Research Paper

ADVANCE RESEARCH JOURNAL OF
C R P
IMPROVEMENT
Volume 5 | Issue 1 | June, 2014 | 26-28

e ISSN-2231-640X
Open Access-*www.researchjournal.co.in*

Growth and yield of soybean genotypes as influenced by different fertilizer levels

■ H.S. GARUD, S.U. PAWAR[1], V.B. AWASARMAL[1], S.S. SOLUNKE[1] AND B.V. ASEWAR[1]

AUTHORS' INFO

Associated Co-author :
[1]Vasantrao Naik Marathwada Krishi Vidyapeeth, PARBHANI (M.S.) INDIA

Author for correspondence :
H. S. GARUD
Vasantrao Naik Marathwada Krishi Vidyapeeth, PARBHANI (M.S.) INDIA

ABSTRACT : The field investigation on response of soybean genotypes to different fertilizer levels was carried out at research farm, Department of Agronomy, College of Agriculture, V.N.M.K.V., Parbhani (M.S.). The experiment was laid down in split-plot design with 12 treatment combinations comprising of four varieties *i.e.* JS-335 (V_1), MAUS – 162 (V_2), MAUS – 71 (V_3) and MAUS – 158 (V_4) as main plot treatments and three fertilizer levels *i.e.* 75% RDF as 23.5:45:23.5 kg ha^{-1} N, P and K_2O (F_1), 100% RDF as 30:60:30 kg ha^{-1} N P_2O_5 and K_2O. (F_2) and 125 % RDF as 37.5:75:37.5 kg ha^{-1} N, P_2O_5 and K_2O (F_3) as subplot treatments. Variety MAUS – 158 and application of 100% RDF recorded significantly higher plant height, number of functional leaves, number of branches, leaf area as well as total dry matter per plant, seed, straw and biological yield, as compared to the rest of the varieties and fertilizer levels.

Key Words : Soybean , Fertilizer, Genotypes, Growth, Yield

How to cite this paper : Garud, H.S., Pawar, S.U., Awasarmal, V.B., Solunke, S.S. and Asewar, B.V. (2014). Growth and yield of soybean genotypes as influenced by different fertilizer levels. *Adv. Res. J. Crop Improv.*, **5** (1):26-28.

Paper History : Received : 06.01.2014; **Revised :** 03.05.2014; **Accepted :** 16.05.2014

In Maharashtra area under soybean cultivation during 2011-12 was 32.13 lakh hectare with an average productivity of 1243 kg per hectare. Maharashtra ranks second in terms of production of soybean after Madhya Pradesh in the country. Soybean has profitably replaced the other legumes like mung bean, black gram. Madhya Pradesh and Maharashtra states are major producers of soybean with regards to acreage and production soybean varieties selected for drought tolerance have the potential of improving agricultural productivity and hence, livelihoods if adopted by farmers (Chianu, 2006).

Fertilizers bear a direct relationship with food grain production along with a number of supporting factors like high yielding varieties (HYVs), irrigation, access to credit, enhanced total factors of productivity, the tenurial conditions, size of the product market and prices they face both for inputs and the outputs etc. Studies have shown that around 50 to 60 per cent of the enhanced food production during 1960 – 77 could be attributed to fertilizers to sustain healthy growth and plant need nutrients.

In light of above, field experiment was conducted to find the effect of different levels of fertilizers on growth and yield of soybean genotypes.

RESEARCH PROCEDURE

The experiment was conducted at research farm, Department of Agronomy, College of Agriculture, V.N.M.K.V., Parbhani (M.S.). The experiment was laid out in Split Plot Design with three replications. The gross plot size was 5.4 m x 4.5 m and net plot size was 4.5 m x 3.6 m. The experiment consisted of twelve treatment combinations of four cultivars *i.e.*, JS- 335, MAUS-162, MAUS-71 and MAUS -158 in main plot and three fertilizer levels *i.e.* 75% RDF, 100% RDF, 125% RDF in sub plot. Soil of experimental site was low in available nitrogen (213 kg ha^{-1}), medium in available phosphorus (15.6 kg ha^{-1}), high in available potassium (574 kg ha^{-1}) and slightly alkaline (pH 7.7) in reaction.

