Comparison of monoammonium phosphate and ammonium polyphosphate for wheat on fallow

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The fertilizers MAP 11-48-0 and APP 15-60-0 were compared for Manitou wheat on fallow on Scott loam in 1967, and on Scott loam and Whitewood loam in 1968. Each fertilizer was drilled with the seed at rates of 20, 40, 60, and 80 lb. P_2O_5 per acre.

Soil tests showed 23 lb/A available P in the Scott loam (0-6") at seeding time in 1967. Both fertilizers produced significant yield increases of wheat and yields of both grain and straw were almost identical for the two phosphate sources at each rate. In 1968, available P level in Scott loam on the plot site was 15 lb/A. Average yields of wheat grain were considerably lower than in 1967, but increases from fertilizer were slightly higher. Again the yields of grain and straw were quite similar at each rate of phosphate for the two sources. With 11-48-0, yields of both grain and straw increased with increasing rate of P_2O_5 applied up to the 80 lb. rate. Similar increases in yield of straw occurred with 15-60-0, but maximum yield of grain was obtained with the 40 lb. P_2O_5 rate.

On the Whitewood loam, having 8 lb/A available P at seeding time in 1968, yields of straw were slightly higher at all rates of 11-48-0, and also yields of grain were higher with the 20 and 40 lb. P_2O_5 rates. Average yield increases on this soil were markedly higher than on the Scott loam, with the highest P rate producing increases of 15 and 17 bu/A for 11-48-0 and 15-60-0 respectively.

Results on these two soils indicate that there is relatively little difference in effectiveness of these two phosphate sources for wheat. Any advantage in the 15-60-0 APP fertilizer would appear to be in the higher nutrient concentration. However, further comparison of these two phosphate sources is warranted under different climatic and soil moisture conditions and different soil types.

Table 1. Comparison of MAP and APP for wheat-grain yields.

Fertilizer and Rate		Grain yields - bu/A		
		Scott loam		Whitewood loam
		1967	1968	1968
11-48-0	20# P_2O_5	29.1	17.4	31.8
	40	29.9	20.2	38.5
	60	30.8	22.9	33.9
	80	29.1	23.2	39.2
15-60-0	20	30.1	18.2	25.4
	40	29.0	22.4	33.2
	60	31.1	22.5	36.4
	80	30.9	21.3	41.0
Check		26.2	15.2	23.9
Mean				
LSD (P=0.05)		2.8	2.8	7.2
Soil pH	0-6"	5.2	5.2	6.6
Soil NO_3-N	0-6"		19	34
(lb/A)	0-24"	101	37	42
$NaHCO_3$-P	0-6"	23	15	8
(lb/A)	6-12"	3	4	5
Exch-K	0-6"		1070	380
(lb/A)	6-12"		500	400

COMPARISON OF MONOAMMONIUM PHOSPHATE AND AMMONIUM POLYPHOSPHATE FERTILIZERS FOR WHEAT

J.M. Sadler

During the 1968 season, field trials were conducted to compare effects of application to wheat crop of ammonium polyphosphate (APP) and Monoammonium phosphate (MAP). Trials were of two types: strip plot applications of the two P fertilizers to assess yield differences, and 'A' value determinations on single row treatments of P^{32}-labelled fertilizers to assess crop utilization of the added P forms. Both sets of trials were carried out on a number of different soil types.

Results

a) The strip test results for 5 soil types and 3 levels of P application (Table 1), did not show any consistent trend. Results when averaged for soil type (Table 1) indicated small overall crop response to added P with inconsistent differences in yield response between MAP and APP treatments.

b) In the 'A' value work, the spring results (6 weeks from seeding) indicated that for 4 out of 5 soils used, crop utilization of APP fertilizer was greater than for MAP (Table 2). In the fall, siutation was reversed for the Weyburn soil. In the one trial which included condensed ammonium polyphosphate (Weyburn gleysol), crop utilization of CAPP fell between that of MAP and APP in the spring and was lower than both in the fall.

In addition to using soils in the same catenary sequence, the Wagner experiment included block treatments of 0, 500 and 1,000 lb P/acre on each of the soils. While results of this study (Table 3) showed wide differences between 'A' values for MAP and APP within block treatment, the differences were not consistent within each soil type.

Table 1. Yield Results - Polyphosphate Strip Tests - 1968

(Yields in bushels/acre and rates of application of fertilizer in lbs/acre)

Farmer Co-operator	Legal Location	Check Yield	Yield Increase over adjacent check					
			15 lb P_2O_5/acre		25 lb P_2O_5/acre		40 lb P_2O_5/acre	
			11-48-0	15-60-0	11-48-0	15-60-0	11-48-0	15-60-0
Bellamy* (Birch Hills)	NE24-46A-25-2	19.9	2.6	6.6	-1.1	2.5	2.4	1.2
Hoey (Hoey)	NW32-44-26-2	34.8	0.9	0.3	0.5	-0.6	5.7	3.1
Jensen (Milden)	NW3-30-12-3	34.6	-0.5	1.4	-0.5	1.3	-0.5	2.5
Popoff (Saskatoon)	SW5-36-3-3	33.8	7.2	4.0	2.7	1.0	8.6	3.6
Wagner* (Hague)	SE26-41-5-3	26.7	2.0	-0.4	2.7	4.1	8.5	7.3
YIELD AVERAGE		30.0	32.4	32.4	30.9	31.7	34.9	33.5

*The rates of application as stated are in doubt for these 2 trials. Visual response in the early growth stages suggested that the drill was not delivering uniformly.

Table 2. Comparison of P^{32} tagged Monoammonium phosphate (MAP), Ammonium Polyphosphate (APP), and Condensed Ammonium Polyphosphate (CAPP) as sources of P for wheat.

		A values											
		Spring						Fall					
		MAP		APP		CAPP		MAP		APP		CAPP	
Soil Type	Profile	Mean	Sx	Mean	Sx	Mean	Sx	Mean	Sx	Mean	Sx	Mean	Sx
Weyburn loam	Calc. Dk. Br.	38.6	3.8	33.1	2.8			81.0	5.3	90.2	4.7		
	Orthic Dk.Br.	15.6	2.1	8.8	0.8			28.8	2.9	28.2	2.4		
	Orthic Gleysol	22.2	3.0	30.7	5.8	25.8	5.7	46.9	3.4	60.8	5.3	66.9	11.1
Whitewood loam	Dark Grey Wooded	53.9	7.6	33.7	3.7			148.4	30.5	100.7	18.8		
Yorkton loam	Calc. Black	16.3	1.3	7.1	1.3			57.2	4.2	54.1	3.2		

MAP Monoammonium phosphate
APP Ammonium polyphosphate
CAPP Condensed ammonium polyphosphate

Table 3. A values - Wagner Site - 1968

Monoammonium Phosphate (MAP) v. Ammonium polyphosphate (APP) at 8 lb P/acre

Soil (Oxbow)	Block Treatment (lb P/acre)	A values			
		Spring		Fall	
		MAP	APP	MAP	APP
Calcareous	0	6.4	12.2	67.3	40.1
	500	2.9	3.4	78.5	237.4
	1000	32.3	0	318.1	180.9
Orthic	0	0	6.6	49.7	68.5
	500	11.8	124.2	175.4	1007.0
	1000	36.1	20.7	315.7	274.2
Eluviated	0	12.3	0	47.6	58.1
	500	11.7	40.8	--	--
	1000	85.4	66.4	315.9	548.6
Gleysol	0	0.9	0.3	127.3	33.3
	500	5.2	51.1	819.1	374.1
	1000	52.3	133.9	--	--