

THE

Connecticut Agricultural Experiment Station,

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The Bulletins and Reports of this Station are mailed free to every citizen of Connecticut who applies for them seasonably.

FERTILIZERS.

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DUTIES OF DEALERS IN FERTILIZERS.

The Connecticut Fertilizer Law holds the SELLER responsible for affixing a correct *label and statement of composition* to every package or lot of fertilizer sold or offered for sale. Purchasers, for their own security, should insist that such statements are supplied.

EVERY PERSON who sells commercial fertilizers in Connecticut is also required by law to report certain facts to the Director of this Station and a penalty is provided for neglect to do this.

The law also holds the SELLER responsible for the payment of an analysis-fee on every brand of fertilizer sold by him in case the fee is not paid by the manufacturer on or before the first of May annually.

Copies of the law will be sent on application.

GRATUITOUS ANALYSES OF FERTILIZERS.

The Station by its authorized agents draws samples of all brands offered for sale in all parts of the State and when possible sends its agents, on request, to sample large lots of goods bought by Granges or Farmers' Clubs.

The coöperation of farmers' organizations is nevertheless desired in calling attention to new brands of fertilizers, and in securing samples.

To insure justice to manufacturers, dealers and consumers alike, the Station will make gratuitous analyses of Commercial Fertilizers *only* on samples taken by the Agents of the Station, or on such other samples as are *fully* described on the Station Forms for Description and taken in accordance with the Station Instructions for sampling, and furthermore are properly authenticated by the certificate of the person drawing the sample, *and in addition* the witness, either

1. Of a Selectman;
2. Of an Officer of a farmers' club, grange or local agricultural society; or
3. Of the Dealer from whose stock the sample is taken.

In case a Dealer takes samples of his own stock, the witness of one of the Officers aforesaid will be required.

It is particularly necessary that the *actual cost prices* be given. In case of special rates the Station, if desired, will hold confidential both the names of the seller and buyer, but to make the results of analysis of any general value, and so to justify making the analyses at all it is essential to know the cost of the material.

OBSERVANCE OF THE FERTILIZER LAW.

MANUFACTURERS who have paid or arranged for payment of the Analysis Fees as required by the Law, and Fertilizers for which fees have been thus paid for the year ending May, 1891.

<i>Firm.</i>	<i>Brand of Fertilizer.</i>
Apothecaries Hall Co., Waterbury, Conn.	Victor Phosphate.
Baker, H. J. & Bro., 215 Pearl St., N. Y.	Pure Ground Bone.
	A. A. Ammoniated Superphosphate.
	Potato Fertilizer.
	Corn Fertilizer.
	Castor Pomace.
Bowker Fertilizer Co., 43 Chatham St., Boston, Mass.	Kainit.
	Pure Dry Fish.
	Stockbridge Tobacco Manure.
	“ Corn and Grain Manure.
	“ Forage Crop Manure.
	“ Vegetable Manure.
	“ Fruit Manure.
	Bowker's Hill and Drill Phosphate.
	“ Fish and Potash.
	“ Ammoniated Dissolved Bone.
	“ Fresh Ground Bone.
Bradley Fertilizer Co., 27 Kilby Street, Boston, Mass.	Bradley's Superphosphate.
	“ Potato Manure.
	“ Complete Manure for Potatoes and Vegetables.
	“ for Top Dressing Grass and Grain.
	“ for Corn and Grass.
	“ Pure Fine Ground Bone.
	“ Circle Brand Ground Bone with Potash.
	“ Fish and Potash, Anchor Brand.
	“ Fish and Potash, Triangle A Brand.
	B. D. Sea Fowl Guano.
	Original Coe's Superphosphate.
	Farmer's New Method Fertilizer.
Church, Joseph & Co., Tiverton, R. I.	Fish and Potash.
	Dry Ground Fish.
Coe, E. Frank, 16 Burling Slip, N. Y.	High Grade Ammoniated Bone Superphosphate.
	Red Brand Excelsior Guano.
	Gold Brand Excelsior Guano.
	Potato Fertilizer.
	Alkaline Bone.
	Ground Bone.
	Fish and Potash.
Coe, Russell, Meriden, Conn.	Superphosphate.
Cooper's, Peter, Glue Factory, 17 Burling Slip, N. Y.	Pure Bone Dust.
Crocker Fertilizer & Chemical Co., Buffalo, N. Y.	New Rival Ammoniated Superphosphate.
	Buffalo Superphosphate No. 2.

