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Connecticut Agricultural Experiment Station
New Haven, Connecticut

REPORT ON INSPECTION
OF
COMMERCIAL FERTILIZERS
1926

Connecticut Agricultural Experiment Station
New Haven, Connecticut

Report on Inspection
of
Commercial Fertilizers for 1926

E. M. BAILEY, *Chemist in Charge of the*
Analytical Laboratory.

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Report on Inspection of Commercial Fertilizers, 1926

E. M. BAILEY,

Chemist in Charge, Analytical Laboratory.

THE FERTILIZER LAW.

The provisions of the Connecticut fertilizer law have been discussed in previous reports but for more ready reference its essential features may be noted here.

SIGNIFICANCE OF THE TERM "COMMERCIAL FERTILIZERS"

Explaining what is meant by the term "commercial fertilizers" the law says:

"The term 'commercial fertilizers' shall be construed to mean any and every substance imported, manufactured, prepared or sold for fertilizing or manuring or soil amendment purposes, except barnyard manure and stable manure which have not been artificially treated or manipulated, marl and lime. Cottonseed meal, rapeseed meal, castor pomace and all other vegetable products used as fertilizers, including the ashes of cotton hulls and wood ashes, shall be included as fertilizers within the meaning of this act and separate analysis fees shall be paid on each different grade which is sold or offered for sale in the state. The person responsible for paying the fees above prescribed may deduct from the total tonnage sold such sales of cottonseed meal or other vegetable products as are made to anyone who gives a written certificate on a form supplied by the Connecticut Agricultural Experiment Station stating that the material bought by him was to be used exclusively for feed and not for fertilizer."

CONCERNING COTTONSEED MEAL.

Cottonseed meal is a fertilizer within the meaning of the Statute but it is provided that when this product is sold for feeding purposes only, it shall be exempt from the tonnage tax.

The status of cottonseed meal under the fertilizer law has been clearly stated in a bulletin¹ from this Station from which the following may be quoted:

Registration and analysis fees. "Each brand of cottonseed meal must be registered on forms provided by this Station and an analysis fee of ten dollars paid on it before it is sold, offered or exposed for sale, and on the first day of January annually thereafter."

¹ Bull. of Information No. 9, 1919.

"A distinctive name constitutes a distinct brand. If shipments have different guaranties of composition they are held to be different brands."

Branding or tagging. "Since nitrogen is the only fertilizer ingredient considered in the trade in cottonseed meal no guaranty of phosphoric acid or potash is required. If either is guaranteed by the manufacturer, however, an additional fee of ten dollars must be paid on each element. The statement of composition now legal for feeds may be used hereafter if the percentage of nitrogen is stated.

"Note that the law regarding feeding stuffs forbids the use of metal in attaching tags and requires that each package shall be branded or tagged with the statement required by law."

Duties of shippers. "It is assumed from correspondence with shippers outside the state that they will register the brands which they sell in Connecticut, will pay analysis fees as has been done in the past by manufacturers of commercial fertilizers, and will semi-annually thereafter pay the tonnage fees.

"They will report to this Station their total sales and if they wish, may report what part has been sold for feed exclusively. From the reports of dealers within the state it will be possible to determine quite closely the amounts of each brand actually used as feed.

"In the case the jobber outside the state neglects or refuses to register a brand, the dealer who sells it within the state is responsible under the law."

Duties of dealers. "Dealers are required to file with the director of the Station on July first of each year and semi-annually thereafter a sworn statement of their total sales of each brand of cottonseed meal and the amount of each sold exclusively for feed, during the preceding six months."

REQUIREMENTS TO BE COMPLIED WITH BY SELLERS OF COMMERCIAL FERTILIZERS.

The seller is responsible for the proper labeling of each package, for the registration at the Station of every brand sold by him and for the payment of the analysis fee, before offering for sale, and annually thereafter on January 1st.

The law specifies the information which shall be given on the label as follows:

1. *Weight of each package in pounds.*
2. *Brand name or trade mark.*
3. *Analysis:*
 - (a) *Available phosphoric acid, per cent.*
 - (b) *Total phosphoric acid, per cent.*
 - (c) *Nitrogen, per cent.*
 - (d) *Equivalent ammonia, per cent.*
 - (e) *Potash soluble in water, per cent.*
4. *Name and address of the manufacturer or of the person who is responsible for the statement of the guaranty.*

In the case of bone meal, tankage or other organic products, and in basic slag and mineral phosphates in which a large percentage of the phosphoric acid is not available by laboratory methods, the

phosphoric acid shall be claimed as total phosphoric acid unless it is desired to claim available phosphoric acid instead, in which case the guaranty shall take the form set forth above.

The label may be a tag attached to the package or a statement printed thereon. Percentages shall be minimum percentages only.

The presence of leather in its various forms, wool waste, hair, or any inert nitrogenous material shall be declared on the label unless, by processing, the activity of these materials has been rendered satisfactory as determined by official methods.

When potash is derived from sulphate or carbonate of potash it may be so claimed.

No claim or guaranty for less than 0.82 per cent of nitrogen or for less than 1 per cent of phosphoric acid, or for less than 1 per cent of potash shall be regarded in the registration or analysis of any commercial fertilizer.

The seller must also, on the 1st of January and July, report the tonnage of fertilizer sold within the preceding six months and pay to the director of the Station a tonnage fee of 6 cents per ton.

On request, copies of the law and blanks for registration and for tonnage reports will be supplied by the Station.

If, however, proper labeling, registration and payments have been provided for by the manufacturer of the brands or by another responsible person all sellers of such brands are released from the above mentioned requirements. The retailer, therefore, should assure himself that the requirements of the law have been met by the manufacturers of the brands which he handles, or himself be prepared to meet all these requirements.

PRECAUTIONS TO BE OBSERVED IN DRAWING SAMPLES FOR ANALYSIS.

The analysis of a fertilizer is of no value unless the sample analyzed represents as nearly as possible the stock from which the sample was drawn. The law prescribes the procedure to be followed by authorized agents of this Station when taking official samples for analysis as follows:

"When samples are taken from fertilizers in bags, a tube shall be used, and it shall be inserted at one end of the bag and shall pass substantially the entire length of the bag, so as to take a core of the material being sampled from substantially the entire length of the bag. Samples thus taken from individual bags shall be thoroughly mixed, and the official samples shall be taken from the mixture so drawn by the method known as 'quartering.' Samples of fertilizers taken as herein provided shall be taken from at least five per centum of the separate original unopened packages in the lot, for the mixture from which the official samples shall be taken. If less than one hundred bags are in the lot, at least five bags shall be sampled; if less than five bags, all shall be sampled. Broken packages shall not be sampled."

GRATUITOUS ANALYSES.

Under the fertilizer law the Station is charged only with the analysis of samples drawn by its own agents. It does, however, each year analyze a considerable number of samples drawn by individuals, representing stock purchased by them for their own use. The object of the purchaser is to satisfy himself as to whether he has obtained goods of the grade represented and, perhaps, to obtain evidence upon which to base a claim for shortage should the materials not meet their guaranties. The Station assumes no responsibility for the sampling in case of such unofficial samples and can only vouch for the accuracy of the results obtained on the materials as submitted. Since a representative sample is as essential as an accurate analysis in judging the quality of a shipment of fertilizer, it is evident that a satisfactory adjustment will seldom be effected on the basis of an unofficial sample. Notwithstanding certain objections which may be raised to the practice of analyzing samples submitted by individuals, the Station is disposed to continue such work so long as there is evidence that it constitutes a useful service; it cannot, however, undertake for any one individual or group, work in such volume or with such frequency that it becomes a systematic control over current purchases. This clearly invades the field of the commercial laboratory.

REGISTRATIONS.

LATE REGISTRATIONS FOR 1925.

To the brands registered for 1925 in our last report should be added:

A. W. Higgins, Inc., South Deerfield, Mass.

Old Deerfield 7-6-6
Old Deerfield 6-10-10

REGISTRATIONS FOR 1926.

For 1926, 67 firms and individuals registered at this Station for sale in this State 422 brands of fertilizers. As required by Statute the brands so registered are listed as follows:

American Agricultural Chemical Co., New Haven Sales Dept., New Haven, Conn.

A. A. C. 16% Acid Phosphate
Acme Fertilizer
Aroostook Potato Manure
Castor Pomace
Complete General Fertilizer
Double A Tobacco Fertilizer
Dry Ground Fish

Farmer's Friend Fertilizer
Fine Ground Bone
Gladiator Fertilizer
Grass and Lawn Top Dressing
Hi-Grade Tobacco Manure
Monarch Fertilizer
Muriate of Potash
Nitrate of Soda
Old Hickory Fertilizer
Pulverized Sheep Manure
South American Sheep and Goat Manure
Sulphate of Potash
Bowker's All Round Fertilizer
Bowker's Market Garden Fertilizer
Bowker's Potato and Vegetable Phosphate
Bowker's Sure Crop Fertilizer
Bradley's Blood, Bone and Potash
Bradley's Complete Manure for Potatoes and Vegetables
Bradley's Complete Tobacco Manure
Bradley's Eclipse Fertilizer
Bradley's Northland Potato Grower
Bradley's Potato Fertilizer
Bradley's Potato Manure
Bradley's Superior Tobacco Compound
Bradley's XL Superphosphate of Lime
National Aroostook Special Fertilizer
National Complete Tobacco Fertilizer
National Market Garden Fertilizer
National Pine Tree State Potato Fertilizer
National Premier Potato Manure
National White Ash Tobacco Grower
Sanderson's Atlantic Coast Bone, Fish and Potash
Sanderson's Complete Tobacco Grower
Sanderson's Corn Superphosphate
Sanderson's Formula A
Sanderson's Formula B
Sanderson's Potato Manure
Sanderson's Top Dressing for Grass and Grain
Stockbridge Early Crop Manure
Stockbridge Hill and Drill Fertilizer
Stockbridge Premier Tobacco Grower
Stockbridge Tobacco Manure

American Cyanamid Co., 511 Fifth Avenue, New York, N. Y.
Ammono-Phos

American Linseed Co., 297 Fourth Ave., New York, N. Y.
Alinco Old Process Linseed Meal

Apothecaries Hall Co., Waterbury, Conn.
Acid Phosphate
Animal Tankage
Bone Meal 4-20
Bone Meal 3-22
Bone and Meat Tankage
Carbonate Potash
Castor Pomace

Cotton Seed Meal
 Double Sulphate Potash and Magnesia
 Dry Ground Fish
 Liberty Corn and All Crops
 Liberty Corn, Fruit and All Crops
 Liberty Fish, Bone and Potash
 Liberty High Grade Market Gardeners
 Liberty High Grade Tobacco Manure 7-4-7
 Liberty Onion Special (Potash as Sulphate)
 Liberty Potato and General Crops
 Liberty Potato and Market Gardeners' Special
 Liberty Potato and Vegetable
 Liberty Tobacco Special 5-4-5
 Liberty Top Dresser for Grass and Grain
 Muriate of Potash
 Nitrate of Soda
 Nitrate of Soda and Potash
 Precipitated Bone
 Sulphate Potash

Armour Fertilizer Works, 50 Broad St., New York, N. Y.

Armour's Big Crop Acid Phosphate
 Armour's Big Crop Bone Meal
 Armour's Big Crop Fertilizer 2-12-4
 Armour's Big Crop Fertilizer 3-8-4
 Armour's Big Crop Fertilizer 4-8-4
 Armour's Big Crop Fertilizer 4-8-7
 Armour's Big Crop Fertilizer 4-6-10
 Armour's Big Crop Fertilizer 4-16-4
 Armour's Big Crop Fertilizer 5-8-7
 Armour's Big Crop Fertilizer 8-6-6
 Armour's Big Crop Super-Phosphate 20%
 Armour's Big Crop Tobacco Special 5-4-5
 Armour's Corn Grower
 Armour's Muriate of Potash
 * Armour's Nitrate of Soda
 Armour's Sheep Manure
 Cotton Seed Meal, 8%
 Ground Tankage

Ashcraft-Wilkinson Co., Atlanta, Ga.

Helmet Brand
 Monarch Brand
 Paramount Brand

Atlantic Packing Co., New Haven, Conn.

Atlantic 4-8-7
 Atlantic 5-8-7
 Atlantic Grain Fertilizer 2-8-2
 Atlantic Potato Phosphate 3-8-4
 Atlantic Special Vegetable 4-8-4
 Atlantic Tobacco Grower 5-4-5
 Atlantic Tobacco Manure 5-8-6
 Atlantic 5-4-16

Baker Castor Oil Co., 120 Broadway, New York, N. Y.

Castor Pomace

The Barrett Co., 40 Rector St., New York, N. Y.

Arcadian Sulphate of Ammonia

F. A. Bartlett Tree Expert Co., Stamford, Conn.

Bartlett's Green Tree Food

Berkshire Fertilizer Co., Bridgeport, Conn.

Berkshire Acid Phosphate
 Berkshire Castor Pomace
 Berkshire Complete Fertilizer
 Berkshire Complete Tobacco
 Berkshire Dry Ground Fish
 Berkshire Economical Grass Fertilizer
 Berkshire Fine Ground Bone
 Berkshire Grass Special
 Berkshire Ground Tankage
 Berkshire Long Island Special
 Berkshire Market Garden Fertilizer
 Berkshire Potato and Vegetable Phosphate
 Berkshire Sheep Manure
 Berkshire Starter with 10% Potash
 Berkshire Tobacco Special
 High Grade Sulphate Potash
 Muriate Potash
 Nitrate of Soda

F. E. Boardman, Middletown, Conn.

Boardman's Fertilizer for Potatoes and General Crops
 Boardman's Tobacco Fertilizer

Amos D. Bridge's Sons, Inc., Hazardville, Conn.

Corn, Onion and Potato and General Purpose
 Special Tobacco Fertilizer

Buckeye Cotton Oil Co., Cincinnati, Ohio.

Buckeye Cottonseed Meal

A. H. Case & Co., Inc., 965 William St., Buffalo, N. Y.

Case's Brand of Pulverized Sheep Manure

The E. D. Chittenden Co., Bridgeport, Conn.

Acid Phosphate
 Castor Pomace
 Complete Grain 3% Potash
 Dry Ground Fish
 Fine Ground Bone
 Fine Ground Tankage
 High Grade Potato 7% Potash
 High Grade Sulphate of Potash
 High Grade Tobacco
 Muriate of Potash
 Nitrate of Soda
 Potato Special
 Sulphate of Ammonia
 Tobacco Special

Everett B. Clark Seed Co., Milford, Conn.

16% Acid Phosphate
 Nitrate of Soda
 Special Mixture for General Use
 Special Mixture with 6% Potash
 Super Phosphate
 Tip-Top Brand

Conn. Fat Rendering & Fertilizer Corp., West Haven, Conn.
 Tankage**Consolidated Rendering Co., 40 North Market St., Boston, Mass.**

Acid Phosphate
 Castor Pomace
 Dry Ground Fish
 Ground Bone 2.5-25.18
 Ground Bone 3-22.9
 Muriate of Potash
 Nitrate of Soda
 Sulphate of Ammonia
 Sulphate of Potash
 Tankage 6-30
 Tankage 9-20

C. A. Cowles, Plantsville, Conn.

Cowles' Complete Corn and Potato

C. & R. Sales Co., Worcester, Mass.

C. & R. Lawn and Shrub Fertilizer

S. P. Davis, Little Rock, Ark.

Steerboy Brand Cottonseed Meal

Davey Tree Expert Co., Kent, Portage County, Ohio.

Davey Tree Food

Eastern States Farmers' Exchange, 33 Lyman St., Springfield, Mass.

Eastern States 3-12-3
 Eastern States 4-8-10
 Eastern States 5-8-7
 Eastern States 5-10-5
 Eastern States 8-6-6
 Eastern States 8-16-8
 Eastern States 8-16-20
 Eastern States 10-16-14
 Eastern States Acid Phosphate
 Eastern States Fine Bone Meal
 Eastern States Muriate of Potash
 Eastern States Nitrate of Soda
 Eastern States Sulphate of Ammonia
 Dried Ground Fish
 Ground Animal Tankage
 Open Formula A Tobacco Fertilizer
 Open Formula C Tobacco Fertilizer
 Precipitated Bone
 Sulphate of Potash

Ed. Eggert, 245 State St., Hartford, Conn.

Cotton Seed Hull Ashes

Essex Fertilizer Co., 39 North Market St., Boston, Mass.

Essex A1 Superphosphate 2-8-2
Essex Complete Manure 5-8-7
Essex Fish Fertilizer For All Crops 3-8-4
Essex Market Garden 4-8-4
Essex Potato Phosphate 4-8-7
Essex Tobacco Grower

Four Seasons Fertilizer Co., Inc., 135 West 29th St., New York, N. Y.

Four Seasons Fertilizer

The L. T. Frisbie Co., New Haven, Conn.

Frisbie's 4-6-10
Frisbie's 5-8-7
Frisbie's Corn and Grain Fertilizer 2-8-2
Frisbie's Fine Bone Meal
Frisbie's 3/50 Bone Meal
Frisbie's Market Garden 4-8-7
Frisbie's Precipitated Bone
Frisbie's Special 3-8-4
Frisbie's Special Vegetable and Potato Grower 4-8-4
Frisbie's Tobacco Grower 5-4-5
Frisbie's Tobacco Manure 5-8-6
Frisbie's Top Dresser 7-6-5

Harris & Co., Portland, Ore.

"Merino" Brand Ground Sheep Manure

A. W. Higgins, Inc., South Deerfield, Mass.

Old Deerfield 3-10-6
Old Deerfield 4-8-4
Old Deerfield 5-8-7
Old Deerfield 7-4-7
Old Deerfield Acid Phosphate
Old Deerfield 10-16-14 Concentrated Fertilizer

Humphreys-Godwin Co., Memphis, Tenn.

Bull Brand
Danish Brand
Dixie Brand

International Agricultural Corp., 126 State St., Boston, Mass.

International Acid Phosphate
International Connecticut Valley Special
International Crop Grower
International Economy
International General Favorite
International High Grade Manure
International Ideal
International Multiple-Strength 8-12-20
International New England Special
International Phosphate and Potash
International Tobacco Producer

I. A. C. Top Dresser and Starter
 Bone Meal
 Castor Pomace
 Cotton Seed Meal
 Nitrate of Soda
 Precipitated Bone
 Sulphate of Potash
 Tankage

John Joynt Co., Inc., Lucknow, Ontario, Canada.
 The Joynt Brand Unleached Hardwood Ashes

Spencer Kellogg & Sons, Inc., Buffalo, N. Y.
 Castor Pomace

King Chemical Co., Inc., Bound Brook, N. J.
 King Acid Phosphate

Kuttroff, Pickhardt & Co., Inc., New York, N. Y.
 Floranid (Urea B. A. S. F.)

L. B. Lovitt & Co., Memphis, Tenn.
 "Lovit Brand" 43% Cotton Seed Meal

Lowell Fertilizer Co., 40 North Market St., Boston, Mass.
 Lowell Animal Brand A High Grade Manure For All Crops 3-8-4
 Lowell Bone Fertilizer 2-8-2
 Lowell Corn and Vegetable 4-8-4
 Lowell Market Garden Manure 5-8-7
 Lowell Potato Grower 4-6-10
 Lowell Potato Phosphate 4-8-7
 Lowell Tobacco 5-4-5
 Lowell Top Dressing 7-6-5

The Mapes Formula & Peruvian Guano Co., 270 Madison Ave., New York, N. Y.

The Mapes Connecticut Valley Special
 The Mapes Corn Manure
 The Mapes General Tobacco Manure
 The Mapes General Truck Manure
 The Mapes General Use Manure
 The Mapes Grain Brand
 The Mapes Onion Manure
 The Mapes Potato Manure
 The Mapes Special Formula Tobacco Manure
 The Mapes Special Trucker
 The Mapes Tobacco Ash Constituents
 The Mapes Tobacco Manure, Wrapper Brand
 The Mapes Tobacco Starter, Improved
 The Mapes Top Dresser
 Cotton Seed Meal
 Nitrate of Soda
 Pure Fine Ground Bone
 Sulphate of Potash

Mehmel & Sarvi, Plantsville, Conn.

Mehmel's Corn, Potato and Onion Fertilizer

Memphis Cottonseed Products Co., Memphis, Tenn.

Durham Thirty-Six Cottonseed Meal

Natural Guano Co., Aurora, Ill.

"Sheep's Head" Pulverized Sheep Manure

R. N. Neal & Co., Memphis, Tenn.

"Triangle" Brand 43% Cottonseed Meal

N. E. By-Products Corp., 20 West St., Lawrence, Mass.

Pure Bone Meal

New England Fertilizer Co., 40A North Market St., Boston, Mass.

New England Corn Phosphate 2-8-2

New England Market Garden Manure 5-8-7

New England Potato Phosphate 4-8-7

New England Potato and Vegetable Manure 4-8-4

New England Superphosphate A High Grade Fertilizer For All Crops

3-8-4

New England Tobacco Manure 5-4-5

Olds & Whipple, Inc., Hartford, Conn.

O & W Acid Phosphate

O & W Castor Pomace

O & W Complete Market Garden Fertilizer

O & W Complete Tobacco Fertilizer

O & W Dry Ground Fish

O & W Grain and General Crop Fertilizer

O & W Grass Fertilizer

O & W High Grade Starter and Potash Compound

O & W High Grade Tobacco Starter

O & W High Grade Vegetable and Potato Fertilizer

O & W Nitrate of Soda

O & W Precipitated Bone

O & W Pure Bone Meal

O & W Tobacco Starter, Blue Label Brand

Double Manure Salts

High Grade Sulphate of Potash

Pacific Manure & Fertilizer Co., 429 Davis St., San Francisco, Cal.

Grozit (Pulverized Sheep Manure)

Parmenter & Polsey Fertilizer Co., 41 North Market St., Boston, Mass.

"P & P" Maine Potato Fertilizer 4-6-10

"P & P" Plymouth Rock Brand For All Crops 3-8-4

Piedmont-Mt. Airy Guano Co., Baltimore, Md.

Harvest Brand 2-8-2

Harvest Brand 3-8-4

Harvest Brand 4-6-10

Harvest Brand 4-8-4

Harvest Brand 5-8-7

Harvest Brand 6-8-6
 Harvest Brand 8-6-6
 Harvest Brand 16%
 Muriate Potash
 Nitrate of Soda
 Steam Bone

Frank S. Platt Co., 450 State St., New Haven, Conn.

Platco Special 5-8-7

Premier Poultry Manure Co., 431 South Dearborn St., Chicago, Ill.

Premier Brand Poultry Manure
 Premier Brand Sheep Manure

The Pulverized Manure Co., 828 Exchange Ave., Chicago, Ill.

Wizard Brand Manure
 Wizard Brand Sheep Manure

Rackliffe Brothers Co., Inc., New Britain, Conn.

Rackliffe Brand 4-8-4
 Rackliffe Brand 5-8-7
 Rackliffe Brand Nitrate of Soda 18%

The Rogers & Hubbard Co., Portland, Conn.

Rogers & Hubbard's All Soils—All Crops Fertilizer
 Rogers & Hubbard's Climax Tobacco Brand
 Rogers & Hubbard's Corn and Grain Fertilizer
 Rogers & Hubbard's High Potash Fertilizer
 Rogers & Hubbard's Potato Fertilizer
 Rogers & Hubbard's Tobacco Grower, Vegetable Formula
 Hubbard's "Bone Base" Oats and Top Dressing
 Hubbard's "Bone Base" Fertilizer for Seeding Down
 Hubbard's "Bone Base" Soluble Corn and General Crops Manure
 Hubbard's "Bone Base" Soluble Potato Manure
 Hubbard's "Bone Base" Soluble Tobacco Manure
 Hubbard's Pure Raw Knuckle Bone Flour
 Hubbard's Strictly Pure Fine Bone
 5-8-7
 4-8-4
 10-3-8
 Acid Phosphate
 Castor Pomace
 Garden Fertilizer
 Muriate of Potash
 Nitrate of Soda
 Tankage

F. S. Royster Guano Co., 602 Citizens National Bank Bldg., Baltimore, Md.

Royster's 16% Acid Phosphate
 Royster's Fine Ground Bone Meal
 Royster's Gem Guano
 Royster's Quality Trucker
 Royster's Rational Guano
 Royster's Spearhead Guano
 Royster's Top Dresser
 Royster's Trucker's Delight

Royster's 5% Truck Guano
 Royster's Valley Tobacco Formula
 Nitrate of Soda
 Sulphate of Ammonia

M. L. Shoemaker & Co., Inc., Venango St. and Delaware Ave., Philadelphia, Pa.

Shoemaker's "Swift-Sure" 16% Acid Phosphate
 Shoemaker's "Swift-Sure" Bone Meal
 Shoemaker's "Swift-Sure" Crop Grower
 Shoemaker's "Swift-Sure" Special Tobacco Formula
 Shoemaker's "Swift-Sure" Super Phos. Potato Special
 Shoemaker's "Swift-Sure" Tobacco and General Use
 Shoemaker's "Swift-Sure" Tobacco Starter

Springfield Rendering Co., Springfield, Mass.

