SHORT COMMUNICATION

EFFECT OF MODIFIED AND SPLIT APPLICATION OF SSP ON AVAILABILITY OF PHOSPHORUS AT DIFFERENT GROWTH STAGES OF TRANSPLANTED RICE (*ORYZA SATIVA* L.)

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Abstract: A field study was carried out at instructional farm of Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad during *Kharif* season, 2010-11 to evaluate the effect of modified phosphatic fertilizer on apparent recovery and phosphorus content in soil and transplanted rice. The experiment was comprised with nine treatments i.e. (T_1) control, (T_2) 100% RDPF, (T_3) 50% basal +50% top dressing in one split at tillering stage, (T_4) 50% basal+50% top dressing in two split 25% at tillering and 25% at PI stage, (T_5) mahua oil coated SSP, (T_6) neem oil coated SSP (T_7) gypsum coated SSP, (T_8) cow dung coated SSP and (T_9) poultry manure coated SSP. These were replicated as thrice under randomized block design. Rice variety NDR-359 was taken as test crop. The experimental soil having pH (1:2.5) 8.8, EC 0.41 dSm^{-1}, organic carbon (0.27%), available nitrogen (188.54), P_2O_5 (16.64) and K_2O (254.83) kg ha^{-1}. The availability of phosphorus significantly increased with the application of phosphorus at all crop growth stages in soil over the control. The maximum available phosphorus was obtained with the application of phosphorus coated with gypsum at tillering, panicle initiation, milking and harvest stages (32.60, 29.20, 24.30 and 19.70 $kgPha^{-1}$), respectively which was significantly superior over mahua oil, cow dung, poultry manure coated and all split application and at par with neem oil coated SSP.

Keywords: Modified SSP, Rice, Salt affected soil, Phosphorus availability

INTRODUCTION

Indian soils are generally deficient in available phosphorus. About 15-20 percent of applied phosphate is available to current crop, and remaining part is converted into relatively unavailable forms due to fixation of P. SSP is one of the most common as well as cheapest fertilizer used by the farmers in India. The best management strategy with phosphorus is to build up to satisfactory level in soil where maintenance dose is needed not to mine the soil reserve but to reduce the extent of fixation. Coating of phosphatic fertilizers is important technique to enhance the availability of phosphorus. The modified and split application of phosphorus doses may reduce the extent of fixation and enhance the availability of phosphorus. (Singh, S. and Swami, B.N., 2006).

MATERIAL AND METHOD

The field experiment was conducted at Instructional Farm of Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) India. It was comprised of nine treatments viz (T_1) control, (T_2) 100% RDPF, (T_3) 50% basal +50% top dressing in one split at tillering stage, (T_4) 50% basal+50% top dressing in two split 25% at tillering stage and 25% at PI stage, (T_5) mahua oil coated SSP, (T_6) neem oil coated SSP (T_7) gypsum coated SSP, (T_8) cow dung coated SSP and (T_9) poultry manure coated SSP. It was replicated three times in randomized block design. Rice verity NDR-359 was taken as test crop. The experimental soil having pH (1:2.5) 8.8, EC 0.41dSm^{-1}, Organic carbon 0.27%, Available N 188.54, P_2O_5 16.64 and K_2O 254.83 kg ha^{-1}.The recommended dose of nitrogen and potassium were applied as per treatment in the plot basis before sowing. The various physico-chemical properties of soil were determined as per standard procedures. The available phosphorus was determined at different growth stages of the crop by 0.5M $NaHCO_3$ at pH 8.5 as procedure of Olsen's *et. al.*, 1954.

RESULT AND DISCUSSION

Grain yield

The grain yield of rice was influenced due to coated and split application of phosphatic fertilizer (SSP) in comparison to control. Application of gypsum coated SSP recorded higher grain yield of rice which was significantly superior over all the treatment except neem oil coated SSP and 50% basal + top dressing in two split 25% tillering stage + 25% panicle stage. This might be due to fact that less fixation of phosphorus and more availability of phosphorus because minimize the contact with soil. The results corroborates with the findings of Yadav *et. al.* (2009) and Bhattacharya *et. al.*(2011).

Availability of phosphorus

The availability of phosphorus in soil at different growth stages decreased with increasing the crop growth stages in all the treatments (Table). Maximum available phosphorus was measured at tillering (32.60 $kgha^{-1}$) and panicle initiation, milking and at harvest with the gypsum coated SSP followed

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by neem oil coated SSP, which was significantly superior over Mahua oil, cow dung and poultry manure coated SSP in all crop growth stages. This might be due to favorable effect of this modified material on SSP which regulates the phosphorus diffusion as well as reduce the surface area of SSP fertilizer The soil particles which may helped in retarding the P fixation consequently increased the availability of phosphorus through out the crop growth period. Subramanyam and Dixit (1988) also reported that release of P from coated superphosphate was high up to 4 week and then gradually declined and different coated form of SSP retained relatively higher quantity of water soluble P even at the end of 8 week period of incubation. Maximum available phosphorus in soil were measured 32.60, 29.20, 24.30 and 19.70 $kgha^{-1}$ at tillering, panicle initiation, milking and harvest stages respectively with gypsum coated SSP were significantly superior over mahua, poultry and cowdung coated SSP in all the stages of crop. Only neem coated SSP was found at par as regards the available P in soil. Application of recommended dose of phosphorus through SSP was found most effective in increase in availability of phosphorus during entire crop growth stages. Among the method of application of SSP three splits (50% basal + 25 % at tillering and 25% at Panicle Initiation stage) was found best for availability of P in soil followed by two splits. These results corroborates with findings of Sarkar and Chaudhary (1988).

It is concluded that modified SSP with coatings of Gypsum and neem oil and application SSP in three splits were found more effective in salt affected soil as regards to availability of phosphorus at different crop growth stages.

Table. Effect of modified and split application of SSP on yield and availability of phosphorus in soil under transplanted rice.

Treatment	Grain Yield ($kgha^{-1}$)	Available phosphorus ($kgha^{-1}$) in soil			
		Tillering	Panicle initiation	Milking	At harvest
T_1:Control	34.20	15.17	15.17	12.16	10.14
T_2 : 100% RDPF Basal @ 60kg P_2O_5 ha^{-1} through SSP	36.30	21.30	18.13	14.13	11.25
T_3: 50% Basal +50% Top dressing in one split at tillering stage	44.00	28.85	25.23	18.78	15.28
T_4: 50% Basal+ 50% Top dressing in two split 25% at tillering stage and 25% at PI stage	44.70	30.08	26.65	21.35	17.85
T_5: Mahua oil coated SSP (1:20)	42.50	27.12	23.85	19.78	16.88
T_6 : Neem oil coated SSP (1:20)	46.40	32.10	28.40	23.10	19.10
T_7 : Gypsum coated SSP (1:10)	49.50	32.60	29.20	24.30	19.70
T_8: Cow dung coated SSP (1:5)	38.80	23.18	20.12	15.52	12.42
T_9: Poultry manure coated SSP (1:10)	40.60	25.35	21.76	17.13	13.63
SEm±	1.69	1.12	0.98	0.78	0.64
C.D. at 5%	4.96	3.29	2.87	2.29	1.88

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