

Evaluation of Lathyrus Genotypes to Varied Levels of Phosphorus under Normal Rainfall Condition of JharkhandBirendra Kumar¹, Supriya Supal Surin², Ashisan Tuti³¹Department of Agronomy, ^{2,3}Department of PBG

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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 Rabi season years 2013-14 and 2014-15. Growth, yield and quality of lathyrus genotypes influenced by Phosphorus levels. The genotypes JLJ-09-1, JHLS-2011-2 and National check Nirmal produced at par result on plant height and dry fodder yield. While, entry JLJ-09-1 produced more green fodder yield (153.23 q/ha), crude protein (14.22 %) and crude protein yield (3.77 q/ha) which was significantly superior over the national checks Nirmal, Prateek and Mahateora. Lathyrus responded up to 60 kg P₂O₅ /ha. Interaction effect of Genotypes and P₂O₅ levels was significant on GFY, DFY as well as CPY.

Keywords: Lathyrus, Discarded Crop, P₂O₅ levels, Crude protein and Crude protein yield.

1. Introduction

Jharkhand is a state having good potential of dairy and milk availability increased to 180 g/day/capita in 2014-15 which is still below the national average of 240 g/day/capita. In this state the percentage population of animal is more than the human percentage population. After the separation of state from Bihar, farmers started giving attention on cultivation of food item of human concern to meet the own requirement, but it is still lag behind than the actual demand. Animals feed scenario is quite below and animal depend on only dry feed, straw and on concentrate up to some extent. Due to uncertainty in monsoon paddy transplanted during *Kharif* harvested late during the month of late November and up to first week of December causes delayed in sowing of wheat and other crops. This, prevailing situation can be converted into opportunity to take fodder crops *during Rabi*. Among the different leguminous fodder Lathyrus (*Lathyrus sativus*) i.e Grass pea is most suited under un- irrigated condition. As it contain good amount of protein and highly palatable than oat that's can be preferred over oat under less moisture condition. Grass pea (*Lathyrus sativus* L.) is a dual purpose annual legume grown for its seeds for human consumption and fodder for livestock feeding. Grass pea is one of the preferred legume seeds in low fertility soils and arid areas because of its outstanding tolerance of dry or flooding conditions, but it contains a toxic component that may cause paralysis in humans and livestock if consumed in excessive amounts (Campbell, 1997). Grass pea flour is used to adulterate high-priced legume flours made from chickpea or mungbean seeds (Campbell, 1997). Immature pods and young plants are cooked and eaten as vegetables (Yadav *et al.*, 2006). Grass pea foliage and seeds make valuable forage. They can be used fresh, dried as hay or made into silage (Yadav *et al.*, 2006; Campbell, 1997). Grass pea straw and chaff are particularly valuable (Yadav *et al.*, 2006). 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 cannot be ignored as it also acts as

yield limiting nutrient next to Nitrogen. Keeping the facts in view present study was under taken to assess the suitability of different entries of Grass pea (Khesari) as green fodder production and to optimize the Phosphorus levels for sustaining yield under dry soil of Jharkhand.

2. Materials And Methods

Field experiment was carried out during Rabi 2013-14 and 2014-15 at the Agrostology field situated at College of Veterinary Science and Animal Husbandry of Birsa Agricultural University, Ranchi. The soil of field was unfertile and dry having texture sand (55.4 %), silt (30.5%), clay (14.1%) and water holding capacity (39.58 %) with pH (6.01), Organic carbon (3.25 g/kg) with available nitrogen (205 kg/ha), available phosphorus (19.25 kg/ha) and available potassium (157.58 kg/ha). The experiment was laid out in FRBD with five Lathyrus genotypes JHLS-2011-2, JLJ-09-1, Nirmal, Mahateora and Prateek and three phosphorus levels 20, 40 and 60 kg/ha which comprises total twenty treatments. The crop was sown during first fortnight of December 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 20 kg/ha and Potassium 20 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 harvesting on 50 % flowering stage. The data of two year was pooled and analyzed statistically under randomized format of the FRBD and presented below in tabular form for its interpretation.

3. Result And Discussion

Genotype response

Genotypes of lathyrus were significantly influenced by phosphorus levels with respect to plant height, green fodder yield, dry fodder yield, crude protein content and crude protein yield. Entry JLJ-09-1 perform to attend the highest green fodder yield (153.23 q/ha), crude protein (14.22 %) and crude protein yield (3.77 q/ha) which was significantly superior over the national checks Nirmal, Prateek and Mahateora. Plant height and dry fodder yield of genotype JHLS-2011-2, JLJ-09-1 and national check Nirmal were at par to each other and also these were superior over others (Table 1).