Springfield Animal Brand 3-8-4
 Springfield 4-8-7
 Springfield Market Garden Grower and Top Dresser 5-8-7
 Springfield Special Potato, Onion and Vegetable 4-8-4
 Springfield Tobacco Special 5-4-5

I. P. Thomas & Son Co., 1000 Drexel Bldg., Philadelphia, Pa.

16% Acid Phosphate
 Castor Pomace
 Economy Fertilizer
 High Grade Potato Manure
 I. P. Thomas 5-8-7
 Long Island Special
 Muriate of Potash
 Nitrate of Soda
 Pure Ground Bone
 Sulphate of Potash
 7% Guano
 Tankage
 Thomas' Fish and Potash
 Truckers' High-Grade
 Thomas' Tobacco Grower (Sulphate of Potash)
 Tip Top Super-Phosphate
 Victor Potash Fertilizer

Triton Oil & Fertilizer Co., 101 Beekman St., New York, N. Y.

Triton 4-8-4 Fertilizer
 Triton 4-8-7 Fertilizer

U. S. Fertilizer Chemical Co., Inc., 85 E. 10th St., New York, N. Y.

Volco Ideal

United States Guano Co., Baltimore, Md.

Standard United States 16% Acid Phosphate
 Standard United States Bone Meal
 Standard United States Evergreen Fish Guano
 Standard United States Fish, Bone and Potash
 Standard United States Mammoth Potato Grower
 Standard United States Muriate of Potash
 Standard United States Nitrate of Soda
 Standard United States Old Fertility

Standard United States Royal Potato Grower
Standard United States 3-9-2
Standard United States 5-4-5
Standard United States 5-8-5

Virginia-Carolina Chemical Co. (of Delaware), 120 Broadway, New York, N. Y.

V-C Aroostook Potato Grower
V-C Double Owl Brand
V-C Rescue Brand
V-C Super-Thirty
Nitrate of Soda

Wilcox Fertilizer Co., Mystic, Conn.

Wilcox 5-8-7 Fertilizer
Wilcox 5-10-5 Fertilizer
Wilcox Corn Special
Wilcox Dry Ground Fish
Wilcox Fish and Potash (1924-25 Formula 4-8-4)
Wilcox Potato and Vegetable Phosphate
Wilcox Special 4-8-4 Fertilizer
Wilcox 7-6-5 Top Dresser
Acid Phosphate
Ground Blood and Meat Tankage
Ground Steamed Bone
Muriate of Potash
Nitrate of Soda

Wilson-Martin Co., Philadelphia, Pa.

Bantle's Wrapper Brand

S. D. Woodruff & Sons, Orange, Conn.

Woodruff's Home Mixed Fertilizer

Worcester Rendering Co., Auburn, Mass.

Prosperity Brand Complete Dressing
Prosperity Brand Corn and Grain Fertilizer
Prosperity Brand Market Garden Fertilizer
Prosperity Brand Potato and Vegetable Fertilizer

Wm. P. Young & Son, 22-24 High St., Pottstown, Montgomery Co., Pa.

Acid Phosphate
Ammonium Sulphate
Muriate of Potash

INSPECTION OF 1926.

During the year the Station inspector has visited 86 towns and villages in the State and drawn 540 official samples, representing all the registered brands which were found on sale. These together with samples submitted by purchasers, or others interested, may be classified as follows:

CLASSIFICATION OF FERTILIZERS ANALYZED IN 1926.

	Number of Samples	Page
I. Containing Nitrogen as the chief active ingredient:		
Nitrate of Soda	31	18
Sulphate of Ammonia	7	21
Castor Pomace	44	22
Cottonseed Meal	134	26
Linseed Meal	7	26
II. Containing Phosphoric Acid as the chief active ingredient:		
Precipitated Bone Phosphate	8	33
Dissolved Rock Phosphate or Acid Phosphate ..	21	35
III. Containing Potash as the chief ingredient:		
Carbonate of Potash	11	37
Muriate of Potash	12	37
Sulphate of Potash	10	37
Sulphate of Potash-Magnesia	2	38
Cotton Hull Ashes	3	38
IV. Containing Nitrogen and Potash:		
Nitrate of Potash and Soda	5	42
Nitrate of Potash	1	42
V. Containing Nitrogen and Phosphoric Acid:		
Dry Ground Fish	18	43
Tankage	16	46
Ground Bone	30	46
VI. Mixed Fertilizers:		
Containing Nitrogen and Phosphoric Acid	3	50
Containing Nitrogen, Phosphoric Acid and Potash	253	50
Special and Home Mixtures	64	74
VII. Miscellaneous fertilizers, amendments, waste products, etc.:		
Wood Ashes	20	80
Sheep Manure, etc.	12	81
Lime, etc.	16	81
Miscellaneous	61	89
Total	789	

I. RAW MATERIALS CHIEFLY VALUABLE FOR NITROGEN.

NITRATE OF SODA.

Nitrate of Soda is obtained from the west coast of South America, chiefly in Chili. Commercial grades of the salt contain from 91 to 97 per cent of sodium nitrate equivalent to from 15 to 16 per cent of nitrogen.

Thirty-one samples, twenty-three of which were drawn officially by the Station, were examined. Twenty-nine equalled or exceeded their guaranties. Sample 3812 showed the only notable deficiency, but a second sample from another source was not deficient.

Prices, based upon ten quotations, have ranged from \$64.00 to \$85.00 per ton, the average being about \$72.00. Nitrogen from this source has cost on an average about 24 cents per pound.

Analyses are given in Table I.

OTHER CONCENTRATED AMMONIATES.

There is an increasing interest, both on the part of manufacturers and growers, in some of the newer raw materials which supply nitrogen in concentrated form. Field experience with some of these products is limited, but so far as they have been tried in this State and elsewhere they have produced generally good results. Director Slate has recently discussed¹ some of these newer ammoniates.

Calcium Cyanamide. This is an air-nitrogen product which has been manufactured in this country for some years, and is relatively cheap. The Muscle Shoals plant is designed to produce it. The commercial article usually contains 20 to 25 per cent of nitrogen, equivalent to 25 to 30 per cent of ammonia. For fertilizer purposes this form of nitrogen is regarded as of organic nature. It is rather slowly available in the soil and should be applied some time before planting seed. It cannot be used in large quantity in mixed goods containing acid phosphate.

Ammonium Nitrate. This salt, formerly made from nitric acid and ammonia, is now made more cheaply in Europe from air nitrogen. The commercial article contains about 41 per cent of ammonia. It leaves no residue in the soil and has given good results on crops so far as it has been tried. It tends to become moist on storage.

Ammonium Chloride. (Muriate of Ammonia.) This salt contains about 26 per cent of nitrogen equivalent to about 31 per cent of ammonia. It is seldom used in fertilizers because of

¹ Farmers' Week, Conn. Agr. College, August, 1926.

its relatively high cost. It is being used to some extent in Europe, however, for such purpose.

Urea. This is a recent commercial product and is the most concentrated of the newer ammoniates. It contains about 45 per cent of nitrogen, equivalent to 55 per cent of ammonia, and is made by a new process directly from ammonia and carbon dioxide. It leaves no residue in the soil and equals nitrate of soda in availability.

"Leuna" Saltpeter. This is a double salt, ammonium sulphate-nitrate, containing 26 per cent of nitrogen of which about $\frac{1}{4}$ is nitrate nitrogen and $\frac{3}{4}$ is ammonia nitrogen. It is hygroscopic but a product claimed to be drillable is being offered.

Other raw materials which supply both nitrogen and phosphoric acid are being offered. Of these may be mentioned the following:

Ammonium Phosphate. (Ammono-Phos.) This salt is being produced in this country and contains about 14 per cent of ammonia and 45 per cent of phosphoric acid. It has given good results as a fertilizer where tried.

Urea Phosphate. It contains 21 per cent of ammonia and 45 per cent of phosphoric acid. Its physical condition is satisfactory and, so far as tried, has given good results in the field.

TABLE I. ANALYSES OF NITRATE OF SODA.

Station No.	Manufacturer or Jobber.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
3752	American Agricultural Chemical Co., New York	Station agent. Stock of Bristol Grain & Supply Co., Bristol	15.04	15.22
3786	Armour Fertilizer Works, New York	Station agent. Stock of Harrison & Gould, Milford	15.12	14.81
3550	Apothecaries Hall Co., Waterbury	Hatheway & Steane, Inc., Hartford	15.34	14.80
3505	Apothecaries Hall Co., Waterbury	Hatheway & Steane, Inc., Hartford	15.50	14.80
3748	Apothecaries Hall Co., Waterbury	Station agent. Stock of J. A. Glasnap, West Cheshire	14.90	14.80
3842	Apothecaries Hall Co., Waterbury	Hatheway & Steane, Inc., Hartford	15.08	14.80
4761	Apothecaries Hall Co., Waterbury	American Sumatra Tobacco Co., Bloomfield	15.70	14.80
3792	Berkshire Fertilizer Co., Bridgeport	Station agent. Stock of Gabriel Dadio, Highwood	15.20	15.00
4300	Berkshire Fertilizer Co., Bridgeport	Station agent. Stock of E. N. Austin, Suffield	15.76	15.00
4216	E. D. Chittenden Co., Bridgeport	Station agent. Stock of E. J. Bantle, Glastonbury	15.54	15.00
3814	E. B. Clark Seed Co., Milford	Station agent. Stock of G. R. Russell, Branford	15.20	15.00
3744	Consolidated Rendering Co., Boston	Station agent. Stock of L. T. Frisbie Co., New Haven	15.50	15.22
3747	Consolidated Rendering Co., Boston	Station agent. Stock of Cheshire Reformatory, Cheshire	15.28	15.22
4399	Eastern States Farmers' Exchange, Springfield	Station agent. Stock of John Swan, Seymour	15.46	14.80
4279	International Agricultural Corp., Boston	Station agent. Stock of Mehmel & Sarvi, Plantsville	15.52	15.00
4656	Mapes Formula & Peruvian Guano Co., New York	Station agent. Stock of Mapes Branch, Hartford	15.46	14.91
3759	Olds & Whipple, Inc., Hartford	Station agent at factory	15.06	15.00
4777	Olds & Whipple, Inc., Hartford	John M. Herr, Burnside	15.76	15.00
3918	Piedmont-Mt. Airy Guano Co., Baltimore	Station agent. Stock of Seymour Grain & Coal Co., Seymour	15.44	15.00
3922	Rackliffe Bros. Co., New Britain	Station agent at factory	15.60	14.80
3784	The Rogers & Hubbard Co., Portland	Station agent at factory	15.42	14.80
3808	The Rogers & Hubbard Co., Portland	Station agent. Stock of E. M. Wooding, North Haven	14.84	14.80

TABLE I. ANALYSES OF NITRATE OF SODA—*Concluded.*

Station No.	Manufacturer or Jobber.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
3812	F. S. Royster Guano Co., Baltimore	Station agent. Stock of Hitchcock Hardware Co., Watertown	14.00	15.00
4086	F. S. Royster Guano Co., Baltimore	Station agent. Stock of F. B. Newton, Plainville	15.64	15.00
3806	I. P. Thomas & Son, Phila- delphia	Station agent. Stock of L. B. Wooding, North Haven	15.46	15.00
4575	United States Guano Co., Baltimore	Station agent. Stock of F. W. Wadhams, Torrington	15.64	15.00
4630	Virginia-Carolina Chemical Co., New York	Station agent. Stock of E. O. Chapman, North Haven	15.96	14.80
3927	The Wilcox Fertilizer Co., Mystic	Daigle Bros., Marion	15.22	15.00
4636	The Wilcox Fertilizer Co., Mystic	Station agent at factory	15.48	15.00
3289	38561	American Sumatra Tobacco Co., Bloomfield	15.78	....
3290	36151	American Sumatra Tobacco Co., Bloomfield	15.98	....

AMMONIUM SULPHATE.

Ammonium sulphate is chiefly derived as a by-product in the process of manufacturing coke and illuminating gas. The ammonia liquor is distilled over lime, the free ammonia conducted into dilute sulphuric acid and the ammonium sulphate thus formed is separated and dried.

Commercial grades of this raw material contain about 20.5 per cent of nitrogen which is equivalent to 25 per cent of ammonia.

Seven samples were examined all of which equalled or exceeded the guaranties so far as given. All contained over 20.5 per cent of nitrogen, the average being 20.78 per cent.

The price per ton was quoted in only one instance which was \$78.00. On this basis the cost per pound of nitrogen is about 18.8 cents. Last year the cost per pound as calculated ranged from 9.8 to 19.3 and averaged 16.6 cents.

Analyses are given in Table II.

TABLE II. ANALYSES OF SULPHATE OF AMMONIA.

Station No.	Manufacturer or Jobber.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
3665	Apothecaries Hall Co., Waterbury	A. N. Shepard & Son, Hartford..	20.90	....
3753	The Barrett Co., New York..	Station agent. Stock of Olds & Whipple, Inc., Hartford	20.76	20.75
3926	The Barrett Co., New York..	Daigle Bros., Marion	20.86	20.75
4235	E. D. Chittenden Co., Bridgeport	Station agent. Stock of E. J. Bantle, Glastonbury	20.72	20.50
3882	Consolidated Rendering Co., Boston	Station agent. Stock of Geo. S. Jennings, Southport	20.86	20.50
4400	Eastern States Farmers' Exchange, Springfield	Station agent. Stock of H. H. Tomlinson, Bethany	20.80	20.55
4085	F. S. Royster Guano Co., Baltimore	Station agent. Stock of W. S. Brown, Trumbull	20.56	20.56

CASTOR POMACE.

Castor pomace is the residue left after removing the oil from the castor bean. It is poisonous to stock and should be kept away from farm animals. It is chiefly valuable in fertilizer mixtures as a source of nitrogen but contains also about one per cent of potash and two per cent of phosphoric acid.

Forty-four samples were analyzed and in only three instances were there any considerable deficiencies in nitrogen, these being 0.17, 0.27 and 0.37 per cent.

Generally this material is sold on a guaranty of about 4.50 per cent nitrogen equivalent to 5.50 per cent of ammonia.

The average nitrogen content found this year is about 5.1 per cent. Last year it was 4.75 per cent.

Prices have ranged from \$23.00 to \$30.00 per ton and averaged \$26.00. If allowance is made for the phosphoric acid and potash present, nitrogen in this material has cost 23.2 cents per pound.

Analyses are given in Table III.

TABLE III. ANALYSES OF CASTOR POMACE.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
	The American Agricultural Chemical Co., New York City.			
3810	.....	Station agent at factory, New Haven	4.86	4.53
4098	N. H. 73174	Spencer Bros., Inc., Suffield	5.08	4.52
	Apothecaries Hall Co., Waterbury, Conn.			
4166	.....	Station agent at factory, East Windsor	5.34	4.52
4762	.....	American Sumatra Tobacco Co., Bloomfield	5.26	4.52
3498	566905	Hatheway & Steane, Inc., Hart- ford	6.01	4.52
3500	38937	Hatheway & Steane, Inc., Hart- ford	5.13	4.52
3501	61864	Hatheway & Steane, Inc., Hart- ford	5.26	4.52
3504	66419	Hatheway & Steane, Inc., Hart- ford	6.11	4.52
3613	20569	Hatheway & Steane, Inc., Hart- ford	5.73	4.52
3672	11653	Hatheway & Steane, Inc., Hart- ford	4.25	4.52
3673	44941	Hatheway & Steane, Inc., Hart- ford	5.38	4.52
3841	83827	Hatheway & Steane, Inc., Hart- ford	4.91	4.52
3955	46448	Hatheway & Steane, Inc., Hart- ford	5.16	4.52
4259	.....	Paul & Ed. Rostek, Melrose	4.98	4.52
	Ashcraft-Wilkinson Co., New York City.			
3821	Erie 88563	Spencer Bros., Inc., Suffield	5.02	4.52
	Baker Castor Oil Co., New York City.			
3560	35751	American Sumatra Tobacco Co., Bloomfield	4.49	4.50
4519	98052	American Sumatra Tobacco Co., Bloomfield	4.91	4.50
4520	83959	American Sumatra Tobacco Co., Bloomfield	5.01	4.50

TABLE III. ANALYSES OF CASTOR POMACE—*Continued.*

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
	Baker Castor Oil Co., New York City.			
4434	.....	Station agent, from stock of Apothecaries Hall Co., Water- bury	5.37	4.50
4670	.....	Station agent, from stock of J. H. Reardan, South Windsor	5.06	4.50
	Berkshire Fertilizer Co., Bridgeport, Conn.			
2691	.....	J. E. Phelps, Suffield	6.35	4.52
2692	.....	J. E. Phelps, Suffield	5.20	4.52
3788	.....	Station agent at factory	4.81	4.52
3824	N. Y. C. 220049	Spencer Bros., Inc., Suffield	4.74	4.52
4095	N. Y. C. 244751	Spencer Bros., Inc., Suffield	5.10	4.52
4298	.....	Station agent, from stock of E. N. Austin, Suffield	4.15	4.52
4691	.....	Station agent, from stock of Man- ning & Kahn, Manchester	5.50	4.52
	E. D. Chittenden Co., Bridgeport, Conn.			
3932	.....	Allied Tobacco Co., Hartford	4.78	4.52
4456	.....	Station agent, from stock of Allied Tobacco Co., Hartford	5.45	4.52
4214	.....	Station agent, from stock of E. J. Bantle, Glastonbury	5.20	4.52
	Consolidated Rendering Co., Boston, Mass.			
4488	.....	Station agent, from stock of Mrs. Frank Bantle, Glastonbury	4.35	4.52
	International Agricultural Corp., Boston, Mass.			
4647	.....	Station agent, from stock of James T. Caffrey, Cromwell	4.64	4.53
	Spencer Kellogg & Sons, Inc., Edgewater, N. J.			
4256	.....	Richard P. Jones, South Windsor	5.38	4.52
4288	.....	Station agent, from stock of E. J. Bantle, Glastonbury	5.39	4.52

TABLE III. ANALYSES OF CASTOR POMACE—*Concluded.*

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
	Olds & Whipple, Inc., Hartford, Conn.			
3901	.....	Station agent at factory	5.56	5.00
4211	.....	R. C. Futtner, Burnside	5.30	5.00
4212	.....	R. C. Futtner, Burnside	5.50	5.00
	The Rogers & Hubbard Co., Portland, Conn.			
4650	.....	Station agent, from stock of John Heller, Glastonbury	4.98	4.75
	I. P. Thomas & Son, Philadelphia, Pa.			
3915	.....	Station agent, from stock of L. M. Benham, Highwood	5.03	4.50
	Manufacturer Unknown.			
3587	13105	American Sumatra Tobacco Co., Bloomfield	4.38	....
3588	36179	American Sumatra Tobacco Co., Bloomfield	4.66	....
3589	17155	American Sumatra Tobacco Co., Bloomfield	4.51	....
2869	Long Island 3343	L. T. Frisbie Co., New Haven ...	4.56	....
2870	Long Island 3345	L. T. Frisbie Co., New Haven ...	4.56	....

COTTONSEED MEAL.

One hundred and thirty-four samples of cottonseed meal have been examined. This number includes official samples and those submitted by purchasers.

The classification of samples and the average nitrogen found in each group are given in the following summary:

Grade	No. of Samples.	Average Nitrogen. %
36 per cent protein (5.76 N)	15	5.84
41 per cent protein (6.58 N)	68	6.60
43 per cent protein (6.88 N)	39	6.78
Odd per cent	1	...
No guaranty	11	6.64

Of one hundred and twenty-three samples with guaranties given, ninety-four exceeded, or substantially met, such guaranties and twenty-nine did not. In the 43 per cent protein group the guaranty of 6.88 per cent nitrogen was not maintained on an average.

The range in price based upon 57 quotations has been from \$33.50 to \$46.00 per ton and the average about \$41.00. On the basis of these figures nitrogen from this source has, therefore, cost about 31.2 cents per pound.

Analyses are given in Table IV.

LINSEED MEAL.

Seven samples of linseed meal were analyzed. All fully satisfied their guaranties.

Analyses are given in Table IV.

TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
	Apothecaries Hall Co., Waterbury, Conn.	Cottonseed Meal.		
4168	.....	Station agent at factory, East Windsor	6.57	6.58
3497	Dixie, 48490	Hatheway & Steane, Inc., Hartford	7.05	6.58
3551	Dixie, 33170	Hatheway & Steane, Inc., Hartford	6.74	6.58
3552	Dixie, 35626	Hatheway & Steane, Inc., Hartford	5.82	6.58
3553	Dixie, 47807	Hatheway & Steane, Inc., Hartford	6.46	6.58
3614	Dixie, 342828	Hatheway & Steane, Inc., Hartford	7.16	6.58
3615	Dixie, 174285	Hatheway & Steane, Inc., Hartford	7.26	6.58
3616	Dixie, 48419	Hatheway & Steane, Inc., Hartford	7.15	6.58
3617	Dixie, 173264	Hatheway & Steane, Inc., Hartford	7.37	6.58
3618	Dixie, 120080	Hatheway & Steane, Inc., Hartford	7.07	6.58
3670	Dixie, 79787	Hatheway & Steane, Inc., Hartford	6.96	6.58
3838	Dixie, 47914	Hatheway & Steane, Inc., Hartford	6.50	6.58
3839	Dixie, 16559	Hatheway & Steane, Inc., Hartford	6.58	6.58
3957	Dixie, 3700	Hatheway & Steane, Inc., Hartford	7.21	6.58
3958	Dixie, 72756	Hatheway & Steane, Inc., Hartford	6.89	6.58
3662	249236 (Off Color)	A. N. Shepard & Son, Hartford ..	6.80	....
3663	04045	A. N. Shepard & Son, Hartford ..	6.90	....
4081	Dixie (Dark)	Mrs. H. Hartz, Burnside	6.55	6.58
4131	Dixie	Allied Tobacco Co., Hartford ...	6.94	6.58
4441	Dixie (Brown), 158334	C. D. Cannon, Windsor Locks ...	6.56	6.58
4442	Dixie (Brown), P. M. 24109.	C. D. Cannon, Windsor Locks ...	6.66	6.58
	Ashcraft-Wilkinson Co., Atlanta, Ga.			
4124	Paramount	Station agent, from stock of W. E. Fisk, Warehouse Point	5.65	5.75
4159	Monarch	Station agent, from stock of Geo. E. Ackley Co., New Milford ...	7.17	6.88

TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS—Continued.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
		Cottonseed Meal.		
	Ashcraft-Wilkinson Co., Atlanta, Ga.			
4160	Helmet	Station agent, from stock of Geo. E. Ackley Co., New Milford ...	6.28	6.58
4163	Paramount	Station agent, from stock of Geo. S. Phelps & Co., Thompsonville	5.77	5.75
3412	39180	American Sumatra Tobacco Co., Bloomfield	7.00	....
3413	27601	American Sumatra Tobacco Co., Bloomfield	6.69	....
3517	Helmet, 166167	American Sumatra Tobacco Co., Bloomfield	6.50	6.58
3561	48229	American Sumatra Tobacco Co., Bloomfield	6.95	....
3590	Helmet, 51314	American Sumatra Tobacco Co., Bloomfield	6.68	6.58
3591	Helmet, 57021	American Sumatra Tobacco Co., Bloomfield	6.54	6.58
3592	Helmet, 25976	American Sumatra Tobacco Co., Bloomfield	6.62	6.58
3593	Helmet, 41782	American Sumatra Tobacco Co., Bloomfield	6.26	6.58
3594	Helmet, 48303	American Sumatra Tobacco Co., Bloomfield	6.92	6.58
3595	Helmet, 95016	American Sumatra Tobacco Co., Bloomfield	6.65	6.58
3596	Helmet, 85816	American Sumatra Tobacco Co., Bloomfield	6.72	6.58
3597	Helmet, 94627	American Sumatra Tobacco Co., Bloomfield	6.58	6.58
3598	Helmet, 340761	American Sumatra Tobacco Co., Bloomfield	7.02	6.58
3599	Helmet, 1272	American Sumatra Tobacco Co., Bloomfield	6.74	6.58
3600	Helmet, 164431	American Sumatra Tobacco Co., Bloomfield	6.28	6.58
3601	Helmet, 518489	American Sumatra Tobacco Co., Bloomfield	6.69	6.58
3602	Helmet, 155380	American Sumatra Tobacco Co., Bloomfield	7.13	6.58
3603	Helmet, 7692	American Sumatra Tobacco Co., Bloomfield	6.27	6.58
4522	Helmet, 75283	American Sumatra Tobacco Co., Bloomfield	6.29	6.58

TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS—Continued.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
	Ashcraft-Wilkinson Co., Atlanta, Ga.	Cottonseed Meal.		
4523	Helmet, 12005	American Sumatra Tobacco Co., Bloomfield	6.88	6.58
4524	Helmet, 8159	American Sumatra Tobacco Co., Bloomfield	6.47	6.58
4525	Helmet, 104117	American Sumatra Tobacco Co., Bloomfield	6.92	6.58
4526	Helmet, 265774	American Sumatra Tobacco Co., Bloomfield	7.00	6.58
4527	Helmet, 170170	American Sumatra Tobacco Co., Bloomfield	6.42	6.58
2698	Paramount, S. A. L. 80784 ..	The Coles Company, Middletown.	6.28	5.75
3655	Helmet, A. C. L. 36329	Spencer Bros., Inc., Suffield	6.58	6.58
3656	Helmet, C. of Ga. 50302	Spencer Bros., Inc., Suffield	6.82	6.58
3819	Monarch, I. G. N. 9357	Spencer Bros., Inc., Suffield	7.06	6.88
3820	Monarch, C. N. W. 114738 ..	Spencer Bros., Inc., Suffield	7.02	6.88
3822	Monarch, C. of Ga. 60227 ..	Spencer Bros., Inc., Suffield	6.98	6.88
3823	Monarch, C. C. C. 53209	Spencer Bros., Inc., Suffield	7.02	6.88
4202	Paramount, B. & O. 174135 ..	Spencer Bros., Inc., Suffield	5.90	5.75
4203	Paramount, I. C. 755930	Spencer Bros., Inc., Suffield	5.69	5.75
4204	Paramount, I. C. 162238	Spencer Bros., Inc., Suffield	5.64	5.75
4205	Paramount, C. of Ga. 55546..	Spencer Bros., Inc., Suffield	5.73	5.75
4206	Paramount, R. D. G. 18086 ..	Spencer Bros., Inc., Suffield	6.18	5.75
4207	Paramount, N. Y. C. 243230..	Spencer Bros., Inc., Suffield	5.76	5.75
4208	Paramount, L. & N. 101250 ..	Spencer Bros., Inc., Suffield	5.83	5.75
4261	Paramount, C. of Ga. 55505 ..	Spencer Bros., Inc., Suffield	5.89	5.75
4262	Paramount, C. of Ga. 56730 ..	Spencer Bros., Inc., Suffield	5.72	5.75
	Buckeye Cotton Oil Co., Little Rock, Ark.			
4125	.....	Station agent, from stock of E. J. Bantle, Glastonbury	6.66	6.58
	S. P. Davis, Little Rock, Ark.			
3772	Steerboy	Amos D. Bridge's Sons, Inc., Hazardville	7.00	6.88
	Humphreys-Godwin Co., Memphis, Tenn.			
2917	101674	American Sumatra Tobacco Co., Bloomfield	6.44	.....
4299	Bull	Station agent, from stock of E. N. Austin, Suffield	6.77	6.88

TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS—Continued.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
		Cottonseed Meal.		
	Humphreys-Godwin Co., Memphis, Tenn.			
3399	Dixie, I. & Gn. 6172	L. B. Hass & Co., Hartford	6.87	6.58
3400	Dixie, N. P. 130268	L. B. Hass & Co., Hartford	6.82	6.58
3401	Dixie, McP. 120063	L. B. Hass & Co., Hartford	7.07	6.58
4776	Bull	John M. Herr, Burnside	6.46	6.88
4528	Dixie, C. B. & Q. 131429	H. C. Nelson, West Suffield	6.58	6.58
4690	Dixie	Station agent, from stock of J. P. Norton, Broad Brook	7.02	6.58
4426	Bull	Edward Perkins, Suffield	6.68	6.88
2690	Dixie	J. E. Phelps, Suffield	6.88	6.58
3997	Bull, A. T. S. F. 46689	Geo. S. Phelps & Co., Thompson- ville	6.91	6.88
4398	Dixie	J. E. Phelps & Co., Suffield	6.55	6.58
4470	Danish	Station agent, from stock of Geo. S. Phelps & Co., Thompsonville	5.85	5.76
4041	Bull, N. Y. 88340 & S. P. 34627	Spencer Bros., Inc., Suffield	6.55	6.88
4042	Bull, S. S. W. 31194	Spencer Bros., Inc., Suffield	7.06	6.88
4043	Dixie, G. N. 11653	Spencer Bros., Inc., Suffield	6.55	6.58
4044	Dixie, N. K. P. 18488	Spencer Bros., Inc., Suffield	6.92	6.58
4096	Bull, N. Y. 77092 & T. P. 31149	Spencer Bros., Inc., Suffield	6.88	6.88
4097	Bull, I. C. 172572	Spencer Bros., Inc., Suffield	7.02	6.88
4263	Danish, A. C. L. 29150	Spencer Bros., Inc., Suffield	5.62	5.76
4264	Bull, W. of A. 977	Spencer Bros., Inc., Suffield	6.87	6.88
4265	Bull, N. Y. 87441 & I. N. O. 52782	Spencer Bros., Inc., Suffield	6.79	6.88
4266	Bull, N. Y. 72768 & S. S. W. 65341	Spencer Bros., Inc., Suffield	7.09	6.88
4267	Bull, N. Y. 76082 & S. L. S. F. 150102	Spencer Bros., Inc., Suffield	7.12	6.88
4268	Bull, M. P. 35512 (Brown) ..	Spencer Bros., Inc., Suffield	6.77	6.88
4269	Bull, N. Y. 80550 & S. L. S. F. 150352 ..	Spencer Bros., Inc., Suffield	7.21	6.88
4270	Bull (Brown), N. P. 48461 ..	Spencer Bros., Inc., Suffield	6.82	6.88
4460	Bull	Station agent, from stock of Spen- cer Bros., Inc., Suffield	7.01	6.88
4461	Dixie	Station agent, from stock of Spen- cer Bros., Inc., Suffield	6.59	6.58
4562	Bull, N. Y. 75574 & S. F. 20711 ..	Spencer Bros., Inc., Suffield	6.90	6.88
4563	Bull, N. Y. 89758 & S. P. 22956 ..	Spencer Bros., Inc., Suffield	6.79	6.88
4564	Bull, B. & M. 66509 & S. P. 27875 ..	Spencer Bros., Inc., Suffield	6.79	6.88
4565	Bull, N. Y. 70254 & S. P. 31139 ..	Spencer Bros., Inc., Suffield	6.74	6.88
3388	Dixie, D. L. & W. 39450	Steane, Hartman & Co., Hartford	6.92	6.58
3389	Dixie, M. O. P. 38817	Steane, Hartman & Co., Hartford	6.72	6.58
3391	Dixie, J. G. & N. 164182	Steane, Hartman & Co., Hartford	6.87	6.58
3392	Dixie, S. S. W. 24574	Steane, Hartman & Co., Hartford	6.94	6.58
3393	Dixie, Southern 337394	Steane, Hartman & Co., Hartford	6.81	6.58

TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS—Continued.

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
Cottonseed Meal.				
	Humphreys-Godwin Co., Memphis, Tenn.			
3394	Dixie, S. S. W. 30102	Steane, Hartman & Co., Hartford	6.74	6.58
3395	Dixie, N. Y. C. 244610	Steane, Hartman & Co., Hartford	6.73	6.58
3396	Dixie, L. & N. 101208	Steane, Hartman & Co., Hartford	6.72	6.58
3398	Dixie, C. J. & W. 24114	Steane, Hartman & Co., Hartford	7.02	6.58
3390	J. G. & N. 7312	Steane, Hartman & Co., Hartford	6.92	....
3397	N. P. 24170	Steane, Hartman & Co., Hartford	6.78	....
4070	Bull, 92503	L. Wetstone & Sons, Inc., Hart- ford	6.70	6.88
4071	Bull, 17463	L. Wetstone & Sons, Inc., Hart- ford	6.69	6.88
4072	Dixie, 165708	L. Wetstone & Sons, Inc., Hart- ford	6.46	6.58
4073	Bull, 27986	L. Wetstone & Sons, Inc., Hart- ford	6.58	6.88
4074	Dixie	L. Wetstone & Sons, Inc., Hart- ford	6.32	6.58
	International Agricultural Corp., Boston, Mass.			
4649	.....	Station agent, from stock of James T. Caffrey, Cromwell	6.90	6.58
	L. B. Lovitt & Co., Memphis, Tenn.			
3453	"Lovit"	E. H. Rollins, Granby	6.57	6.88
3585	"Lovit"	Fred H. Kendall, Granby	6.90	6.88
4046	"Lovit"	Henry E. Wells, Warehouse Point	7.00	6.88
4174	"Lovit"	Station agent, from stock of Louis C. Bunce, South Manchester ...	6.30	6.88
4182	"Lovit" (Off Grade)	Station agent, from stock of M. E. Thompson, Ellington	6.53	6.88
4183	"Lovit" (Off Grade)	Station agent, from stock of M. E. Thompson, Ellington.....	6.81	6.88
4232	"Lovit"	J. C. Dufford, Glastonbury	5.50	6.58
4561	"Lovit"	Edward Handel, Glastonbury	6.76	....
4457	"Lovit"	Station agent, from stock of Adolph Lanz, Ellington	6.48	6.88
4458	"Lovit"	Station agent, from stock of Mr. Rashall, Ellington	6.58	6.88
4701	"Lovit"	Albert P. Handel, Glastonbury ..	6.01	6.58

TABLE IV. ANALYSES OF COTTONSEED AND LINSEED MEALS—*Concluded.*

Station No.	Manufacturer or Jobber, Car No. or Mark.	Purchased, Sampled or Sent by	Per cent. Nitrogen.	
			Found.	Guaranteed.
Cottonseed Meal.				
4657	Memphis Cotton Seed Products, Memphis, Tenn. Durham 36%	Station agent, from stock of Fred C. Morse, Guilford	6.08	5.76
3622	R. N. Neal & Co., Memphis, Tenn. Triangle, No. 1 Del., L. & W. 12385	Clark Bros., Windsor	6.84	6.74
3623	Triangle, No. 2 Chicago & N. W. 104494	Clark Bros., Windsor	6.53	6.88
4228	Manufacturers Unknown.	The P. Schwartz Company, New London	5.29	6.88
4756	1067	H. D. Haskins, Amherst, Mass. ..	5.33	....
4757	1068	H. D. Haskins, Amherst, Mass. ..	6.50	....
Linseed Meal.				
3956	American Linseed Co., Chicago, Ill. 79282	Hatheway & Steane, Inc., Hart- ford	5.60	5.44
3840	20104	Hatheway & Steane, Inc., Hart- ford	5.60	5.44
3674	79282	Hatheway & Steane, Inc., Hart- ford	5.52	5.44
3496	19020	Hatheway & Steane, Inc., Hart- ford	5.73	5.44
3495	18304	Hatheway & Steane, Inc., Hart- ford	5.49	5.44
3494	18428	Hatheway & Steane, Inc., Hart- ford	5.62	5.44
3661	36003	A. N. Shepard & Son, Hartford..	5.75	5.44

II. RAW MATERIALS CHIEFLY VALUABLE FOR PHOSPHORIC ACID.

PRECIPITATED BONE PHOSPHATE.

The phosphorus in this raw material is nearly all in the so-called "available" form. Precipitated bone phosphate is obtained as a by-product in the manufacture of gelatin.

Of the eight samples examined all exceeded their guaranties, so far as guaranties were given, with the exception of No. 3757. In four cases no guaranties were quoted to us, but the samples were of good quality.

So far as prices were quoted available phosphoric acid from this source has cost about 6.4 cents per pound.

Analyses are given in Table V.

TABLE V. ANALYSES OF PRECIPITATED BONE PHOSPHATE.

Station No.	Manufacturer or Wholesale Dealer.	Place of Sampling.	Phosphoric Acid.			
			Citrate-insoluble.	Total.	"Available."	
		Found.			Guaranteed.	
			%	%	%	%
4431	<i>Sampled by Station:</i> Apothecaries Hall Co., Waterbury	At factory	2.08	38.40	36.32	36.0
3894	L. T. Frisbie Co., New Haven	At factory	1.38	36.75	35.37	35.0
3757	Olds & Whipple, Inc., Hartford	At factory	1.19	38.25	37.06	38.0
	<i>Sampled by Purchaser:</i>					
3372	81821	American Sumatra Tobacco Co., Bloomfield	1.03	39.46	38.43	....
3373	62943	American Sumatra Tobacco Co., Bloomfield	1.17	39.06	37.89	....
3499	Apothecaries Hall Co., Waterbury 49514	Hatheway & Steane, Inc., Hartford	2.49	40.14	37.65	36.0
4779	Olds & Whipple, Inc., Hartford	John M. Herr, Burnside	0.60	39.85	39.25	38.0
3666	10274	A. N. Shepard & Son, Hartford	1.89	41.28	39.39	....

ACID PHOSPHATE.

Acid phosphate is the chief source of phosphoric acid in mixed fertilizers. It is obtained by treating ground phosphate rock with sulphuric acid which results in the formation of calcium phosphate of the soluble mono-calcium type and calcium sulphate or gypsum. This mixture is allowed to remain in a tank or "hot bin" where it solidifies after which it is broken up and ground to a suitable condition for use in fertilizer mixtures. This raw material is generally guaranteed to contain 16 per cent of available phosphoric acid.

Twenty-one samples were analyzed all except four of which equalled or exceeded their guaranties. In one case a second sample showed no deficiency.

The average content of available phosphoric acid is 16.4 per cent. On the basis of the average of prices quoted, viz., \$22.50, the cost of available phosphoric acid from this source has been about 6.9 cents per pound.

Analyses are given in Table VI.

TABLE VI. ANALYSES OF ACID PHOSPHATE.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Phosphoric Acid.				Station No.
			Citrate-insoluble.	Total.	Found.	Guaranteed.	
			%	%	%	%	
	<i>Sampled by Station.</i>						
3751	American Agricultural Chemical Co., New York	Bristol Grain & Supply Co., Bristol	0.35	16.85	16.50	16.00	3751
4165	Apothecaries Hall Co., Waterbury	Sampled at factory, East Windsor	2.14	17.85	15.71	16.00	4165
3883	Armour's Fertilizer Works, New York	F. A. Bartlett Co., Stamford	0.45	16.10	15.65	16.00	3883
4127	Armour's Fertilizer Works, New York	F. A. Bartlett Co., Stamford	0.59	15.96	15.37	16.00	4127
4410	Berkshire Fertilizer Co., Bridgeport	C. Ahearn, Stratford	0.73	17.65	16.92	16.00	4410
4236	E. D. Chittenden Co., Bridgeport	E. J. Bantle, Glastonbury	0.58	17.45	16.87	16.00	4236
3813	E. B. Clark Seed Co., Milford	G. R. Russell, Branford	0.58	17.35	16.77	16.00	3813
3742	Consolidated Rendering Co., Boston	L. T. Frisbie Co., New Haven	1.18	17.55	16.37	16.00	3742
4404	Eastern States Farmers' Exchange, Springfield, Mass.	Ridgewood Farm, North Haven	0.68	17.35	16.67	16.00	4404
4599	A. W. Higgins, South Deerfield, Mass.	J. D. Kelsey, Madison	1.83	19.10	17.27	16.00	4599
4467	International Agricultural Corp., Boston, Mass.	Wm. Colson, West Suffield	0.40	16.85	16.45	16.00	4467
4284	King Chemical Co., Bound Brook, N. J.	Meriden Farmers' Exchange, Meriden	0.23	16.75	16.52	16.00	4284
3756	Olds & Whipple, Inc., Hartford	Sampled at factory	1.15	18.15	17.00	16.00	3756
3920	Piedmont-Mt. Airy Guano Co., Baltimore, Md.	Seymour Grain & Coal Co., Seymour	1.25	17.30	16.05	16.00	3920
3790	The Rogers & Hubbard Co., Portland	H. D. Peters, Highwood	0.35	16.93	16.58	16.00	3790

TABLE VI. ANALYSES OF ACID PHOSPHATE—Concluded.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Phosphoric Acid.				
			Citrate-insoluble. %	Total. %	Found. %	Guaranteed. %	Station No.
	<i>Sampled by Station.</i>						
3794	I. P. Thomas & Son, Philadelphia, Pa.	L. B. Wooding, North Haven	2.40	17.45	15.05	16.00	3794
4024	I. P. Thomas & Son, Philadelphia, Pa.	D. L. Clark & Sons, Milford	1.80	17.90	16.10	16.00	4024
3811	F. S. Royster Guano Co., Baltimore, Md.	Hitchcock Hardware Co., Watertown ..	0.95	16.68	16.03	16.00	3811
4001	United States Guano Co., Baltimore, Md.	E. O. Chapman, North Haven	0.15	16.50	16.35	16.00	4001
4294	The Wilcox Fertilizer Co., Mystic	Henry Joy, Woodstock	0.33	17.90	17.57	17.00	4294
	<i>Sampled by Purchaser.</i>						
3925	The Wilcox Fertilizer Co., Mystic	Daigle Bros., Marion	0.24	16.88	16.64	16.00	3925

III. RAW MATERIALS CHIEFLY VALUABLE FOR POTASH.

The potash ingredient of mixed fertilizers is supplied chiefly in the forms of muriate (chloride) and of sulphate, but the carbonate and nitrate are also used. Tobacco growers in the New England States prefer their potash supply in the form of carbonate or sulphate.

Potash salts are furnished chiefly from German and French sources, but high grade muriate is now produced in California and Utah.

CARBONATE OF POTASH.

When pure, carbonate of potash contains 68.2 per cent of actual potash (K_2O), but commercial grades usually contain from 60 to 65 per cent.

The eleven samples examined this year all contained over 61 per cent, the range being from 61.1 to 66.6 per cent and the average 64.3 per cent.

Price quotations were limited, but at \$125.00 per ton, which was the price quoted in two cases, potash from this source has cost about 9.7 cents per pound.

Analyses are given in Table VII.

MURIATE OF POTASH.

This raw material as obtained in commercial grades contains about 80 per cent potassium chloride which is equivalent to about 50.5 per cent of actual potash (K_2O). Guaranties for this salt are generally placed at 48 to 50 per cent potash.

Twelve samples were examined, all except one being official samples taken by the station agent. All samples exceeded 48 per cent of potash so that none can be regarded as inferior. However, four did not meet the guaranties under which they were sold. In one of these cases **4603**, another sample, **3924**, of the same goods submitted by a purchaser, considerably exceeded the guaranty.

Only two price quotations were obtained and these differed by \$16.00 per ton. The average potash content of the salts examined is 50.4 per cent which, on the basis of the average of quoted prices, makes the cost of potash about 5.1 cents per pound.

Analyses are given in Table VII.

SULPHATE OF POTASH.

Commercial grades of this salt contain about 90 per cent of potassium sulphate equivalent to about 48 per cent of potash (K_2O), which is the usual guaranty.

Ten samples were examined and all exceeded 48 per cent and met higher guaranties where such were made. The average potash content is 49.29 per cent and the cost per pound has been about 6.6 cents.

Analyses are given in Table VII.

SULPHATE OF POTASH-MAGNESIA.

Two samples of this material were found to be of normal potash content and both met their guaranties.

Analyses are given in Table VII.

COTTON HULL ASHES.

Cotton hull ashes have not been used as fertilizer in this State to any considerable extent in recent years. They are obtained from the South where the hulls are used for fuel purposes.

They are variable in composition, containing from 10 to 40 per cent or more of potash, 2 to 12 per cent of phosphoric acid and about 10 per cent each of lime and magnesia. These ashes are free, or nearly so, from chlorides and were formerly used to a considerable extent in the Connecticut valley for growing tobacco.

Three samples were analyzed this year. Two of them, **4069** and **4173**, were of curious and unexplained composition. The potash content in these two samples, both of which represented the same stock, was between 8.50 and 9.00 per cent; they contained about 30 per cent of phosphoric acid and 4 and 11 per cent of lime and magnesia respectively.

Examination of the stock showed the material to consist largely of coarse fused masses or clinkers which were very high in phosphoric acid. The hulls had evidently been burned in such a way as to become largely mixed with phosphate.

Sample **4886** from a later shipment was of normal appearance and potash content.

Analyses are given in Table VII.

TABLE VII. ANALYSES OF POTASH SALTS, ETC.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Potash.		Station No.
			Found.	Guaranteed.	
4167	Carbonate of Potash. <i>Sampled by Station:</i> Apothecaries Hall Co., Waterbury	Sampled at factory	% 63.16	% 61.00	4167
4759	<i>Sampled by Purchaser:</i> Apothecaries Hall Co., Waterbury	American Sumatra Tobacco Co., Bloomfield	63.95	61.00	4759
3671	Apothecaries Hall Co., Waterbury	Hatheway & Steane, Inc., Hartford	65.46	61.00	3671
3961	Apothecaries Hall Co., Waterbury #8752.	Hatheway & Steane, Inc., Hartford	64.35	61.00	3961
3554	A. Klipstein, New York City 83706	American Sumatra Tobacco Co., Bloomfield	64.24	.....	3554
3555	A. Klipstein, New York City 84805	American Sumatra Tobacco Co., Bloomfield	64.98	.....	3555
3556	A. Klipstein, New York City 67114	American Sumatra Tobacco Co., Bloomfield	64.35	.....	3556
3557	A. Klipstein, New York City 8674	American Sumatra Tobacco Co., Bloomfield	64.11	.....	3557
3558	A. Klipstein, New York City 92436	American Sumatra Tobacco Co., Bloomfield	64.83	.....	3558
3559	A. Klipstein, New York City 94628	American Sumatra Tobacco Co., Bloomfield	66.59	.....	3559
2689	J. E. Phelps, Suffield	P. J. Anderson, Tobacco Station, Windsor	61.12	.....	2689
3809	Muriate of Potash. <i>Sampled by Station:</i> American Agricultural Chemical Co., New York City	Sampled at factory, New Haven	50.53	50.00	3809
3761	Apothecaries Hall Co., Waterbury	Sampled at factory	50.65	50.00	3761
3787	Armour Fertilizer Works, New York City	Harrison & Gould, Milford	48.83	48.00	3787

TABLE VII. ANALYSES OF POTASH SALTS, ETC.—Continued.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Potash.		Station No.
			Found.	Guaranteed.	
			%	%	
	Muriate of Potash.				
	<i>Sampled by Station:</i>				
4158	Berkshire Fertilizer Co., Bridgeport	Sampled at factory	51.68	50.00	4158
4297	Berkshire Fertilizer Co., Bridgeport	E. N. Austin, Suffield	53.48	50.00	4297
4215	E. D. Chittenden Co., Bridgeport	E. J. Bantle, Glastonbury	50.80	50.00	4215
3746	Consolidated Rendering Co., Boston, Mass.	Cheshire Reformatory, Cheshire	48.81	50.00	3746
4401	Eastern States Farmers' Exchange, Springfield, Mass.	Edward Myers, Bethany	48.88	50.00	4401
3851	The Rogers & Hubbard Co., Portland	H. D. Peters, Highwood	49.76	50.00	3851
4573	United States Guano Co., Baltimore, Md.	E. O. Chapman, North Haven	50.86	50.00	4573
4603	The Wilcox Fertilizer Co., Mystic	Sampled at factory	49.08	50.50	4603
	<i>Sampled by Purchaser:</i>				
3924	The Wilcox Fertilizer Co., Mystic	Daigle Bros., Marion	51.40	50.50	3924
	Sulphate of Potash.				
	<i>Sampled by Station:</i>				
3766	American Agricultural Chemical Co., New York City	Geo. S. Phelps & Co., Thompsonville	49.78	48.00	3766
4430	Apothecaries Hall Co., Waterbury	Sampled at factory	48.60	48.00	4430
4296	Berkshire Fertilizer Co., Bridgeport	E. N. Austin, Suffield	49.04	48.00	4296
4217	E. D. Chittenden Co., Bridgeport	E. J. Bantle, Glastonbury	48.80	48.00	4217
3743	Consolidated Rendering Co., Boston, Mass.	L. T. Frisbie Co., New Haven	49.68	48.00	3743

TABLE VII. ANALYSES OF POTASH SALTS, ETC.—Concluded.

