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# TESTING FERTILIZERS

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F. B. MUMFORD, Director

L. D. HAIGH, Chemist

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# Agricultural Experiment Station

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# Testing Fertilizers; Spring 1928

L. D. HAIGH, Chemist

The results here reported were obtained by chemical analysis of the samples of fertilizer collected from stocks sold during the spring season in 1928. They represent the brands usually purchased in Missouri for truck growing, commercial tomato and fruit culture, and for oats.

The samples are grouped alphabetically under the name of the manufacturer and show the name of the dealer or consumer from whom collected. The percentages of nitrogen, phosphoric acid and potash found on analysis are printed side by side with the figure percentage as guaranteed by the manufacturer. When the found figure is below the guaranteed figure, it is printed in bold faced type merely to call attention to the low value.

In the last two columns of the table of figures will be found the calculated value in dollars and cents of this particular brand in comparison with an approximate value based upon the manufacturer's guarantee of the plant food contained therein. In order to make this monetary comparison in values it was necessary to select a unit value for each plant food constituent used and guaranteed in the fertilizers. These were assessed after a careful study of the market values of these constituents, contained in the simple plant food carriers, had been made. The values used in the present calculations are the following:

Total nitrogen.....	\$4.25 per unit.
Total phosphoric acid (in bone).....	1.00 per unit.
Insoluble phosphoric acid from bone (when so guaranteed in registra- tion).....	0.80 per unit.
Available phosphoric acid (all sources)	1.40 per unit.
Potash (water soluble).....	1.05 per unit.

The activity of the nitrogen in all nitrogen carrying fertilizers was tested by the usual procedure. The water soluble portion was first determined and if this proved to be less than 67 per cent of the total nitrogen present, the water insoluble portion was tested by the permanganate methods for activity. A full description of the use of these tests is given in Bulletin 260 of this station.

The results of tests for nitrogen activity on the samples shown in this report indicate inferior quality of nitrogen in the following samples of concentrated mixed fertilizers: 6-28, 6-29, 6-31, 6-55. Also all samples whose nitrogen source is manure give results indicating nitrogen of inferior activity. These numbers are: 6-24, 6-42, 6-72, 6-73, 6-74, 6-75.

The above mentioned tests for nitrogen activity are correct for distinguishing between good and inferior qualities of nitrogen in con-

centrated fertilizers. Where the nitrogen carrying material contains a low percentage of nitrogen, that is, the water insoluble nitrogen is not concentrated, the result will always indicate inferior nitrogen. Thus manure and plant residues always test low under these conditions. Such materials require large applications to produce fertilizing effects and cannot be considered concentrated fertilizers.

### FOOTNOTES

The superscript numerals following the names of certain brands of fertilizer in the table of analysis on pages 5 to 8 indicate violations of the Fertilizer Law, or special conditions, respectively as follows:

- |                              |                                |
|------------------------------|--------------------------------|
| 1. Not registered            | 4. Sample drawn from one sack  |
| 2. Without registration tags | 5. Sample drawn from two sacks |
| 3. Without labels            | 6. Incomplete labels           |

## Suggestions for Fertilizer Buyers

Buyers are often at a loss to know how to avail themselves of the protection of the state fertilizer law, or how to know when they are getting protection. The purpose of this article is to guide such in this perplexity.

A few simple conditions observed by the seller are all that are necessary to insure protection to the buyer. These conditions are all stipulated in the Missouri Fertilizer Law and distinguish at once between goods sold legally or contrary to the law. The buyer therefore should know the legal requirements for fertilizer sales and see that these are met when he buys his goods.

### FERTILIZER MUST BE REGISTERED

The first of these requirements is registration. Every manufacturer must register every brand of fertilizer he sends out from his factory before sales are made. Every fertilizer salesman or dealer should be able to prove that the fertilizer for which he takes orders has been registered. Every buyer can see this for himself by consulting the last inspection report.\* No buyer should purchase unregistered fertilizer if he would obtain reliable goods.

### FERTILIZER MUST BE LABELED

The second requirement is that the fertilizer must be labeled to show the brand name, guaranteed analysis, and name and address of the manufacturer. Nothing can be told about the quality of a fertilizer by its color or its smell.

No fertilizer can be legally sold without labels and no farmer is compelled to take it without labels. As an example, our inspectors have

\*Bulletin 260, Missouri Agricultural Experiment Station.

found fertilizer which had been shoveled into empty sugar or flour sacks and offered to customers without the fertilizer labels. The only safe thing to do is to refuse to buy unlabelled goods.

