

Effect of Cultivar and Phosphorus on Yield and Quality of Berseem (*Trifolium Alexandrinum* L) Fodder

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Abstract

Field experiment was carried out at Instructional Dairy Farm, G B pant University of Agriculture & Technology, Pantnagar during winter season of 2017-18 to study the effect of cultivars and phosphorus level on yield and quality of berseem (*Trifolium alexandrinum* L.). Berseem variety BB-2 gave significantly higher green and dry fodder yield and closely followed by varieties Mescavi and PC-82. The crude protein content was also recorded higher in BB-2 but NDF and ADF were lower than other berseem varieties. The phosphorus application @ 100kg/ha produced significantly higher green and dry fodder yield that was 4.8% and 4.7% greater than 80 kg P levels, respectively. The leaf:stem ratio, crude protein content, NDF and ADF were not influenced significantly by phosphorus levels. Therefore it can be concluded that 'BB-2' can be grown at application of 100kg P/ha for higher productivity in Tarai region of Uttarakhand.

Keywords

Cultivar and Phosphorus, Yield and Quality, Berseem

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Introduction

Berseem (*Trifolium alexandrinum* L) is one of the most important winter fodder crops in India which belongs to the family Fabaceae and order Leguminale. Presently it is cultivated in whole North India under irrigated conditions on an acreage of 1.9 million ha in the country. It was first introduced in India in 1904 from Egypt and so it is also called 'Egyptian clover'. It is an annual leguminous crop, well adapted to the semi-arid conditions of the Northern India with good nitrogen fixing ability. Berseem fodder is highly palatable due to its succulence and nutritious with 20% crude protein, high Ca and P and also 62% total digestible nutrients. The green fodder is rich in crude protein (12–20%), Ca and P. Besides it enriched soil by fixing atmospheric nitrogen and also conserve soil and water by reducing erosion. It provides green fodder from November to end of March by multiple cutting. Presently number of high yielding berseem cultivars has been bred but its response to phosphorus is yet to be studied for realization of their production potential. Therefore the present study was taken up to study the effect of cultivars and phosphorus levels on yield and quality of berseem fodder in Tarai region of Uttarakhand.

Materials and Methods

Field experiment was carried out at Instructional Dairy Farm, G B pant University of Agriculture

and Technology, Pantnagar during winter season of 2017–18 to study the effect of cultivars and phosphorus level on yield and quality of berseem (*Trifolium alexandrinum* L). The experimental site was sandy loam with neutral soil pH and available nitrogen, phosphorus and potassium were 278.5, 27.7 and 232.8 kg/ha, respectively. The experiment consisted of 5 berseem cultivars i.e. 'JB-05-9', 'Wardan', 'PC-82', 'Mescavi' and 'Bundel Berseem-2 (BB-2)' and three phosphorus levels i.e. 60, 80 and 100 kg/ha, was planted during Rabi season 2017–18 under split plot design with three replications. The crop was fertilized with uniform 20 kg N and 30 kg K₂O/ha at the time of sowing. Pendimethalin @ 3.3 l/ha was applied as pre emergence application for weed control. The crop was planted at 25 kg seed rate/ha with 30cm x 10cm planting geometry. The harvesting was started after 55 days of sowing (1 cut) and subsequent cutting were taken at 30 days interval up to 2nd week of April and total 4 cuttings were taken. The crude protein, NDF and ADF were estimated at different cuttings and pooled data were analyzed for average values.

Result and Discussion

1. Growth and fodder yield

A. Effect of cultivars

The berseem cultivars had significantly equal plant height (Table 1). The number of shoots/m row length also did not differ significantly among cultivars, however

'Mescavi' had the highest number of shoots followed by 'PC-82'. The green fodder yield differed significantly among cultivars and 'Bundel Berseem-2' produced significantly highest green fodder that was statistically superior to 'JB-05-9' cultivar. Similarly the dry fodder yield was recorded significantly higher under 'BB-2' that was significantly equal to 'Mescavi' and 'PC-82'. The L:S ratio was not influenced significantly by cultivars, however maximum L:S ratio was found in 'Wardan' and the minimum in 'BB-2'. Mahmood et al. (2018) reported higher growth and fodder yield of berseem at application of 90 kg P and 60 kg K/ha. Jha et al. (2018) also found higher plant growth and green fodder of berseem at application of 100% NPK i.e. 80 kg N + 40 kg P₂O₅ + 20 kg K₂O/ha.