POTASH SALTS

Station No.	Manufacturer or Wholesale Dealer	Dealer or Purchaser.	Potash.		Station No.
			Found.	Guaranteed.	
	Sulphate of Potash. <i>Sampled by Station:</i>				
4499	The Mapes Formula & Peruvian Guano Co., New York City	S. J. Orr, West Suffield	50.26	48.00	4499
3754	Olds & Whipple, Inc., Hartford	Sampled at factory	49.65	48.05	3754
	<i>Sampled by Purchaser:</i>				
3667	Apothecaries Hall Co., Waterbury	A. N. Shepard & Son, Hartford	48.51	48.00	3667
4760	Apothecaries Hall Co., Waterbury	American Sumatra Tobacco Co., Bloomfield	49.84	48.00	4760
4780	Olds & Whipple, Inc., Hartford	John M. Herr, Burnside	48.66	48.05	4780
	Sulphate of Potash-Magnesia. <i>Sampled by Station:</i>				
4432	Apothecaries Hall Co., Waterbury	Sampled at factory	27.98	26.00	4432
3755	Olds & Whipple, Inc., Hartford	Sampled at factory	28.05	26.00	3755
	Cotton Hull Ashes. <i>Sampled by Station:</i>				
4886	Ed. Eggert, Hartford	John Sullivan & Son, Suffield	15.04	.....	4886
	<i>Sampled by Purchaser:</i>				
4173	Ed. Eggert, Hartford	John Sullivan & Son, Suffield	8.02	12.75	4069
4069	Ed. Eggert, Hartford	John Sullivan & Son, Suffield	8.62	12.75	4173

IV. RAW MATERIALS CONTAINING NITROGEN AND POTASH.

Six samples of this group of materials have been examined, three taken by the station agent and three sent by purchasers.

Analyses are given in Table VIII.

3762. Nitrate of Soda and Potash. Apothecaries Hall Co., Waterbury. Sampled by station agent at factory.

4180. Nitrate of Soda and Potash. Apothecaries Hall Co., Waterbury. Sampled by station agent, stock of Chas. Cass, Wallingford.

4181. Nitrate of Soda and Potash. Apothecaries Hall Co., Waterbury. Sampled by station agent at factory, East Windsor.

4610. Nitrate of Soda and Potash. Apothecaries Hall Co., Waterbury. Submitted by Apothecaries Hall Co.

4489. Nitrate of Soda and Potash. Apothecaries Hall Co., Waterbury. Submitted by Jas. S. Burroughs Co., New York.

2688. Nitrate of Potash. Manufacturer unknown, stock of J. E. Phelps, Suffield.

TABLE VIII. ANALYSES OF NITRATE OF SODA AND POTASH, ETC.

Station No.	3762	4180	4181	4610	4489	2688
Nitrogen:	%	%	%	%	%	%
found	14.78	15.24	14.88	....	14.80	13.72
guaranteed	14.80	14.81	14.81	....	14.80	....
Equivalent to ammonia:						
found	17.97	18.53	18.09	....	17.99	16.68
guaranteed	18.00	18.00	18.00	....	18.00	....
Potash:						
found	10.08	10.99	11.21	11.56	12.06	46.28
guaranteed	12.00	12.00	12.00	12.00	12.00	....

The five samples of nitrate of potash and soda represent the same original stock. This stock was offered by Apothecaries Hall Co., Waterbury, and purchased by them through Jas. S. Burroughs Co., New York. It was sold on a guaranty of 12 per cent potash and 18 per cent ammonia.

The first sample taken by the station agent, **3762**, was considerably deficient in potash. Further official samples taken at the warehouse of Apothecaries Hall Co. and from the stock of a purchaser failed to substantiate the 12 per cent guaranty of potash but were found to be considerably higher in potash than our first sample. Exchanges of samples were made between the importers, the dealer and the Station for purposes of checking results. Numbers **4181**, **4610** and **4489** are portions of one official sample. Number **4489** represents the portion submitted first to Jas. S. Burroughs Co., New York, who afterwards sent us a subsample for a check analysis. Unfortunately, the package was damaged

in transit to us and our result is without significance so far as checking the analysis made for the importers is concerned. Their result for potash was reported to us at 12.88 per cent.

The stock in question was rather coarse and somewhat lumpy, hence sampling was more difficult than usual. Our first result is apparently too low to fairly represent these goods; but there is no evidence that the product as received here would average as much as 12 per cent of potash.

V. RAW MATERIALS CONTAINING NITROGEN AND PHOSPHORIC ACID.

DRY GROUND FISH.

Non-edible fish such as menhaden and dogfish and the offal from fish canneries are used in making this fertilizer material. The fish is steamed and pressed to remove oil and afterwards dried and ground.

Eighteen samples, ten of which were sampled by the station agent, were analyzed.

All samples equalled or exceeded guaranties for phosphoric acid and all, with one exception, **4635**, substantially met or exceeded the guaranties for nitrogen. This material has contained, on an average, 8.55 per cent of nitrogen and 6.92 per cent of phosphoric acid. At the price quoted, about \$70.00 per ton, and allowing 4 cents per pound for phosphoric acid, nitrogen from this source has cost about 37.7 cents per pound.

Analyses are given in Table IX.

TABLE IX. ANALYSES OF DRY GROUND FISH.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Nitrogen.		Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Station No.
			Total found.	Total guaranteed.		Total found.	Total guaranteed.	
	<i>Sampled by Station:</i>							
3878	American Agricultural Chemical Co., New York City	Sampled at factory, New Haven	8.18	8.23	9.95	8.13	6.00	3878
3764	Apothecaries Hall Co., Waterbury ..	Sampled at factory	8.38	8.20	10.19	7.13	5.00	3764
4671	Apothecaries Hall Co., Waterbury ..	J. P. Norton, Broad Brook	8.28	8.20	10.07	5.85	5.00	4671
3789	Berkshire Fertilizer Co., Bridgeport ..	Sampled at factory	8.39	8.22	10.20	6.35	6.00	3789
4295	Berkshire Fertilizer Co., Bridgeport ..	E. N. Austin, Suffield	8.66	8.22	10.53	6.28	6.00	4295
4301	Berkshire Fertilizer Co., Bridgeport ..	T. W. Ryan, Stratford	8.37	8.22	10.18	6.33	6.00	4301
4213	E. D. Chittenden Co., Bridgeport	E. J. Bantle, Glastonbury	8.42	8.00	10.24	6.90	6.00	4213
4238	Consolidated Rendering Co., Boston, Mass.	L. T. Frisbie Co., New Haven ..	8.54	8.22	10.38	6.90	6.40	4238
3902	Olds & Whipple, Inc., Hartford	Sampled at factory	9.10	8.23	11.06	7.05	5.00	3902
4635	The Wilcox Fertilizer Co., Mystic	Sampled at factory	8.56	9.04	10.41	7.10	6.00	4635
	<i>Sampled by Purchaser:</i>							
4763	Apothecaries Hall Co., Waterbury	American Sumatra Tobacco Co., Bloomfield	8.34	8.20	10.14	5.70	5.00	4763
3503	Apothecaries Hall Co., Waterbury 49514	Hatheway & Steane, Inc., Hartford	8.94	8.20	10.87	7.72	5.00	3503

TABLE IX. ANALYSES OF DRY GROUND FISH.—Concluded.

Station No.	Manufacturer or Wholesale Dealer.	Dealer or Purchaser.	Nitrogen.		Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Station No.
			Total found.	Total guaranteed.		Total found.	Total guaranteed.	
3549	<i>Sampled by Purchaser:</i> Apothecaries Hall Co., Waterbury (Truck)	Hatheway & Steane, Inc., Hartford	8.72	8.20	10.60	7.73	5.00	3549
3844			Apothecaries Hall Co., Waterbury 79527	8.95	8.20	10.88	7.25	5.00	3844
4257	Berkshire Fertilizer Co., Bridgeport ..	Paul and Ed. Rostek, Melrose ..	8.65	8.22	10.52	6.60	6.00	4257
3414			Olds & Whipple, Inc., Hartford	9.00	8.23	10.94	7.12	5.00	3414
4778	Olds & Whipple, Inc., Hartford	John M. Herr, Burnside	8.15	8.23	9.91	7.08	5.00	4778
3664			10274	8.26	10.04	7.30	.....	3664

TANKAGE.

The material sold under this name is generally bone and meat refuse material which has been cooked with steam, defatted and dried. The analysis depends upon the relative amounts of bone and meat in the product; tankage containing less than 5 per cent of nitrogen and over 15 per cent of phosphoric acid has a considerable admixture of bone. High grade tankage contains 8 to 10 per cent of nitrogen and from 5 to 10 per cent of phosphoric acid.

Garbage tankage is obtained by processing city garbage and is of less value as a fertilizer. Such material will usually contain 2.5 to 3.5 per cent of nitrogen and from 2 to 5 per cent of phosphoric acid.

Sixteen samples were analyzed, all of the bone and meat variety. Samples **4237**, **3783** and **4120** did not meet guaranties for nitrogen, while one sample, **3745**, was deficient in phosphoric acid.

Analyses are given in Table X.

GROUND BONE.

Thirty samples of ground bone or bone meal, twenty-one of which were sampled by the station agent, were analyzed.

All of the guaranties for phosphoric acid were met but samples **4477**, **4484**, **3793** and **4574** did not meet their guaranties for nitrogen.

Analyses are given in Table XI.

TABLE X. ANALYSES OF TANKAGE.

Station No.	Manufacturer.	Dealer or Purchaser.	Nitrogen		Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Mechanical Analysis.		Station No.
			Total found.	Total guaranteed.		Found.	Guaranteed.	Finer than 1-50 inch.	Coarser than 1-50 inch.	
			%	%	%	%	%	%	%	
3749	<i>Sampled by Station:</i> Apothecaries Hall Co., Waterbury..	J. A. Glasnap, West Cheshire ...	3.88	3.29	4.72	23.90	20.00	55.0	45.0	3749
3793	Apothecaries Hall Co., Waterbury..	Sampled at factory	8.22	7.40	9.99	4.75	3.00	61.0	39.0	3793
4419	Berkshire Fertilizer Co., Bridgeport	T. W. Ryan, Stratford	7.38	7.40	8.97	11.10	6.86	43.0	57.0	4419
4237	E. D. Chittenden Co., Bridgeport ..	E. J. Bantle, Glastonbury	7.26	7.40	8.83	10.95	9.00	40.0	60.0	4237
3745	Conn. Fat Rendering and Fertilizer Corp., New Haven	Sampled at factory	4.26	3.29	5.18	19.80	22.88	54.0	46.0	3745
3783	Consolidated Rendering Co., Boston	Rand & Christensen, Wilson	7.15	7.41	8.69	14.60	9.15	32.0	68.0	3783
3795	Consolidated Rendering Co., Boston	Kiowies & Lombard, Guilford ..	10.77	....	13.09	7.35	....	21.0	79.0	3795
4061	Consolidated Rendering Co., Boston	Lyman Farms, Middlefield	3.90	....	4.74	17.68	....	37.0	63.0	4061
4487	Consolidated Rendering Co., Boston	L. T. Frisbie Co., New Haven ..	5.22	4.94	6.35	15.53	14.00	27.0	73.0	4487
4681	Consolidated Rendering Co., Boston	L. T. Frisbie Co., New Haven ..	7.50	7.41	9.12	10.25	9.15	27.0	73.0	4681
4655	International Agricultural Corp., Boston	Frank Flannigan, West Cheshire..	4.89	4.93	5.95	15.05	11.00	52.5	47.5	4655
4120	The Rogers & Hubbard Co., Portland	H. D. Peters, Highwood	4.45	4.93	5.41	15.68	....	42.0	58.0	4120
4578	I. P. Thomas & Son, Philadelphia, Pa.	Frank Seaman, Milford	5.69	5.76	6.92	11.14	11.25	37.0	63.0	4578
4602	Wilcox Fertilizer Co., Mystic	Sampled at factory	7.89	7.40	9.59	8.33	4.57	51.5	48.5	4602
	<i>Sampled by Purchaser:</i>									
3780	Consolidated Rendering Co., Boston	C. R. Burr & Co., Inc., Manchester	6.37	....	7.74	12.75	....	11.0	89.0	3780
3923	Wilcox Fertilizer Co., Mystic	Daigle Bros., Marion	9.81	7.40	11.93	4.30	4.57	65.0	35.0	3923

TABLE XI. ANALYSES OF GROUND BONE.

Station No.	Manufacturer.	Dealer or Purchaser.	Nitrogen.		Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Mechanical Analysis.		Station No.
			Found.	Guaranteed.		Found.	Guaranteed.	Finer than 1-50 inch.	Coarser than 1-50 inch.	
3750	American Agricultural Chemical Co., New York	Bristol Grain & Supply Co., Bristol	2.64	2.47	3.21	23.60	22.88	61.5	38.5	3750
3765	Apothecaries Hall Co., Waterbury	Sampled at factory	3.96	3.29	4.81	22.70	20.00	50.0	50.0	3765
3875	Armour's Fertilizer Works, New York	Harrison & Gould, Milford	2.52	2.47	3.06	23.70	22.00	37.0	63.0	3875
3791	Berkshire Fertilizer Co., Bridgeport	W. D. Thomas, Highwood	2.76	2.47	3.36	22.75	20.00	51.0	49.0	3791
4218	E. D. Chittenden Co., Bridgeport	E. J. Bantle, Glastonbury	2.65	2.47	3.22	23.75	22.00	65.0	35.0	4218
3881	Consolidated Rendering Co., Boston	Herbert Grulich, Meriden	2.74	2.46	3.33	25.95	22.90	49.0	51.0	3881
4477	Consolidated Rendering Co., Boston	Rockville Milling Co., Rockville	1.87	2.05	2.27	28.20	25.18	56.5	43.5	4477
4484	Eastern States Farmers' Exchange, Springfield, Mass.	H. H. McKnight, Ellington	2.22	2.46	2.70	24.55	23.09	44.0	56.0	4484
3995	L. T. Frisbie Co., New Haven	Geo. S. Jennings, Southport	2.96	2.46	3.60	26.30	22.90	48.5	51.5	3995
4482	L. T. Frisbie Co., New Haven	Frank S. Platt Co., New Haven	4.05	3.28	4.92	22.32	22.00	42.0	58.0	4482
4286	International Agricultural Corp., Boston	James T. Caffrey, Cromwell	2.90	2.47	3.53	23.25	22.00	64.0	36.0	4286
4593	New England By-Products Co., Lawrence, Mass.	M. Kosenko, Plainville	3.90	3.75	4.74	26.30	25.00	77.0	23.0	4593
3760	Olds & Whipple, Inc., Hartford	Sampled at factory	3.20	2.50	3.89	25.45	22.00	47.0	53.0	3760
4696	Piedmont-Mt. Airy Guano Co., Baltimore	Seymour Grain & Coal Co., Seymour	2.44	2.47	2.97	25.35	22.90	62.5	37.5	4696
3782	The Rogers & Hubbard Co., Portland	Cadwell & Jones, Hartford	3.85	3.82	4.68	25.95	24.70	81.0	19.0	3782
3785	The Rogers & Hubbard Co., Portland	Sampled at factory	3.41	3.29	4.14	23.60	20.50	40.0	60.0	3785

TABLE XI. ANALYSES OF GROUND BONE—Concluded.

Station No.	Manufacturer.	Dealer or Purchaser.	Nitrogen.		Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Mechanical Analysis.		Station No.
			Found.	Guaranteed.		Found.	Guaranteed.	Finer than 1-50 inch.	Coarser than 1-50 inch.	
	<i>Sampled by Station:</i>									
4002	F. S. Royster Guano Co., Baltimore	Hitchcock Hardware Co., Water-town	2.90	2.47	3.53	23.08	22.90	65.0	35.0	4002
3914	M. L. Shoemaker & Co., Philadelphia	Olds & Whipple, Inc., Hartford...	5.67	4.51	6.89	20.50	20.00	37.5	62.5	3914
3793	I. P. Thomas & Son, Philadelphia..	L. B. Wooding, North Haven ...	2.28	2.45	2.77	25.65	23.00	51.0	49.0	3793
4574	United States Guano Co., Baltimore	Rackliffe Bros. Co., New Britain	2.24	2.46	2.72	23.75	22.00	38.5	61.5	4574
4292	The Wilcox Fertilizer Co., Mystic...	Henry Joy, Woodstock	2.84	2.46	3.45	23.73	22.00	49.0	51.0	4292
	<i>Sampled by Purchaser:</i>									
3502	Apothecaries Hall Co., Waterbury..	Hatheway & Steane, Inc., Hartford	4.52	3.29	5.50	21.94	20.00	64.0	36.0	3502
3845	Apothecaries Hall Co., Waterbury..	Hatheway & Steane, Inc., Hartford	4.13	3.29	5.02	22.45	20.00	49.5	50.5	3845
3846	Apothecaries Hall Co., Waterbury..	Hatheway & Steane, Inc., Hartford	4.00	3.29	4.86	23.35	20.00	72.5	27.5	3846
3959	Apothecaries Hall Co., Waterbury..	Hatheway & Steane, Inc., Hartford	3.88	3.29	4.72	20.80	20.00	45.0	55.0	3959
3513	29790	American Sumatra Tobacco Co., Bloomfield	3.28	....	3.99	24.40	....	48.0	52.0	3513
3514	700444	American Sumatra Tobacco Co., Bloomfield	3.18	....	3.87	25.09	....	43.0	57.0	3514
3515	40835	American Sumatra Tobacco Co., Bloomfield	2.98	....	3.62	23.76	....	46.0	54.0	3515
3516	13323	American Sumatra Tobacco Co., Bloomfield	2.76	....	3.36	23.22	....	39.0	61.0	3516
4521	93489	American Sumatra Tobacco Co., Bloomfield	3.14	....	3.82	25.10	....	50.0	50.0	4521

VI. MIXED FERTILIZERS.

MIXTURES CONTAINING ONLY NITROGEN AND
PHOSPHORIC ACID.

Three samples of this group of materials were analyzed.

3758. Ammo Phos. American Cyanamid Co., New York. Sampled by the station agent from stock of Olds & Whipple, Inc., Hartford, Conn.

4536. Shoemaker's "Swift-Sure" Tobacco Starter. M. L. Shoemaker & Co., Philadelphia, Penn. Sampled by the station agent from stock of F. S. Bidwell Co., Windsor Locks.

4501. O & W High Grade Tobacco Starter. Olds & Whipple, Inc., Hartford, Conn. Sampled by the station agent from stock of E. O. Gates, Pine Meadow.

	3758	4536	4501
	%	%	%
Nitrogen, found	16.37	3.52	9.56
guaranteed	16.45	3.28	8.23
Ammonia equivalent to nitrogen ..	19.90	4.28	11.62
Phosphoric acid, total	22.30	11.45	4.68
available, found	21.72	9.95	4.53
guaranteed..	20.00	10.00	3.00

Ammo Phos contains no organic nitrogen. The quality of the organic nitrogen in the two other samples was satisfactory as judged by the usual laboratory methods.

MIXTURES CONTAINING NITROGEN, PHOSPHORIC ACID
AND POTASH.

Analyses of two hundred and forty-seven official samples of complete fertilizers, and of six samples submitted by purchasers or others interested, are given in Table XII.

In this table the "grade" of the fertilizer is given in addition to the brand name; and in the analysis the items of ammonia, available phosphoric acid and potash found are given in bold face type so that the comparison between the composition claimed and that found may be more readily seen. A brand represented as 4-8-4, for example, is guaranteed to contain not less than 4 per cent of ammonia, not less than 8 per cent of available phosphoric acid and not less than 4 per cent of potash.

Some of the conspicuous facts shown by the inspection this year may be seen in the following summary:

Total number of official samples analyzed	247
Samples considerably deficient in	
one item	69
two items	13
three items	1
total	83
Total deficiencies	98
Total of guaranties made (247 × 3)	741
Samples showing deficiencies in money value greater than \$1.00 per ton	11

This tabulated statement shows that about $\frac{1}{3}$ of the samples examined have failed to fully satisfy their guaranties in all of the three items of plant food guaranteed; that of the total number of guaranties made (there being three for each sample), about 87 per cent have been substantially met or exceeded; that considerable losses in money value (greater than \$1.00 per ton), have not been involved, excepting eleven samples representing only about 4.5 per cent of the total number.

These data are in close accord with similar calculations made last year. One sample in three has failed to meet the claim in one or more of the three items of plant food guaranteed. While many of these shortages are relatively small, and perhaps within the limit of reasonable analytical differences, nevertheless *guaranties required by law are minimum guaranties and they ought to be met in all cases.*

CONCERNING DEFICIENT SAMPLES.

In ten samples this year deficiencies in plant food have exceeded \$1.00 per ton.¹ In some cases second samples have not been found deficient or such deficiencies have not exceeded the above value. In other cases, however, second samples could not be secured.

TABLE XIII. SAMPLES SHOWING COMMERCIAL DEFICIENCIES.

No.	Brand.	Approximate deficiency in money value per ton.
4090	Stockbridge Early Crop Manure 5-8-7	\$1.29
4223	Armour's Big Crop Fertilizer 5-8-7	2.24
3986	Armour's Big Crop Fertilizer 5-8-7	1.16
3884	Bartlett's Green Tree Food 6-8-4	3.17 ²
4483	Eastern States 8-16-20	5.84
4511	Piedmont-Mt. Airy Harvest Brand 6-8-6	2.45
4544	Rogers & Hubbard 10-3-8	3.68 ²
4539	Royster's 5% Truck Guano 5-8-7	11.58 ³
4547	Royster's Valley Tobacco Formula 5-4-5	2.36
4579	U. S. Fertilizer Chemical Co. Volco Ideal 2.4-5-8..	3.41
3921	Woodruff's Home Mixed Fertilizer 4-8-6	1.18

¹ In calculating these values, averages have been balanced against shortages and ammonia has been reckoned at 21 cents per pound, available phosphoric acid at 6 cents and potash at $4\frac{1}{2}$ cents.

² Second sample not deficient.

³ See page 52.

3884. Bartlett's Green Tree Food. Both this sample and a second sample, **4126**, were low in "available" phosphoric acid. The manufacturer explained that a good share of the phosphorus used was derived from bone. Since the conventional method for determining "available" phosphoric acid does not apply satisfactorily to bone and tankage, the low results reported may be thus explained.

4539. Royster's 5% Truck Guano. This sample was taken from a small lot of six bags. The analysis shows only about one-half as much nitrogen as is guaranteed and the manufacturer raised the question of a possible mixture with other goods when our sample was drawn. We are unable to find any error in the identity of the brand or in the sampling; and our analytical results have been checked by ourselves and substantially confirmed by the manufacturer. It is unfortunate, however, that other shipments of this brand could not be located and further analyses made.

4510. Piedmont-Mt. Airy Guano Co., Harvest Brand 4-6-10. This sample showed a deficiency of 2.5 per cent in potash.

4023. I. P. Thomas & Sons Economy Fertilizer. This sample was 1.49 per cent below guaranty in available phosphoric acid. If the phosphorus was derived from bone the explanation already given for No. **3884** applies here.

4058, 4293. Wilcox Potato and Vegetable Phosphate, 4-8-6. Both samples were deficient in potash.

4178, 4453 and 4754. Sanderson's Atlantic Coast Bone Fish and Potash. These three samples were all low in available phosphoric acid but all represented the same stock. Another sample, **4416**, from a different source was not deficient. Phosphoric acid in this mixture is derived from bone.

COMMERCIAL DEFICIENCIES FOR A PERIOD OF YEARS.

In a system of inspection where many brands are represented by a single analysis the products of the several manufacturers may not be fairly evaluated in any one year. Although it is our practice to examine at least two samples of any brand showing considerable deficiencies, a second sample is not always obtainable. Comparisons are more informing, therefore, if made upon data covering a period of years. A number of different bases might be chosen for such comparisons, but since it has been our practice for many years to cite brands in which commercial deficiencies amount to one dollar or more per ton, these data have been compiled for the 6-year period 1921-1926, and are tabulated in Table XIV. No manufacturer is included unless ten or more samples have been analyzed in the period covered. The compilation shows that of a total of about 1500 samples analyzed less than 10 per cent have fallen short of guaranties to any considerable extent

in commercial value. Or, in other words, purchasers have received commercial values represented by the guaranties in over 90 per cent of purchases made.

TABLE XIV. COMMERCIAL DEFICIENCIES 1921-1926 INCLUSIVE.

