

Balance sheet of soil nitrogen and phosphorus *vis-a-vis* soybean productivity under different levels and sources of phosphorus and plant growth regulators in sub-humid Rajasthan

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ABSTRACT

An experiment was conducted at Udaipur during **kharif** seasons of 2009 and 2010 on soybean crop involving 27 treatments i. e. three levels (20, 30 and 40 kg P₂O₅/ha) and three sources (single super phosphate or SSP, phosphorus rich organic manure or PROM and di-ammonium phosphate or DAP) of phosphorus in main plots and three plant growth regulators or PGRs (water spray, benzyl adenine 50 ppm and NAA 100 ppm) in sub-plots of a split plot design having three replications. Results revealed that 40 kg P₂O₅/ha, SSP and NAA recorded a pooled grain and stover yields of 25.95 and 37.37, 25.12 and 36.23, and 24.23 and 35.73 q/ha, respectively, which were not only maximum but also significantly superior to their respective counter treatments. Higher soybean productivity recorded in 40 kg P₂O₅/ha, SSP and NAA treatments linked with considerably higher mean uptake of nitrogen and P₂O₅ which were 243.96 and 24.79; 228.10 and 24.52 and 229.90 and 23.44 kg/ha, respectively. Data on actual soil nitrogen status after crop harvest or E values (kg/ha) showed that among different levels of phosphorus, mean N ranged from 269.52 at 20 kg P₂O₅ to 298.24 at 40 kg P₂O₅/ha, while mean P₂O₅ varied between 23.41 at 20 kg P₂O₅ and 25.99 at 40 kg P₂O₅/ha. Among different phosphorus sources, the order of mean E values (kg/ha) for N were PROM (294.93)>DAP (281.69)>SSP (275.98) but order for mean E P₂O₅ values was SSP (26.09)>PROM (24.33)>DAP (24.31). Among PGRs, the order for mean E values of N and P₂O₅ (kg/ha) was NAA (286.47 and 25.00)>benzyl adenine (284.64 and 24.79)>water spray (281.48 and 24.39). Data on actual mean gain or loss (G=E-initial soil nutrient status) of N showed that different levels and sources of phosphorus as well as PGRs recorded a negative balance ranging from -2.94 kg/ha at 40 kg P₂O₅/ha to -31.67 kg/ha at 20 kg P₂O₅/ha. Contrary to N, different levels and sources of phosphorus as well as PGRs recorded a positive balance in mean G values (kg/ha) that for various P₂O₅ levels ranged from 0.25 at 20 kg P₂O₅/ha to 2.83 at 40 kg P₂O₅/ha; for different phosphorus sources between 0.99 in DAP to 2.56 in SSP and between 1.63 in benzyl adenine to 1.84 in NAA among PGRs evaluated in this study.