<i>Firm.</i>	<i>Brand of Fertilizer.</i>
Crocker Fertilizer & Chemical Co., Buffalo, N. Y.	Special Potato Manure. Pure Ground Bone. Ammoniated Bone Superphosphate. Potato, Hop and Tobacco Phosphate. Queen City Phosphate. Vegetable Bone Superphosphate. Ammoniated Wheat and Corn Phosphate.
Cumberland Bone Co., Portland, Maine.	Cumberland Superphosphate. Seeding Down Fertilizer.
Darling, L. B. Fertilizer Co., Pawtucket, R. I.	Animal Fertilizer. Extra Bone Phosphate. Pure Ground Bone. Ground Bone.
Downs & Griffin, Birmingham, Conn.	Standard Special Formula.
Farmers Fertilizer Co., 230 W. Water St., Syracuse, N. Y.	Fish and Potash.
Great Eastern Fertilizer Co., Rutland, Vt.	Great Eastern General Phosphate for Oats, Buckwheat and Seeding Down. Great Eastern General Fertilizer for Grass and Grain. Great Eastern Vegetable, Vine and Tobacco Fertilizer.
Kelsey, E. R., Branford, Conn.	Fish and Potash.
Lister's Agricultural Chemical Works, Newark, N. J.	Standard Superphosphate of Lime. Ammoniated Dissolved Bone. Celebrated Ground Bone.
Ludlam Frederick, 140 Maiden Lane, N. Y.	Ludlam's Cereal Fertilizer.
Mapes Formula & Peruvian Guano Co., 158 Front St., N. Y.	" Cecrops Fertilizer. Potato Manure. Complete Manure for Light Soils. " " for General Use. " " " A " Brand.
	Tobacco Manure, Connecticut Brand. " " Wrapper Brand.
	Fruit and Vine Manure. Peruvian Guano. Corn Manure. Fine Dissolved Bone. Seeding Down Manure. Grass and Grain Spring Top Dressing. Flour of Bone Phosphate. Pure Ground Bone.
Miller, G. W., Middlefield, Conn.	Olds & Whipple Special Phosphate.
Olds & Whipple, Hartford, Conn.	Bone Fertilizer.
Plumb & Winton, Bridgeport, Conn.	Farmers' Friend Fertilizer.
Read Fertilizer Co., New York, N. Y.	Lion Brand Fertilizer. High Grade Farmers' Friend. Bone, Fish and Potash.
Red Seal Castor Oil Co., St. Louis, Mo., by Olds & Whipple, Hartford.	Red Seal Castor Pomace.
Reese, J. S. & Co., New Bedford, Mass.	Bay State Fertilizer. Great Planet " A " Fertilizer. Reese's Concentrated Potato and Corn Manure. Reese's Concentrated Tobacco and Cabbage Manure. Reese's New England Favorite. Pilgrim Fertilizer. King Philip Alkaline Bone Superphosphate.
Rogers & Hubbard Co., Middletown, Conn.	Pure Raw Knuckle Bone Flour. Pure Ground AX Bone.

<i>Firm.</i>	<i>Brand of Fertilizer.</i>
Rogers & Hubbard Co., Middletown, Conn.	Soluble Potato Manure. Fairchild's Corn Formula. " Seeding Down Formula.
Sanderson, L., Long Wharf, New Haven, Conn.	Formula A. Sulphate of Ammonia. Kainit. Nitrate of Soda. Blood, Bone and Meat. Dissolved Bone Black. Muriate of Potash. Sulphate of Potash. Fine Ground Bone.
Stewart, W. D. & Co., 8 Congress St., Boston, Mass.	Soluble Pacific Guano. Pacific Fish and Potash.
Wilcox, Leander, Mystic Bridge, Conn.	Wilcox's Acidulated Fish Guano. " Dry Ground Fish Guano.
Wilkinson & Co., 54 Williams St., N. Y.	Economical Bone Fertilizer.
Williams & Clark Fertilizer Co., 81 Fulton Street, N. Y.	High Grade Special for Tobacco, &c. Potato Phosphate. Americus Ammoniated Bone Phosphate. Americus Pure Bone Meal. Royal Bone Phosphate.

