



Research Article

## Effect of cultivar and graded levels of fertilizer on quality and yield of soybean

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**Abstract :** The field experiment was conducted at Department of Agronomy, College of Agriculture, Latur (M.S.), during *Kharif* season of 2008-2009. The experiment comprised of five soybean cultivars in main plots and 3 levels of fertilizer in sub plots of split plot design was replicated thrice. Results clearly indicated that cultivar MAUS-71 at fertilizer level 30:60:30 NPK kg ha<sup>-1</sup> recorded significantly more seed yield, stalk yield, harvest index, oil yield, protein yield and phosphorus uptake.

**Key Words :** Graded levels of fertilizer, Phosphorus, Potash correction, Soybean

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### INTRODUCTION

Soybean is the crop of warm temperature to tropical zone, thriving best in wide range of pH and soil types. There must be good conditions for obtaining higher yield, good yield can be achieved by balanced nutrition along with N and adequate supply phosphate and potash is highly important. Nitrogen is essential constituent of protein and chlorophyll, which is present in many other compounds of great physiological importance in plant metabolism such as nucleotide, phospholipids, enzyme, hormones vitamins, etc. Phosphorus plays important role in growth, development and maturity out of total uptake of phosphorus comes into grain, therefore, application of phosphorus is most intensive cropping coupled with increased use of nitrogen and phosphorus, lower use of organic manures and very low rates of application or practically no application of K. The resources of K and S in most of the soil of this region have

started depleting and are limiting of soil productivity, low seed production and inferior quality of oil and protein of oil seed crops are also due to various constraints. Keeping these views, the present investigation was undertaken.

### EXPERIMENTAL METHODS

The field experiment was conducted during *Kharif* season 2008-09 at the experimental farm, Agronomy Section, College of Agriculture, Latur (M.S.). The soil of experimental field was clayey in texture, medium in available nitrogen (205 kg/ha), medium in available phosphorus (15.70 kg/ha), high in available potassium (479 kg/ha) and low in sulphate. The soil was slightly alkaline in reaction (8.05). The experiment was laid out in split plot design with three replications, in main plot treatments five, different cultivars viz., V<sub>1</sub> JS-335, V<sub>2</sub> MAU-47 were taken, three graded levels of fertilizer viz., F<sub>1</sub> 15:30:15 kg NPK/ha, F<sub>2</sub> 30:60:30 kg NPK/ha and F<sub>3</sub> 45:90:45 were included in sub-plot. The precipitation received during crop growth season was 398.9 mm and distributed over 22 rainy days during the course of experimentation, sowing was done on 26 July 2008. The sowing was done by dibbling with 2 seeds per hill at a distance of 45 x 5 cm at about 2.5 cm depth. The complete dose of nitrogen, phosphorus and potash was drilled at

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sowing uniformly in the plot.

## EXPERIMENTAL RESULTS AND ANALYSIS

The results obtained from the present study have been presented under following heads :

### Cultivars:

Data on plant grain yield presented in Table 1 revealed that soybean cultivars differed significantly in respect of their grain yield cultivar MAUS-71 recorded higher grain yield (2210 kg ha<sup>-1</sup>) over MAUS-81, JS-335, JS-93-5 and MAUS-47 in general. The yield levels of soybean cultivars were directly proportionate that of duration in terms of stalk yield cultivar MAUS-71 being tall in habit recorded maximum straw yield which was significantly more than rest of the cultivars while maximum harvest index was observed in MAUS-81 which was followed by JS-335.

It was observed that cultivar JS-93-5 had highest protein content (40.58%), which was significantly superior over cultivar JS-335 and cultivar MAUS-81, while at par with cultivar MAUS-71 and cultivar MAUS-47 (Table 2). In terms of oil content cultivar MAUS-81 recorded maximum oil content (21.63%) which was significantly superior over cultivar MAUS-71, JS-93-5, and MAUS-47 while at par with cultivar JS-335. The values of phosphorus uptake were non

**Table 1 : Seed yield, stalk yield and harvest index as influenced by varieties and fertilizer levels**

Treatments	Grain yield (kg ha <sup>-1</sup> )	Stalk yield (kg ha <sup>-1</sup> )	Harvest index
<b>Cultivars</b>			
V <sub>1</sub> -JS-335	1192	2608	42.23
V <sub>2</sub> -MAUS-81	2130	2813	43.31
V <sub>3</sub> -MAUS-71	2210	3061	41.74
V <sub>4</sub> -JS-93-5	1812	2400	41.52
V <sub>5</sub> -MAUS-47	1540	2205	40.99
S.E. ±	47	153	
C.D. (P=0.05)	139	541	
<b>Graded levels of fertilizer (kg NPK ha<sup>-1</sup>)</b>			
F <sub>1</sub> - 15:30:15	1845	2588	42.74
F <sub>2</sub> - 30:60:30	2065	2903	24.41
F <sub>2</sub> - 45:90:45	1928	2863	41.27
S.E. ±	47	124	--
C.D. (P=0.05)	139	368	--
<b>Interaction (V x F)</b>			
S.E. ±	110	289	
C.D. (P=0.05)	NS	NS	
G.M.	1140	2696	42.02

