

Effect of P and S on yield, nutrient uptake and quality of French bean (*Phaseolus vulgaris* L.)

R.N. Singh¹, Devanand² and Shikha Tripathi³

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ABSTRACT : The microplot experiment conducted in Pot Culture House of department of Soil Science and Agricultural Chemistry, C.S. Azad University of Agriculture and Technology, Kanpur, during rabi season of 2012-13 to assess the effect of P and S on yield, nutrient content and their uptake and quality of French bean (*Phaseolus vulgaris* L.) of variety Uday, showed that the application of P and S increased the yield attributes i.e. no. of pods/plant, no of seeds/pod and test weight of 100 seeds and straw yields upto 90 kg P₂O₅/ha, whereas S application increased these parameters only upto 40 kg S/ha, and there after decreased at 60 kg S/ha level. On an average, the highest seed and straw yields of 24.54 and 24.96 q/ha were computed 22.27 and 21.75 per cent higher in comparison to lowest seed and straw yield of 20.07 and 20.50 q/ha at control, respectively. Likewise, on an average, the highest seed (23.98 q/ha) and straw (24.35 q/ha) yields at 40 kg S/ha were computed 12.58 and 11.69 per cent higher than the lowest seed (21.30 q/ha) and straw (21.80 q/ha) yields obtained at control (0 kg S/ha), respectively. P and S showed antagonistic effect to their content and their uptake. The N, P and S uptake was found significantly higher at 90 kg P/ha. However, P uptake was found highest on 40kg S/ha, thereafter decreased at 60 kg S/ha. The protein content increased significantly upto highest levels of P and S i.e. 90kg P₂O₅ and 60 kg S/ha.

Key Words : French bean (*Phaseolus vulgaris*), P and S nutrition, nutrients uptake, yield, protein content.

Table-1 : Effect of P and S on yield attributes.

P levels (kg/ha)	S levels (kg/ha)				Average
	0	20	40	60	
No. of pods/plant					
0	3.90	4.05	4.20	4.18	4.08
30	4.42	4.66	5.02	5.00	4.78
60	5.11	5.35	5.60	5.40	5.37
90	5.35	5.45	5.72	5.68	5.55
Average	4.70	4.88	5.14	5.07	-
		P	S	PxS	
		SE (diff)	0.11	0.11	0.23
		CD (0.05)	0.23	0.23	NS
No. of seeds/pod					
P levels (kg/ha)					
0	6.34	6.37	6.38	6.40	6.37
30	6.40	6.48	6.51	6.51	6.48
60	6.67	6.75	6.83	6.80	6.76
90	6.78	6.84	6.87	6.87	6.84
Average	6.55	6.61	6.65	6.64	-
		P	S	PxS	
		SE (diff)	0.05	0.05	0.10
		CD (0.05)	0.11	0.11	NS
Test weight – 100 seeds (g)					
P levels (kg/ha)					
0	32.25	32.50	32.75	32.60	32.53
30	33.80	34.00	34.25	34.20	34.06
60	34.50	34.70	34.90	34.80	34.73
90	34.75	34.90	35.10	34.90	34.91
Average	33.83	34.03	34.25	34.13	-
		P	S	PxS	
		SE (diff)	0.23	0.23	0.46
		CD (0.05)	0.47	0.47	NS

Table-2 : Effect of P and S on yield (q/ha).

P levels (kg/ha)	S levels (kg/ha)				Average
	0	20	40	60	
Seed yield					
0	18.61	19.96	20.94	20.78	20.07
30	21.00	22.24	23.99	23.92	22.79
60	22.50	24.60	25.50	24.90	24.37
90	23.10	24.60	25.48	25.40	24.54
Average	21.30	22.85	23.98	23.75	-
		P	S	PxS	
	SE (diff)	0.37	0.37	0.75	
	CD (0.05)	0.76	0.76	NS	
Straw yield					
P levels (kg/ha)					
0	19.74	20.10	21.10	21.00	20.50
30	21.11	22.30	24.19	23.98	22.89
60	24.91	25.02	26.11	25.53	24.89
90	23.46	25.00	26.00	25.40	24.96
Average	21.80	23.12	24.35	23.98	-
		P	S	PxS	
	SE (diff)	0.42	0.42	0.83	
	CD (0.05)	0.85	0.85	NS	

Table-3 : Effect of P and S on average nutrients content (%).

Nutrient levels (kg/ha)	N content		P content		S content	
	Seed	Straw	Seed	Straw	Seed	Straw
Phosphorus						
0	3.22	0.82	0.39	0.12	0.31	0.15
30	3.40	0.93	0.42	0.16	0.33	0.18
60	3.51	1.01	0.44	0.17	0.33	0.17
90	3.52	1.01	0.45	0.18	0.31	0.15
	P	S	P	S	P	S
SE (diff)	0.026	0.019	0.009	0.006	0.002	0.001
CD (0.05)	0.052	0.038	0.018	0.012	0.004	0.002
Sulphur						
0	3.26	0.85	0.42	0.15	0.31	0.12
20	3.41	0.93	0.44	0.17	0.33	0.16
40	3.49	0.99	0.43	0.16	0.33	0.18
60	3.50	0.99	0.42	0.15	0.31	0.19
	P	S	P	S	P	S
SE (diff)	0.026	0.019	0.009	0.006	0.002	0.001
CD (0.05)	0.052	0.038	0.018	0.012	0.004	0.002

Table-4 : Effect of P and S on average uptake of nutrients (kg/ha).

Nutrient levels (kg/ha)	N Uptake		P Uptake		S Uptake	
	Seed	Straw	Seed	Straw	Seed	Straw
Phosphorus						
0	64.68	16.85	7.83	2.62	6.36	3.14
30	77.77	21.36	9.57	3.67	7.68	4.16
60	85.60	25.15	10.85	4.23	8.01	4.32
90	86.89	25.18	11.02	4.43	7.60	3.76
	P	S	P	S	P	S
SE (diff)	0.95	0.07	0.22	0.07	0.12	0.04
CD (0.05)	1.89	1.03	0.45	0.14	0.25	0.08
Sulphur						
0	69.67	18.77	8.93	3.31	5.77	2.62
20	78.17	21.80	10.05	3.98	7.32	3.65
40	83.84	24.19	10.40	3.98	8.27	4.51
60	83.34	23.80	9.89	3.68	8.29	4.59
	P	S	P	S	P	S
SE (diff)	0.95	0.07	0.22	0.07	0.12	0.04
CD (0.05)	1.89	1.03	0.45	0.14	0.25	0.08

Table-5 : Effect of P and S on average protein content in seed (%).

P levels (kg/ha)	Sulphur levels (kg/ha)				Average
	0	20	40	60	
0	19.06	19.93	20.62	21.00	20.15
30	20.31	21.31	21.62	21.87	21.28
60	21.00	21.87	22.50	22.31	21.92
90	21.12	22.12	22.44	22.37	22.01
Average	20.37	21.31	21.79	21.89	-
		P	S	PxS	
	SE (diff)	0.026	0.026	0.51	
	CD (0.05)	0.052	0.052	NS	

