
UNIVERSITY OF MISSOURI.

COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

Agricultural Experiment Station

BULLETIN NO. 80.

**INSPECTION OF COMMERCIAL
FERTILIZERS.**
(Spring Sales)

COLUMBIA, MISSOURI.

June, 1908.

E. W. Stephens Publishing Co., Columbia, Missouri.

UNIVERSITY OF THE STATE OF MISSOURI.

COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

Agricultural Experiment Station

BOARD OF CONTROL.

THE CURATORS OF THE UNIVERSITY OF MISSOURI.

THE EXECUTIVE COMMITTEE OF THE BOARD OF CURATORS.

HON WALTER WILLIAMS, President
Columbia, HON. B. H. BONFOY,
Unionville, HON. CAMPBELL WELLS,
Platte City.

ADVISORY COUNCIL.

THE MISSOURI STATE BOARD OF AGRICULTURE.

OFFICERS OF THE STATION.

THE PRESIDENT OF THE UNIVERSITY.

Henry J. Waters, B. S. A., <i>Dir.</i>	F. G. King, ² B. S., <i>Asst. in Feeding.</i>
Paul Schweitzer, PH. D., LL. D., <i>Agr.</i> <i>Chem. Emeritus.</i>	J. M. Evvard, B. S., <i>Asst. to the Director.</i>
J. C. Whitten, M. S., PH. D., <i>Hort.</i>	C. A. Willson, B. S., <i>Asst. Animal Husb.</i>
J. M. Stedman, ¹ B. S., <i>Ent.</i>	A. E. Perkins, ² B. S., <i>Asst. Dairy Chem.</i>
J. W. Connaway, D. V. S., M. D., <i>Vet.</i>	H. D. Hughes, B. S., <i>Asst. Agron.</i>
F. B. Mumford, M. S., <i>Animal Husb.</i>	L. S. Backus, D. V. S., <i>Asst. Vet.</i>
C. H. Eckles, B. AGR., M. S., <i>Dairying.</i>	L. G. Rinkle, B. S., <i>Asst. Dairyman.</i>
M. F. Miller, M. S. A., <i>Agron.</i>	C. R. Moulton, B. S., <i>Asst. Chem.</i>
P. F. Trowbridge, PH. D., <i>Assoc. Chem.</i>	L. F. Shackell, <i>Asst. Chem.</i>
W. L. Howard, M. S., PH. D., <i>Asst. Hort.</i>	L. D. Haigh, M. S., <i>Asst. Chem.</i>
R. H. Shaw, ² B. S., <i>Asst. Dairyman.</i>	E. N. LaRue, D. V. S., <i>Asst. Vet.</i>
G. M. Reed, PH. D., <i>Asst. Bot.</i>	C. W. Rine, B. S. AGR., <i>Asst. Animal Husb.</i>
E. H. Favor, B. A., <i>Asst. Hort.</i>	C. B. Hutchison, B. S., <i>Asst. Agron.</i>
Leonard Haseman, A. B., <i>Asst. Ent.</i>	Arthur Rhys, <i>Herdsman.</i>
R. C. Doneghue, B. S., <i>Asst. Agron.</i>	John Schnabel, <i>Gardener.</i>
W. H. Chandler, M. S., <i>Asst. Hort.</i>	J. G. Babb, M. A., <i>Sec.</i>
E. A. Trowbridge, B. S. A., <i>Asst. Animal Husb.</i>	R. B. Price, <i>Treas.</i>
	S. E. Kennedy, <i>Clerk, Sten.</i>

¹ On Leave.

² In the service of the U. S. Department of Agriculture.

INSPECTION OF COMMERCIAL FERTILIZERS

(Spring Sales)

By P. F. TROWBRIDGE, Chemist.

It has been deemed advisable to make a special spring collection of fertilizer samples, and issue a separate Bulletin containing the results of the analyses. The following report covers the analyses of the samples collected by our inspector, Mr. H. Krusekopf, during the month of May. This work was done under the supervision of the department of Agronomy of the University. One hundred and twelve samples were collected, in each case in such a manner as to represent fairly the whole lot of the fertilizer sampled. In most cases these samples were taken from the stock in the hands of the retailers. In all cases the general condition of the fertilizer was reported as good. As soon as these samples were all received at the laboratory they were grouped according to manufacturer and brand. The samples of the same manufacturer and brand were made up into composites, each being taken in proportion to the relative amount of total fertilizer which that sample represented. These with the individual samples, made sixty-nine samples which were analyzed. In all cases where the results of the analyses did not come up to that guaranteed by the manufacturer, the work was repeated and the results reported in this bulletin are the averages of such analyses.