Manufacturer.	Total number of samples.	Number equaling or exceeding guaranties in money value.	Per cent for 6 yr. period.	Per cent for 1926.
American Agricultural Chemical Co.	259	247	95	98
Apothecaries Hall Co.	49	49	100	100
Armour Fertilizer Works	64	46	72	78
Atlantic Packing Co.	43	39	91	100
Berkshire Fertilizer Co.	51	51	100	100
Boardman, F. E.	12	12	100	100
Bowker Fertilizer Co. ¹	71	63	...	...
Bridges, A. D. & Sons	13	13	100	100
Chittenden, E. D. Co.	39	35	90	100
Clark, E. B. Seed Co.	28	26	93	100
Coe-Mortimer Co.	30	27	90	...
Eastern States Farmers' Exchange	56	47	84	86
Essex Fertilizer Co.	40	39	98	100
Frisbie, L. T. Co.	65	55	85	100
International Agricultural Corp.	53	48	91	100
Lowell Fertilizer Co.	61	53	87	100
Mapes Fertilizer and Peruvian Guano Co.	77	76	99	100
New England Fertilizer Co.	48	45	94	100
Nitrate Agencies Co.	14	11	79	...
Olds & Whipple, Inc.	37	37	100	100
Parmenter & Polsey Fertilizer Co.	21	20	95	100
Piedmont-Mt. Airy Guano Co. ...	24	15	63	80
Rogers & Hubbard Co., The	82	79	96	93
Royster, F. S. Guano Co.	45	33	73	75
Sanderson Fertilizer & Chemical Co. ¹	41	39	...	...
Shoemaker, M. L. & Co.	17	17	100	100
Springfield Rendering Co.	25	23	92	100
Thomas, I. P. & Son	12	12	...	100
Virginia-Carolina Chemical Co...	49	46	94	100
Wilcox Fertilizer Works	50	47	94	100
Worcester Rendering Co.	21	18	86	100
Total	1,497	1,368	91	96

¹ Included under American Agricultural Chemical Co. this year.

DECREASE IN PROPORTION OF FERTILIZER WITH LOW PLANT FOOD CONTENT.

In a previous report¹ it has been pointed out that nitrogen costs two to three times as much in low grade (1 per cent ammonia) fertilizers as in high grade mixtures.

¹ Conn. Exp. Sta., Bull. 241, p. 110, 1922.

A study of grades with reference to ammonia content, also cited in an earlier report,¹ shows that in the period 1921 to 1924 inclusive, the proportion of samples containing 1 per cent of ammonia decreased from 10 per cent to 2 per cent; that the proportion containing 3 per cent or less of ammonia decreased from 54 per cent to 30 per cent; and that the proportion containing 4 per cent or more of ammonia increased from 46 per cent to 70 per cent.

At the Massachusetts conference of the Soil Improvement Committee it was recently shown² that low analysis (less than 14 per cent of total plant food) mixtures have decreased both in number and tonnage. Thus, in 1922 there were 29 low analysis mixtures in Massachusetts representing a tonnage of about 8000; in 1925 there were only 9 such mixtures representing a tonnage of less than 2100. It was also shown that of the total registrations in New England in 1925, 784 were high analysis (14 per cent or over) brands and 126 were brands containing less than 14 per cent of plant food. On an average, low analysis brands comprised about 14 per cent of total registrations in New England, varying in the several States from 1/10 to 1/5 of their total registrations.

NEW ENGLAND "STANDARD NINE."

Nine standard grades have been recommended for use in New England. The experience in this State has been that in the three years following the proposal of these nine grades, the number of samples analyzed which corresponded exactly to the "standard nine" comprised in 1923, 32 per cent; in 1924, 36 per cent; and in 1925, 44 per cent, of the total. During the year just passed the proportion is 44 per cent. The data show an increasing number of samples each year excepting the last, falling in the selected grades, but the proportion is still less than 1/2 of the total.

Citing Director Haskell's report again it appears, from a tonnage standpoint, that in the four-year period 1922-1925 inclusive, five, of the "standard nine," viz., 4-8-4, 5-8-7, 5-4-5, 8-6-6, and 3-10-4, have maintained, or increased in, tonnage; three grades, viz., 0-12-6, 2-12-4 and 3-10-6 serve no evident necessity judging from tonnage returns; and one grade, 4-8-6, has shown a marked decrease in tonnage. Some of the standard grades have, moreover, been outstripped in tonnage by closely related formulas, such as 4-8-7, 3-8-4, and 3-8-6. The report concludes that there is apparent need of revision of the nine grades originally proposed.

¹ Conn. Exp. Sta., Bull. 261, p. 57, 1924.

² Report of S. B. Haskell, Director of the Massachusetts Experiment Station.

Our classification of samples this year with respect to the "Standard Nine" is as follows:

Grade.	No. of Samples.
0-12-6	0
2-12-4	4
3-10-4	7
3-10-6	3
4-8-4	35
4-8-6	4
5-4-5	24
5-8-7	31
8-6-6	1
Total	109

Other grades in which a considerable number of samples have fallen are as follows:

Grade.	No. of Samples
2-8-2	8
3-8-4	17
4-8-7	17
7-6-5	8
Total	50

QUALITY OF THE INSOLUBLE ORGANIC NITROGEN.

The present accepted methods of evaluating the insoluble organic nitrogen in fertilizer materials distinguishes between the better and the poorer forms of nitrogen. Activity values below 50 per cent by the alkaline method and below 80 per cent by the neutral method are accepted as indicating inferior nitrogenous material. Both methods should be applied before judgment is passed in any case.

During the past season four samples have shown activity values somewhat less than those mentioned, but in all of them the water-soluble nitrogen practically equalled or exceeded the guaranties of total nitrogen and the samples were passed.

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i> American Agricultural Chemical Co., New York.			
3877	Acme Fertilizer	1-9-4	North Haven
4221	Aroostook Potato Manure	5-8-7	Bloomfield
3938	Complete General Fertilizer	3-8-4	North Haven
4665	Double A Tobacco Fertilizer	5-4-5	Gaylordsville
3939	Farmers' Friend Fertilizer	2-12-4	North Haven
3935	Gladiator Fertilizer	4-8-7	New Britain
4093	Grass and Lawn Top Dressing	6-6-4	Stafford Springs ...
4668	Hi-Grade Tobacco Manure	7-4-7	Windsor
3934	Monarch Fertilizer	4-8-4	New Britain
4664	Old Hickory Fertilizer	2-8-10	Granby
4084	Bowker's All Round Fertilizer	3-8-4	New Milford
4091	Bowker's Market Garden Fertilizer	4-8-4	Mansfield Depot ...
4088	Bowker's Potato and Vegetable Phosphate ..	2-9-3	Willimantic
4089	Bowker's Sure Crop Fertilizer	1-9-4	Willimantic
4092	Bradley's Blood, Bone and Potash	5-8-7	Stafford Springs ...
4094	Bradley's Complete Manure for Potatoes and Vegetables	4-8-7	Stafford Springs ...
4414	Bradley's Complete Tobacco Manure	5-4-5	Glastonbury
3943	Bradley's Eclipse Fertilizer	1-9-4	Meriden
4412	Bradley's Northland Potato Grower	4-8-4	Simsbury
4219	Bradley's Potato Fertilizer	2-9-3	Stafford Springs ...
3937	Bradley's Potato Manure	3-8-4	Suffield
3936	Bradley's XL Superphosphate of Lime	3-10-4	Thompsonville
3941	National Aroostook Special Fertilizer	5-8-7	Silver Lane
4415	National Complete Tobacco Fertilizer	5-4-5	Simsbury
3942	National Market Garden Fertilizer	3-8-4	Silver Lane
4411	National Pine Tree State Potato Fertilizer ..	4-8-4	Warehouse Point ...
4755	National Pine Tree State Potato Fertilizer ..	4-8-4	New Haven
3944	National Premier Potato Manure	4-8-7	Greenwich
4178	Sanderson's Atlantic Coast Bone, Fish and Potash	3-10-4	West Cheshire
4416	Sanderson's Atlantic Coast Bone, Fish and Potash	3-10-4	Simsbury
4453	Sanderson's Atlantic Coast Bone, Fish and Potash	3-10-4	West Cheshire
4754	Sanderson's Atlantic Coast Bone, Fish and Potash	3-10-4	West Cheshire
4413	Sanderson's Complete Tobacco Grower	5-4-5	New Milford
4176	Sanderson's Corn Superphosphate	2-9-3	South Coventry ...
3940	Sanderson's Formula A	4-8-4	Guilford
4177	Sanderson's Formula B	4-8-7	West Cheshire
4179	Sanderson's Potato Manure	3-8-4	Durham

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH.

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
0.07	0.39	0.41	0.19	1.06	1.29	0.35	9.43	9.08	4.36	4.36	3877
0.44	2.56	0.54	0.49	4.03	4.90	0.33	8.64	8.31	7.14	7.14	4221
0.15	1.45	0.49	0.46	2.55	3.10	0.50	8.73	8.23	4.05	4.05	3938
0.69	0.73	0.01	2.76	4.19	5.09	0.18	4.23	4.05	0.48	5.65	4665
0.10	0.90	0.36	0.40	1.76	2.14	0.50	12.00	12.00	4.04	4.04	3939
0.31	1.74	0.68	0.45	3.18	3.87	0.73	8.70	7.97	6.95	6.95	3935
1.63	2.50	0.40	0.55	5.08	6.18	0.38	6.60	6.22	3.84	3.84	4093
0.65	0.72	0.17	4.18	5.72	6.95	0.50	5.40	4.90	0.35	7.00	4668
0.46	1.73	0.37	0.62	3.18	3.87	0.38	8.19	7.81	4.02	4.02	3934
0.06	0.88	0.45	0.32	1.71	2.08	0.73	8.75	8.02	9.74	9.74	4664
0.10	1.36	0.55	0.54	2.55	3.10	0.83	8.98	8.15	4.05	4.05	4084
0.43	1.72	0.43	0.62	3.20	3.89	0.45	8.45	8.00	3.79	3.79	4091
0.02	0.78	0.50	0.38	1.68	2.04	0.66	9.68	9.02	3.38	3.38	4088
0.03	0.33	0.39	0.22	0.97	1.18	0.45	9.50	9.05	4.01	4.01	4089
0.35	2.50	0.64	0.53	4.02	4.89	0.40	8.57	8.17	7.11	7.11	4092
0.45	1.84	0.69	0.47	3.45	4.19	0.71	8.69	7.98	7.19	7.19	4094
0.52	0.58	0.15	2.65	3.90	4.74	0.31	4.00	3.69	0.41	5.80	4414
0.10	0.36	0.33	0.23	1.02	1.24	0.40	9.57	9.17	4.00	4.00	3943
0.38	1.78	0.64	0.49	3.29	4.00	0.95	8.95	8.00	3.90	3.90	4412
0.11	0.78	0.42	0.35	1.66	2.03	0.68	9.34	8.66	3.40	3.40	4219
0.06	1.45	0.59	0.42	2.52	3.06	0.55	8.55	8.00	4.03	4.03	3937
0.06	1.42	0.72	0.39	2.59	3.15	0.73	10.72	9.99	4.01	4.01	3936
0.37	2.60	0.52	0.46	3.95	4.80	0.51	8.47	7.96	6.86	6.86	3941
0.41	0.67	0.16	2.68	3.92	4.77	0.28	4.90	4.62	0.56	5.14	4415
0.13	1.40	0.47	0.45	2.45	2.98	0.48	8.51	8.03	3.96	3.96	3942
0.34	1.68	0.43	0.63	3.08	3.74	0.48	8.50	8.02	3.93	3.93	4411
0.36	1.82	1.22		3.40	4.13	0.98	9.00	8.02	3.78	3.78	4755
0.37	1.73	0.79	0.42	3.31	4.02	0.66	8.51	7.85	7.59	7.59	3944
0.46	1.74	0.50	0.57	3.27	3.98	0.66	8.60	7.94	4.04	4.04	4178
0.12	1.32	0.61	0.47	2.52	3.06	0.85	11.00	10.15	3.97	3.97	4416
0.36	1.62	0.55	0.49	3.02	3.67	0.73	9.50	8.77	3.95	3.95	4453
0.23	1.57	1.10		2.90	3.53	0.80	10.00	9.20	4.18	4.18	4754
0.42	0.56	0.25	2.83	4.06	4.94	0.23	4.28	4.05	0.47	5.30	4413
0.13	0.68	0.40	0.35	1.56	1.89	0.38	9.33	8.95	2.96	2.96	4176
0.45	1.79	0.44	0.61	3.29	4.00	0.42	8.42	8.00	3.97	3.97	3940
0.72	1.23	0.12	1.38	3.45	4.19	1.63	9.55	7.92	1.04	6.68	4177
0.12	1.46	0.39	0.53	2.50	3.04	0.53	8.53	8.00	3.98	3.98	4179

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
American Agricultural Chemical Co., New York—Concluded.			
4175	Sanderson's Top Dressing for Grass and Grain	6-6-4	South Coventry
4090	Stockbridge Early Crop Manure	5-8-7	Mansfield Depot
3933	Stockbridge Hill and Drill Fertilizer	4-8-7	Bristol
4087	Stockbridge Tobacco Manure	5-4-5	Glastonbury
Apothecaries Hall Co., Waterbury.			
3880	Liberty Corn and All Crops 2-8-2	2-8-2	Branford
3885	Liberty Corn, Fruit and All Crops 2-12-4 ...	2-12-4	Greenwich
3992	Liberty Fish, Bone and Potash 3-8-3	3-8-3	Branford
3985	Liberty High Grade Market Gardeners 5-8-7	5-8-7	West Cheshire
4433	Liberty High Grade Tobacco Manure 7-4-7..	7-4-7	East Windsor
3990	Liberty Potato and Market Gardeners' Special 4-8-4	4-8-4	North Haven
3991	Liberty Onion Special (Potash as Sulphate) 4-8-7	4-8-7	North Haven
4436	Liberty Potato and General Crop 4-8-10	4-8-10	Rockville
4169	Liberty Tobacco Special 5-4-5	5-4-5	East Windsor
3995	Liberty Top Dresser for Grass and Grain 10-3-5-8	10-3-5-8	Greenwich
Armour Fertilizer Works, New York.			
4161	Armour's Big Crop Fertilizer 3-8-4	3-8-4	Thompsonville
4606	Armour's Big Crop Fertilizer 3-8-4	3-8-4	Waterbury
3987	Armour's Big Crop Fertilizer 4-8-4	4-8-4	Milford
4222	Armour's Big Crop Fertilizer 4-8-4	4-8-4	Madison
4429	Armour's Big Crop Fertilizer 4-6-10	4-6-10	Wallingford
3986	Armour's Big Crop Fertilizer 5-8-7	5-8-7	Milford
4223	Armour's Big Crop Fertilizer 5-8-7	5-8-7	Madison
4162	Armour's Big Crop Tobacco Special 5-4-5 ..	5-4-5	Thompsonville
4428	Armour's Corn Grower 2-8-2	2-8-2	Danbury
Atlantic Packing Co., New Haven, Conn.			
4407	Atlantic 4-8-7	4-8-7	Glastonbury
4439	Atlantic 5-4-16	5-4-16	Glastonbury
4438	Atlantic Grain Fertilizer 2-8-2	2-8-2	South Windsor
4164	Atlantic Special Vegetable 4-8-4	4-8-4	Silver Lane
4408	Atlantic Tobacco Grower 5-4-5	5-4-5	East Hartford
4669	Atlantic Tobacco Grower 5-4-5	5-4-5	South Windsor
F. A. Bartlett Tree Expert Co., Stamford, Conn.			
3884	Bartlett's Green Tree Food	6-8-4	Stamford
4126	Bartlett's Green Tree Food	6-8-4	Stamford

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

Nitrogen.					Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
In nitrates.	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
1.60	2.62	0.10	0.55	4.06	6.03	0.45	6.60	6.15	3.88	3.88	4175
0.36	2.45	0.66	0.46	3.93	4.78	0.63	8.65	8.02	6.56	6.56	4090
0.51	1.82	0.59	0.50	3.42	4.16	0.65	9.00	8.35	6.71	6.71	3933
0.48	0.54	0.14	2.77	3.93	4.78	0.13	3.80	3.67	0.58	5.82	4087
0.12	1.00	0.48	0.65	2.25	2.74	2.20	10.31	8.11	3.05	3.05	3880
0.00	1.35	0.43	0.14	1.92	2.33	1.38	13.36	11.98	4.32	4.32	3885
0.79	1.02	0.42	0.66	2.89	3.51	1.93	9.73	7.80	3.07	3.07	3992
0.84	2.90	0.28	0.16	4.18	5.08	0.85	9.05	8.20	7.14	7.14	3985
0.18	1.86	0.18	3.80	6.02	7.32	0.38	7.70	7.32	1.63	7.19	4433
0.84	2.08	0.25	0.30	3.47	4.22	1.28	9.43	8.15	4.00	4.00	3990
1.50	0.10	0.42	1.80	3.82	4.66	1.75	9.93	8.18	1.53	7.61	3991
2.39	0.98	0.24	0.09	3.70	4.50	0.88	9.63	8.75	9.60	9.60	4436
0.06	1.02	0.15	2.71	3.94	4.79	0.30	5.95	5.65	0.77	5.91	4169
1.07	7.07	0.03	0.06	8.23	10.01	0.25	3.85	3.60	8.28	8.28	3995
0.19	1.26	0.48	0.61	2.54	3.09	0.97	8.36	7.39	3.91	3.91	4161
0.13	1.18	0.46	0.71	2.48	3.02	0.93	8.89	7.96	4.24	4.24	4606
0.82	1.12	0.56	0.72	3.22	3.91	0.69	8.58	7.89	4.26	4.26	3987
0.82	1.24	0.56	0.62	3.24	3.94	0.78	8.70	7.92	4.21	4.21	4222
0.50	1.26	0.98	0.64	3.38	4.11	1.10	7.60	6.50	10.93	10.93	4429
0.94	1.66	0.51	0.75	3.86	4.69	0.83	8.90	8.07	7.06	7.06	3986
1.00	1.53	0.60	0.77	3.90	4.74	1.20	8.80	7.60	6.26	6.26	4223
0.70	0.10	0.26	3.09	4.15	5.05	0.50	5.00	4.50	0.48	5.41	4162
0.16	0.90	0.20	0.57	1.83	2.22	0.75	8.70	7.95	2.12	2.12	4428
1.57	0.54	0.70	0.49	3.30	4.01	1.28	9.39	8.11	6.71	6.71	4407
1.31	0.89	0.56	1.55	4.31	5.24	1.83	8.58	6.75	1.47	17.32	4439
0.65	0.03	0.46	0.53	1.67	2.03	1.41	9.55	8.14	2.04	2.04	4438
0.52	1.61	0.60	0.54	3.27	3.98	1.18	9.40	8.22	3.88	3.88	4164
1.67	0.07	0.51	1.89	4.14	5.03	0.93	5.68	4.75	0.23	5.55	4408
1.64	0.09	0.38	2.03	4.14	5.03	0.85	5.85	5.00	0.31	5.00	4669
0.03	3.79	0.04	0.79	4.65	5.65	3.61	10.18	6.57	4.02	4.02	3884
0.15	4.40	0.12	0.75	5.42	6.59	2.10	8.20	6.10	5.33	5.33	4126

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
Berkshire Fertilizer Co., Bridgeport, Conn.			
4224	Berkshire Complete Fertilizer	3-8-3	Chester
4437	Berkshire Complete Tobacco	5-4-5	Hazardville
4435	Berkshire Economical Grass Fertilizer	10-3-8	Ellington
4667	Berkshire Economical Grass Fertilizer	10-3-8	Rockville
3993	Berkshire Grass Special	7-6-5	New Canaan
3989	Berkshire Long Island Special	5-8-7	Highwood
3988	Berkshire Market Garden Fertilizer	4-8-4	Highwood
3994	Berkshire Potato and Vegetable Phosphate ..	2-9-3	New Canaan
4405	Berkshire Tobacco Special	7-4-7	Suffield
4607	Berkshire Starter 10% Potash	5-8-10	Ellington
4683	Berkshire Starter 10% Potash	5-8-10	Rockville
Frank E. Boardman, Middletown, Conn.			
4684	Boardman's Complete Fertilizer, Potato and General Use	4-7-4	Middletown
4689	Boardman's Tobacco Fertilizer	4-7-4	Middletown
Amos D. Bridge's Sons, Hazardville, Conn.			
4220	Corn, Onion and Potato and General Use ..	4-8-4	Hazardville
4485	Special Tobacco Fertilizer	5-4-5	Hazardville
4688	Special Tobacco Fertilizer	5-4-5	Hazardville
E. D. Chittenden Co., Bridgeport, Conn.			
4406	Complete Grain 3% Potash	2-9-3	Bloomfield
4409	High Grade Potato with 7% Potash	5-8-7	Abington
4242	High Grade Tobacco	6.5-3-7.5	Glastonbury
4243	Potato Special	4-8-4	Glastonbury
4234	Tobacco Special	5-4-5	Glastonbury
E. B. Clark Seed Co., Milford, Conn.			
3858	Special Mixture for General Use	4-8-4	Branford
3856	Special Mixture with 6% Potash	4-8-6	Branford
3857	Superphosphate	5-8-7	Branford
3855	Tip Top Brand	5-10-5	Branford
4682	Tip Top Brand	5-10-5	Orange
C. A. Cowles, Plantsville, Conn.			
4402	Cowles' Complete Corn, Potato and Onion Fertilizer	4-8-4	Plantsville
Davey Tree Expert Co., Kent, Ohio.			
4685	Davy Tree Food	7-8-3.6	Greenwich

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
0.87	1.75	0.33	0.44	3.39	4.12	0.48	9.02	8.54	3.20	3.20	4224
0.17	1.12	0.69	2.56	4.54	5.52	0.48	5.35	4.87	1.10	5.73	4437
2.81	3.64	0.34	2.03	8.82	10.72	3.28	8.40	5.12	9.72	9.72	4435
1.94	4.01	1.53	2.18	9.66	11.74	3.70	8.90	5.20	8.06	8.06	4067
3.35	1.66	0.60	0.89	6.50	7.90	1.96	7.50	5.63	4.99	4.99	3993
0.53	2.50	0.28	0.92	4.23	5.14	0.55	8.85	8.30	7.00	7.00	3989
0.09	2.32	0.18	0.80	3.39	4.12	0.60	9.12	8.52	5.33	5.33	3988
0.04	1.56	0.09	0.23	1.92	2.33	0.50	10.15	9.65	3.43	3.43	3994
0.27	1.69	0.56	3.58	6.10	7.42	0.20	5.05	4.85	1.21	8.18	4405
0.01	3.01	0.03	1.39	4.44	5.40	1.25	9.88	8.63	2.11	10.74	4607
0.00	2.44	0.06	1.75	4.25	5.17	1.00	9.83	8.83	2.34	11.15	4683
0.58	1.36	0.67	1.04	3.65	4.44	0.87	7.70	6.83	4.85	4.85	4684
0.12	1.30	1.14	1.58	3.14	3.82	0.63	7.65	7.02	1.22	5.98	4689
0.94	1.20	0.52	0.79	3.45	4.19	1.18	9.55	8.37	4.33	4.33	4220
0.18	1.11	0.33	2.60	4.31	5.24	0.68	5.70	5.02	0.45	5.67	4485
0.11	1.13	0.18	2.84	4.26	5.18	0.55	5.65	5.10	0.39	6.32	4688
0.09	1.20	0.34	0.33	1.96	2.38	0.45	9.63	9.18	3.86	3.86	4406
0.00	3.50	0.37	0.33	4.20	5.11	0.20	8.63	8.43	7.81	7.81	4409
0.00	3.29	0.34	1.77	5.40	6.57	0.28	4.10	3.82	0.69	8.60	4242
0.06	3.20	0.26	0.80	4.32	5.25	0.30	8.19	7.89	4.45	4.45	4243
0.10	2.08	0.26	1.45	3.89	4.73	0.33	5.78	5.45	2.55	5.57	4234
0.05	2.41	0.15	0.60	3.21	3.90	0.83	8.63	7.80	4.22	4.22	3858
0.09	2.81	0.23	0.39	3.52	4.28	1.13	9.23	8.10	5.88	5.88	3856
0.46	2.81	0.05	0.81	4.13	5.02	2.04	9.49	7.45	7.04	7.04	3857
0.62	2.88	0.23	0.27	4.00	4.86	1.10	11.01	9.91	5.22	5.22	3855
0.04	2.58	0.53	0.83	3.98	4.84	0.56	10.45	9.89	6.39	6.39	4682
0.80	1.32	0.46	0.94	3.52	4.28	1.33	9.98	8.65	4.41	4.41	4402
0.17	3.88	0.15	1.52	5.72	6.95	4.20	14.05	9.85	3.40	3.40	4685

