ijergs
Open Access
International Journal of Engineering Research and Generic Science (IJERGS)
Available Online at www.ijergs.in
ISSN: 2455 - 1597
Volume -2, Issue-6, November - December 2016, Page No. 33 -37

Potential of Soyabean as Green Fodder at Varied Levels of Phosphorus under Sandy Loam Soil Condition of Jharkhand

Birendra Kumar[1], Ashisan Tuti[2], Supriya Supal Surin[3]
[1]Department of Agronomy, [2,3]Department of PBG
Birsa Agricultural University, Kanke, Ranchi, Jharkhand-834006
E-mail: kbirendra1973@gmail.com

Abstract

A field experiment was conducted under collaboration of AICRP on Forage Crops and Agrostology, College of Veterinary Science and Animal Husbandry of Birsa Agricultural University, Ranchi during Kharif season two consecutive years 2012 and 2013. Results showed that, the growth, yield and quality of Soya bean genotypes influenced by Phosphorus levels. The genotypes JS 07-24-13 and JS 07-21-7 were at par to each other with regards to plant height and crude protein yield. Different tested genotypes performed non significant with regards to green fodder yield and dry fodder yield. However, improvement in growth as well as quality characters were recorded with increased levels of P2O5 dose up to 90 kg/ha. Interaction of genotypes and P- levels were significant only with regards to leaf: stem ratio (dry condition) and crude protein content.

Keywords: Fodder Soybean, Phosphorus Levels, Malnutrition, Protein Content.

1. Introduction

As India is on top rank in milk production in the world and produced 146.31 million tones of milk in 2014-15 (Ethical Indian 2016) which is due to contribution of large population of livestock with low milking ability compared to other many western countries in the world. Malnutrition beside the low genetic potential of the animals is also a prime factor for low productivity of milch animals. The country is highly deficient in respect of availability of green fodder, dry fodder and concentrates. In order to supply the protein requirement in animal and also to maintain the Calcium: Phosphorus ratio leguminous fodder plays an important role. Among the different sources of protein Soyabean contains fare amount of good quality protein but the concept of feeding green Soyabean herbage is not in tradition due to low yielding (green fodder) potential and high demand of Soyabean for human consumption.

However, being leguminous it provides protein and rich in mineral as well as some good amount of fiber and also improves the soil fertility. Phosphorus deficiency is one of the major limiting factors in crop production and it's availability in acid soil of Jharkhand is very poor. Role of phosphorus in nodulation and other enzymatic activity and also acts as yield limiting nutrient next to Nitrogen. Even though, soil possess medium to high in Phosphorus level but its availability is very less, due to its slow mobility and fixed in soil which identify the way and means of its judicious use for maximizing the quality herbage production. Keeping the facts in view present study was under taken to assess the suitability of different entries of Soyabean as green fodder production and to optimize the Phosphorus levels for sustaining yield of Soybean (Glycin max) under sandy loam soil of Jharkhand.

2. Materials and Methods

The present field investigation was carried out during Kharif 2012 and 2013 at the Agrostology field situated at College of Veterinary Science and Animal Husbandry of Birsa Agricultural University, Ranchi. The soil of field was sandy loam in texture having sand (50. 4 %, silt (31.7%), clay (17.9%) and water holding capacity (42.65 %) with pH (6.03), Organic carbon (3.64 g/kg) with available nitrogen (274 kg/ha), available phosphorus (26.25 kg/ha) and available potassium (168.79 kg/ha). The experiment was laid out in FRBD with four Soya bean genotypes JS 07-24-13, JS 07-24-1, JS 07-24-8 and JS 07-21-7 and four phosphorus levels 0, 30, 60 and 90 kg/ha which comprises total sixteen treatments. The crop was sown during first fortnight of July during both the years at row spacing of 30 cm apart. Full dose of fertilizers was applied at the time of sowing. The recommended dose of Nitrogen 25 kg/ha and Potassium 30 kg/ha were applied in the form of Urea and muriate of potash while, Phosphorus was applied as per treatments through Single super phosphate (SSP). Cultural as well as other Agronomical production practices were applied as per the recommendation. Observations were taken at 15 days (for germination and population count) and growth, yield and quality parameter were recorded at 50 % flowering stage. The data of two year was pooled and analyzed statistically under slandered format of the FRBD design and presented below in tabular form for its interpretation.

