

## EFFECT OF NITROGEN AND SULPHUR ON DRY MATTER ACCUMULATION, NITROGEN AND SULPHUR UPTAKE AND CHLOROPHYLL CONTENT IN LINSEED(*Linum usitatissimum* L.) CV. NEELAM

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### ABSTRACT

The Research work entitled "Effect of Nitrogen and Sulphur on Dry matter Accumulation, Nitrogen and Sulphur uptake and chlorophyll content in Linseed (*Linum usitatissimum* L.) cv. Neelam" was carried at College Research Farm, Chandeshwar, Azamgarh (U.P.) with nine treatments in four replications in randomized block design. The treatment combinations of Nitrogen (N) and Sulphur (S) were N<sub>40</sub>, N<sub>80</sub>, S<sub>20</sub>, S<sub>40</sub>, N<sub>40</sub>S<sub>20</sub>, N<sub>40</sub>S<sub>40</sub>, N<sub>80</sub>S<sub>20</sub>, N<sub>80</sub>S<sub>40</sub> and untreated control. The statistically analysed data show that the treatment of nitrogen and sulphur alone or in combination showed better results than untreated control. The treatment N<sub>80</sub> and S<sub>40</sub> were found more effective than their lower dose as well as untreated control but less effective than their combined effect. N<sub>80</sub>S<sub>40</sub> was found more effective than all the treatments in increasing dry matter accumulation, N- and S- uptake and chlorophyll content at different intervals and stages respectively in linseed cv. Neelam.

**KEYWORDS :** Dry matter accumulation (DMA), Days after sowing (DAS), Nitrogen uptake (N-uptake), Sulphur uptake (S-uptake)

Linseed or flax has got a specific importance and fourth most important oilseed crops in India. Researches on crop physiological and agronomical practices have been shown that the dry matter accumulation, N- and S-uptake and chlorophyll content can be increased considerably at different intervals and stages of plant growth with judicious application of nitrogen and sulphur. Raghubansi et al., (1987) observed an increase in dry weight/plant with the application of 60 kg N/ha. Similar results were also obtained by Thakur et al., (1997) and Singh and Vyas, (1998) respectively. Singh and Saran, (1987) also reported an increase in S-uptake with sulphur application. Singh et al., (2000) obtained an increase in chlorophyll content.

Keeping in view the importance of Nitrogen and Sulphur, the field experiment was conducted to see the effect of N and S on dry matter, N-uptake, S-uptake and chlorophyll content in linseed cv. Neelam.

### MATERIALS AND METHODS

At the time of land preparation urea granules and elemental sulphur were used to supply 40 and 80 kg N/ha; as well as 20 and 40 kg S/ha alone and in combination. The seeds of linseed (*Linum usitatissimum* L.) cv. Neelam treated with bovistin @ 2g/kg seed, were sown @ 25 kg/ha in furrows opened by kudali maintaining a distance of 20 cm

with 3-4 cm depth on Nov. 10, 2010 and Nov. 12, 2011 respectively. During the crop season, light irrigation was done at 25, 40, 55 and 70 days after sowing. Interculture operation was done to remove the weeds. The data on dry matter accumulation g/plant at 30, 60 and 90 DAS; N-uptake and S-uptake kg/ha at pre-flowering, post-flowering and at harvest (in seed and straw); and chlorophyll content mg/g fresh weight at 30, 60 and 90 DAS were recorded. The data were statistically analysed.

### RESULTS AND DISCUSSION

In an experiment the application of nitrogen and sulphur were found to increase the dry matter/plant at different stages of linseed plants. The higher dose of nitrogen and sulphur were found superior to their lower doses. The combined effect of Nitrogen and Sulphur was better than the N and S applied alone. It was 0.149, 1.08 and 3.07 g/plant in N<sub>80</sub>; 0.146, 0.95 and 2.84 g/plant in S<sub>40</sub> and 0.168, 1.45 and 3.15 g/plant in N<sub>80</sub>S<sub>40</sub> treated plants whereas in the control plants it was 0.129, 0.76 and 2.24 g/plant respectively (Table, 1). Similar results were also obtained by Gaur et al., 1992 and Singh et al., 2000 respectively.