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
Eastern States Farmers' Exchange, Springfield, Mass.			
4233	Eastern States 3-12-3	3-12-3	Seymour
4244	Eastern States 4-8-10	4-8-10	Farmington
4240	Eastern States 5-8-7	5-8-7	North Haven
4241	Eastern States 5-10-5	5-10-5	Guilford
4403	Eastern States 8-6-6	8-6-6	North Haven
4483	Eastern States 8-16-20	8-16-20	Farmington
4239	Eastern States 10-16-14	10-16-14	Farmington
Essex Fertilizer Co., Boston, Mass.			
4478	Essex A1 Superphosphate 2-8-2	2-8-2	Wallingford
4598	Essex Complete Manure 5-8-7	5-8-7	Wallingford
4283	Essex Fish Fertilizer for All Crops 3-8-4 ...	3-8-4	Wallingford
4280	Essex Market Garden 4-8-4	4-8-4	South Manchester ..
4281	Essex Potato Phosphate 4-8-7	4-8-7	South Manchester ..
L. T. Frisbie Co., New Haven, Conn.			
3850	Frisbie's 5-8-7	5-8-7	Wilson
4008	Frisbie's Corn and Grain Fertilizer 2-8-2	2-8-2	Danbury
4481	Frisbie's Market Garden 4-8-7	4-8-7	New Britain
4480	Frisbie's Special 3-8-4	3-8-4	New Britain
4009	Frisbie's Special Vegetable and Potato Grower 4-8-4	4-8-4	Danbury
4486	Frisbie's Tobacco Grower 5-4-5	5-4-5	Buckland
4222	Frisbie's Tobacco Manure 5-8-6	5-8-6	Burnside
4479	Frisbie's Top Dresser 7-6-5	7-6-5	Wethersfield
A. W. Higgins, South Deerfield, Mass.			
4465	Old Deerfield 3-10-6	3-10-6	Suffield
4651	Old Deerfield 4-8-4	4-8-4	Madison
4601	Old Deerfield 5-8-7	5-8-7	Madison
4600	Old Deerfield 10-16-14	10-16-14	Madison
4464	Old Deerfield Tobacco Fertilizer 7-4-7	7-4-7	Suffield
International Agricultural Corp., Boston, Mass.			
4466	I. A. C. Connecticut Valley Tobacco Special	7-4-7	West Suffield
4454	I. A. C. Crop Grower 5-8-7	5-8-7	West Cheshire
4285	I. A. C. Ideal	4-8-4	Cromwell
4287	I. A. C. Multiple Strength 8-12-20	8-12-20	Cromwell
4468	I. A. C. New England Special	2-12-4	East Granby
4469	I. A. C. Tobacco Producer	5-4-5	East Granby
4648	I. A. C. Top Dresser 7-6-5	7-6-5	Cromwell

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
0.40	1.20	0.39	0.51	2.50	3.04	0.57	12.15	11.58	3.43	3.43	4233
0.27	2.27	0.52	0.60	3.66	4.45	1.18	9.48	8.30	9.81	9.81	4244
0.06	2.58	0.57	0.74	3.95	4.77	0.98	9.01	8.03	7.29	7.29	4240
0.62	2.94	0.55	0.55	4.06	4.94	0.78	10.46	9.68	5.26	5.26	4241
0.33	4.16	0.93	0.96	6.38	7.76	0.68	8.25	7.57	6.11	6.11	4403
0.50	4.88	0.31	0.73	6.42	7.81	0.48	16.90	16.42	13.85	13.85	4483
1.10	6.16	0.25	0.86	8.37	10.18	0.45	15.90	15.45	13.52	13.52	4239
0.08	0.81	0.37	0.57	1.83	2.22	0.90	9.73	8.83	2.13	2.13	4478
0.43	3.00	0.14	0.58	4.15	5.05	0.85	9.40	8.55	7.22	7.22	4598
0.18	1.63	0.16	0.56	2.53	3.08	0.76	9.02	8.26	4.03	4.03	4283
0.40	1.84	0.37	0.79	3.40	4.13	0.56	8.74	8.18	4.17	4.17	4280
0.41	1.91	0.40	0.66	3.38	4.11	0.78	8.90	8.12	6.86	6.86	4281
0.22	2.80	0.49	0.60	4.11	5.00	0.99	8.90	7.91	6.95	6.95	3850
0.14	0.85	0.33	0.60	1.92	2.33	0.88	9.55	8.67	2.17	2.17	4008
1.34	0.70	0.75	0.49	3.28	3.99	1.40	9.73	8.33	6.59	6.59	4481
1.35	0.04	0.62	0.51	2.52	3.06	1.44	9.10	7.66	4.30	4.30	4480
0.36	2.25	0.27	0.40	3.28	3.99	0.55	9.00	8.45	3.91	3.91	4009
1.53	0.09	0.42	1.98	4.02	4.89	0.80	5.65	4.85	0.17	5.56	4486
1.88	0.00	0.79	1.61	4.28	5.20	1.15	10.83	9.68	0.74	6.27	4422
2.68	0.64	1.32	1.01	5.65	6.87	1.78	7.70	5.92	5.06	5.06	4479
0.16	1.50	0.56	0.58	2.80	3.40	0.93	10.28	9.35	6.40	6.40	4465
0.57	1.41	0.59	0.97	3.54	4.30	1.30	9.50	8.20	5.46	5.46	4651
0.80	1.23	0.54	1.28	3.85	4.68	0.83	8.46	7.63	8.12	8.12	4601
0.72	5.07	0.90	1.70	8.39	10.20	0.88	18.25	17.37	14.52	14.52	4600
1.56	0.50	0.50	3.28	5.84	7.10	0.38	6.00	5.62	0.66	8.41	4464
0.15	1.91	0.45	3.21	5.72	6.95	0.13	4.23	4.10	0.76	7.10	4466
0.37	2.10	0.48	1.02	3.97	4.83	0.18	8.25	8.07	6.93	6.93	4454
0.26	1.66	0.59	0.86	3.37	4.10	0.23	8.40	8.17	4.28	4.28	4285
0.60	4.41	0.69	0.84	6.54	7.95	0.65	12.75	12.10	2.30	20.44	4287
0.37	0.93	0.00	0.60	1.90	2.31	0.28	12.43	12.15	3.93	3.93	4468
0.18	1.37	0.07	2.42	4.04	4.91	0.13	4.08	3.95	0.65	5.01	4469
1.34	2.18	0.51	1.31	5.34	6.49	0.23	7.03	6.80	1.42	5.04	4648

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
Lowell Fertilizer Co., Boston, Mass.			
3848	Lowell Animal Brand, A High Grade Manure for All Crops 3-8-4	3-8-4	Cheshire
4686	Lowell Animal Brand, A High Grade Manure for All Crops 3-8-4	3-8-4	Southington
4007	Lowell Bone Fertilizer 2-8-2	2-8-2	Saugatuck
4005	Lowell Corn and Vegetable 4-8-4	4-8-4	Southport
4006	Lowell Market Garden Manure 5-8-7	5-8-7	Southport
4278	Lowell Potato Grower 4-6-10	4-6-10	Shelton
3849	Lowell Potato Phosphate 4-8-7	4-8-7	Cheshire
4463	Lowell Tobacco 5-4-5	5-4-5	Warehouse Point ..
3847	Lowell Top Dressing 7-6-5	7-6-5	Cheshire
4674	Lowell Top Dressing 7-6-5	7-6-5	Wethersfield
Mapes Formula and Peruvian Guano Co., New York.			
4459	The Mapes Connecticut Valley Special	6-4-7	Hazardville
3904	The Mapes Corn Manure	3-8-3	Meriden
4462	The Mapes General Tobacco Manure	5-4-5	West Suffield
4282	The Mapes General Truck Manure	5-6-5	Hazardville
3896	The Mapes General Use Manure	3-6-4	Windsor Locks
4496	The Mapes Onion Manure	4-6-4	Hazardville
3897	The Mapes Potato Manure	4-7-5	Windsor Locks
4492	The Mapes Special Trucker	5-8-7	Hartford
4498	The Mapes Tobacco Ash Constituents	1-4-15	Suffield
4497	The Mapes Tobacco Manure Wrapper Brand	7.5-2-10.5	Hazardville
4494	The Mapes Tobacco Starter Improved	5-6-1	Hartford
4493	The Mapes Top Dresser	10-4-2	Hartford
Mehmel & Sarvi, Plantsville, Conn.			
4680	Mehmel's Complete Corn, Potato and Onion Fertilizer	4-8-4	Plantsville
New England Fertilizer Co., Boston, Mass.			
3900	New England Corn Phosphate 2-8-2	2-8-2	Rockville
4004	New England Market Garden 5-8-7	5-8-7	Rockville
3899	New England Potato and Vegetable Manure 4-8-4	4-8-4	Meriden
4653	New England Potato Phosphate 4-8-7	4-8-7	Unionville
4500	New England Tobacco 5-4-5	5-4-5	Warehouse Point ..
3898	New England Superphosphate, A High Grade Fertilizer for All Crops 3-8-4	3-8-4	Meriden

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
0.14	1.60	0.05	0.62	2.41	2.93	0.93	9.17	8.24	3.69	3.69	3848
0.03	1.79	0.26	0.54	2.62	3.19	0.90	9.20	8.30	4.07	4.07	4686
0.16	0.82	0.23	0.55	1.76	2.14	0.85	9.43	8.58	2.04	2.04	4007
0.64	2.36	0.02	0.48	3.50	4.26	0.73	8.95	8.22	3.91	3.91	4005
0.00	2.77	0.75	0.61	4.13	5.02	0.73	9.50	8.77	6.80	6.80	4006
0.26	1.56	0.68	1.08	3.58	4.35	1.08	7.50	6.42	9.72	9.72	4278
0.49	1.75	0.40	0.82	3.46	4.21	0.78	8.87	8.09	6.95	6.95	3849
1.00	0.12	0.72	2.30	4.14	5.03	1.13	5.90	4.77	1.26	5.48	4463
0.00	5.60	0.05	0.19	5.84	7.10	0.10	6.37	6.27	4.75	4.75	3847
0.09	5.57	0.09	0.17	5.92	7.20	0.30	6.70	6.40	5.19	5.19	4674
2.65	0.29	0.51	2.17	5.62	6.83	0.88	5.43	4.55	0.65	7.56	4459
0.72	2.10	0.08	0.76	3.66	4.45	2.50	10.03	7.53	3.68	3.68	3904
1.52	0.14	0.61	2.13	4.40	5.35	1.03	5.80	4.77	0.45	6.02	4462
0.61	1.51	1.33	0.90	4.35	5.29	0.85	8.90	8.05	4.65	5.42	4282
1.17	1.00	0.21	0.68	3.06	3.72	2.38	9.50	7.12	5.15	5.15	3896
0.71	1.52	0.99	0.48	3.70	4.50	2.53	9.13	6.60	0.27	4.37	4496
1.19	1.58	0.17	0.84	3.78	4.60	0.90	9.28	8.38	4.98	4.98	3897
1.70	1.74	0.13	0.76	4.33	5.26	2.85	10.88	8.03	7.38	7.38	4492
0.02	0.12	0.17	0.53	0.84	1.02	1.50	6.73	5.23	1.10	16.84	4498
2.21	0.24	0.70	3.17	6.32	7.68	1.25	5.60	4.35	1.09	11.38	4497
1.38	1.62	0.38	1.04	4.42	5.37	3.28	10.78	7.50	0.35	1.54	4494
5.28	2.00	0.25	0.66	8.19	9.96	1.10	7.23	6.13	0.23	2.47	4493
0.68	1.32	0.50	0.87	3.37	4.10	1.10	10.10	9.00	4.72	4.72	4680
0.05	0.80	0.19	0.64	1.68	2.04	0.83	9.55	8.72	1.93	1.93	3900
0.35	2.89	0.52	0.67	4.43	5.39	0.55	8.60	8.05	7.37	7.37	4004
0.45	2.05	0.28	0.46	3.24	3.94	0.73	8.85	8.12	4.07	4.07	3899
0.17	1.90	0.70	0.71	3.48	4.23	0.83	9.25	8.42	6.98	6.98	4653
1.28	0.08	0.17	2.45	3.98	4.84	0.50	5.30	4.80	0.69	6.22	4500
0.08	1.48	0.25	0.53	2.34	2.84	0.95	9.45	8.50	3.67	3.67	3898

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
Olds & Whipple, Inc., Hartford, Conn.			
4507	O & W Complete Market Garden Fertilizer	4-8-4	South Manchester ..
4502	O & W Complete Tobacco Fertilizer	5-4-5	Rockville
4687	O & W Complete Tobacco Fertilizer	5-4-5	Hazardville
4121	O & W Grain and General Crop Fertilizer ..	2-9-3	South Windsor
3993	O & W Grass Fertilizer	6-6-4	Hartford
4512	O & W High Grade Vegetable and Potato Fertilizer	5-8-7	Plantsville
4516	O & W High Grade Starter and Potash Compound	5-4-15	Burnside
4495	O & W Tobacco Fertilizer, Blue Label Brand	6-3-6	Manchester
Parmenter & Poley Fertilizer Co., Boston, Mass.			
4646	P & P Maine Potato Fertilizer 4-6-10	4-6-10	Wallingford
4517	P & P Plymouth Rock Brand For All Crops 3-8-4	3-8-4	Plainville
Piedmont-Mt. Airy Guano Co., Baltimore, Md.			
4509	Harvest Brand 3-8-4	3-8-4	Seymour
4508	Harvest Brand 4-8-4	4-8-4	Seymour
4510	Harvest Brand 4-6-10	4-6-10	Seymour
3919	Harvest Brand 5-8-7	5-8-7	Seymour
4511	Harvest Brand 6-8-6	6-8-6	Seymour
Frank S. Platt Co., New Haven, Conn.			
4513	Platco Special 5-8-7	5-8-7	New Haven
Rackliffe Bros. Co., New Britain, Conn.			
4049	Rackliffe Complete Corn, Potato and Onion Fertilizer	4-8-4	New Britain
4050	Rackliffe High Grade Potato Fertilizer	5-8-7	New Britain
The Rogers & Hubbard Co., Portland, Conn.			
3998	4-8-4	4-8-4	Hartford
4054	5-8-7	5-8-7	North Haven
4544	10-3-8	10-3-8	Rockfall
4119	Rogers & Hubbard's All Soils All Crops Fertilizer	4-10-4	Highwood
4051	Garden Fertilizer	2-8-4	Hartford
3999	Hubbard's "Bone Base" Fertilizer for Seeding Down	3-5-6	Portland

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
0.88	1.16	0.44	0.86	3.34	4.06	1.20	9.73	8.53	4.74	4.74	4507
0.05	1.13	0.18	2.84	4.20	5.11	0.60	6.20	5.60	0.40	6.00	4502
0.16	1.02	0.06	2.92	4.16	5.06	0.48	5.95	5.47	0.47	5.75	4687
0.26	1.02	0.07	0.42	1.77	2.15	1.83	11.45	9.62	0.47	3.15	4121
1.71	2.05	0.56	1.00	5.32	6.47	1.10	7.43	6.33	4.36	4.36	3903
1.11	1.57	0.48	1.03	4.19	5.09	1.33	10.13	8.80	0.45	7.94	4512
0.86	1.04	0.05	2.30	4.25	5.17	0.60	5.85	5.25	1.08	16.25	4516
0.15	1.10	0.07	3.90	5.22	6.35	0.35	4.20	3.85	0.28	6.93	4495
0.24	1.38	0.74	0.98	3.34	4.06	0.93	7.50	6.57	9.74	9.74	4646
0.05	1.78	0.30	0.54	2.67	3.25	0.75	9.05	8.30	3.73	3.73	4517
0.17	1.47	0.29	0.75	2.68	3.26	1.23	9.35	8.12	4.28	4.28	4509
0.01	2.11	0.37	0.67	3.16	3.84	1.15	9.18	8.03	3.96	3.96	4508
0.11	2.69	0.28	0.42	3.50	4.26	0.90	7.95	7.05	7.50	7.50	4510
0.10	3.55	0.37	0.64	4.66	5.67	0.80	8.23	7.43	6.95	6.95	3919
0.13	3.35	0.57	0.30	4.35	5.29	0.93	9.75	8.82	5.50	5.50	4511
1.89	0.65	0.96	0.58	4.08	4.96	1.33	9.50	8.17	6.94	6.94	4513
0.68	2.02	0.00	0.68	3.38	4.11	0.65	9.28	8.63	5.12	5.12	4049
0.94	1.55	1.01	1.05	4.55	5.53	1.53	10.15	8.62	0.45	7.78	4050
1.06	1.42	0.56	0.21	3.25	3.95	1.13	9.93	8.80	4.13	4.13	3998
1.30	1.82	0.59	0.24	3.95	4.80	0.98	9.43	8.45	6.58	6.58	4054
1.43	5.01	0.56	0.30	7.30	8.88	0.48	4.15	3.67	8.24	8.24	4544
0.15	1.92	0.77	0.33	3.17	3.85	1.25	11.48	10.23	4.28	4.28	4119
0.59	0.47	0.64	0.20	1.90	2.31	0.60	8.87	8.27	4.13	4.13	4051
0.22	0.15	0.62	1.77	2.76	3.36	7.55	13.25	5.70	6.18	6.18	3999

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand,	Grade.	Place of Sampling.
<i>Sampled by Station:</i> The Rogers & Hubbard Co., Portland, Conn.—Concluded.			
4000	Hubbard's "Bone Base" Oats and Top Dressing	10-3-8	Highwood
4003	Hubbard's "Bone Base" Soluble Corn and General Crops Manure	3-8-6	Branford
4055	Hubbard's "Bone Base" Soluble Potato Manure	6-8-5	Branford
4515	Hubbard's "Bone Base" Soluble Tobacco Manure	6-8-10	Glastonbury
4518	Rogers & Hubbard's Climax Tobacco Brand	5-4-5	Granby
4056	Rogers & Hubbard's Corn and Grain Fertilizer	1-10-3	New Britain
4545	Rogers & Hubbard's High Potash Fertilizer..	3-8-10	Torrington
4542	Rogers & Hubbard's Potato Fertilizer	2-10-4	Willimantic
4514	Rogers & Hubbard's Tobacco Grower, Vegetable Formula	6-4-4	Glastonbury
F. S. Royster Guano Co., Baltimore, Md.			
4538	Royster's Gem Guano	2-12-4	Watertown
4540	Royster's Quality Trucker	4-8-7	Plainville
4546	Royster's Rational Guano	1-9-4	New Canaan
4543	Royster's Spearhead Guano	3-8-4	Thompsonville
4537	Royster's Top Dresser	7-6-5	Waterbury
4541	Royster's Truckers' Delight	4-8-4	Plainville
4539	Royster's 5% Truck Guano	5-8-7	Trumbull
4547	Royster's Valley Tobacco Formula	5-4-5	Simsbury
M. L. Shoemaker & Co., Philadelphia, Pa.			
4695	5-8-7 Potato Special	5-8-7	New Milford
4570	Swift-Sure Crop Grower	4-8-4	Glastonbury
4580	Shoemaker's "Swift-Sure" Special Tobacco Formula	4-8-5	New Milford
4569	Shoemaker's "Swift-Sure" Tobacco and General Use	3-10-3	Glastonbury
Springfield Rendering Co., Springfield, Mass.			
4571	Springfield Animal Brand 3-8-4	3-8-4	Stafford Springs ...
4576	Springfield Market Garden Grower and Top Dresser 5-8-7	5-8-7	Hazardville
4572	Springfield Special Potato, Onion and Vegetable 4-8-4	4-8-4	Stafford Springs ...

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
7.58	0.03	0.45	0.30	8.36	10.16	3.38	9.15	5.77	5.69	8.08	4000
0.24	1.29	0.67	0.50	2.70	3.28	2.23	10.33	8.10	6.31	6.31	4003
0.97	1.95	1.26	0.82	5.00	6.08	1.98	10.15	8.17	0.80	4.83	4055
0.93	1.86	1.37	0.74	4.90	5.96	1.55	10.08	8.53	0.74	10.41	4515
1.11	0.14	0.05	2.82	4.12	5.01	0.40	5.60	5.20	0.69	5.54	4518
0.07	0.19	0.41	0.25	0.92	1.12	0.98	11.33	10.35	3.12	3.12	4056
0.14	1.29	0.69	0.32	2.44	2.97	0.85	8.80	7.95	10.72	10.72	4545
0.13	0.66	0.79	0.37	1.95	2.37	1.05	11.28	10.23	4.38	4.38	4542
0.73	0.11	0.36	3.79	4.99	6.07	0.75	4.54	3.79	0.43	4.32	4514
0.04	0.91	0.10	0.69	1.74	2.11	1.12	12.85	11.73	4.31	4.31	4538
0.00	2.08	0.16	0.97	3.21	3.90	1.10	9.58	8.48	6.38	6.38	4540
0.05	0.43	0.00	0.38	0.86	1.05	0.75	9.80	9.05	4.14	4.14	4546
0.13	1.44	0.04	0.82	2.43	2.95	1.03	9.20	8.17	4.11	4.11	4543
0.58	2.74	0.62	1.58	5.52	6.71	0.73	7.18	6.45	5.02	5.02	4537
0.01	1.99	0.19	1.03	3.22	3.91	1.31	8.90	7.59	4.00	4.00	4541
0.03	1.02	0.13	0.63	1.81	2.20	1.05	9.53	8.48	6.56	6.56	4539
0.29	0.73	0.16	2.34	3.52	4.28	0.31	4.20	3.89	0.40	5.88	4547
0.46	1.53	0.69	1.10	3.87	4.71	1.58	9.80	8.22	8.63	8.63	4695
0.44	1.50	0.48	0.63	3.05	3.71	0.98	9.85	8.87	5.11	5.11	4570
0.48	1.34	0.19	1.36	3.37	4.10	1.28	9.29	8.01	0.52	5.85	4580
0.42	1.04	0.34	1.00	2.80	3.40	1.35	11.16	9.81	3.49	3.49	4569
0.09	1.43	0.52	0.54	2.58	3.14	0.68	8.97	8.29	4.00	4.00	4571
0.35	2.10	0.85	0.74	4.04	4.91	0.88	9.43	8.55	6.62	6.62	4576
0.41	1.71	0.70	0.50	3.32	4.04	0.70	9.08	8.38	3.86	3.86	4572

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
I. P. Thomas & Son, Philadelphia, Pa.			
4015	7% Guano	7-6-5	Highwood
4023	Economy Fertilizer	3-12-3	Plainville
3853	High Grade Potato Manure 4-8-10	4-8-10	North Haven
4017	Long Island Special	4-8-7	Highwood
4026	I. P. Thomas 5-8-7	5-8-7	Milford
3852	Thomas Fish and Potash	5-8-5	North Haven
4025	Thomas Fish and Potash	5-8-5	Milford
4577	Thomas Tobacco Grower 5-4-5 (Sulphate of Potash)	5-4-5	Simsbury
3854	Tip-Top Superphosphate	3-10-6	North Haven
4016	Tip-Top Superphosphate	3-10-6	Highwood
4020	Truckers' High Grade	4-8-4	Ansonia
4019	Victor Potash Fertilizer 2-8-5	2-8-5	Ansonia
Triton Oil and Fertilizer Co., New York.			
4652	Triton 4-8-4 Fertilizer	4-8-4	New London
4697	Triton 4-8-7	4-8-7	New London
U. S. Fertilizer Chemical Co., New York.			
4579	Volco Ideal	2.4-5-8	Whitneyville
United States Guano Co., Baltimore, Md.			
4638	Standard United States 3-9-2	3-9-2	Torrington
4633	Standard United States 5-4-5	5-4-5	New Britain
4018	Standard United States 5-8-5	5-8-5	North Haven
4022	Standard United States Evergreen Fish Guano	4-8-4	Guilford
4021	Standard United States Fish, Bone and Potash	5-8-7	Guilford
4052	Standard United States Mammoth Potato Grower	2-8-10	North Haven
4637	Standard United States Old Fertility	2-8-3	Torrington
4053	Standard United States Royal Potato Grower	4-8-7	North Haven
4654	Standard United States Royal Potato Grower	4-8-7	Torrington
Virginia-Carolina Chemical Co., New York.			
4628	V-C Aroostook Potato Grower	5-8-7	North Haven
4629	V-C Double Owl Brand	4-8-7	North Haven
4632	V-C Rescue Brand	3-8-4	North Haven
4631	V-C Super-Thirty	6-18-6	North Haven
The Wilcox Fertilizer Co., Mystic, Conn.			
4060	Wilcox 5-8-7 Fertilizer	5-8-7	Willimantic
4291	Wilcox 5-10-5 Fertilizer	5-10-5	Woodstock

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—Continued.