3. Result and Discussion

Genotype response

Genotypes of Soya bean were significantly influenced by phosphorus levels with respect to plant length, leaf: stem ratio in green and dry condition, green fodder yield, dry fodder yield, crude protein content and crude protein yield. Entry JS-07-21-7 perform to attend the highest plant height (74.1 cm), which was at par with entries JS-07-24-13 (73.5 cm) and same were significantly superior over other while L:S ratio under JS-07-24-8 and JS-07-21-7 were at par while JS-07-24-1 contains more CP% (12.78%) than other which were at par to each other crude protein yield under JS-07-24-13 (4.14 q/ha) was more than other entries except JS-07-24-1 (4.09 q/ha) which were at par to each other (Table 1).

At higher levels of Phosphorus the availability of nitrogen and potash along with Phosphorus nutrient also increased resulted into better plant stand which reflected into more growth and finely resulted into higher yield and improvement in quality with regards to crude protein content. This result is in conformity to the results observed by Krasilnikoff et al. (2003) and Nyoki et al. (2013) in cowpea. This could be attributed to the fact that phosphorus is required in large quantities in shoot and root tips where metabolism is high and cell division is rapid (Ndakidemi and Dakora, 2007). Thus, an indication that the Soyabean varieties utilized the phosphorus fertilizer applied judiciously in growth and development processes.

Phosphorus response

In other hand significant response of P2O5 were recorded up to 90 kg/ha. Increase level of phosphorus increase the growth yield and also improves the quality green fodder of Soybean. Plant height (81.08 cm), L: S ratio (0.75), GFY (179.8 q/ha), DFY (12.89 q/ha), CP (12.89 %) and CP yield (4.51 q/ha) were higher at phosphorus 90 kg/ha. The high capacity of the soil to fix P mostly in unavailable form to plant which caused increased in yield, thus its response up to 90 kg/ha for higher herbage yield were advocated by Fageria et, al. (1998)

Interaction

Interaction of Genotypes and Phosphorus have no interaction effect on plant length, GFY, DFY and CPY, while L:S ratio under dry condition and Crude protein content were significantly affected by the same (Table 2 and 3). As L: S ratio in dry condition under both the genotypes increased with increased levels of Phosphorus up to 90 kg/ha. Results reflect that leaf: stem ratio in dry condition and crude protein (%) at 90 kg P2O5/ha level the genotypes JS 07-24-13 and JS 07-21-7, as well as JS 07-24-1 and JS 07-24-8 were at par to each other (Table 2 and 3)

4. References

[1]. Deb Roy (1993). Reap more biomass through diversity in forestry. Intensive Agriculture. XXXI (5-8): 23-26

[2]. Ethical, Indian February, 13, 2016. www.ethicalpost.in/top 10 milk producing countries in the world.

[3]. Fageria, N.K, Wright, R.J. and Baligar, V.C. (1998) Rice cultivar evaluation for phosphorus use efficiency. Plant and soil 111, 105-109.

[4]. Karki, Uma. (1985). Impact of crossbred cows on the economy of small farmers and their performance. Nepalese Journal of Ani. Sci. Vol. 9, No. 9.

[5]. Krasilnikoff, G., Gahoonia, T., and Erik-Nelson, N., (2003). Variation in phosphorus uptake by genotypes of cowpea (Vigna unguiculata (L.) Walp) due to differences in root and root hair length and induced rhizosphere processes. Plant and Soil., 251: 83- 91.

