphate. Made, sampled and sent by J. J. Webb, Hamden.

1129. Bone Superphosphate. From stock of Chas. Sanford, Redding Ridge. Sampled and sent by Wm. H. Burr, Redding Ridge.

	1191	1124	1188	1129
Nitrogen as nitrates	3.79	----	---	----
Nitrogen as ammonia-salts	----	----	3.70	----
Organic nitrogen	2.86	3.81	----	1.58
Soluble phosphoric acid	7.06	trace.	6.57	5.38
Reverted phosphoric acid	.65	3.54	4.96	3.91
Insoluble phosphoric acid	.05	.54	2.55	6.04
Potash	9.92	8.05	9.29	2.39
Chlorine	1.02	none	----	1.88
Cost per ton	$50.00	$25.63	$36.20	$35.00
Valuation per ton	$53.95	$33.77	$48.54	$31.59

When not otherwise stated, the samples are invariably drawn by Station Agents.

The Connecticut Fertilizer Law.

☞ The officers of the Station understand it to be their duty to see that the "Act Concerning Commercial Fertilizers" be enforced and that violators thereof be prosecuted.

☞ The immediate attention of all manufacturers, importers, agents and dealers concerned, is therefore called to the requirements of the law, and especially to the following points:—

1. In case of fertilizers that retail at ten dollars or more per ton, the law holds the SELLER responsible for *affixing a correct label or statement* to every package or lot sold or offered, as well as for the *payment of an analysis fee* of ten dollars for each fertilizing ingredient which the fertilizer contains or is claimed to contain, *unless* the MANUFACTURER OR IMPORTER shall have provided labels or statements and shall have paid the fee. Sections 1 and 3.

2. The law also requires, in case of any fertilizer selling at ten dollars or more per ton, that a *certified statement* of composition, net weight in package, etc., shall be filed with the Director of the Experiment Station, and that a *sealed sample* shall be deposited with him by the MANUFACTURER OR IMPORTER. Section 2.

3. It is also provided that EVERY PERSON in the State who sells *any commercial fertilizer of whatever kind or price* shall annually report certain facts to the Director of the Experiment Station, and on demand of the latter shall deliver a sample for analysis. Section 4.

4. All "CHEMICALS" that are applied to land, such as: Muriate of Potash, Kainite, Sulphate of Potash and Magnesia, Sulphate of Lime (Gypsum or Land Plaster), Sulphate of Ammonia, Nitrate of Potash, Nitrate of Soda, etc.—are considered to come under the law as "Commercial Fertilizers." Dealers in these chemicals must see that all packages are suitably labeled. They must also report them to the Station, and see that the analysis fees are duly paid, in order that the Director may be able to discharge his duty as prescribed in Section 9 of the Act.

Here follows the full text of the law, with explanatory footnotes.

AN ACT CONCERNING COMMERCIAL FERTILIZERS.

GENERAL ASSEMBLY,
January Session, A. D. 1882.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

SECTION 1. Every person or company who shall sell, offer, or expose for sale, in this State, any commercial fertilizer or manure, the retail price of which is ten dollars, or more than ten dollars per ton, shall affix conspicuously to every package thereof a plainly printed statement, clearly and truly certifying the number of net pounds of fertilizer in the package, the name, brand, or trade-mark under which the fertilizer is sold, the name and address of the manufacturer, the place of manufacture and the chemical composition of the fertilizer, expressed in the terms and manner approved and currently employed by the Connecticut Agricultural Experiment Station.*

Printed statement to be affixed to all packages and to go with all lots.

If any such fertilizer be sold in bulk, such printed statement shall accompany and go with every lot and parcel sold, offered, or exposed for sale.

SEC. 2. Before any commercial fertilizer, the retail price of which is ten dollars, or more than ten dollars per ton, is sold, offered, or exposed for sale, the manufacturer, importer, or party who causes it to be sold, or offered for sale, within the State of Connecticut, shall file with the Director of the Connecticut Agricultural Experiment Station two certified copies of the statement named in section one of this act, and shall deposit with said

Before sale *certified copies* of statement, and *Sealed Sample* to be deposited with Director.