### ALL PACKAGES MUST BE TAGGED

The next requirement is that every package shall carry a tag or sticker label certifying to the fact of registration by the Missouri Agricultural Experiment Station. This does not mean that the Missouri Agricultural Experiment Station guarantees the fertilizer to be correct and true in every particular, but does assert that the manufacturer has registered it and that its sale is permitted. When the buyer receives his fertilizer from the manufacturer or dealer, each sack should carry one of these tags. If not the buyer should refuse to take the goods. Untagged bags of fertilizer in a dealer's warehouse should never be purchased by any farmer or other user if he would be certain of the quality of goods he buys.

Therefore, if the buyer will see to it that the three requirements of registration, labeling, and affixing of registration tags to the sacks, are carried out when he makes his purchase, he will be assured that he is buying reliable goods. If he will consult each year the last inspection report\* he will learn how carefully the manufacturer has compounded his fertilizer mixture in comparison with the guaranteed analysis as printed on the labels.

The question is often asked, does fertilizer lose its strength by lying too long in storage? The answer is, no. Fertilizer loses none of its strength by age and if it has not been exposed to fire or to water, will be as good or better than when it was prepared. Aging often improves the mechanical condition. Sometimes because of a lack of curing at the factory the contents of the sack may set to a hard lump and will have to be broken down to a powder before it can be used. The composition however is not necessarily affected.

The composition of resacked fertilizer ought to be as good as that in the original sacks. However, when the labels on the original containers were entirely destroyed before the fertilizer was resacked, different kinds are liable to become mixed and the composition of the resacked fertilizer may not be true to the label. This should be considered by the buyer when purchasing resacked fertilizer, which as before stated, should always carry labels and registration tags like that in the original containers.

We have made no attempt in this article to advise prospective fertilizer purchasers as to what kind of fertilizer or fertilizer mixture to purchase for certain crops grown on various types of soil. Inquiries along this line should be addressed to the Department of Soils, College of Agriculture, Columbia, Missouri, and the information will be furnished promptly.

\* Bulletin 260, Agricultural Experiment Station.

TABLE 1.—FERTILIZER ANALYSES AND GUARANTEES; 1928

Lab. No.	Manufacturer and Brands	Dealer	Nitrogen			Phosphoric Acid P <sub>2</sub> O <sub>5</sub>						Water Soluble Potash K <sub>2</sub> O		Value Per Ton	
			Total G'td	Total F'nd	Water Soluble to Total	Total		Insoluble		Available		G'td	F'nd	G'td	F'nd
						G'td	F'nd	G'td	F'nd	G'td	F'nd				
	<b>American Agricultural Chemical Company St. Louis, Missouri A. A. Brands</b>		Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent		
6-1	20 per cent Superphosphate	Farmers Coop. Assn. No. 82, Brunswick	-----	-----	-----	-----	22.25	0.50	1.82	20.00	20.43	-----	-----	\$28.00	\$28.60
6-2	20 per cent Superphosphate	E. B. Evans Feed and Seed Co., Springfield	-----	-----	-----	-----	21.63	0.50	1.59	20.00	20.04	-----	-----	28.00	28.06
6-3	Agrico Fertilizer for Grain	Goodwin Co., Doniphan	1.65	1.67	91.02	-----	14.11	0.50	1.59	12.00	12.52	4.00	4.52	28.01	29.38
6-4	Antler Fertilizer	E. B. Evans Feed and Seed Co., Springfield	1.65	1.67	92.22	-----	13.09	0.50	1.06	12.00	12.03	6.00	6.22	30.11	30.47
6-5	Red Dragon Fertilizer	Farmers Coop. Assn. No. 82, Brunswick	1.65	1.78	91.57	-----	13.51	0.50	1.24	12.00	12.27	2.00	2.19	25.91	27.05
6-6	Red Dragon Fertilizer	E. B. Evans Feed and Seed Co., Springfield	1.65	1.65	90.91	-----	13.92	0.50	1.30	12.00	12.62	2.00	2.19	25.91	26.98
	<b>American Cyanamid Company New York</b>														
6-7	Ammo Phos	Whitney-Goit Company,* Kansas City	16.00	15.97	98.50	-----	21.55	1.00	1.51	19.00	20.04	-----	-----	94.60	95.93
	<b>American Floricult Corp. New York</b>														
6-8	A. F. C. Plant Food <sup>1</sup> 2	Sears Roebuck & Co., Kansas City	15.00	14.76	99.25	-----	30.24	-----	0.10	30.00	30.14	15.00	16.24	121.50	121.98
	<b>American Soda Products Company Moorestown, N. J.</b>														
6-9	Grogreen Fern Food <sup>1</sup> 2	F. W. Woolworth Co., St. Louis	4.92	5.19	63.20	-----	9.58	-----	1.20	8.00	8.38	3.00	4.21	35.26	38.21

\* Sample obtained from bulk lot without labels and not being offered for sale.