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
1.23	3.82	0.00	0.63	5.68	6.91	1.10	7.80	6.70	5.39	5.39	4015
0.30	1.22	0.43	0.70	2.65	3.22	3.27	13.78	10.51	3.10	3.55	4023
0.89	1.52	0.22	0.65	3.28	3.99	2.28	10.33	8.05	9.45	9.45	3853
0.72	1.58	0.40	0.65	3.35	4.07	2.28	10.30	8.02	7.04	7.04	4017
0.30	2.28	0.87	0.90	4.35	5.29	2.17	9.89	7.72	6.66	7.05	4026
0.81	1.97		1.05	3.83	4.66	2.35	10.55	8.20	4.70	4.70	3852
0.80	2.20	0.38	0.81	4.19	5.09	2.63	10.20	7.57	5.02	5.02	4025
0.79	0.96	0.30	2.05	4.10	4.98	1.50	9.03	7.53	0.64	5.65	4577
0.50	1.05	0.21	0.76	2.52	3.06	2.75	12.60	9.85	6.18	6.18	3854
0.44	1.18	0.12	0.80	2.54	3.09	3.03	12.79	9.76	6.20	6.20	4016
0.80	1.55	0.26	0.65	3.26	3.96	2.15	10.38	8.23	3.93	3.93	4020
0.45	0.75	0.03	0.62	1.85	2.25	1.80	9.93	8.13	4.90	4.90	4019
0.44	1.24	0.69	0.93	3.30	4.01	1.00	9.23	8.23	4.88	4.88	4652
0.61	1.18	0.56	0.89	3.24	3.94	1.13	8.58	7.45	7.05	7.05	4697
0.09	1.77	0.03	0.01	1.90	2.31	0.40	5.17	4.77	0.00	4.94	4579
0.04	1.28	0.21	0.92	2.45	2.98	1.03	9.29	8.26	3.09	3.09	4638
0.04	0.20	0.19	3.29	3.72	4.52	0.38	5.65	5.27	0.00	6.12	4633
0.34	2.24	0.41	1.29	4.28	5.20	1.23	9.33	8.10	4.95	4.95	4018
0.12	2.28	0.29	0.61	3.30	4.01	0.70	8.95	8.25	4.52	4.52	4022
0.07	3.62	0.22	0.46	4.37	5.31	0.50	8.73	8.23	6.64	6.64	4021
0.14	1.30	0.07	0.47	1.98	2.41	0.63	8.85	8.22	9.86	9.86	4052
0.20	1.28	0.24	2.04	3.76	4.57	1.30	8.92	7.62	4.55	4.55	4637
0.22	3.38	0.08	0.80	4.48	5.45	0.72	8.78	8.06	5.86	5.86	4053
0.22	2.56	0.15	0.62	3.55	4.32	1.00	9.28	8.28	7.19	7.19	4654
0.11	3.53	0.31	0.16	4.11	5.00	0.65	8.61	7.96	7.05	7.05	4628
0.00	2.62	0.53	0.20	3.35	4.07	0.68	9.10	8.42	6.96	6.96	4629
0.18	2.10	0.08	0.27	2.63	3.20	1.02	8.90	7.88	4.17	4.17	4632
0.11	3.94	0.52	0.08	4.65	5.65	0.63	18.69	18.06	6.35	6.35	4631
1.40	1.50	0.27	1.12	4.29	5.22	0.55	9.02	8.47	5.97	7.10	4060
1.38	1.52	0.41	1.03	4.34	5.28	0.88	11.38	10.50	0.58	5.13	4291

TABLE XII. ANALYSES OF MIXED FERTILIZERS

Station No.	Manufacturer and Brand.	Grade.	Place of Sampling.
<i>Sampled by Station:</i>			
The Wilcox Fertilizer Co., Mystic, Conn.			
<i>—Concluded.</i>			
4639	Wilcox 7-6-5 Top Dresser	7-6-5	Ellington
4059	Wilcox Corn Special	3-10-4	Willimantic
4290	Wilcox Corn Special	3-10-4	Woodstock
4634	Wilcox Fish and Potash (1924-25 Formula 4-8-4)	4-8-4	Mystic
4058	Wilcox Potato and Vegetable Phosphate ...	4-8-6	Willimantic
4293	Wilcox Potato and Vegetable Phosphate ...	4-8-6	Woodstock
4057	Wilcox Special 4-8-4 Fertilizer	4-8-4	Willimantic
Wilson-Martin Co., Philadelphia, Pa.			
4184	Bantle's Wrapper Brand 7-4-7	7-4-7	Glastonbury
S. D. Woodruff & Sons, Orange, Conn.			
3921	Woodruff's Home Mixed Fertilizer	4-8-6	Orange
Worcester Rendering Co., Auburn, Mass.			
4608	Prosperity Brand Complete Dressing	6-6-4	Putnam
4605	Prosperity Brand Corn and Grain Fertilizer ..	2-8-2	Groton
4604	Prosperity Brand Market Garden Fertilizer ..	5-8-7	Groton
4609	Prosperity Brand Potato and Vegetable Fer- tilizer	4-8-4	Moosup
<i>Sampled by Purchaser:</i>			
F. A. Bartlett Tree Expert Co., Stamford, Conn.			
3563	Bartlett's Green Tree Food	6-8-4	Greenwich
C. & R. Sales Co., Worcester, Mass.			
4773	C. & R. Lawn and Shrub Fertilizer 6-5-5 ...	6-5-5	Taftville
Davey Tree Expert Co., Kent, Ohio.			
3562	Davey Tree Food	7-8-3	Greenwich
U. S. Fertilizer Chemical Co., Inc., New York.			
3305	Volco Imperial Fertilizer	3-8-6	New York
3306	Volco Ideal Fertilizer	2-5-8	New York
3307	Volco Superior Fertilizer	3-5-7	New York

CONTAINING NITROGEN, PHOSPHORIC ACID AND POTASH—*Concluded.*

In nitrates.	Nitrogen.				Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
	In ammonia.	Organic water-soluble.	Organic water-insoluble.	Total.		Citrate-insoluble.	Total.	So-called "Available."	As muriate.	Total.	
%	%	%	%	%	%	%	%	%	%	%	
1.74	2.36	0.82	1.16	6.08	7.39	0.93	7.28	6.35	3.81	5.00	4639
1.26	0.08	0.62	0.92	2.88	3.50	0.68	10.75	10.07	4.26	4.26	4059
1.26	0.08	0.71	0.93	2.98	3.62	0.83	10.61	9.78	4.48	4.48	4290
1.60	0.40	0.62	0.78	3.40	4.13	0.61	8.65	8.04	2.83	4.10	4634
1.85	0.07	0.78	0.82	3.52	4.28	0.90	9.00	8.10	3.77	4.88	4058
1.83	0.08	0.73	0.88	3.52	4.28	0.93	9.00	8.07	4.07	4.93	4293
0.98	1.36	0.58	0.62	3.54	4.30	0.48	8.74	8.26	4.17	4.17	4057
1.39	0.16	1.08	4.13	6.76	8.22	1.80	7.20	5.40	0.85	8.49	4184
1.70	0.00	0.06	1.30	3.06	3.72	0.33	7.82	7.49	6.68	6.68	3921
0.78	1.77	1.23	1.12	4.90	5.96	1.15	7.43	6.28	3.95	3.95	4608
0.07	0.87	0.47	0.52	1.93	2.35	0.77	8.79	8.02	2.20	2.20	4605
0.35	2.63	0.56	0.51	4.05	4.92	0.54	8.69	8.15	6.90	6.90	4604
0.35	1.73	0.53	0.62	3.23	3.93	0.57	8.56	7.99	3.94	3.94	4609
0.16	4.82	1.17		6.15	7.48	2.28	9.59	7.31	2.39	2.39	3563
0.15	0.63	0.44	3.90	5.12	6.22	1.73	7.73	6.00	5.50	5.50	4773
0.13	3.32	3.79		7.24	8.80	0.69	9.29	8.60	3.50	3.50	3562
0.04	2.92	0.00		2.96	3.60	0.52	9.11	8.59	0.00	5.10	3305
0.00	1.84	0.02		1.86	2.26	0.38	6.12	5.74	0.00	5.88	3306
0.00	3.23	0.05	0.04	3.32	4.04	0.32	5.32	5.00	0.00	5.74	3307

SPECIAL MIXTURES AND HOME MIXTURES.

Sixty-four samples have been analyzed for purchasers. These represent, generally, fertilizers mixed to order according to special formulas.

Analyses are given in Table XV.

TABLE XV. ANALYSES OF SPECIAL MIXTURES AND HOME MIXTURES—Continued.

Station No.	Manufacturer.	Place of Sampling.	Total nitrogen.	Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
					Citrate-insoluble.	Total.	"So-called available."	As sulfate.	Total.	
			%	%	%	%	%	%	%	%
3834	<i>Sampled by Purchaser:</i> Formula A	American Sumatra Tobacco Co., Bloomfield	5.20	6.32	0.73	4.98	4.25	....	7.10	3834
3833	Formula B	American Sumatra Tobacco Co., Bloomfield	6.32	7.68	0.73	4.68	3.95	....	5.84	3833
3657	Formula C	American Sumatra Tobacco Co., Bloomfield	6.07	7.38	0.66	3.92	3.26	....	5.72	3657
3658	Formula D	American Sumatra Tobacco Co., Bloomfield	5.80	7.05	0.51	3.80	3.29	....	4.75	3658
4758	Formula CC	American Sumatra Tobacco Co., Bloomfield	6.12	7.44	0.48	4.70	4.22	0.11	6.48	4758
4141	Formula A.G.	American Sumatra Tobacco Co., Bloomfield	5.19	6.31	0.70	4.78	4.08	0.15	7.12	4141
4142	Formula B.G.	American Sumatra Tobacco Co., Bloomfield	5.25	6.38	0.83	4.80	3.97	....	7.28	4142
3832	Formula C.G.	American Sumatra Tobacco Co., Bloomfield	5.62	6.83	0.63	4.23	3.60	....	7.56	3832
4135	Formula C.G.	American Sumatra Tobacco Co., Bloomfield	5.96	7.25	0.63	4.15	3.52	....	7.94	4135
4136	Formula D.G.	American Sumatra Tobacco Co., Bloomfield	5.74	6.98	0.43	3.95	3.52	....	5.86	4136
4138	Formula E	American Sumatra Tobacco Co., Bloomfield	5.58	6.78	0.25	4.48	4.23	0.74	5.78	4138
4790	Formula E	American Sumatra Tobacco Co., Bloomfield	5.70	6.93	1.45	6.83	5.38	0.20	6.30	4790
4140	Formula F	American Sumatra Tobacco Co., Bloomfield	5.76	7.00	0.23	4.80	4.57	0.78	6.31	4140

TABLE XV. ANALYSES OF SPECIAL MIXTURES AND HOME MIXTURES—Continued.

Station No.	Manufacturer.	Place of Sampling.	Total nitrogen.	Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
					Citrate-insoluble.	Total.	"So-called" available."	As muriate.	Total.	
	<i>Sampled by Purchaser:</i>									
3831	Formula G	American Sumatra Tobacco Co., Bloomfield	6.44	7.83	0.65	4.45	3.80	....	6.68	3831
4137	Formula H	American Sumatra Tobacco Co., Bloomfield	6.02	7.32	0.73	6.25	5.52	0.49	5.75	4137
4139	Formula I	American Sumatra Tobacco Co., Bloomfield	6.51	7.91	0.83	5.03	4.20	0.48	6.27	4139
4143	Formula <i>Du Bons</i> I	American Sumatra Tobacco Co., Bloomfield	6.10	7.42	0.53	3.93	3.40	0.48	7.35	4143
4791	Formula P	American Sumatra Tobacco Co., Bloomfield	5.60	6.81	0.18	4.80	4.62	0.57	7.68	4791
4145	Fertilizer for Drill	American Sumatra Tobacco Co., Bloomfield	9.95	12.10	0.88	4.43	3.55	0.39	1.04	4145
4144	Tobacco Bed Fertilizer ..	American Sumatra Tobacco Co., Bloomfield	7.58	9.22	4.18	9.90	5.72	0.47	0.47	4144
3722	Mr. Hale's Mixture	American Sumatra Tobacco Co., Bloomfield	8.90	10.82	0.45	2.70	2.25	....	1.37	3722
4227	Welsh Farm Fertilizer ..	Allied Tobacco Co., Hartford ..	5.93	7.21	0.13	2.45	2.32	....	4.85	4227
4490	Apothecaries Hall Co., Waterbury	A. N. Shepard & Son, Hartford	5.50	6.69	....	5.50	....	....	8.24	4490
4491	Apothecaries Hall Co., Waterbury	A. N. Shepard & Son, Hartford	5.70	6.93	....	5.08	....	....	6.86	4491
2748	Berkshire Fertilizer Co., Bridgeport	E. N. Austin, Suffield	4.63	5.63	....	5.32	....	....	5.48	2748
4258	Berkshire Fertilizer Co., Bridgeport	Paul and Ed. Rostek, Melrose ..	6.40	7.78	0.58	7.95	7.37	....	9.52	4258

TABLE XV. ANALYSES OF SPECIAL MIXTURES AND HOME MIXTURES—Continued.

Station No.	Manufacturer.	Place of Sampling.	Total nitrogen.	Ammonia equivalent to total nitrogen.	Phosphoric Acid.			Potash.		Station No.
					Citrate-insoluble.	Total.	So-called "available."	As sulfate.	Total.	
			%	%	%	%	%	%	%	%
4304	<i>Sampled by Purchaser:</i> Berkshire Fertilizer Co., Bridgeport	Tobacco Station, Windsor	4.58	5.57	0.30	5.20	4.90	....	5.99	4304
4302	The Mapes Formula & Peruvian Guano Co., New York	Tobacco Station, Windsor	4.52	5.50	0.90	6.08	5.18	0.66	5.73	4302
4660	Olds & Whipple, Inc., Hartford	L. B. Hass & Co., Hartford	5.98	7.27	0.48	9.18	8.70	0.33	11.10	4660
4661	Olds & Whipple, Inc., Hartford	L. B. Hass & Co., Hartford	7.38	8.97	0.45	7.35	6.90	0.70	7.10	4661
4452	Olds & Whipple, Inc., Hartford	Stephen Potwine, Warehouse Point	5.14	6.25	0.33	4.80	4.47	....	5.93	4452
4047	Olds & Whipple, Inc., Hartford	Harry E. Wells, Warehouse Point	4.08	4.96	0.08	8.68	8.60	1.10	14.38	4047
3930	The Rogers & Hubbard Co., Portland	Allied Tobacco Co., Hartford	6.08	7.39	0.58	4.60	4.02	....	4.16	3930
3931	The Rogers & Hubbard Co., Portland	Allied Tobacco Co., Hartford	6.41	7.79	0.45	4.50	4.05	....	4.26	3931
4128	The Rogers & Hubbard Co., Portland	Allied Tobacco Co., Hartford	6.08	7.39	....	4.75	....	....	4.14	4128
4129	The Rogers & Hubbard Co., Portland	Allied Tobacco Co., Hartford	5.79	7.04	....	4.85	....	....	4.20	4129
4130	The Rogers & Hubbard Co., Portland	Allied Tobacco Co., Hartford	6.00	7.29	0.48	4.88	4.40	....	4.29	4130
4172	The Rogers & Hubbard Co., Portland	Allied Tobacco Co., Hartford	5.09	6.19	0.53	6.65	6.12	....	6.00	4172

TABLE XV. ANALYSES OF SPECIAL MIXTURES AND HOME MIXTURES—Concluded.

Station No.	Manufacturer.	Place of Sampling.	Total nitrogen.	Ammonia equivalent to total nitrogen.	Phosphoric Acid.		Potash.		Station No.	
					Citrate-insoluble.	Total.	As muriate.	Total.		
			%	%	%	%	%	%	%	
4226	<i>Sampled by Purchaser:</i> The Rogers & Hubbard Co., Portland	Allied Tobacco Co., Hartford ..	5.02	6.10	0.63	6.60	5.97	....	6.46	4226
4225	The Rogers & Hubbard Co., Portland (In Fire)	Allied Tobacco Co., Hartford ..	0.04	0.05	6.85	15.70	8.85	....	13.68	4225
4275	The Rogers & Hubbard Co., Portland	Allied Tobacco Co., Hartford ..	5.15	6.26	0.70	6.53	5.83	....	6.09	4275
4276	The Rogers & Hubbard Co., Portland	Allied Tobacco Co., Hartford ..	5.13	6.24	0.38	7.13	6.75	0.15	6.49	4276
4303	The Rogers & Hubbard Co., Portland	Tobacco Station, Windsor	4.99	6.07	0.78	5.40	4.62	....	3.89	4303
4305	The Rogers & Hubbard Co., Portland	Tobacco Station, Windsor	5.00	6.08	0.65	5.18	4.53	0.35	3.99	4305
4884	Woodruff's Fertilizer	Yale Athletic Association	2.03	2.47	0.70	7.30	6.60	....	0.45	4884
4885	Stump & Walters Fertilizer	Yale Athletic Association	4.78	5.81	0.15	12.90	12.75	....	0.29	4885
2682	.....	E. N. Austin, Suffield	4.49	5.46	1.38	5.10	3.72	1.34	6.21	2682
4764	.....	E. N. Austin, Suffield	5.79	7.04	0.60	3.63	3.03	2.27	11.59	4764
3796	.....	Allan J. Bartlett, Greenwich ...	5.46	6.64	3.83	11.65	7.82	....	3.50	3796
3928	.....	Daigle Bros., Marion	4.15	5.05	0.53	9.73	9.20	....	7.46	3928
3773	.....	Frank Flannigan, Cheshire	3.67	4.46	....	8.83	....	....	5.78	3773

VII. MISCELLANEOUS FERTILIZERS, AMENDMENTS AND WASTE PRODUCTS.

WOOD ASHES.

Twenty samples of wood ashes were analyzed. With the exception of two samples, 2648 and 2744, which were very inferior, probably leached ashes, all were of good quality. Excepting the two samples mentioned, water-soluble potash ranged from 4.53 per cent to 7.92 per cent and averaged 6.23 per cent. Phosphoric acid ranged from 1.33 per cent to 2.78 per cent. Wood ashes will usually contain 30 per cent or more of lime. The prevailing price has been \$5.00 per unit of potash. Canada is practically the only source of the commercial wood ashes used in this State.

Analyses are given in Table XVI.

TABLE XVI. ANALYSES OF WOOD ASHES.

Station No.	Manufacturer or Dealer.	Submitted or Purchased by.	Phosphoric acid.	Water-soluble potash.
	<i>Sampled by Purchaser:</i>		%	%
3510	John Joynt, Lucknow, Canada	The Allied Tobacco Co., Hartford	.....	5.21
2648	.....	L. M. Chapman, Danbury	1.50	1.14
2744	.....	L. M. Chapman, Danbury	1.33	0.92
4080	John Joynt, Lucknow, Canada	A. A. Clark, Windsor	1.90	4.94
2620	John Joynt, Lucknow, Canada	John M. Clark, Simsbury	2.56	5.21
3843	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford	2.23	5.41
3960	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford	2.48	7.09
4132	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford	2.78	6.92
4133	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford	2.05	6.57
4134	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford	2.10	6.30
4254	John Joynt, Lucknow, Canada	Hatheway & Steane, Inc., Hartford	1.88	6.25
4255	Olds & Whipple, Inc., Hartford	Max Lavitt, Ellington	2.20	6.90
4082	John Joynt, Lucknow, Canada	Joseph Rostek, Jr., Melrose	1.63	6.20
3668	.....	A. N. Shepard & Son, Hartford ..	2.26	6.33
3829	John Joynt, Lucknow, Canada	Steane, Hartman & Co., Hartford	1.88	6.32
3830	John Joynt, Lucknow, Canada	Steane, Hartman & Co., Hartford	2.13	6.06
4210	John Joynt, Lucknow, Canada	Steane, Hartman & Co., Hartford	2.05	7.68
3416	John Joynt, Lucknow, Canada	J. B. Stewart, Windsor .....	.....	4.53
4075	John Joynt, Lucknow, Canada	L. Wetstone & Sons, Hartford ...	1.70	5.34
4076	John Joynt, Lucknow, Canada	L. Wetstone & Sons, Hartford ...	1.78	7.92

SHEEP MANURE, ETC.

Twelve samples of sheep and other farm manures were analyzed. There were no considerable deficiencies except in 3876 which contains about $\frac{3}{4}$ of one per cent less than the guaranteed amount of potash.

These materials will contain, on an average, about 130 lbs. of plant food per ton, but they have additional agricultural value as conditioners and as suitable culture media for the growth of soil bacteria.

Analyses are given in Table XVII.

LIME.

Sixteen samples of liming materials have been analyzed during the year for purchasers and others interested. Results are given in Table XVIII.

The following discussion on the use of lime for soil amendment purposes should be of interest and is contributed by the Department of Soil Research.

THE USE OF LIME IN ADJUSTING THE SOIL REACTION.

M. F. MORGAN, *Soil Investigator.*

Ever since the state was first settled a few farmers have given some attention to the problem of "sour soils," and some form of lime has occasionally been applied to certain fields; but the problem of soil acidity was not keenly felt as long as good yields of the standard crops, such as timothy, corn, tobacco and potatoes, could be obtained without the use of lime. Excellent growth of such crops have been produced with heavy applications of manure or commercial fertilizers alone.

In recent years there has been an awakened interest in the soil reaction and its proper adjustment. Alfalfa and other legumes have begun to receive more attention. Vegetable crops are becoming increasingly important. The nature of certain plant diseases, such as potato scab and the black root rot of tobacco, is now more accurately known. Under such conditions it becomes imperative that the farmer should have definite knowledge of the reaction of his soil and how it may best be corrected to meet the demands of the particular crops in which he is most interested.

The older ideas of determining whether a field is "sour" from its general appearance are mostly very poor "guess work." Pastures which produce practically nothing but moss, cinquefoil, everlasting, broomsedge or poverty grass are supposed to be too acid to grow anything else. When one fails to get a stand of

TABLE XVII. ANALYSES OF

Station No.	Manufacturer or Brand.	Place of Sampling.
	<i>Sampled by Station:</i>	
3874	Pulverized. American Agricultural Chemical Co., New York City ...	Bristol Grain & Supply Co., Bristol
4083	So. American. American Agricultural Chemical Co., New York City	American Agricultural Chemical Co., New Haven Sales Dept.
3879	Armour Fertilizer Works, New York	Charles Templeton, Waterbury Factory
3876	Berkshire Fertilizer Co., Bridgeport	Southington Lumber & Feed Co., Southington
3913	Groz-It. Pacific Manure & Fertilizer Co., San Francisco, Cal.	Lightbourn & Pond, New Haven
3911	Premier Poultry Manure. Premier Poultry Manure Co., Chicago, Ill.	Lightbourn & Pond, New Haven
3912	Premier Sheep Manure. Premier Poultry Manure Co., Chicago, Ill.	Lightbourn & Pond, New Haven
3916	Wizard Brand Manure. Pulverized Manure Co., Chicago, Ill.	S. P. Strople, New Britain ..
3917	Wizard Brand Sheep Manure. Pulverized Manure Co., Chicago, Ill.	S. P. Strople, New Britain ..
3895	"Sheep's Head." Natural Guano Co., Aurora, Ill.	F. S. Blish Hardware Co., So. Manchester
	<i>Sampled by Purchaser:</i>	
2700	.....	S. D. Woodruff & Sons, N. Y.
2735	American Agricultural Chemical Co., New York City	S. D. Woodruff & Sons, N. Y.

SHEEP MANURE, ETC.

Total nitrogen.	Ammonia equivalent to total nitrogen.		Phosphoric acid.				Potash.		Station No.
	Found.	Guaranteed.	Available.		Total.		Found.	Guaranteed.	
			Found.	Guaranteed.	Found.	Guaranteed.			
%	%	%	%	%	%	%	%	%	
1.54	1.87	1.75	....	....	0.88	0.75	1.95	2.00	3874
1.29	1.57	1.50	....	....	0.95	1.00	2.74	2.50	4083
1.57	1.91	1.50	....	....	1.55	1.00	3.39	2.00	3879
1.76	2.14	2.18	1.10	1.00	1.33	....	1.26	2.00	3876
1.57	1.91	1.82	0.80	0.75	0.90	1.25	2.85	3.00	3913
5.68	6.91	6.00	2.53	2.50	2.58	2.75	1.25	1.30	3911
1.88	2.29	2.43	0.75	1.00	0.83	1.20	2.40	2.00	3912
2.11	2.57	2.10	1.25	1.00	1.45	....	1.99	1.00	3916
2.03	2.47	2.43	1.57	1.25	1.65	....	3.40	2.00	3917
2.50	3.04	2.73	1.85	1.00	2.10	1.25	2.41	2.00	3895
1.57	1.91	....	....	....	0.63	....	2.96	....	2700
1.92	2.33	1.50	....	....	1.24	1.00	3.42	2.50	2735

grass, and red sorrel appears in the mowing lots, then the soil is thought to be "sour." Probably these diagnoses are correct, but they are not necessarily so. Many wet fields in limestone regions "look sour," but actually contain an abundance of lime. A serious phosphorus deficiency can produce the characteristic symptoms of acidity as shown by the character of pasture vegetation, and several pasture fertilization trials in this state have shown that in limed plots without other treatment the type of growth is unchanged. Sorrel thrives luxuriantly on a soil which has been heavily limed, if for any reason there is not a complete stand of grass or clover. A large number of soil tests by the Soils Department of this Station have shown that practically every field in the state is acid to some degree, unless it has been limed recently. Except for a few small areas in the western part of the state the rocks from which our soils are derived contain no lime carbonate, and even in these areas the limestone is so local in occurrence as to influence the soil to a very slight extent. Our common rocks, when weathered under conditions of normal rainfall, normally produce acid soils. The degree of acidity will be determined by the exact nature of the rock from which the soil is derived, the climate, the leachiness of the soil, the amount of organic matter and colloidal material (very fine particles) which the soil contains, and the agricultural practice followed on the field. All farmed soils of humid regions tend to become more and more acid, due to the constant removal of basic material through leaching and crops taken from the field.