* A statement of the per cents. of Nitrogen, Phosphoric Acid (P_2O_5) and Potash (K_2O), and of their several states or forms, will suffice in most cases. Other ingredients may be named if desired.

In all cases the per cent. of *nitrogen* must be stated. Ammonia may also be given when actually present in ammonia salts, and "ammonia equivalent to nitrogen" may likewise be stated.

The per cent. of soluble and reverted phosphoric acid may be given separately or together, and the term "available" may be used in addition to, but not instead of soluble and reverted.

Insoluble phosphoric acid may be stated or omitted.

In case of Bone, Fish, Tankage, Dried Meat, Dried Blood, etc., the chemical composition may take account of the two ingredients: Nitrogen, Phosphoric Acid.

For Potash Salts give always the per cent. of Potash (potassium oxide); that of Sulphate of Potash or Muriate of Potash may also be stated.

The chemical composition of other fertilizers may be given as found in the Station Reports.

director a sealed glass jar or bottle containing not less than one pound of the fertilizer, accompanied by an affidavit that it is a fair average sample thereof.*

SEC. 3. The manufacturer, importer, agent, or seller of any commercial fertilizer, the retail price of which is ten dollars or more than ten dollars per ton, shall pay on or before the first of May, annually, to the Director of the Connecticut Agricultural Experiment Station, an analysis fee of ten dollars for each of the fertilizing ingredients† contained or claimed to exist in said fertilizer: *provided*, that whenever the manufacturer or importer shall have paid the fee herein required for any persons acting as agents or sellers for such manufacturer or importer, such agents or sellers shall not be required to pay the fee named in this section.

Analysis Fee to be paid annually on or before May 1st.

SEC. 4. Every person in this State who sells, or acts as local agent for the sale of any commercial fertilizer of whatever kind or price, shall annually, or at the time of becoming such seller or agent, report to the Director of the Connecticut Agricultural Experiment Station his name, residence, and post-office address, and the name and brand of said fertilizer, with the name and address of the manufacturer, importer, or party from whom such fertilizer was obtained, and shall, on demand of the Director of the Connecticut Agricultural Experiment Station, deliver to said director a sample suitable for analysis of any such fertilizer or manure then and there sold or offered for sale by said seller or agent.‡

Yearly Report to Station of Dealers or Agents.

SEC. 5. No person or party shall sell, offer, or expose for sale, in the State of Connecticut, any pulverized leather, raw, steamed, roasted, or in any form, as a fertilizer or as an ingredient of any fertilizer or manure, without explicit printed certificate of the fact, such certificate to be conspicuously affixed to every package of such fertilizer or manure, and to accompany and go with every parcel or lot of the same.

Leather.

* The analysis of samples sent in accordance with section two is discretionary with the Station. Such samples are intended for preservation as manufacturers' standards.

† The Station understands "the fertilizing ingredients" to be those whose determination in an analysis is necessary for a valuation, viz: Nitrogen, Phosphoric acid and Potash. The analysis-fees in case of any fertilizer will therefore be ten, twenty or thirty dollars, according as one, two or three of these ingredients are contained or claimed to exist in the fertilizer.

On receipt of statements, samples and analysis-fees, the Station will issue Certificates of Compliance with the law.

‡ Blanks for Dealers' Reports will be mailed to applicants.

SEC. 6. Every manufacturer of fish guano, or fertilizers of which the principal ingredient is fish or fish-mass from which the oil has been extracted, shall, before manufacturing or heating the same, and within thirty-six hours from the time such fish or mass has been delivered to him, treat the same with sulphuric acid or other chemical, approved by the director of said experiment station, in such quantity as to arrest decomposition: *provided, however*, that in lieu of such treatment such manufacturers may provide a means for consuming all smoke and vapors arising from such fertilizers during the process of manufacture. Fish-guano, &c.

SEC. 7. Any person violating any provision of the foregoing sections of this act shall be fined one hundred dollars for the first offense, and two hundred dollars for each subsequent violation. Fines.