It will be noticed that a large number of the fertilizers failed to meet the guarantee of the manufacturers, and the attention of the farmers of the State is called to this condition.

Summarized, the general condition is as follows: 61 samples were analyzed for nitrogen. Fifty seven of these samples had the nitrogen content guaranteed. Of these, 36 samples or 63 per cent failed to come within the guarantee.

Sixty-six samples were analyzed for total phosphorus. In 61 of these samples the phosphorus content was guaran-

teed. Fifteen of these samples or 25 per cent came below the guarantee.

The determination of the insoluble phosphorus is for the purpose of computing the available phosphorus. Samples showing more insoluble phosphorus than guaranteed usually are below the guarantee in available phosphorus. For this reason the consideration of the guaranteed available phosphorus is of value to the farmer, rather than a consideration of the insoluble phosphorus, which is only remotely available.

In 64 samples the available phosphorus was determined. In 51 of these samples the amount of available phosphorus was guaranteed. Of these 51 samples 26, or 51 per cent were below the guarantee.

Fifty-one samples were analyzed for potash. Forty-five of these samples had the potash content guaranteed. Twenty of these samples, or 44 per cent were below the guarantee.

Summarized by manufacturers, the condition is as follows:

Arkansas Fertilizer Company.

Eleven analyses made. Four of these analyses, or 36 per cent gave results below the guarantee.

Armour & Company.

Fifty-four analyses made. Twenty-two of these analyses, or 41 per cent gave results below the guarantee.

Mathiason & Company.

Twelve analyses made. Eight of these analyses, or 67 per cent gave results below the guarantee.

Mayer Fertilizer Company.

Fifteen analyses made. Eight of these analyses, or 53 per cent gave results below the guarantee.

Empire Carbon Works.

Thirty-seven analyses made. Fifteen of these analyses, or 41 per cent gave results below the guarantee.

Morris & Company.

Sixteen analyses made. Five of these analyses, or 31 per cent gave results below the guarantee.

Swift & Company.

Forty-four analyses made. Twenty-four of these analyses, or 55 per cent gave results below the guarantee.

Tuscarora Fertilizer Company.

Nineteen analyses made. Nine of these analyses, or 47 per cent gave results below the guarantee.

Virginia Carolina Chemical Company.

Six analyses made. Two of these analyses, or 33 per cent gave results below the guarantee.

A total of 214 analyses were made for which there were guarantees. Of these 97, or 45 per cent were below the manufacturers guarantee.

The detailed results of the analyses are shown in the tabulations which follow.

Laboratory No.	Date of Collection	Manufacturer and Brand	From Whom Collected	Nitrogen		Phosphoric Acid P ₂ O ₅						Potash K ₂ O	
						Total		Insoluble		Available			
				Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct
	1908	Arkansas Fertilizer Co., Little Rock, Ark. "White Diamond"											
61	May 11	Economy Fertilizer.	B. R. Middleton, Mexico.....	0.82	1.02	11.00	14.03	1.00	6.53	10.00	7.50	2.00	2.32
62	" 2	Kali-Superphosphate..	Adams Hardware Co., Lamar....	0.00		12.00	15.78		6.21	12.00	5.79	2.50	2.67
63	" 11	Corn and Wheat Fertilizer.....	B. R. Middleton, Mexico.....	1.65	1.69	10.00	10.20	1.00	3.11	9.00	7.09	4.00	3.53
		Armour & Co., Kansas City. "Helmet Brand"											
64	" 4	Special Potato Fertilizer..	{ Dixon & Zone, Carthage	1.65	1.58	9.50	11.80	1.50	1.28	8.00	10.52	10.00	10.15
65	" 20		{ McAfee & Foster, Moberly.....										
66	" 7	Lawn and Garden Fertilizer.....	{ Foote Bros., Clinton.....	2.88	2.68	9.50	13.39	1.50	2.08	8.00	11.31	4.00	4.66
67	" 4		{ Dixon & Zone, Carthage.....										
68	" 20		{ McAfee & Foster, Moberly..										
69	" 1	Odorless Lawn Fertilizer.....	Christopher, Warrensburg.....	3.29	2.23	10.50	9.32	1.50	2.95	9.00	6.37	3.00	3.90
610	" 2	Ammoniated Dissolved Bone and Potash.....	{ A. Z. Peck, Sheldon.....	1.65	1.60	11.50	13.57	1.50	1.72	10.00	12.15	2.00	2.04
611	" 4		{ Dixon & Zone, Carthage.....										
612	" 4		{ Buckner & Son, Peirce City.....										
613	" 7		{ C. B. Cooper, Osceola.....										
614	" 7		{ Foote Bros., Clinton.....										
615	" 20	{ McAfee & Foster, Moberly.....											