The recommended plant protection measures for the crop were followed. The fertilizers were applied as per the treatments at the time of sowing of the crop.

RESEARCH ANALYSIS AND REASONING

The results of the present study as well as relevant discussions have been presented under following sub heads:

Effect of varieties :

The data on mean plant height as influenced by different treatments indicated that genotype MAUS – 162 recorded the highest plant height (Table 1). The other three cultivars remained approximately equal in respect of the height characteristic. This could be attributed to genetic makeup of variety. In general, the plant height of individual variety was directly proportional to the duration of that variety. Siddiqui *et al.* (2007) and Ruhul Amin *et al.* (2009) also reported significant differences in plant height due to different varieties.

The data on number of functional leaves indicated that the maximum number of functional leaves were produced by genotype MAUS – 158 it was followed by variety MAUS – 71 both of these varieties recorded higher number of functional leaves at all growth stages than remaining varieties. Similar trend was observed in case of leaf area. The lowest leaf area per plant was recorded by the variety MAUS-162. This might be due to genetic composition of cultivars. Ruhul Amin *et al*. (2009) also stated significant differences in number of functional leaves and leaf area due to different varieties.

The maximum number of branches was recorded with variety MAUS – 158 and was at par with variety MAUS – 71 and significantly superior over rest of the varieties. This was due to the differences in growth habit of soybean varieties. Sharief *et al.* (2010) also found significant variation in number of branches due to different genotypes.

It was observed that the total dry matter accumulation was highest in variety MAUS – 158 followed by variety MAUS – 71. This might be due to larger leaf area and more number of branches in MAUS –158. Larger leaf area resulted in more photosynthetic activities and more accumulation of carbohydrates which inturn increased dry matter accumulation. Chiezey and Odunze (2005) studied parallel results in respect of total dry matter accumulation.

The highest seed, straw and biological yields of soybean crop was recorded with variety MAUS – 158, it was at par with variety MAUS – 71 and significantly superior over rest of the varieties. The lowest seed, straw and biological yield of soybean was obtained by variety JS – 335 which might be due to minimum yield contributing characters of the genotype. The results are in line with those reported by Jay Davison, (2000), Saratha Kumudini *et al.* (2001), Tung and Pamela (2005), Mathu *et al.* (2009), Sharief *et al.* (2010) and Jaidee *et al.* (2012).

Effect of fertilizer levels:

The data indicated that application of 125% RDF recorded highest plant height, it was found significantly superior over 75 % of RDF and was at par with 100% of RDF (Table 1).

The data on number of functional leaves was significantly influenced by different fertilizer levels. Application of 125% RDF and 100% RDF were found significantly superior over 75% of RDF. The treatment 75% of RDF recorded the lowest

Table 1: Growth and yield of soybean genotypes as influenced by different treatments

Treatments	Plant height (cm)	Number of functional leaves	Number of branches plant^{-1}	Leaf area (cm2)	Dry matter plant^{-1} (g)	Straw yield (kg ha^{-1})	Biological yield (kg ha^{-1})	Seed yield (kg ha^{-1})
Varieties (V)								
V_1 JS-335	59.07	25.04	4.66	1460	31.32	2382	4218	1836
V_2 MAUS – 162	68.93	22.65	4.91	1333	29.39	2549	4666	2117
V_3 MAUS-71	64.34	24.22	5.23	1510	32.01	2991	5326	2415
V_4 MAUS-158	58.04	27.15	5.83	1661	32.87	3033	5552	2519
S.E. $\pm$	0.85	0.56	0.22	39.85	1.96	114.24	149.21	57.55
C.D. at 5 %	2.54	1.68	0.67	119.31	5.88	341.97	446.66	172.27
Fertilizer levels (F)								
F_1 - 75 % RDF	60.60	23.51	4.81	1411	30.83	2517	4548	2064
F_2 - 100 % RDF	62.61	24.86	5.15	1502	31.84	2704	4968	2264
F_3 - 125 % RDF	66.57	25.92	5.51	1559	31.03	2935	5305	2370
S.E. $\pm$	0.951	0.39	0.18	34.48	1.50	89.29	106.09	67.28
C.D. at 5 %	2.85	1.18	0.54	103.24	4.51	267.31	317.59	201.41
Interaction (V x F)								
S.E. $\pm$	1.90	0.39	0.36	68.57	3.01	178.60	212.19	134.57
C.D. at 5 %	NS	NS	NS	NS	NS	NS	NS	NS
General mean	62.59	24.76	5.16	1491	30.90	2719	4940	2226

NS= Non-significant

number of functional leaves.