The N-uptake were also found to increase with the increase in Nitrogen application in linseed cv. Neelam at pre-flowering, post-flowering and at harvest stages of crop.

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Table 1: Effect of Nitrogen (N) and Sulphur (S) on Dry matter accumulation, Nitrogen (N) and Sulphur (S) uptake and Chlorophyll content in Linseed (*Linum usitatissimum* L.) cv. Neelam

Treatments	Dry matter g/Plant at			N-uptake kg/ha				S-uptake kg/ha				Chlorophyll content mg/g		
	30 DAS	60 DAS	90 DAS	At harvest In		Flowering post	Flowering pre	At harvest In		Flowering post	Flowering pre	Chlorophyll content mg/g		
				Seed	Straw			Seed	Straw			30 DAS	60 DAS	90 DAS
Control	0.129	0.76	2.24	8.28	57.43	34.74	20.61	1.82	17.19	5.65	13.60	1.32	4.17	6.19
N <sub>40</sub>	0.141	0.91	2.79	11.11	89.96	39.85	27.21	1.92	17.84	5.71	13.56	1.45	4.42	6.43
N <sub>80</sub>	0.149	1.08	3.07	13.33	116.55	44.41	32.31	2.01	19.30	5.80	13.60	1.48	4.46	6.47
S <sub>20</sub>	0.140	0.89	2.70	11.23	87.21	39.32	26.08	1.94	17.95	7.13	13.95	1.40	4.33	6.36
S <sub>40</sub>	0.146	0.95	2.84	12.51	98.58	42.38	30.00	2.19	20.39	7.31	14.00	1.50	4.44	6.44
N <sub>40</sub> S <sub>20</sub>	0.145	1.15	2.92	13.40	102.10	40.85	26.65	1.88	18.30	7.78	14.15	1.43	4.48	6.45
N <sub>40</sub> S <sub>40</sub>	0.154	1.35	2.44	13.95	105.25	40.30	30.20	2.26	20.80	7.85	14.55	1.55	4.55	6.48
N <sub>80</sub> S <sub>20</sub>	0.160	1.30	3.12	14.40	116.00	42.55	31.20	2.14	27.70	8.25	14.80	1.45	4.60	6.51
N <sub>80</sub> S <sub>40</sub>	0.168	1.45	3.15	15.65	128.40	49.80	36.95	2.15	23.35	8.55	15.00	1.62	4.64	6.52
Mean	0.148	1.19	2.86	12.64	100.02	41.64	29.02	2.02	19.64	7.11	14.13	1.46	4.45	6.42

Also, the application of sulphur was found to increase the S-uptake at different stages of growth over control. The N-uptake in control was 8.28 and 57.43 kg/ha at pre-flowering and post-flowering stage whereas it was 13.33 and 116.55 kg/ha in N<sub>80</sub>; 12.51 and 98.58 kg/ha in S<sub>40</sub>; 15.65 and 128.40 kg/ha in N<sub>80</sub>S<sub>40</sub> treated plants at pre- and post-flowering stage respectively. Similarly at harvest stage, the uptake of N and S was also found to increase over control in seed and straw (Table-1). similar results were also obtained by Khan and Agrawal,(1983) and Dwivedi and Patel, (1987) respectively.

The amount of chlorophyll in untreated control was 1.32, 4.17 and 6.19 mg/g fresh weight at 30, 60 and 90 DAS whereas it was 1.48, 4.46 and 6.47 mg/g in N<sub>80</sub>; 1.50, 4.44 and 6.44 mg/g in S<sub>40</sub>; 1.62, 4.64 and 6.53 mg/g fresh weight in N<sub>80</sub>S<sub>40</sub> treated plants respectively (Table,1). Karwasra et al., (1985) and Singh et al., (2000) also obtained an increase in chlorophyll content with the application of N and S respectively.

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