Phosphorus response

The responses of P_2O_5 were recorded up to 60 kg/ha. Increase level of phosphorus increased the growth yield and also improves the quality green fodder of Lathyrus. Plant height (93.0 cm), L: S ratio (0.53), GFY (150.02 q/ha), DFY (26.74 q/ha), CP (13.32 %) and CP yield (3.57 q/ha) were significantly higher at 60 kg P_2O_5 /ha. This is due to that 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. 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 of lathyrus and Phosphorus has significant effect on GFY, DFY and CPY, while other parameters were not affected by interaction. The national check Nirmal at lower level of P_2O_5 produced relatively inferior GFY and DFY, while at higher level i.e at 60 kg P_2O_5 /ha Nirmal produced significantly more GFY(199.70 q/ha)

as well as DFY (36.59 q/ha) over other combination of entries and P_2O_5 levels (Table 2 and 3). In other hand, genotype JLJ-09-1 (5.19 q/ha) at 60 kg P_2O_5 /ha produced significantly more CPY over other combinations (Table 4).

4. References

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Table 1. Effect of phosphorus levels on growth, yield and quality of Lathyrus (pooled of 2013-14 and 2014 -15).

Treatments	Tillers /m length (at harvest)	Growth and Yield				Protein	
		Plant height (cm)	Leaf : stem ratio	Green fodder Yield (q/ha)	Dry fodder Yield (q/ha)	Content (%)	Yield (q/ha)
Entries							
JHLS-2011-2	30	95	0.52	144.70	26.51	13.15	3.48
JLJ-09-1	30	93	0.51	153.23	24.01	14.22	3.77
Nirmal	30	93	0.51	144.79	26.51	13.05	2.22
Prateek	29	79	0.51	104.27	17.03	13.26	3.18
Mahateora	30	73	0.52	98.82	14.07	12.76	1.80
S.Em ±	0.02	0.07	0.004	0.71	1.03	0.03	0.14
CD at 5%	NS	0.20	NS	2.05	2.99	0.09	0.41
P ₂ O ₅ - level(Kg/ha)							
20	30	77	0.51	100.80	17.41	13.25	2.32
40	29	89	0.51	123.30	20.75	13.28	2.77
60	30	93	0.53	150.02	26.74	13.32	3.57
S.Em ±	0.20	0.05	0.003	0.55	0.79	0.02	0.11
CD at 5%	0.59	0.16	0.01	1.59	2.31	NS	0.32
Interaction(TXN)							
S. Em ±	0.4	0.07	0.08	1.23	1.78	0.05	0.10
CD at 5%	NS	NS	NS	3.50	5.18	NS	0.30

Table 2. Effect of phosphorous levels on green fodder yield (q/ha) of promising genotype of Lathyrus (pooled of 2013-14 and 2014-15).

Entries	P ₂ O ₅ – level (Kg/ha)			Mean
	20	40	60	
JHLS-2011-2	121.56	138.92	173.64	144.70
JLJ-09-1	121.21	156.28	182.30	153.23
Nirmal	104.45	130.23	199.70	144.79
Prateek	78.39	104.19	130.28	104.27
Mahateora	79.39	86.90	104.18	98.83
Mean	100.80	123.30	150.02	
Interaction(TXN)	S. Em ±	1.23	CD at 5%	3.56

Table 3. Effect of phosphorous levels on dry fodder yield (q/ha) of promising genotype of lathyrus (pooled of 2013-14 and 2014-15).

Entries	P ₂ O ₅ – level (Kg/ha)			Mean
	20	40	60	
JHLS-2011-2	22.27	25.45	31.82	26.51
JLJ-09-1	21.99	24.49	28.57	25.02
Nirmal	19.14	23.87	36.59	26.53
Prateek	14.36	16.32	20.41	17.03
Mahateora	12.28	13.62	16.33	14.07
Mean	17.41	20.75	26.74	
Interaction(TXN)		S. Em ± 1.78	CD at 5% 5.18	

Table 4 Effect of phosphorous levels on crude protein yield (q/ha) of promising genotype of lathyrus (pooled of 2013-14 and 2014-15).

Entries	P ₂ O ₅ – level (Kg/ha)			Mean
	20	40	60	
JHLS-2011-2	2.91	3.35	4.18	3.48
JLJ-09-1	2.73	3.39	5.19	3.77
Nirmal	1.87	2.12	2.67	2.22
Prateek	2.51	3.26	3.77	3.18
Mahateora	1.55	1.73	2.10	1.80
Mean	2.32	2.77	3.57	
Interaction(TXN)		S. Em ± 1.23	CD at 5% 3.56	