<b>Floyd Plant Food Co.</b>														
<b>St. Louis, Missouri</b>														
<b>Floyd's Money Maker Brands</b>														
6-50	F. P. F. 0-12-6 Goods.....	Earl Davis, Naylor.....												
6-51	2-12-2 Goods .....	Earl Davis, Naylor.....	1.67	1.94	89.09	12.25	0.25	1.05	12.00	11.20	2.00	3.22	26.00	27.31
6-52	2-12-4 Goods .....	Earl Davis, Naylor.....	1.67	1.36	88.24	13.63	0.25	1.50	12.00	12.13	4.00	4.67	28.10	27.66
6-53	3-9-3 Goods .....	Earl Davis, Naylor.....	2.48	2.11	86.73	10.63	0.25	1.29	9.00	9.34	3.00	2.97	26.29	25.17
6-55	Garden Fertilizer (4-4-1) <sup>2</sup> .....	Farmers' Exchange, Carthage.....	3.30	2.50	56.80	6.03	0.10	1.07	4.00	4.96	1.00	1.37	20.68	19.01
6-56	F. P. F. 4-8-6 <sup>4</sup> .....	J. Seward, Camden.....	3.28	3.27	87.46	9.43	0.25	1.07	8.00	8.36	6.00	5.08	31.44	30.93
<b>M. F. A. Brands</b>														
6-57	16 per cent Superphosphate <sup>6</sup> .....	Producers' Grain Co., Montgomery City.....				18.69	0.25	1.18	16.00	17.51			22.40	24.51
6-58	20 per cent Superphosphate.....	Farmers' Produce Exchange, Cassville.....				22.09	0.10	1.63	20.00	20.46			28.00	28.64
6-59	20 per cent Superphosphate <sup>6</sup> .....	Producers' Grain Co., Centralia.....				21.44	0.10	1.07	20.00	20.37			28.00	28.52
6-60	2-12-2 Goods .....	Farmers' Produce Exchange, Cassville.....	1.67	1.34	84.33	13.55	0.25	1.47	12.00	12.08	2.00	2.32	26.00	25.05
6-61	2-16-2 Goods <sup>6</sup> .....	Greene County Farmers' Sales Assn., Springfield.....	1.67	1.34	88.06	16.74	0.25	0.86	16.00	15.88	2.00	1.85	31.60	29.87
6-62	3-8-6 Goods .....	Newton Co. Livestock and Warehouse Assn., Neosho.....	2.51	2.48	80.65	9.75	0.25	1.19	8.00	8.56	6.00	6.46	28.17	29.30
6-63	3-12-4 Goods.....	Verona Farmers Sales Assn., Verona.....	2.51	2.09	85.17	13.91	0.25	1.91	12.00	12.00	4.00	5.06	31.67	30.99
6-64	3-12-8 Goods .....	Verona Farmers Sales Assn., Verona.....	2.51	1.95	85.64	14.55	0.25	1.62	12.00	12.93	8.00	7.70	35.87	34.48
<b>Grasselli Chemical Co.</b>														
<b>Cleveland, Ohio</b>														
6-65	Grasselli Odorless Plant Food .....	Kresge's 5 and 10c Store, St. Louis .....	4.12	4.29	96.50	15.06	2.00	1.81	13.00	13.25	4.00	4.42	39.91	41.42
6-66	Grasselli Odorless Plant Food <sup>2</sup> .....	St. Louis Seed Co., St. Louis.....	4.12	4.01	97.76	17.57	2.00	0.84	13.00	16.73	4.00	3.91	39.91	44.57
<b>Mission Laboratories</b>														
<b>Kansas City, Missouri</b>														
6-67	Grasgro.....	Factory sample.....	4.10	4.06	55.67	6.53	1.00	0.82	4.00	5.71	3.00	3.55	26.18	28.98
<b>Plant Products Co.</b>														
<b>Baltimore, Maryland</b>														
6-68	Plantabbs <sup>1 2</sup> .....	McGroary's 5 and 10c Store, St. Louis .....	11.00	11.22	91.00	19.68	2.00	0.79	15.00	18.89	20.00	26.81	88.75	102.29
<b>Prosperity Laboratories</b>														
<b>Kansas City Missouri</b>														
<b>Prosperity Brands</b>														
6-69	Garden Fertilizer <sup>2</sup> .....	Sears Roebuck & Co., Kansas City.....	4.92	5.24	97.14	9.27	0.50	1.38	8.00	7.89	6.00	6.18	38.41	39.81
6-70	Lawn Food.....	Carman Supply Co., North Kansas City.....	5.80	5.94	50.17	5.93	1.00	2.66	5.00	3.27	3.00	3.47	34.80	33.47