SEC. 8. This act shall not affect parties manufacturing, importing, or purchasing fertilizers for their own private use, and not to sell in this State. Fertilizers for private use.

SEC. 9. The director of the Connecticut Agricultural Experiment Station shall pay the analysis-fees received by him into the treasury of the station, and shall cause one or more analysis of each fertilizer to be made and published annually. Said director is hereby authorized, in person or by deputy, to take samples for analysis from any lot or package of manure or fertilizer which may be in the possession of any dealer. Director's duties and authority.

SEC. 10. The director of the Connecticut Agricultural Station shall, from time to time, as bulletins of said station may be issued, mail or cause to be mailed two copies, at least, of such bulletins to each post-office in the State. Bulletins.

SEC. 11. Title sixteen, chapter fifteen, sections fifteen and sixteen, and title twenty, chapter twelve, section five of the general statutes, and chapter one hundred and twenty of the public acts of 1881, being an act concerning commercial fertilizers, are hereby repealed. Repeal of former acts.

SEC. 12. This act shall take effect on the first day of September, 1882.

OBSERVANCE OF THE FERTILIZER LAW.

MANUFACTURERS *who have paid Analysis Fees as required by the Fertilizer Law, and* FERTILIZERS *for which the Fees have been paid.*

FIRM.	ARTICLES.	DATE.
Baker, H. J. & Bro., 215 Pearl St., New York,	Castor Pomace. "A.A." Ammoniated Superphosphate. Pelican Bone Phosphate. Special Corn Fertilizer Special Potato Fertilizer,	May 19
Bennett, P. W., Rockfall, Ct.,	Ground Bone,	May 15
Bosworth Bros., Putnam, Ct.,	Superphosphate of Lime. Ground Bone.	May 8
Bowker Fertilizer Co., 43 Chatham St., Boston, Mass.,	Stockbridge Grain Manure. Stockbridge Forage Crop Manure. Stockbridge Vegetable Manure. Bowkers' Hill and Drill Phosphate. Bowkers' Fish and Potash. Bowkers' Dissolved Bone. Bowkers' Dry Fish. Bowkers' Kainit,	May 13
Bradley Fertilizer Co., 27 Kilby St., Boston, Mass.,	Bradley's Superphosphate. B. D. Sea-Fowl Guano. Original Coe's Superphosphate,	April 16
Brown, R. B., Oil Co., St. Louis, Mo.,	I.X.L. Castor Pomace.	May 20
Coe, E. Frank, 16 Burling Slip, N. Y.,	Ammoniated Bone Superphosphate. Alkaline Bone. Ground Bone,	May 13
Coe, Russel, Linden, N. J.,	Ammoniated Bone Superphosphate. Fish and Potash,	May 13
Clark's Cove Guano Co., New Bedford, Mass.,	Great Planet "A." Bay State Fertilizer,	May 8
Collier White Lead and Oil Co., St. Louis, Mo. By F. Ellsworth, Hartford,	Castor Pomace,	May 12
Common Sense Fertilizer Mfg. Co., 42 Congress St., Boston, Mass.,	Common Sense Fertilizer, No. 2,	May 14
Crocker, L. L., Buffalo Fertilizer and Chemical Works, Buffalo, N. Y.,	Ammoniated Bone Superphosphate. Potato, Hop, and Tobacco Phosphate. Superphosphate No. 2,	May 10
Curtis, J. G., Elliott, Conn.,	Reliable Superphosphate,	May 14
Darling, L. B. Fertilizer Co., Pawtucket, R. I.,	Animal Fertilizer. Ground Bone,	May 8
Glidden & Curtis, Boston, Mass.,	Soluble Pacific Guano,	May 13

