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Short Communication

Efficacy of Ammonium Polyphosphate as compared to Diammonium Phosphate

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Fertilizer application is an indispensable component of modern wheat production technology. Wheat responds to 30-150 kg P_2O_5 ha^{-1} depending upon the initial P status of the soil. Various P fertilizers are manufactured with varying percentages of water soluble P content. Since the response of crops to the water soluble phosphatic fertilizers varies in different soils, depending upon the reaction product formed, it is necessary to choose the more suitable P fertilizers for a crop in maximizing the efficiency and profitability from the investment in fertilizer P. The objective of the present investigation was to study the relative efficiency of liquid ammonium polyphosphate (APP) and diammonium phosphate (DAP) on wheat crop and also to elucidate suitable dose and method of application.

A field experiment was taken up on a Fleventic Ustochrept soil having pH 7.9, organic carbon 0.55%, Olsen's P 9.5 ppm. The treatments comprised of two sources (APP and DAP), three P_2O_5 levels (30, 60 and 90 kg ha^{-1}) and two methods of phosphorus application (with pre-sowing irrigation and with first irrigation). 60 kg P_2O_5 ha^{-1} through DAP and SSP applied at sowing and control (without phosphorus) were also included in the treatments. The experiment

Table 1 *Effect of levels, sources and methods of P application on yield and P uptake by wheat and available P left in the soil after harvest of crop*

Treatments	Grain yield (q ha^{-1})	Straw yield (q ha^{-1})	P uptake (kg ha^{-1})	Available P (ppm)
Control	31.4	46.7	11.7	9.5
At sowing :				
SSP (60)	36.9	52.8	13.1	14.2
DAP (60)	40.0	56.1	13.9	16.6
With pre-sowing irrigation :				
APP (30)	35.8	51.8	12.8	13.4
APP (60)	41.5	57.3	14.2	17.4
APP (90)	45.4	61.3	15.0	19.4
DAP (30)	34.0	49.7	12.4	11.4
DAP (60)	40.1	55.1	13.8	14.6
DAP (90)	42.1	57.4	14.3	18.5
With first irrigation :				
APP (30)	35.5	50.7	12.7	15.5
APP (60)	38.4	53.4	13.4	18.5
APP (90)	39.8	55.4	14.8	20.1
DAP (30)	32.8	47.9	12.0	13.7
DAP (60)	36.5	51.8	13.0	17.7
DAP (60)	38.7	55.1	14.8	20.0
C.D. 5%	1.1	1.5	0.3	0.6

was replicated four times in randomised block design. All the plots were given 120 kg N ha^{-1} through urea. Wheat (Lok-1) was the test crop. Grain and straw samples drawn at harvest were digested in triacid mixture and phosphorus in the digest was determined using method of Dickman and Bray (1940). Available phosphorus left in the soil after the harvest of wheat was also determined (Olsen *et al.* 1954).

Wheat responded significantly to P application upto 90 kg ha^{-1}, though the magnitude of increase in grain and straw yield was maximum with 60 kg P_2O_5 ha^{-1} (Table 1). Venugopalan & Prasad (1989a) also obtained similar response in Delhi soils. As a P source, APP was superior over DAP regardless of the level and method of application. APP, when applied with pre-sowing irrigation, resulted in higher yields than its application with first irrigation; whereas application of DAP with first irrigation was beneficial than its application with pre-sowing irrigation. Better performance of APP, when used with pre-sowing irrigation, is perhaps due to its slower hydrolysis, thus making enough available P during growth period. DAP application with pre-sowing irrigation perhaps encouraged reversion and led to lower availability.

The effect of P application on uptake of phosphorus was same as that on the yield. This is not unexpected since the concentration of P is unlikely to vary much within the range of P applied. The residual available P left in the soil after the harvest of wheat varied from 9.5 in control to 21.1 ppm in APP @90 kg P_2O_5 ha^{-1} with the first irrigation. Although all the P carriers increased available P, but APP led to a higher level of residual P. The greater availability of P in case of APP may be due to hydrolysis of pyrophosphate fraction to orthophosphate with the passage of time. Similar observations have also been recorded by Venugopalan & Prasad (1989b), Singh (1992) and Choudhary (1992).

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