TABLE I (CONTINUED). FERTILIZER ANALYSIS AND GUARANTEES; SPRING, 1928

Lab. No.	Manufacturer and Brands	Dealer	Nitrogen			Phosphoric Acid P <sub>2</sub> O <sub>5</sub>						Water Soluble Potash K <sub>2</sub> O		Value Per Ton	
			Total G'td	Total F'nd	Water Soluble to Total	Total		Insoluble		Available		G'td	F'nd	G'td	F'nd
						G'td	F'nd	G'td	F'nd	G'td	F'nd				
			Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
	<b>Pulverized Manure Co. Chicago, Illinois Wizard Brands</b>														
6-72	Sheep Manure.....	Springfield Seed Co., Springfield.....	2.00	1.94	20.10	1.40	0.26	1.25	1.14	2.00	2.76	12.35	12.75		
6-73	Sheep Manure.....	Palmer Seed Co., St. Louis.....	2.00	1.86	24.19	1.47	0.44	1.25	1.03	2.00	2.81	12.35	12.30		
6-74	Sheep Manure.....	Harnden Seed Co., Kansas City.....	2.00	1.85	15.68	1.60	0.30	1.25	1.30	2.00	3.18	12.35	13.02		
6-75	Sheep Manure.....	Oakley-Pate Seed Co., Joplin.....	2.00	2.05	18.54	1.25	0.19	1.25	1.06	2.00	2.65	12.35	12.97		
	<b>Read Phosphate Company Nashville, Tennessee Red Diamond Brands</b>														
6-76	16 per cent Superphosphate..	Neosho Seed Co., Neosho.....				20.50	2.00	2.31	16.00	18.19		22.40	25.47		
6-77	16 per cent Superphosphate..	Marionville Farmers Exchange, Marionville.....				19.90	2.00	3.07	16.00	16.83		22.40	23.56		
6-78	16 per cent Superphosphate..	Greene Co. Farmers' Sales Assn., Springfield.....				19.05	2.00	2.28	16.00	16.77		22.40	23.48		
6-79	20 per cent Superphosphate..	Greene Co. Farmers' Sales Assn., Springfield.....				20.89	0.73	20.00	20.16			28.00	28.22		
6-80	Pure Raw Bone Meal.....	Whitlock Lines, Monett.....	3.70	3.50	6.00	20.00	23.09					35.73	37.97		
	<b>Sewerage Commission of the City of Milwaukee Milwaukee, Wisconsin</b>														
6-81	Milorganite <sup>23</sup> .....	Wild Nurseries, Sarcoxie**.....	5.00	5.32	13.16	3.73	0.75	0.66	2.00	3.07		24.05	26.91		
	<b>Smith Agricultural Chemical Company Columbus, Ohio</b>														
6-82	SACCO Plant Food.....	Andrew's Burri Seed Co., Kansas City.....	3.29	3.53	88.95	13.14	0.50	1.20	12.00	11.94	4.00	4.31	34.98	36.25	

\*\*Purchased from Crocker Packing Company.



TABLE I (CONTINUED). FERTILIZER ANALYSIS AND GUARANTEES; SPRING, 1928

Lab. No.	Manufacturer and Brands	Dealer	Nitrogen			Phosphoric Acid P <sub>2</sub> O <sub>5</sub>						Water Soluble Potash K <sub>2</sub> O		Value Per Ton	
			Total G <sup>1</sup> td	Total F <sup>2</sup> nd	Water Soluble to Total	Total		Insoluble		Available		G <sup>1</sup> td	F <sup>2</sup> nd	G <sup>1</sup> td	F <sup>2</sup> nd
						G <sup>1</sup> td	F <sup>2</sup> nd	G <sup>1</sup> td	F <sup>2</sup> nd	G <sup>1</sup> td	F <sup>2</sup> nd				
Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent	G <sup>1</sup> td	F <sup>2</sup> nd
6-108	Virginia-Carolina Chemical Corp. Memphis, Tennessee V-C 20 per cent Superphosphate.....N.	Johannes & Sons Implement Company, Lamar.....	1.65	1.93	74.09	13.00	0.74	12.00	12.26	2.00	2.90	25.91	28.41		
6-109	V-C Plow Brand Fertilizer...N.	Johannes & Sons Implement Company, Lamar.....	1.65	1.89	82.54	17.32	1.39	16.00	15.93	2.00	2.49	31.51	32.94		
6-110	V-C Star Brand Fertilizer...N.	Johannes & Sons Implement Company, Lamar.....	1.65	1.89	82.54	17.32	1.39	16.00	15.93	2.00	2.49	31.51	32.94		

<sup>1</sup>Not registered.

<sup>2</sup>Without registration tags.

<sup>3</sup>Without labels.

<sup>4</sup>Sample drawn from one sack.

<sup>5</sup>Sample drawn from two sacks.

<sup>6</sup>Incomplete labels.