Firm.	Articles.	Date.
W. Burr Hall, Wallingford, Conn.,	Ground Bone. Meat and Plaster,	May 27
Harris, Geo. H. & Son, Eagleville, Conn.,	Pure Ground Bone. Pure Bone Phosphate,	May 8
Hurtado & Co., 16 and 18 Exchange Place, N. Y.,	Peruvian Guano, Lobos,	April 25
Judson & Sparrow, 38 South Market St., Boston, Mass.,	Bone and Potash Phosphate,	April 14
Lister Brothers, Newark, N. J.,	Standard Ammoniated Dissolved Bone. Special Potato Fertilizer. Special Corn Fertilizer. Ground Bone,	May 14
McNamara, M., Trumbull, Conn.,	Ground Bone,	May 28
Mapes' Formula and Peruvian Guano Co., 158 Front St., New York,	The Mapes' Potato Manure. The Mapes' Corn Manure. The Mapes' Complete Manure for Light Soils. The Mapes' Tobacco Manure, Connecticut Brand. The Mapes' Tobacco Manure for use with Stems. The Mapes' Grass and Grain Spring Top Dressing. The Mapes' Complete Manure, "A" Brand. Plain Superphosphate, High Grade,	May 12
Miller, G. W., Middlefield, Ct.,	Raw Bone Phosphate. Ground Bone,	May 13
Mitchell, A., Linden, N. J.,	Standard Superphosphate,	May 17
National Fertilizer Co., Bridgeport, Conn.,	Chittenden's Complete Fertilizer for Roots. Chittenden's Complete Fertilizer for Grain. Chittenden's Complete Fertilizer for Tobacco. Chittenden's Fish and Potash. Chittenden's Ammoniated Bone Superphosphate. Cooke's Blood Guano,	May 13
Preston Fertilizer Co., Greenpoint, L. I.,	Fish Guano. Ammoniated Superphosphate. Ground Bone,	March 28
Quinnipiac Fertilizer Co., New London, Conn.,	Quinnipiac Phosphate. Quinnipiac Extra Phosphate. Dry Ground Fish. Fish and Potash, Crossed Fishes Brand. Fish and Potash, Plain Brand,	May 13
Rogers & Hubbard Co., Middletown, Conn.,	Pure Raw Knuckle Bone "A." Pure Raw Knuckle Bone "Meal." Ground Bone "A.X." Bone Sawdust,	May 19

Firm.	Articles.	Date.
Sanford, Charles, Redding Ridge, Conn.,	Bone Superphosphate,	May 17
Shoemaker, M. L. & Co., Philadelphia, Pa. By F. Ellsworth, Hartford,	Swift-Sure Superphosphate. Swift-Sure Bone Meal,	May 13
Smith, Edmund, South Canterbury, Conn.,	Ground Bone,	May 19
Stearns & Co., 149 Front St., N. Y.,	Eagle Brand Fish and Potash. Dry Ground Fish. Ammoniated Bone Superphosphate,	May 6
St. Louis Lead and Oil Co., St. Louis, Mo. By F. Ellsworth, Hartford,	Castor Pomace,	May 13
Thomson, Paul, Hartford, Conn.,	*	May 15
Williams, Clark & Co., 101 Pearl St., New York,	Americus Superphosphate. Fish and Potash. Acorn Brand Kainite. Acorn Brand Muriate Potash.	May 27
Wilcox, L. & Co., Mystic Bridge, Conn.,	Wilcox Prepared Fertilizer,	May 14

* Name not reported. Sample not received.

As required by law, a package of each Bulletin is mailed to every post-office in the State. The package is directed to the postmaster, with a request to distribute to farmers.

The Bulletins will be regularly sent, also, on application, to any address in Connecticut.

To citizens of other States remitting fifty cents, the publications of the current year, including Bulletins and next Annual Report, will be mailed as they appear.

The Station supply of its last Annual Report (for 1883) is exhausted.

A limited number of copies of the Station Report, bound with the Annual Report of the State Board of Agriculture, may be had of the Secretary of the Board, T. S. Gold, West Cornwall, Ct.

Bound copies of the two Reports are yearly sent by the Board of Agriculture to the town clerks throughout the State, for distribution.

Correction.—On page 53 of the Station Report for 1883 the valuation of Swift-Sure Bone Meal is given at $52.58. It should have been $44.26. The error was made by misplacement of a decimal point in the calculation, the same error having been made by two persons reckoning independently.

S. W. JOHNSON, *Director.*

May 29, 1884.