Laboratory No.	Date of Collection	Manufacturer and Brand	From Whom Collected	Nitrogen		Phosphoric Acid P ₂ O ₅						Potash K ₂ O	
						Total		Insoluble		Available			
				Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct
		Armour & Co.—Continued.											
633	May 12	Special Pure Grain Fertilizer.....	H. F. Schmitt, Wright City.....	1.64	1.77	13.10	12.60	3.10	1.64	10.00	10.96	2.00	1.75
634	" 12	Wheat, Corn and Oats Special.....	C. H. Nerbuhr, Wright City.....	1.00	0.78	10.00	7.89	2.00	0.98	8.00	6.91	1.00	1.06
635	" 11	Hoosier Corn Grower.....	Wm. Pollock M. & E. Co., Mexico....	1.00	0.63	10.00	8.75	2.00	1.31	8.00	7.44	4.00	3.84
		Ash Grove Manufacturing Co.,* Ash Grove, Mo.											
636	" 2	Wood Ashes.....	{ T. Eggar, Lamar..... }	Alkali	nity	equivalen	t to	25.01	per ct.	CaO			3.75
637	" 6		{ Ash Grove Mfg. Co., Ash Grove... }										
638	" 2	Lime Refuse.....	{ T. Eggar, Lamar..... }	Alkali	nity	equivalen	t to	61.61	per ct.	CaO			
639	" 6		{ Ash Grove Mfg. Co., Ash Grove... }										
640	" 2	Wood Ashes and Lime.....	{ T. Eggar, Lamar..... }	Alkali	nity	equivalen	t to	44.98	per ct.	CaO			2.21
641	" 6		{ Ash Grove Mfg. Co., Ash Grove... }										
642	" 2	Wood Ashes and Lime.....	{ T. Eggar, Lamar..... }	Alkali	nity	equivalen	t to	44.98	per ct.	CaO			2.21
643	" 2		{ T. Eggar, Lamar..... }										
		Thos. Jenkins, Springfield, Mo.*											
650	" 6	Lawn Fertilizer.....	T. Jenkins, Springfield.....		2.95		5.99		3.00		2.99		0.84
651	" 6	Blood, Bone and Potash.....	T. Jenkins, Springfield.....		1.94		9.88		4.15		5.73		1.53

*No guarantee furnished.

Laboratory No.	Date of Collection	Manufacturer and Brand	From Whom Collected	Nitrogen		Phosphoric Acid P ₂ O ₅						Potash K ₂ O	
						Total		Insoluble		Available			
				Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct
		P. B. Mathiason Mfg. Co., St. Louis, Mo. "Inerescent Brand."											
652	May 5	Dissolved Bone.....	Sanders Merc. Co., Billings.....	3.09	2.45	11.00	14.27	2.00	5.62	9.00	8.65	4.00	3.28
653	" 5	Acidulated Bone and Potash.....	Sanders Merc. Co., Billings.....	2.47	1.85	11.00	10.46	2.00	2.39	9.00	8.25	2.00	2.23
654	" 4	Basing Mixture.....	Reding & Clark, Joplin.....	2.88	2.59	19.00	20.64	13.00	9.96	6.00	10.68	7.00	6.32
		Mayer Fertilizer Co., St. Louis, Mo.											
655	" 4	Mayer's "Anchor Brand" Bone and Potash.....	{ Tucker Seed Co., Carthage..... }	1.00	2.21	12.00	11.40	5.00	5.51	7.00	5.89	1.00	3.97
656	" 4												
657	" 4	Mayer's "Anchor Brand" Raw Bone Meal.....	{ Tucker Seed Co., Carthage..... }	3.70	3.54	20.00	21.12	13.00	12.27	7.00	8.85		
659	" 4												
658	" 7	Mayer's "Anchor Brand" Special Corn Grower.....	A. R. Wilder, Clinton.....	2.05	1.56	11.00	11.32	3.09	5.14	8.00	6.18	3.00	3.71
660	" 4	Mayer's "Anchor Brand" Special Wheat Grower.....	Tucker Seed Co., Carthage.....	1.00	1.13	12.00	10.84	2.00	2.79	10.00	8.05	3.00	1.74
		Empire Carbon Works, St. Louis, Mo.											
644	" 12	"Horse Shoe Brand" National Bone Dust.....	Silex Fert. Co., Silex.....	2.06	2.02	9.50	10.01	1.50	1.88	8.00	8.13	1.50	1.76