B. Effect of Phosphorus levels

Taller plants were observed at highest P level i.e. 100 kg P/ha that remained non significant with 80 kg P/ha. P levels did not have significant effect on number of shoots and it increased up to 80 kg P level. The green fodder yield was affected significantly with P levels (Table 1). The green fodder yield was also found significantly highest at 100 kg P level that was 4.8% and 12.3% greater than 80 and 60 kg P levels, respectively. The dry fodder yield differed significantly with P levels and 100 kg P level gave significantly higher dry fodder yield that was 4.7% higher

Table 1: Effect on cultivar and phosphorus levels on yield and quality of berseem fodder.

N	Treatment	Plant height (cm)	No. of shoots/m row length	Green fodder yield (q/ha)	Dry fodder yield (q/ha)	L:S ratio	CP (%)	NDF (%)	ADF (%)
A	Berseem Variety								
	JB-05-9	49	94	503.19	73.35	0.70	16.91	64.76	54.13
	Wardan	49	94	524.17	75.95	0.71	17.60	66.00	53.37
	PC-82	49	97	540.32	79.50	0.70	17.50	65.34	54.50
	Mescavi	49	101	540.67	79.70	0.70	17.50	65.06	53.71
	Bundel Berseem-2	49	95	547.16	80.61	0.69	17.79	64.86	54.07
	SEM±	0.2	1.5	7.86	1.13	0.004	0.27	0.19	0.27
	LSD (0.05)	ns	ns	26.03	3.75	ns	ns	0.55	ns
B	Phosphorus Level								
	60 kg/ha	49	95	498.47	73.00	0.69	17.50	64.69	54.17
	80 kg/ha	49	98	534.54	78.40	0.70	17.50	65.56	53.87
	100 kg/ha	50	97	560.30	82.07	0.71	17.38	65.35	53.83
	SEM±	0.1	0.88	5.97	0.88	0.01	0.21	0.15	0.21
	LSD (0.05)	0.28	ns	17.73	2.61	0.02	ns	0.42	ns
	Interaction	ns	ns	ns	ns	ns	ns	ns	ns

than 80 kg P level. The green and dry fodder yield was recorded significantly lower under 60 kg P level. The L:S ratio was not affected significantly by P levels but the 100 kg P had the highest L:S ratio. The higher level of phosphorus had better nutrient availability resulted in to better growth and development of plants producing greater fodder yield and L:S ratio. The interaction effect was found non-significant to all parameters. Patel and Rajagopal (2003) also supported above findings with increase of P level up to 90 kg/ha. Saeed et al. (2011) reported that highest biological yield at application of 60 kg P/ha.

2. Quality studies

A. Effect of cultivars

The crude protein content also remained significantly unaffected among cultivars but 'BB-2' and 'JB-05-9' had the highest and the lowest values. The cultivars had significant effect on NDF and the lowest value were found in 'JB-05-9' and 'BB-2', while the highest value was recorded under 'Wardan'. The ADF did not differ significantly amongst cultivars, however the lowest value was observed 'Wardan' and 'Mescavi'.

B. Effect of phosphorus levels

The crude protein content and ADF did not differ significantly with P levels and had decreasing trend with increase in P levels. The highest and the lowest values of both CP and ADF was recorded under 60 and 100 kg P levels, respectively. The NDF was affected significantly with P levels and increased up to 80 kg P/ha. Saeed et al. (2011) reported that highest seed yield and quality was found at application of 60 kg P/ha.

Conclusion

The above results demonstrate that berseem cultivar 'BB-2' had the highest green and dry fodder production crude protein production and lower values of NDF and ADF. The green and dry fodder yield also increased significantly up to 100kg phosphorus/ha. Therefore it can be concluded that 'BB-2' can be grown at application of 100kg P/ha for higher productivity in Tarai region of Uttarakhand. However more replicated research are required for confirmation of above findings.

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