NS=Non-significant

**Table 2 : Oil content, protein content and phosphorus uptake as influenced by varieties fertilizer levels**

Treatments	Oil content (%)	Protein content (%)	P uptake (kg/ha)
<b>Cultivars</b>			
V <sub>1</sub> -JS-335	21.44	39.51	21.10
V <sub>2</sub> -MAUS-81	21.63	38.88	21.75
V <sub>3</sub> -MAUS-71	21.09	39.95	22.43
V <sub>4</sub> -JS-93-5	21.27	40.58	21.40
V <sub>5</sub> -MAUS-47	20.13	40.13	21.30
S.E.	0.07	0.22	0.38
C.D. (P=0.05)	0.22	0.66	NS
<b>Graded levels of fertilizer (kg NPK ha<sup>-1</sup>)</b>			
F <sub>1</sub> - 15:30:15	20.89	39.27	16.43
F <sub>2</sub> - 30:60:30	21.11	40.40	22.21
F <sub>2</sub> - 45:90:45	21.34	39.76	25.55
S.E.	0.05	0.13	0.41
C.D. (P=0.05)	0.15	0.40	1.21
<b>Interaction (V x F)</b>			
S.E.	0.11	0.30	0.91
C.D. (P=0.05)	NS	0.89	NS
G.M.	21.11	39.81	21.52

NS=Non-significant

significant due to different cultivars while cultivar MAUS-71 recorded highest phosphorus uptake followed by MAUS-81, JS-335, JS-93-5 and MAUS-47.

### Graded levels of fertilizers:

Fertilizer treatment F<sub>2</sub> 30:60:30 NPK kg ha<sup>-1</sup> gave maximum grain yield which was significantly higher than rest of the fertilizer treatment under study. Lowest grain yield was recorded in fertilizer treatment F<sub>1</sub> 15:30:15 NPK kg ha<sup>-1</sup>. The trend of straw yield due to fertilizer treatment was similar to that of grain yield (Table 1).

Application of fertilizer 30:60:30 kg NPK/ha recorded maximum protein content (40.40 %) which was significantly superior over rest of the fertilizer grade. In terms of oil content application fertilizer grade 45:90:45 kg NPK/ha recorded maximum oil content (21.34 %) which was significantly superior over rest of the fertilizer grade. Fertilizer grade 45:90:45 kg NPK/ha recorded significantly highest phosphorus uptake over rest of the treatment (Table 2). Response of soybean to nitrogen and phosphorus were also studied by different workers (Jayant and Ganesharaya, 1990; Vara *et al.*, 1994; Vyas *et al.*, 1987).

**Table 3 : Simple correlation of seed yield with yield attributing characters**

Particulars	Plant height (cm)	Dry matter (g/plant)	Protein content (%)	No. of pods plant <sup>-1</sup>	No. of leaves plant <sup>-1</sup>	No. of branches plant <sup>-1</sup>	Oil content (%)	Grain yield (kg/ha)
Plant height (cm)	1.00	0.631**	-0.151	0.824**	-0.955**	0.276	0.887**	0.754**
Dry matter (g/plant)		1.00	-0.021	0.742**	-0.530*	0.755**	0.495**	0.914**
Protein content (%)			1.00	-0.368	0.300	0.081	-0.244	-0.33
No. of pods plant <sup>-1</sup>				1.00	-0.770**	0.450	0.844**	0.795**
No. of leaves plant <sup>-1</sup>					1.00	-0.116	-0.847**	-0.639**
No. of branches plant <sup>-1</sup>						1.00	0.130	0.720**
Oil content (%)							1.00	0.628**
Grain yield (kg/ha)								1.00

**Correlation:**

Data presented in Table 3 revealed that positive and highly significant correlation were observed between seed yield (kg ha<sup>-1</sup>) and plant character viz., plant height (cm) (4=0.754\*\*), dry matter (g) (r=0.914\*\*), number of pods per plant (4=0.795), number of branches per plant (r=0.720\*\*) oil content (%) (r=0.628\*\*) negative but highly significant correlation were observed seed yield (kg ha<sup>-1</sup>) and the plant characters number of leaves per plant (r=0.639\*\*) negative but non significant correlation was observed between seed yield (kg ha<sup>-1</sup>) and plant characters dry matter (g): (r=0.033). None of the interaction was found significant.

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