[6]. Ndakidemi, P. A. and Dakora, F. D., (2007). Yield components of nodulated cowpea (Vigna unguiculata (L.) Walp) and maize (Zea mays) plants grown with exogenous phosphorus in different cropping systems. Aust. J. Exp. Agric. 47: 587-590

[7]. Nyoki, D., Patrick, A., Ndakidemi, R., (2013). Economic benefits of Bradyrhizobium japonicum inoculation and phosphorus supplementation in cowpea(Vigna unguiculata (L.) Walp) grown in northern Tanzania. American J. of Research comm., 1(11): 173- 189.

Table: 1. Effect of phosphorus levels on growth, yield and quality of Soya bean (pooled of 2012 and 2013).

Treatments	Plant population/m^2	Plant height(cm)	Leaf :stem ratio		Fodder yield(q/ha)		Crude protein (%)	Crude protein yield (q/ha)
			Green	Dry	Green	Dry		
A .Entries (E)								
E1: JS 07-24-13	35.6	73.5	0.64	0.59	144.8	32.52	12.70	4.14
E_2: JS 07-24-1	34.5	70.9	0.66	0.54	160.3	32.0	12.78	4.09
E_3: : S 07-24-8	35.5	68.8	0.72	0.55	157.2	31.07	12.57	3.91
E_4 : JS 07-21-7	3.7	74.1	0.71	056	161.1	31.41	12.65	3.98
S. Em ±	0.55	0.80	0.01	0.01	6.01	0.45	0.046	0.056
CD at 5%	NS	2.31	0.02	0.02	NS	NS	0.133	0.162
B. P level (kg P_2O_5 /ha)								
P1 : 0	35.5	62.7	0.60	0.49	123.1	27.31	12.34	3.37
P2 : 30	34.8	69.4	0.66	0.54	154.2	31.18	12.71	3.96
P3 : 60	34.3	74.1	0.73	0.59	166.3	33.51	12.76	4.27
P4 : 90	34.9	81.08	0.75	0.63	179.8	35.01	12.89	4.51
S. Em ±	0.55	0.80	0.0071	0.0075	6.01	0.45	0.046	0.056
CD at 5%	NS	2.31	0.02	0.021	17.30	1.30	0.133	0.162
Entries X P levels								
S. Em ±	1.11	1.60	0.014	0.014	12.03	0.90	0.09	0.11
CD at 5%	NS	NS	NS	0.043	NS	NS	0.26	NS
CV %	5.63	3.86	4.23	6.78	13.44	4.93	1.40	5.0

Table 2.Effect of phosphorous levels on leaf: stem ratio (dry condition) of promising genotype of Soya bean (pooled of 2012 and 2013).

Entries	P-Levels (kg/ha)				Mean
	P1:0	P1:30	P2:60	P3:90	
E1: JS 07-24-13	0.48	0.58	0.65	0.68	0.59
E_2: JS 07-24-1	0.48	0.52	0.59	0.59	0.54
E_3 : S 07-24-8	0.49	0.53	0.59	0.62	0.55
E_4 : JS 07-21-7	0.51	0.53	0.55	0.65	0.56
Mean	0.49	054	0.59	0.63	
	Entries		P-Levels	Entries	X P levels
S. Em ±	0.0075		0.0075		0.014
CD at 5%	0.02		0.02		0.041

Table 3 Effect of phosphorous levels on crude protein (%) of promising genotype of Soya bean (pooled of 2012 and 2013).

Entries	P-Levels (kg/ha)				Mean
	P1:0	P1:30	P2:60	P3:90	
E1: JS 07-24-13	12.19	12.78	12.83	13.00	12.70
E_2: JS 07-24-1	12.42	12.85	12.92	12.93	12.78
E_3 : S 07-24-8	12.38	12.69	12.71	12.52	12.57
E_4 : JS 07-21-7	12.35	12.54	12.60	13.11	12.65
Mean	12.34	12.71	12.76	12.89	
	Entries		P-Levels	Entries X P-Levels	
S. Em ±	0.046		0.046	0.09	
CD at 5%	0.133		0.133	0.26	