THE TRADE-VALUES FOR 1890 OF FERTILIZING INGREDIENTS IN RAW MATERIALS AND CHEMICALS.

The average Trade-Values or *retail cost per pound* of the ordinarily occurring forms of nitrogen, phosphoric acid and potash are as follows:

	Cts. per lb.
Nitrogen in ammonia salts	17
nitrates	14½
Organic nitrogen in dry and fine ground fish, meat and blood	17
in cotton seed meal and castor-pomace	15
in fine bone and tankage	16½
in fine medium bone and tankage	13
in medium bone and tankage	10½
in coarser bone and tankage	8½
in hair, horn shavings and coarse fish scrap	8
Phosphoric acid, soluble in water	8
in ammonium citrate*	7½
in dry ground fish, fine bone and tankage	7
in fine-medium bone and tankage	6
in medium bone and tankage	5
in coarser bone and tankage	4
in fine ground rock phosphate	2
Potash as high-grade Sulphate and in forms free from Muriate (or Chlorides)	6
as kainit	4½
as muriate	4½

* 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 65° C., with agitation once in five minutes. Commonly called "reverted" or "backgone" Phosphoric Acid.

These Trade-Values are the average prices at which in the six months preceding March the respective ingredients could be bought at retail for cash in our large markets, Boston, New York and Philadelphia, 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. They have been agreed upon by the Experiment stations of Massachusetts, New Jersey and Connecticut for use in their respective States during 1890. The valuations obtained by use of the above figures will be found to agree fairly with the *average retail price* at the large markets of standard raw materials such as :

Sulphate of Ammonia,	Azotin,
Nitrate of Soda,	Ammonite,
Dried Blood,	Dry Ground Fish,
Muriate of Potash,	Bone or Tankage,
Sulphate of Potash,	Ground So. Carolina Rock,
	Plain Superphosphate.

VALUATION OF SUPERPHOSPHATES, SPECIAL MANURES AND MIXED FERTILIZERS OF HIGH GRADE.

The Valuation of a Fertilizer consists in calculating the *retail Trade-value* or *cash-cost* at trade centers (in raw materials of good quality) of an amount of nitrogen, phosphoric acid and potash equal to that contained in one ton of the fertilizer.

To obtain the Valuation of a Fertilizer 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.

Organic nitrogen in Mixed Fertilizers is reckoned at 17 cents, the price of nitrogen in raw materials of the best quality.

Insoluble Phosphoric Acid is reckoned at 3 cents, unless found to be from rock phosphate. In this latter form Insoluble Phosphoric Acid costs but 2 cents per pound. Potash is rated at 4½ 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 at 6 cents.

In most cases the valuation of the Ingredients in Superphosphates and Specials falls below the retail cash price charged for

these goods at the factory. The difference between the two figures represents the manufacturer's charges for converting raw materials into manufactured articles and selling them. These charges are for grinding and mixing, bagging or barreling, storage, commission to agents and dealers, interest on investment, and finally, profits. If the purchaser buys on credit, the price of the fertilizer is commonly made to cover interest.

FERTILIZER ANALYSES.

Here follow fertilizer analyses recently made at this Station and which have immediate interest to farmers. The work of analyzing every brand of fertilizer sold in the State which is required by the fertilizer law to be done annually cannot be completed before August or September.

MATERIALS CHIEFLY VALUABLE AS SOURCES OF NITROGEN.

2690 NITRATE OF SODA, **2691** SULPHATE OF AMMONIA, **2721** DRIED BLOOD, sampled by Station Agent from stock of L. Sanderson.