The true measure of the degree of soil acidity is the concentration of the acid-reacting matter technically known as "hydrogen-ions." To express this in a simple way, scientists have devised the "pH" scale. On this basis, a neutral soil, neither acid or alkaline, has a reaction of 7 pH. (The figure 7 has a definite mathematical significance as related to the actual concentration of hydrogen-ions.) Below 7 pH indicates acidity, above 7 indicates alkaline conditions. As applied to Connecticut soils, the scale operates as follows:

- Below 4 pH, extremely acid soils of rare occurrence.
- 4-5 pH—Very acid soils.
- 5-6 pH—Moderately acid soils, growing good crops of corn, timothy, tobacco, potatoes, etc., when other conditions of fertility are favorable, but too acid for alfalfa, beets, cabbage, onions, cauliflower, and other "acid-sensitive" crops.
- 6-7 pH—Slightly acid soils, favorable for growth of most crops.
- 7 pH—Neutral soils.
- 7-8 pH—Slightly alkaline soils, rare in this state unless heavily limed at a recent date.

Fortunately it is now possible by rapid field or laboratory tests to determine quite accurately the "pH" of a soil, so that the exact conditions of soil acidity may be known, and after taking into proper consideration the amount of organic matter, drainage conditions and fertilizer treatment, one can estimate fairly closely the need for lime of a particular crop on that soil.

It is not always necessary or desirable to lime a soil which has been found to be acid. Certain crops, such as strawberries, are not affected by soil acidity, while corn, potatoes and timothy do well on moderately acid soils (5-6 pH). Recent investigations have shown that the black root rot of tobacco is most prevalent on soils which are neutral or only slightly acid (5.9 to 7 pH). Potato scab is prevented by a moderate degree of acidity (below 5.6 pH). Lawn experiments at the Rhode Island Station have demonstrated that "weedless" lawns of the finest fine-leaved grasses are best secured on fairly acid soils. Soil acidity may be either injurious, of no consequence, or beneficial, depending upon what we wish to grow.

If it is necessary to make a soil less acid or correct the acidity entirely in order to produce certain crops, some form of lime-bearing material must be incorporated with the soil. In common practice, three liming materials are used: burnt lime ("stone lime" or "quick lime"), hydrated lime ("slaked lime") and ground limestone (lime carbonate).

The relationship between the chemically pure forms of the above materials is as follows: 100 lbs. of ground limestone = 74 lbs. of hydrated lime = 56 lbs. burnt lime. None of these materials are pure, and usually there is more or less of the corresponding forms of magnesium, similar in value to lime.

Commercial liming materials are judged on the basis of actual lime and magnesia (oxides of calcium and magnesium), which they contain, and upon their degree of fineness. The various products are quite variable in composition, but in general they will contain mixed oxides about as follows:

Material.	Oxide of Calcium and Magnesium. %
Limestone	45-55
Oyster shells	40-50
Burned lime	85-90
Hydrated lime, high grade	65-75
Hydrated lime, low grade, containing over 10% carbonates	55-60
Lime ashes	50-60

The rapidity of action of lime in the soil will depend upon its degree of fineness. It is necessary that the material shall be ground sufficiently fine to produce relatively quick effect without prohibitive cost of grinding. For average conditions, a medium

TABLE XVIII. ANALYSES OF

Station No.	Manufacturer or Brand.	Sampled by.
4427	Coe Lime Works, Northford. Ground Limestone	Sidney Edwards, Middletown
4099	Conn. Agricultural Lime Co., New Haven. Hydrated Lyme No. 1	E. Mehmel & F. Sarvi, Plantsville
4100	Hydrated Lime No. 2	E. Mehmel & F. Sarvi, Plantsville
3807	Conn. Agstone Co., Danbury. Ground Limestone	Station agent from stock of L. B. Wooding, North Haven
4117	Ground Limestone	Station agent from stock of Geo. S. Jennings, Southport
4118	Ground Limestone	Station agent from Factory
4273	Ground Limestone	Comstock & Ferry, Wethersfield
4274	Ground Limestone	S. Ellsworth Hall, East Wallingford
4666	Ground Limestone	Station agent from stock of H. B. Brownson, Shelton
4440	Farnam Cheshire Lime Co., Farnams, Mass. Agricultural Lime	Amos D. Bridge's Sons, Hazardville
2797	Grangers Mfg. Co., West Stockbridge, Mass. Ground Limestone	Chas. R. Treat, Orange
4101	Ground Limestone	Chas. R. Treat, Orange
4277	Ground Limestone	Station agent from stock of Edward Myers, Bethany
4200	International Agricultural Corp., Boston, Mass. Hydrated Lime	Benj. G. Southwick, Hartford
4455	Hydrated Lime	Station agent from stock of Frank Flannigan, West Cheshire
3669	Manufacturer Unknown. 10274	A. N. Shepard & Son, Hartford

LIMESTONE, ETC.

Chemical Analysis.						Mechanical Analysis.					
Lime (CaO).		Magnesia (MgO).		Total Oxides.	Insoluble in acid.	20 mesh.	40 mesh.	50 mesh.	80 mesh.	100 mesh.	Station No.
Found.	Guaranteed.	Found.	Guaranteed.								
%	%	%	%	%	%	%	%	%	%	%	
50.12	....	0.78	....	50.90	8.10	84.00	66.00	55.00	46.00	42.00	4427
49.02	....	32.17	....	81.19	3.06	88.00	65.50	48.00	32.00	29.00	4099
67.63	....	3.77	....	71.40	2.62	93.00	70.00	49.00	30.00	24.00	4100
44.10	45.00	4.61	3.00	48.71	....	99.50	91.00	80.00	68.50	64.00	3807
43.04	45.00	5.50	3.00	48.54	11.70	99.50	91.00	83.50	74.00	69.00	4117
44.92	45.00	4.54	3.00	49.46	10.50	99.50	92.00	82.00	72.00	66.00	4118
44.76	....	5.91	....	50.67	10.14	99.50	92.00	83.00	71.00	66.50	4273
43.75	....	5.75	....	49.50	10.56	99.50	92.00	83.00	71.00	66.00	4274
45.32	45.00	3.86	3.00	49.18	11.39	99.00	91.00	81.00	70.50	67.50	4666
68.65	....	1.06	....	69.71	0.71	88.50	54.00	30.00	14.00	11.00	4440
51.50	....	1.02	....	52.52	....	99.80	99.50	97.50	84.00	77.00	2797
53.34	....	0.77	....	54.11	3.93	100.00	100.00	98.00	89.50	84.00	4101
42.14	35.00	6.92	1.00	49.06	10.80	96.50	83.00	70.00	55.00	50.00	4277
62.45	....	7.23	....	69.68	2.07	98.00	90.00	76.00	60.00	55.00	4200
48.88	....	33.10	....	81.98	0.96	84.00	55.50	42.50	31.50	29.00	4455
48.36	....	32.44	....	80.80	....	100.00	100.00	99.50	95.00	93.00	3669

ground lime or limestone seems to be the most desirable commercial product. A reliable authority states that pulverized limestone, all of which will pass a 10 mesh sieve, 70% of which will pass a 50 mesh sieve, and 50% of which will pass a 100 mesh sieve, should give excellent results, and yet be cheap enough to make its use worth while. In Ohio the standard required by law for agricultural ground limestone is that 95% of the material shall pass a 10 mesh screen, 50% shall pass a 50 mesh screen, and 30% shall pass a 100 mesh screen. If immediate results are desired in the use of a moderate amount of lime for a special crop of high money value, extreme fineness may be desirable, regardless of the greatly increased cost.

The exact amount of lime to be applied to properly adjust the soil reaction is not easily determined, even in the laboratory, and only general recommendations can be made. The following are safe quantities which should give good results on average Connecticut soils:

TONS LIMESTONE PER ACRES.

Crop.	Extreme Acidity.	Strong Acidity.	Moderate Acidity.	Slight Acidity.
Alfalfa	4-6	3-4	2-3	½-2
Asparagus	4-6	3-4	2-3	½-2
Barley	3-4	2-3	½-2	0
Beets	4-6	3-4	2-3	½-2
Cabbage	4-6	3-4	2-3	½-2
Carrots	3-4	2-3	½-2	0
Clover, red	3-4	2-3	½-2	0
Clover, alsike	2-3	½-2	0	0
Corn	2-3	½-2	0	0
Lettuce	4-6	3-4	2-3	½-2
Oats	2-3	½-2	0	0
Onions	4-6	3-4	2-3	½-2
Potatoes	1-2	½-1	0	0
Radishes	3-4	2-3	½-2	0
Red top	1-2	½-1	0	0
Rye	1-2	½-1	0	0
Spinach	4-6	3-4	2-3	½-2
Strawberries	0	0	0	0
Timothy	2-3	½-2	0	0
Tobacco	2-3	½-2	0	0

(Use other forms of lime in equivalent amounts.)

MISCELLANEOUS.

In this group are included thirteen samples of check fertilizers in the coöperative program of the Royster Guano Co., and thirty samples of check cottonseed meal in a similar program of the American Oil Chemists' Society.

Eighteen other samples of a miscellaneous character have been analyzed, making the total for this group sixty-one.

3996. *Four Seasons Fertilizer.* This product is apparently intended for greenhouse use although it is recommended for lawns, golf greens, etc. It consists largely or entirely of waste cacao material, chiefly cacao shells. It contains 2.3 per cent of nitrogen, all of which is organic and largely (1.9 per cent) insoluble in water; about 1 per cent of phosphoric acid; and 2.2 per cent of water-soluble potash. One ton of this material, therefore, contains about 110 lbs. of plant food, 46 lbs. of which is nitrogen, largely in insoluble and inactive forms. The use of this material as a conditioner or amendment might be justified if it could be obtained at reasonable cost.

2618, 2619. *Guano* from Hobbies Keys, off the Nicaragua coast. Submitted by C. L. Beach of Storrs.

Analyses:

	2618 Light.	2619 Dark.
Nitrogen	1.06%	2.40%
Available phosphoric acid	7.93	5.37
Total phosphoric acid	27.28	14.47
Total potash	0.07	0.12

At average commercial valuations of nitrogen and phosphoric acid the plant food in these materials is worth about \$25.00 per ton. They are rather inferior as guanos, however, since they are poor in nitrogen, the element for which such materials are chiefly valuable. Guanos of fair quality will contain from 5 to 8 per cent of nitrogen while good guanos will contain 10 per cent, or over, of this constituent.

2636. *Rock Bone*, submitted by C. R. Burr and Co., Inc., Manchester.

This was rather coarse bone containing 1.53 per cent of nitrogen and 30.80 per cent of phosphoric acid.

3349. *Horn Shavings.* Griffin Button Co., Shelton. This waste material contains 14.59 per cent of nitrogen and a trace of phosphoric acid. The nitrogen is practically all insoluble but activity values by laboratory methods were high, 80 to 90 per cent. Some authorities regard horn as inferior because of its slow decomposition; others regard it as an effective fertilizer. On the basis of "activity" values for nitrogen by present methods it cannot be regarded as inferior.

3659. *Bone Meal* which had been used hardening steel. Submitted by E. W. Aspelin, Bristol. The nitrogen of the bone had been burned away but the material contained 21.12 per cent of phosphoric acid. It could be used as a source of phosphorus for fertilizer purposes.

3907. *Wool Waste.* Submitted by the Somersville Mfg. Co., Somersville. Material of this sort may contain considerable and varying amounts of nitrogen and small amounts of potash, usually from 1 to 3 per cent. This sample contained 14.59 per cent of nitrogen. The nitrogen is slowly available, however, and in the fertilizer industry such material is treated with sulphuric acid which makes the nitrogen more active. After this treatment it is suitable for mixing with other base goods in commercial fertilizer mixtures.

Wool waste has been used directly on the farm, spreading it broadcast and plowing under in preparation for seeding down. It can also be utilized in compost heaps mixed with wet stable manure.

3801, 3929. *Sewage Sludge.* **3802.** *Incinerator ashes.* Submitted by F. C. Oefinger, Stamford.

Analyses of materials as received:

	3801	3929	3802
	%	%	%
Nitrogen	0.73	0.80	...
Phosphoric acid (total)	0.26	0.36	0.85
Potash (total)	0.07	0.07	0.27

Sample **3801**, as received, was about $\frac{2}{3}$ water, so that 3 tons would yield about 1 ton of air-dry material and contain about 60 pounds of plant food. Sample **3929** was about $\frac{1}{2}$ water, hence 2 tons would yield 1 ton of air-dry material and contain about 50 pounds of plant food.

In addition to the plant food contained in it such material has some value as a conditioner on light soils, but the cost of carting, drying, etc., is likely to exceed its agricultural worth.

The incinerator ashes are poor in fertilizer ingredients, the phosphoric acid and potash in them being worth less than a dollar per ton.

4185. *Tobacco Stems.* Tobacco By-Products and Chemical Corporation, Richmond, Va. Sampled by the station agent from stock of E. J. Bantle, Glastonbury.

Analysis:

Nitrogen in nitrates	0.29%
total	1.19
Phosphoric acid, total	0.60
Potash, total	4.78

3056. "*Black Tobacco*" and **3057** *Light Tobacco*. Submitted by Dr. P. J. Anderson, Tobacco Station, Windsor.

In the curing of tobacco "black" leaves sometimes occur which as compared with normal (light) leaves are of poor quality and of little commercial value.

Comparative analyses of "black" and light leaves are given in Table XIX.

The analyses were made partly because of the fact that some growers felt that the occurrence of black leaves was possibly due to the increased use of magnesia in their fertilizer materials. While the black leaves show about twice as much magnesia as the light leaves, there appears to be no special significance in this since old analyses show considerably larger amounts of this ingredient than was found in either of these samples.

2918. *Humus*. Submitted by H. S. Coe, Waterbury.
Analysis:

Water	19.38%
Ash (sand, etc.)	53.03
Organic and volatile	27.59
Nitrogen	1.46
Phosphoric acid	0.20
Potash soluble in water	0.73

This material would be useful as an absorbent but contains no considerable plant food other than about 1.5 per cent of nitrogen.

4765. *Apparently peat or muck*. Submitted by Geo. D. Shedd, Willimantic.

TABLE XIX. ANALYSES OF TOBACCO (LEAVES).¹

	No. 3056		No. 3057	
	Black Tobacco, As rec'd.	Dry basis.	Light Tobacco, As rec'd.	Dry basis.
Moisture	21.09	0.00	21.10	0.00
Total Ash	21.21	26.88	19.18	24.31
Nitric Nitrogen	0.66	0.84	0.62	0.79
Ammonic Nitrogen	0.62	0.79	0.72	0.91
Total Nitrogen	3.39	4.30	3.77	4.78
Sand	1.28	1.62	1.05	1.33
Soluble Silica (SiO ₂)	0.18	0.23	0.13	0.17
Ferric Oxide (Fe ₂ O ₃)	0.27	0.34	0.23	0.30
Aluminum Oxide (Al ₂ O ₃)	0.12	0.16	0.01	0.01
Mangano-Manganic Oxide (Mn ₂ O ₄)	0.12	0.16	0.16	0.20
Calcium Oxide (CaO)	4.23	5.36	3.68	4.66
Magnesium Oxide (MgO)	1.96	2.49	0.94	1.19
Sodium Oxide (Na ₂ O)	0.07	0.10	0.10	0.13
Potassium Oxide (K ₂ O)	5.61	7.11	6.05	7.69
Sulphur (S)	1.01	1.28	1.07	1.36
Phosphorus Pentoxide (P ₂ O ₅)	0.45	0.56	0.60	0.76
Chlorine	0.24	0.31	0.18	0.23

¹ Analyses by H. J. Fisher.

TABLE XIX. ANALYSES OF TOBACCO (LEAVES)—*Concluded*.
Ash constituents in percentages of the total (crude) ash.

	No. 3056	No. 3057
Sand	6.02	5.45
Silica (SiO ₂)	0.86	0.70
Ferric Oxide (Fe ₂ O ₃)	1.26	1.23
Aluminum Oxide (Al ₂ O ₃)	0.60	0.04
Manganese Oxide (Mn ₂ O ₄)	0.60	0.82
Calcium Oxide (CaO)	19.94	19.11
Magnesium Oxide (MgO)	9.26	4.88
Sodium Oxide (Na ₂ O)	0.37	0.53
Potassium Oxide (K ₂ O)	26.45	31.53
Sulphur (S)	4.76	5.58
Phosphorus Pentoxide (P ₂ O ₅)	2.08	3.12
Chlorine (Cl)	1.15	0.94
Undetermined, chiefly Co ₂	26.65 ¹	26.07 ¹

¹ Co₂ may be 20-25%.

The sample contained about 0.8 per cent of nitrogen and only traces of phosphoric acid and potash. It is worthless as a fertilizer so far as plant food is concerned.

2750. *Fertilizer.* Submitted by Walter T. Clark, County Agent, Norwich, to be tested for borax. No borax was found.

1752 and **4936** were two samples of soil thought to contain valuable metals. They were both mica.

THE EFFECT OF CHLORIDES UPON THE BURNING QUALITY OF TOBACCO.¹

E. H. JENKINS, *Director Emeritus.*

Regarding the use of muriates (chlorides) as tobacco fertilizers the opinion and practice of New England tobacco growers developed probably in large measure from the account of the experiments of Nessler and others in Germany which was set forth by Prof. S. W. Johnson, then chemist of the Connecticut Board of Agriculture, in the report of the Board, 1872, p. 384. He concluded:

"It is a result of observation in our state as well as in Europe that the use of salt (muriates) increases the crop, but with detriment to its burning quality.

"We must in general avoid employing fertilizers which contain salt or other chlorine compounds in raising wrapping or smoking tobacco."

At the same time Johnson notes that chlorine is not the only cause of poor burn.

"It is most probable that burning quality is the result of the coincidence of several conditions.

¹ The renewed interest in the question of chlorides in fertilizer materials, and the proposed limitations for chlorine in raw materials and in mixed goods intended for use in tobacco culture, make this brief review by Dr. Jenkins of particular interest. (E. M. B.)

"Abundance of organic potash in the leaf (that is potash combined with organic acids), abundance of cellulose (woody fiber), abundance of sulphates,¹ are evidently favorable to easy burning. On the other hand, sugar, gum (pectic acid) and albuminous matters are difficult of combustion. Mineral salts, which fuse at a burning temperature, chlorides and phosphates of potash and soda, hinder free burn."

Fermentation, which reduces the quantity of sugar and probably other ingredients, acts on the whole to improve burn. The results given in our Bulletin 180, however, prove that in no case was the fire-holding capacity of a poor burning sort made satisfactory by fermentation.

Garner observes that the compounds in the leaf which are of importance in producing a good burn are the potash salts of the organic acids such as malate and citrate, and these are only formed from the potash which remains over after the mineral radicals, such as chlorine and sulphuric acid, have been neutralized.

While the harmful effects of chlorine under certain conditions is everywhere admitted, the question has been raised whether the experiments made in other countries, on soils different from ours, with different strains of tobacco and under methods of growing and harvesting unlike our own, were strictly applicable to our conditions; and it has been asked what definite and careful tests have been made in this country which prove that muriates injure the burning quality of the leaf. It is worth while to consider the question and note the observations of different experimenters.

The Virginia Station² reports that experiments conducted since 1906 indicate that "The sulphate is preferable as a source of potash for flue-cured tobacco. . . . Muriate and kainit contain chlorine; experiments have established the fact that chlorine tends to impair the burning quality of the leaf." Fifty to one hundred and fifty pounds of sulphate, i. e., 25 to 75 pounds of potash, are recommended.

T. K. Wolfe, Professor of Agronomy, Virginia Polytechnic Institute, says:³

"Five years results with dark tobacco and two years results with light tobacco show that tobacco produced from the use of muriate was equal and usually superior to that produced from the use of sulphate of potash. The selling price of the muriate and sulphate tobacco was identical. From the standpoint of yield and selling price muriate of potash is to be preferred to sulphate especially since the former is cheaper. In tobacco, the burning quality has to be considered as well as the yield. Burning tests⁴ conducted with tobacco from the

¹ Further observation make more than questionable the value of "abundance of sulphates."

² Bull. 205, 1914.

³ Tobacco, Vol. XLII, No. 1, p. 30, April 29, 1926.

⁴ Tests made on rolled cigars.

Virginia Station showed that the sulphate of potash held fire for $3\frac{1}{2}$ minutes while the muriate of potash held fire for $1\frac{3}{4}$ minutes or exactly one-half as long as the sulphate tobacco."

In the report of the North Carolina Station, 1919, p. 32, it is stated that while there is some evidence that muriate may give good results, from the standpoint of the grower its use is not advocated because without doubt it injures the burning quality. In the experiments as high as 160 pounds of potash were used but from 36 to 40 pounds pays best.

Practically the same is said in the North Carolina report for 1920, i. e., muriate in quantities up to 80 pounds per acre of potash gave larger yields but poorer quality.

In the report of the same Station, 1921, p. 30, larger yield from muriate is reported and market value the same as from tobacco grown on sulphate, but muriate does not improve the burning quality.

A letter from the chemist of a fertilizer company doing a large business in the southern tobacco regions says that the Virginia and North Carolina tobacco regions recommend a fertilizer supply of potash of one half muriate and one half sulphate of potash.

The Ohio Station¹ states, in experiments with tobacco grown alone or in rotation with other crops, but with the fertilizers applied on tobacco, covering six, five and four year periods, 60 pounds of muriate were applied per acre. When the amount of muriate was increased the yield was not increased and the quality was reduced.

These observations were made in regions where pipe and cigarette tobaccos are produced and where "burn" is not so vital a thing as with us where wrapper and binder leaf is the only kind grown at present.

With us in New England a good burn is about the first essential. The leaf must hold fire well, not burning too fast or too slowly. It must not coal on the cigar and it must leave a clear white or light gray—not "muddy"—ash. These requirements for the most part do not apply to other types of leaf. Moreover, the quantity of potash used at the south, 40 to 75 pounds to the acre, is much less than is used here, 150 to 200 pounds—which is perhaps in some cases excessive. Under our conditions, therefore, it is evident that the risk of damage in using muriate is very much greater than with other types of tobacco.

At the same time some growers have been unnecessarily anxious to exclude even quite small quantities from the fertilizer. It is certain that a certain small quantity is necessary to the normal development of the crop.

¹ Bull. 285, p. 210.

Dr. Garner¹ concludes from his laboratory tests that while chlorine is undoubtedly injurious the experiments indicate "that it requires larger quantities to seriously affect the burning quality than is commonly supposed."

Dr. Anderson of the Tobacco Sub-Station at Windsor kindly permits the following statement in advance of his printed report.

Plots under test, each made in triplicate, had identical applications of nitrogen and phosphoric acid. All received the same amount of actual potash, 172 pounds per acre, but in different forms. From each set of three, 160 burning tests² were made, after fermentation, with these results.

Tobacco fertilized with sulphate of potash burned	34.3 sec.
Tobacco fertilized with carbonate of potash burned	44.9 sec.
Tobacco fertilized with muriate of potash burned	4.8 sec.
Tobacco fertilized with $\frac{2}{3}$ nitrate, $\frac{1}{3}$ carbonate burned	43.1 sec.
Tobacco fertilized with $\frac{1}{2}$ sulphate, $\frac{1}{2}$ carbonate burned	38 sec.
Tobacco fertilized with $\frac{1}{3}$ carbonate, $\frac{1}{3}$ nitrate, $\frac{1}{3}$ sulphate ..	43.5 sec.

Tobacco experts who examined the leaves also agreed that the chlorine (muriate) sample had bad burning quality and that all the others were good. Thus the evidence of experiment and observation of intelligent growers indicate that to use any considerable amount of muriate of potash in tobacco fertilizers is sure to damage or ruin its quality but no damage is likely to be done by the very small quantities of chlorine unavoidably present in commonly used fertilizer materials. The desire of some growers to exclude even these small quantities is not justified. Let it also be borne in mind that poor burn may also be caused by the accidents of the season and is not always to be ascribed to a fault in the fertilizer.

¹ Bull. 105, Bureau of Plant Industry.

² Tests made by ignition of single leaves with electric match.

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