Laboratory No.	Date of Collection	Manufacturer and Brand	From Whom Collected	Nitrogen		Phosphoric Acid P ₂ O ₅						Potash K ₂ O	
						Total		Insoluble		Available			
				Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct
		Empire Carbon W'ks.—Continued.											
645	May 12	"Horse Shoe Brand" Corn and Wheat Grower	Silex Fert. Co., Silex.....	1.64	1.48	9.00	9.70	1.00	1.60	8.00	8.10	2.00	2.09
646	" 13	"Horse Shoe Brand" Quick Acting Phosphate.....	A. D. Luck, Eolia.....			10.00	12.75		3.03	10.00	9.72		
647	" 11	"Horse Shoe Brand" Animal Bone Manure.....	T. H. Britt & Son, Montgomery.....	0.82	0.12	8.00	13.61	1.00	4.32	7.00	9.29	1.00	1.93
648	" 11	"Horse Shoe Brand" Bone and Potash.....	{ T. H. Britt & Son, Montgomery... } { A. D. Luck, Eolia..... }			10.00	11.84		3.55	10.00	8.29	2.00	1.58
649	" 13												
670	" 13	"Horse Shoe Brand" Corn and Wheat Grower.....	{ S. M. Sanderson & Son, Cyrene... } { A. D. Luck, Eolia..... }	1.64	1.12	9.00	10.27	1.00	2.25	8.00	8.02	2.00	1.90
671	" 13												
672	" 13	"Horse Shoe Brand" National Bone Dust.....	{ A. D. Luck, Eolia..... } { T. H. Britt & Son, Montgomery... }	2.06	1.96	9.50	10.46	1.50	3.30	8.00	7.16	1.50	1.51
673	" 11												
674	" 13	"Horse Shoe Brand" Acidulated Bone and Potash	S. M. Sanderson & Son, Cyrene.....	0.82	1.12	11.00	14.35	1.00	4.35	10.00	10.00	1.00	1.44
675	" 12	"Boars Head Brand" Faultless Grain Grower.....	Moore & Henry, Troy	0.82	0.73	8.00	8.16	1.00	1.58	7.00	6.58	1.00	1.18
676	" 12	"Boars Head Brand" World of Good Superphosphate.....	Moore & Henry, Troy.....	2.06	2.00	9.50	10.39	1.50	4.13	8.00	6.26	1.50	1.39

Laboratory No.	Date of Collection	Manufacturer and Brand	From Whom Collected	Nitrogen		Phosphoric Acid P ₂ O ₅						Potash K ₂ O	
						Total		Insoluble		Available			
				Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct	Gtd. per ct	Found per ct
		Swift & Co.—Continued.											
683	May 12	Swift's Complete Fertilizer.....	{ Silex Fert. Co., Silex..... }	1.00	0.84	11.00	8.02	3.00	2.24	8.00	5.78	1.00	0.72
684	" 11		{ Hathaway Seed Co., Mexico..... }										
685	" 1	Swift's Pure Bone Meal and Potash..	J. E. Hall, Warrensburg.....	2.50	2.31	23.00	26.06		13.63		12.43	3.00	3.16
686	" 2	Swift's Pure Special Bone Meal.....	T. Eggar, Lamar.....	0.82	1.63	27.50	30.13	15.25	16.47	12.25	13.66		
687	" 2	Swift's Raw Bone Meal.....	J. P. Robinson, Nevada.....	3.75	3.97	23.00	24.23		13.55		10.68		
688	" 2	Swift's Pure Raw Bone Meal.....	{ T. Eggar, Lamar..... }	3.75	3.98	23.00	24.86		12.59		12.27		
691	" 11		{ Jas. Cunningham, Montgomery.... }										
689	" 2	Swift's Pure Bone Meal.....	{ J. P. Robinson, Nevada..... }	2.50	1.80	25.00	29.81	13.75	15.50	11.35	14.31		
690	" 11		{ Hathaway Seed Co., Mexico..... }										
692	" 2		{ T. Eggar, Lamar..... }										
693	" 1	Swift's Pure Bone Meal.....	N. P. Gibson, Strassburg.....	2.50	1.48	25.00	29.36	13.75	17.38	11.25	12.58		
694	" 19	Swift's Pure Superphosphate.....	{ Walker & Wade, Monroe City..... }	1.64	1.48	12.00	8.97	4.00	1.52	8.00	7.45	2.00	1.25
695	" 20		{ Phelps & Thomas, Centralia..... }										
696	" 12		{ Silex Fert. Co., Silex..... }										
697	" 11		{ Jas. Cunningham, Montgomery.... }										
698	" 11		{ Hathaway Seed Co., Mexico..... }										
699	" 2	Swift's Pure Superphosphate.....	J. P. Robinson, Nevada.....	1.64	1.61	12.00	8.60	4.00	1.46	8.00	7.14	2.00	1.48