	ANALYSES.		
	Nitrate of Soda.	Sulphate of Ammonia.	Dried Blood.
	2690	2691	2721
Nitrogen	16.06	20.86	12.90
Equivalent ammonia	19.4	25.3	15.6
Cost per ton	\$50.00	\$75.00	\$40.00
Nitrogen costs per pound	15.6 cts.	18 cts.	15.5 cts.

COTTON SEED MEAL AND CASTOR POMACE.

2658. Cotton Seed Meal, "Off Color," unfit for cattle food. Stock of Olds & Whipple.

2723. Cotton Seed Meal, from stock of L. Sanderson, New Haven.

2758. Cotton Seed Meal, "Off Color," from stock of C. L. Spencer, Suffield.

2714. Castor Pomace. Made by Occidental Oil Co., N. Y. Sold by L. Sanderson, New Haven. Sampled by E. F. Thompson, Warehouse Point.

2655. Castor Pomace. Made by Occidental Oil Co., N. Y. Sold by L. Sanderson, New Haven. Sampled by John Mason at Warehouse Point.

2656. Castor Pomace. Made by Collier Lead & Oil Co., St. Louis. Sold by F. Ellsworth, Hartford.

ANALYSES.

	2658	2723	2758	2714	2655	2656
Nitrogen.....	6.44	6.89	6.74	4.70	4.93	5.65
Phosphoric acid.....	3.34	3.12	3.22	1.55	1.62	2.11
Potash.....	1.96	2.22	2.16	1.24	1.11	1.05
Cost per ton.....	\$22.00	\$26.00	\$23.00	\$19.00	\$19.00	\$23.00
Nitrogen costs per pound in cents,*	11.7	13.8	11.9	16.3	15.6	16.6

*Allowing 7c. and 6c. per pound respectively for phosphoric acid and potash.

Cotton seed meal, of good quality, such as is used for cattle food, continues to be one of the cheapest sources of available nitrogen in our fertilizer market, and that which is "off color" supplies nitrogen at an even lower price; in Nos. **2658** and **2758** for less than 12 cents.

The Castor Pomace furnished by the Occidental Oil Co. is exceptionally low in nitrogen [4.70-4.93 per cent.], but at \$19.00 per ton, nitrogen costs rather less than in the other brand sold at \$23.00 per ton.

RAW MATERIALS CHIEFLY VALUABLE AS SOURCES OF POTASH.

POTASH SALTS.

2687. Sulphate of Potash. **2689.** Muriate of Potash; both from stock of L. Sanderson, sampled by Station agent.

ANALYSES.

	2687	2689
Potash.....	25.76	51.12
Cost per ton.....	\$30.00	\$42.50
Potash costs per pound in cents	5.8	4.2

COTTON HULL ASHES.

The following analyses have been made this spring of samples, sent for the most part by purchasers. Nos. **2731** and **2740** were from stock sold by Olds & Whipple, Hartford. Nos. **2657**, **2660** and **2713** were sold by R. A. Parker, Warehouse Point. No. **2643** by R. E. Pinney, Suffield. No. **2661** by J. E. Soper & Co., Boston. Nos. **2652**, **2671**, **2717** and **2757** by C. L. Spencer, Suffield, and No. **2718** by Allen Wilson, Suffield.

ANALYSES OF COTTON HULL ASHES.

Station No.	2731	2740	2657	2660	2713	2643	2661	2652	2671	2717	2757	2718
Soluble phosphoric acid.....	1.62	.72	.64	2.08	1.23	.46	2.94	.40	.54	.70	.16	1.10
Reverted phosphoric acid.....	7.24	6.16	5.14	7.58	6.28	6.84	7.74	6.68	8.07	5.09	4.85	4.80
Insoluble phosphoric acid.....	1.89	.28	1.17	1.09	2.40	.99	1.95	1.24	1.33	2.77	1.55	4.81
Potash [chiefly as carbonate and phosphate], soluble in water.....	30.24	29.86	20.00	22.81	25.28	19.36	25.69	22.79	19.07	17.81	15.57	21.10
Cost per ton.....	\$35.00	\$35.00	\$35.00	\$35.00	\$35.00	\$33.00	\$30.00	\$35.00	\$35.00	\$35.00	\$35.00	\$34.00
Potash costs per pound in cents	3.4	4.1	6.5	4.4	4.5	5.6	2.5	5.2	5.6	7.0	8.6	5.5

Two points shown in the above analyses are to be noted:—

1. The content of valuable ingredients is very variable, and the quantity of water-soluble potash in cotton hull ashes has a wide range—one sample containing 30.24 per cent., another little more than half as much, viz: 15.57.

