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BIOCHEMICAL STUDIES IN SOYBEAN AS INFLUENCED BY DIFFERENT SOURCES AND LEVELS OF PHOSPHORUS

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The field experiment was conducted during *kharif* season of 1993-94, to study the influence of different sources and levels of phosphorus on biochemcial studies. The chlorophyll, plant nitrogen, root nodule nitrogen, plant phosphorus and potassium content was significantly increased with increase in levels of P_2O_5 than the sources BM or SSP in soybean. The interactions were nonsignificant except in plant nitrogen content.

Keywords : Biochemical studies; Phosphorus; Soybean.

Soybean is an important oil seed crop which contains bacteria in their root nodules that fixes atmospheric nitrogen and improves the soil, as such reduces cost of valuable inputs. Its soil requirement and growth period is flexible. Realising the importance of this crop, efforts are now being made to increase its area in the country.

Phosphorus one of the three major plant nutrient plays major role in several plant metabolic and energy transformation processes in plant. It is responsible for utilization of starch and sugar in photosynthesis, nucleus formation and cell division[1]. Phosphorus is a constituent of nucleic acid phytin, phospholipids and majority of enzymes which plays major role in transformation of energy in carbohydrate and fat metabolism and also in respiration in plants. An experiment was laid out to analyse the influence of different sources and levels of phosphorus on biochemical studies in soybean.

The experiment was carried out in *kharif* season 1993-94 in the experimental farm of Botany Section, College of Agriculture, Nagpur, with 12 treatments. Bone meal and single super phosphate each with six levels of 0, 25, 50, 75, 100 and 125 kg P_2O_5 ha^{-1}. The experiment was laid out in FRBD in four replications. The spacing was 45 x 15 cm with 3.60 x 2.70 m and 2.25 x 2.40 m gross and net plot size. The sowing was undertaken on 10th July 1993. The cultivar was PKV-1. N at the rate of 30 kg ha^{-1} was applied through urea to all the plots. BM, SSP and urea were applied at the time of sowing. Sulphur and calcium present in SSP was compensated by application of gypsum to bone meal plots.

Total chlorophyll content of leaves determined at peak flowering stage reveal that total chlorophyll content of leaves was not influenced significantly by BM or SSP when averaged over treatments. Chlorophyll content was significantly increased with increase in doses of P_2O_5 except at 100 kg over 75 kg P_2O_5 ha^{-1}. Total chlorophyll content in leaves of treated plants was significantly increased with 5.73 and 22.20 per cent with 25 and 125 kg P_2O_5 ha^{-1} over control. Interactions were found non significant (Table 1).

It was found that plant nitrogen content was significantly decreased in BM by 7.85 per cent at 7.5 DAS than SSP. Nitrogen content was significantly increased from 25 to 125 kg P_2O_5 ha^{-1} over control. Interactions were found significant where 25, 50, 75 and 100 kg P_2O_5 ha^{-1} levels of SSP were more effective than BM in increasing plant N.

Table 1. Effect of varying levels and sources of phosphorus on chlorophyll content (mg g^{-1}), plant nitrogen content (%), root nodule nitrogen content (%) plant phosphorus and potassium content (%) in soybean.

Treatment	Chlorphyll content (mg g^{-1}) 55 DAS			Nitrogen content (%) 75 DAS			Root nodule nitrogen content (%) 75 DAS			Phosphorus content (%) 75 DAS			Potassium content (%) 75 DAS		
	SSP	BM	Mean	SSP	BM	Mean	SSP	BM	Mean	SSP	BM	Mean	SSP	BM	Mean
Control	0.8057	0.8129	0.8093	1.89	1.71	1.80	2.70	2.06	2.38	5.37	5.62	5.49	9.50	10.25	19.87
25 kg	0.8448	0.8666	0.8557	2.06	1.83	1.94	3.51	2.60	3.05	5.74	5.87	5.80	11.31	11.62	11.46
50 kg	0.8825	0.8984	0.8904	2.31	2.03	2.17	3.91	3.34	3.62	5.99	6.28	6.13	11.56	12.87	12.21
75 kg	0.9144	0.9419	0.9281	2.60	2.27	2.45	4.25	4.14	4.19	6.37	6.43	6.40	12.62	13.87	13.24
100 kg	0.9680	0.9376	0.9528	2.71	2.50	2.60	4.88	4.30	4.59	6.84	7.21	7.02	13.87	14.87	14.37
125 kg	1.0028	0.9753	0.9890	2.95	3.06	3.00	5.11	5.07	5.09	7.52	7.59	7.55	15.56	16.12	15.84
Mean	0.9030	0.9054		2.42	2.23		4.06	3.59		6.30	6.50		12.40	12.83	
% Deviation		(+0.26)			(-7.85)			(-11.57)			(+3.17)			(+3.46)	
Source SE±		0.006			0.02			0.09			0.04			0.11	
CD (5%)		N.S.			0.08			0.25			0.13			0.32	
Treatment SE±		0.0104			0.05			0.15			0.08			0.19	
CD (5%)		0.0298			0.14			0.44			0.24			0.56	
Interactions SE±		0.0148			0.07			0.22			0.11			0.27	
CD (5%)		N.S.			0.20			N.S.			N.S.			N.S.	

Similar results were also obtained by Singh and Prasad[2].

The root nodule nitrogen significantly reduced in BM by 11.57 per cent at pod development than SSP. Increasing levels of P_2O_5 significantly increased root nodule nitrogen. Interactions were not significant. Singh and Ram[3] reported that application of P increases the nitrogen content significantly in root nodules of plants.

Phosphorus content was significantly increased in BM treated plants at pod development stage (75 DAS) by 3.17 per cent. Phosphorus content in plant was significantly increased from initial level of 25 kg P_2O_5 ha^{-1} to their subsequent higher levels of P_2O_5 i.e. 125 kg P_2O_5 ha^{-1} over control when averaged over BM and SSP. Interactions were non significant. Shinde *et al.*[4] reported increase in P content of seed and straw of soybean by P application.

Potassium content significantly increased at pod development stage (75 DAS). At pod development stage i.e. content in plants treated with BM was significantly increased than SSP. All levels of phosphorus from 25 to 125 kg P_2O_5 ha^{-1} was significantly superior over their previous levels and control when averaged over BM and SSP. Interactions were found non significant.

Considering the over all data, levels of phosphorus increased chlorophyll nitrogen, phosphorus and potassium content in shoot and nitrogen in root nodules significantly. The interactions were significant only in plant nitrogen content.

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