Laboratory No.	Date of Collection	Manufacturer and Brand	From Whom Collected	Nitrogen		Phosphoric Acid P ₂ O ₅						Potash K ₂ O	
						Total		Insoluble		Available			
				Gtd. per ct.	Found per ct.	Gtd. per ct.	Found per ct.	Gtd. per ct.	Found per ct.	Gtd. per ct.	Found per ct.	Gtd. per ct.	Found per ct.
		Tuscarora Fertilizer Co., Chicago, Ill.											
6100	May 12	Tuscarora Big Four.....	A. H. Williams, Silex.....	1.65	0.71	7.00	8.26	1.15	7.00	7.11	1.00	3.08	
6101	" 12	Tuscarora Standard.....	A. H. Williams, Silex.....	1.65	1.42	8.00	9.31	1.90	8.00	7.41	2.00	1.61	
6102	" 12	Tuscarora Steamed Bone.....	A. H. Williams, Silex.....	1.65	1.52	20.00	21.52	12.04		9.48			
6103	" 13	Tuscarora Raw Bone Meal.....	{ L. T. Henry, Whiteside	3.70	3.99	22.00	23.59	13.39		10.20			
6104	" 13												{ W. H. Tinsley, Edgewood.....
6105	" 13	Tuscarora Bone and Potash.....	{ W. H. Tinsley, Edgewood.....			10.00	10.88	0.71	10.00	10.17	2.00	1.77	
6106	" 13												{ L. T. Henry, Whiteside.....
6107	May 12	Tuscarora Ammoniated Phosphate...	{ A. H. Williams, Silex.....	0.82	0.80	7.00	7.96	1.12	7.00	6.84	4.00	0.74	
6108	" 13												{ L. T. Henry, Whiteside.....
		Virginia-Carolina Chemical Co., Memphis, Tenn.											
6109	" 2	Champion Corn and Wheat Grower..	Adams Hdw. Co., Lamar.....	0.82	1.13	8.00	12.24	3.14	8.00	9.10	2.00	1.89	
6110	" 2	Pure Raw Animal Bone.....	Adams Hdw. Co., Lamar.....	3.30	2.86	20.00	21.78	11.16		8.84		0.08	
		Miscellaneous.											
6111	" 1	Rock Phosphate					20.12						
466	April	Fertilizer Number 1*.....	Wm. Swathwood, El Dorado Springs.		0.06		Trace						

13

*Chiefly Calcium Carbonate.

TABLE SHOWING PROPORTION OF SAMPLES ANALYZED THAT FAILED TO COME WITHIN THE MANUFACTURERS' GUARANTEE

Name of Manufacturer	Nitrogen			Phosphoric Acid, P ₂ O ₅						Potash, K ₂ O			Summary		
	No. of analyses with guarantee	No. of analyses below guarantee	Per cent of the analyses falling below the guarantee	Total			Available			No. of analyses with guarantee	No. of analyses below guarantee	Per cent of the analyses falling below guarantee	No. of analyses with guarantee	No. of analyses below guarantee	Per cent of the analyses falling below guarantee
				No. of analyses with guarantee	No. of analyses below guarantee	Per cent of the analyses falling below guarantee	No. of analyses with guarantee	No. of analyses below guarantee	Per cent of the analyses falling below guarantee						
Arkansas Fertilizer Company	2	0	0	3	0	0	3	3	100	3	1	33	11	4	36
Armour & Company	15	9	60	15	5	33	13	4	31	11	4	36	54	23	41
P. B. Mathiason & Company	3	3	100	3	1	33	3	2	67	3	2	67	12	8	67
Mayer Fertilizer Company	4	2	50	4	2	50	4	3	75	3	1	33	15	8	53
Empire Carbon Works	8	7	88	10	0	0	10	5	50	9	3	33	37	15	41
Morris & Company	5	0	0	5	2	40	3	2	67	3	1	33	16	5	31
Swift & Company	13	10	77	13	5	38	10	5	50	8	4	50	44	24	55
Tuscarora Fertilizer Company	5	4	80	6	0	0	4	2	50	4	3	75	19	9	47
Virginia Carolina Chemical Company	2	1	50	2	0	0	1	0	0	1	1	100	6	2	33
Total	57	36	63	61	15	25	51	26	51	45	20	44	214	97	45