The proportion of phosphoric acid ranges from 7 to 12.5 per cent. This inequality, which is found not only in different car lots, but in ton lots and even in the contents of different sacks in a ton lot, can only be overcome by purchasers insisting on a guarantee of composition from the manufacturer or dealer, and a suitable rebate in case the ashes are not as represented.

2. The ashes are nearly or quite free from chlorides, ["muriates"] the potash being combined chiefly with carbonic and phosphoric acids and can therefore serve instead of sulphate of potash in tobacco fertilizers or wherever it is desired to avoid using muriates. Allowing the same value for soluble and reverted phosphoric acid as in superphosphates and 2 cents per pound for insoluble phosphoric acid, the freely soluble potash in these samples has cost from 8.6 cents to 1.5 cents per pound, or on the average of the twelve samples 5.3 cents per pound. Cotton hull ashes of the best quality are therefore the cheapest source of potash free from chlorides to be found in our markets.

RAW MATERIALS CHIEFLY VALUABLE AS SOURCES OF PHOSPHORIC ACID.

2669. Precipitated Phosphate, made by the Carteret Chemical Co., 115 Broadway, New York. Sampled and sent by the manufacturers.

2688. Dissolved Bone Black, Stock of L. Sanderson, New Haven.

ANALYSES.

	2669	2688
Soluble phosphoric acid	2.32	16.99
Reverted phosphoric acid	28.52	.13
Insoluble phosphoric acid ..	6.53	---
Cost per ton	\$33.63	\$26.00
Available phosphoric acid costs per pound.	4.7 cts.*	7.6 cts.

Particular attention is called to the Precipitated Phosphate which we are told is a waste product of the glue manufacture.

* At wholesale.

It is a white powder, fine and dry, and contains a large per cent. of phosphoric acid which has been precipitated from solution by the addition of lime. It is sold on analysis, wholesale, at "90 cents per unit of phosphoric acid." A "unit" in the trade is 1 per cent. or 20 pounds per ton. As the sample contains 37.33 per cent. or "units" of phosphoric acid, the ton price would be $37.37 \times .90 = \$33.63$ at Newark, N. J., f. o. b.

Precipitated phosphate of lime is readily available and in many cases has proved quite as efficient as water-soluble phosphates and is considerably cheaper.

BONE AND TANKAGE.

2686. Pulverized Tankage [Bone and Meat]; **2722,** Tankage; **2749,** Blood, Bone and Meat. All from stock of L. Sanderson, New Haven.

2681. Pure Ground AX Bone; **2682,** Strictly Pure Fine Bone; and **2683,** Raw Knuckle Bone Flour. All made by the Rogers & Hubbard Co., Middletown.

2720. Ground Bone. Sold by L. Sanderson, New Haven.

2751. Ground Bone. Ground at a grist mill for E. N. Spalding, Suffield.

MECHANICAL ANALYSES.

	2686	2722	2749	2681	2682	2683	2720	2751
Fine, smaller than $\frac{1}{8}$ inch	96	42	51	45	52	72	74	7
Fine medium, smaller than $\frac{1}{16}$ inch....	4	22	18	24	29	28	23	7
Medium, smaller than $\frac{1}{32}$ inch	--	25	19	28	19	--	3	37
Course, larger than $\frac{1}{16}$ inch.....	--	11	12	3	--	--	--	49
	100	100	100	100	100	100	100	100

CHEMICAL ANALYSES.