The fertilizer level 125 % RDF recorded the highest amount of dry matter accumulation per plant and it was found significantly superior over 75 % RDF and at par with fertilizer level 100% of RDF. The lowest dry matter accumulation was recorded with fertilizer level 75% RDF.

It was observed that the highest seed, straw and biological yields were produced with the application of 125% RDF followed by 100% RDF. On the other hand, the minimum seed, straw and biological yields were achieved by application of 75% RDF. Chiezey and Odunze (2005), Bansode (2008), Anonymous (2009) and Ramesh *et al.* (2008) reported the same results.

LITERATURE CITED

Bansode (2008). Effect of organic, inorganic sources of nutrient and rain water conservation techniques on periodicity, profitability and moisture use in soybean + pigeonpea (4:2) intercropping system. M.Sc. (Ag.) Thesis, Marathwada Krishi Vidyapeeth, Parbhani, M.S. (INDIA).

Chianu, J. (2006). Soybean (*Glycine max*) promotion for improved nutrition and soil fertility in small holder farms. East Africa. Tropical Soil Bio. and Fertility Ins. of the Internat. Centre for Tropical Agriculture (CIAT).

Chiezey, U.F. and Odunze, A.C. (2005). Soybean response to application of poultry manure and phosphorus fertilizer in the subhumid Savanna of Nigeria. *J. Ecol. & Natur. Environ*., **1**(2): 25-31.

Jay Davison (2000). The potential for soybean production in Western Nevada. University of Nevada. *Fact Sheet,* **2**: 53.

Mathu, R. W., Nandokha, T., Riungu, T.C., Matere, S. and Bendera, N.K. (2009). The potential of soybean to increase agricultural productivity in dry areas of central Kenya. Kenya Agric. Res. Inst. (KARI)-Muguga South report. Nairobi, pp.156 – 160.

Jaidee, Rattiyaporn, Polthanee, Anan and Saenjan, Patcharee (2012). Growth and yield of soybean cultivars as affected by ground water levels and phosphorus rates grown under greenhouse and field conditions. *Australian J. Crop Sci.,* **6** (1): 81 – 92.

Ramesh, P., Panwar, N.R., Singh A.B. and Ramana, S. (2009). Production potential, nutrient uptake, soil fertility and economic of soybean (*Glycine max*)-based cropping systems under organic, chemical and integrated nutrient management practices. *Indian J. Agron.,* **54** (3) : 278-283.

Ruhul Amin, A.K.M., Jahan, S.R.A., Karim, M.F. and Mirza Hasanuzzaman (2009). Growth dynamics of soybean (*Glycine max* L.) as affected by varieties and timing of irrigation. *American-Eurasian J. Agron.,* **2** (2): 95-103.

Saratha Kumudini, Larry J. Grabau, Todd W. Pfeiffer, and Colleen C. Steele (2005). Management and production potential of value-added soybean cultivars in South Central USA. *American Soc. Agron. J.,* **97** (3) : 904 – 909.

Sharief, A.E.M., El-Kalla, S.E., Salama, A.M. and Mostafa, E.I. (2010). Influence of organic and inorganic fertilization on the productivity of some soybean cultivars. *Crop & Environ*., **1** (1): 6 – 12.

Siddiqui, M. H., Oad, F.C., Kumbhar, A. M. and Buriro, U. A. (2007). NP requirement of soybean varieties for yield and yield components. Asian network for Science information. *Agron. J.,* **6** (1): 222 – 224.

Tung, L.D. and Pamela,G. F. (2005). Yield and seed quality of modern and traditional soybean [*Glycine max* (L.) Merr.] under organic, biodynamic and chemical production practices. *Omonrice,* **15**: 75 – 85.

■ WEBLIOGRAPHY

Anonymous (2009). Annual report. 2008 – 09. ICAR Research Complex for NEH Region. Umroi Road, Umiam – 793 103, Meghalaya. 47-48 and 69-70. *www.icarneh.ernet.in.*