	2686	2722	2749	2681	2682	2683	2720	2751
Nitrogen.....	5.03	8.26	7.35	4.08	4.00	3.85	3.61	3.31
Phosphoric acid.....	19.32	8.75	12.69	22.52	22.93	25.45	25.38	17.45
Cost per ton.....	\$35.00	\$35.00	\$35.00	\$32.00	\$34.00	\$37.00	\$33.00	\$30.00
Valuation per ton	43.36	32.46	35.67	38.73	40.51	44.60	45.26	23.17

ROCKWEED AND SPONGE.

Some species of marine plants are more or less used on the coast as fertilizers, and are thought much of for corn land, particularly the "round-stalked rockweed" and "flat-stalked rockweed," for which farmers sometimes pay 5 cents per bushel in its green state as it is cut from the rocks at low tide. It is plowed under green, and is popularly believed to lose much of its value if allowed to dry before turning under.

Partial analyses of several species have been made, the samples being supplied by Mr. Walter Merwin, March 24.

2724. Round Stalked Rock-Weed. *Ascophyllum nodosum*.

2725. Flat Stalked Rock-Weed. *Fucus vesiculosus*.

2726. A coarse Sponge. Species not determined.

2727. A finely branching Sea Weed. Species not determined.

2728. "Irish Moss." *Chondrus crispus*.

ANALYSES.

	2724	2725	2726	2727	2728
Water at 100°C.	82.71	84.34	86.13	81.38	80.84
Organic and Volatile.....	13.52	12.09	5.46	14.16	14.43
Ash.....	3.77	3.57	8.41	4.46	4.73
	100.00	100.00	100.00	100.00	100.00
Nitrogen in the Organic Matter..	.53	.48	.58	.73	.77
Phosphoric Acid in the ash.....	.11	.09	.14	.18	.17
Potash in the ash.....	.60	.55	.17	1.30	1.00
Sand and Silica.....	.12	.27	6.19	.41	.54

The analyses show as large a percentage of nitrogen in all the samples as is contained in good stable manure, but less phosphoric acid. The "rock weeds" have as much potash, and the fine seaweed and Irish moss a good deal more than ordinary stable manure. In the opinion of those who use rock weed, fresh, it is as quick in its action as stable manure. Further analyses will show its composition at different seasons of the year. Some maintain that that gathered in the fall is best. Others prefer the spring crop.

PIGEON MANURE.

2649. A dry sample, containing very little foreign matter, feathers, straw, etc. Sampled and sent by A. D. Cooke, Hartford.

ANALYSIS.

Water	9.55
Organic and Volatile*	62.38
Potash	1.07
Soda65
Lime	2.12
Magnesia79
Oxide of iron and alumina	1.08
Phosphoric acid	1.83
Sulphuric acid57
Chlorine47
Sand and Silica	18.12
Carbonic acid and undetermined	1.37
	<hr/>
	100.00
* Containing nitrogen as ammonia47
Organic nitrogen	3.43
	<hr/>
Total nitrogen	3.90

This material contains as much or more nitrogen than most commercial fertilizers, besides 1 per cent. of potash and 1.8 per cent. of phosphoric acid. The "dung" of fowls contains not only the undigested food, but also, in solid form, the excretions of the kidneys, which in cattle are voided as urine, and are apt to be lost, both by drainage and by rapid fermentation. This, the richer food, and the fact that the dung of fowls is comparatively dry, explain the higher percentage of nitrogen, phosphoric acid and potash in it.

WILCOX'S FISH FERTILIZERS.

Following are analyses of two brands of commercial fertilizers which are new in the Connecticut market :

2679. Wilcox's Dry Ground Fish Guano.

2680. Wilcox's Acidulated Fish Guano.

Made by Leander Wilcox, Mystic Bridge, Conn.

ANALYSES.

	2679	2680
Nitrogen as ammonia21	1.19
Nitrogen, organic	8.16	4.84
Total nitrogen	8.37	6.03
Soluble phosphoric acid89	1.28
Reverted phosphoric acid	3.73	3.00
Insoluble phosphoric acid	2.35	.95
Total phosphoric acid	6.97	5.23
Valuation per ton	\$36.88	\$27.63