



SHORT COMMUNICATION

Evaluation of Berseem (*Trifolium alexandrinum* L.) Varieties for Fodder and Seed Production

J.J. Gupta* and A. Dey

ICAR Research Complex for Eastern Region, Patna-800014, Bihar, India

ABSTRACT

Three varieties of berseem (*Trifolium alexandrinum* L.) seeds viz., JHB-146, Wardan and Hybrid were sown in first week of November with seed rate of 20 kg/ha in line with distance of 15 cm. Fodder was harvested three and/or four times at 55, 90, 110 and/or 130 days of crop duration. Irrigation with top dressing of urea @ 60 kg/ha was provided after each harvest. Finally crop was harvested at 160 days of crop duration to record the total biomass and seed yield. The maximum ($P < 0.01$) cumulative fodder yield was recorded from Wardan variety irrespective of total numbers of cuttings. The highest berseem seed yield was recorded in Wardan variety after third cut of fodder in March first week than JHB-146 and Hybrid berseem variety. However, seed yield reduced at fourth cut of last week of March. Hence, berseem fodder could be harvested only thrice and then left for maximum seed yield. However, reasonably good seed yield could be harvested from Wardan berseem variety even after fourth cut of fodder in last week of March.

Key words: Berseem, Fodder production, Seed production, Variety

Being the source of major rabi forage for dairy animal feeding, berseem (*Trifolium alexandrinum* L.) occupies 54% of total cultivated fodder area in India (Kumar, 2013). It is well adapted to most places of north and eastern India under sub-tropical condition with assured irrigation facilities due to its rapid growth, multi-cut nature, good fodder recovery after cutting, long period of fodder supply, high tonnage with excellent palatability and high nutritive value (Saini and Chowdhury, 1993; Gupta *et al.*, 2016). In eastern India, sowing period of berseem starts from middle of October to November and first harvest is taken after 45-50 days of sowing. A total of 4-6 cuttings with interval of 25-30 days were taken for a period of 115-125 days from end of November to March with cumulative biomass production of 55-60 t/ha depending upon the agronomical package of practices (Gupta *et al.*, 2017). However, farmers depend on local market for availability of seed though it is not available in time resulting in late start of cultivation operations. Consequently, there is scarcity period which extends from October to middle of December. As such *Trifolium sp.* and *Medicago sp.* are poor seed producer or shy-seeder due to their narrow genetic base

(Hazra and Sinha, 1996). Besides, not much attention has been paid in India towards its seed production because it is mainly cultivated for forage. It is estimated that the annual availability of seeds of all fodder crops in India is only 20% of the total requirement (Hazra, 1992). Hence, the present study was undertaken to evaluate the performance of different cultivars of berseem for production of forage biomass and seed so as to increase the availability of both berseem forage and seed to mitigate the future fodder requirements.

The study was conducted at ICAR Research Complex for Eastern Region, Patna, Bihar, India farm during 2016-17 having tropical agro-climatic conditions, clay-loam type soil with neutral pH (6.74), 0.67% organic carbon and N, P, K values of 248, 23, 267 kg/ha, respectively. Land was prepared with addition of FYM @ 5 t/ha and DAP @ 60 kg/ha. Three main plots of 300 m² each were prepared and further divided into 2 sub-plots of 150 m² each. Three varieties of berseem seeds viz., JHB-146, Wardan and Hybrid were sown in first week of November with seed rate of 20 kg/ha in line with row to row distance of 15 cm. Irrigation was provided just after sowing. Fodder was harvested thrice from all sub-plots at 55, 90 and 110 days. Irrigation with

*Corresponding author e-mail: guptajj@rediffmail.com

Table 1. Performance of different berseem varieties in production of forage and seed

Particular	Variety			LSD±
	JHB-146	Wardan	Hybrid	
Cumulative fodder yield 3 cuts (t/ha)	28.98 ^a ±0.42	35.63 ^b ±0.37	32.95 ^b ±0.15	2.74 ^{**}
Cumulative fodder yield 4 cuts (t/ha)	39.67 ^a ±0.47	47.25 ^b ±0.75	42.72 ^{ab} ±0.43	4.67 ^{**}
Cumulative fodder yield 3 cuts (t DM/ha)	3.92 ^a ±0.04	5.14 ^b ±0.05	4.80 ^b ±0.02	0.34 ^{**}
Cumulative fodder yield 4 cuts (t DM/ha)	5.36 ^a ±0.07	6.82 ^b ±0.11	6.24 ^b ±0.06	0.68 ^{**}
Straw yield after 3 cuts (t DM/ha)	1.47 ^a ±0.01	1.75 ^b ±0.03	1.87 ^b ±0.07	0.18 [*]
Straw yield after 4 cuts (t DM/ha)	0.70 ^a ±0.02	0.91 ^b ±0.03	1.12 ^c ±0.03	0.19 ^{**}
Seed yield after 3 cuts (q/ha)	2.53 ^b ±0.06	3.24 ^c ±0.04	1.07 ^a ±0.07	0.49 ^{**}
Seed yield after 4 cuts (q/ha)	1.55 ^b ±0.06	1.89 ^b ±0.02	0.85 ^a ±0.05	0.39 ^{**}
Total biomass yield after 3 cuts (t DM/ha)	5.65 ^a ±0.03	7.21 ^c ±0.07	6.78 ^b ±0.04	0.40 ^{**}
Total biomass yield after 4 cuts (t DM/ha)	6.21 ^a ±0.09	7.92 ^b ±0.08	7.44 ^b ±0.09	0.74 ^{**}

^{a,b,c}Value having different superscripts within a row differ significantly (P<0.05*; P<0.01**)

top dressing of urea @ 60 kg/ha was provided after each harvest. Forth cut fodder was harvested at 130 days of crop duration from 50% area (75 m²) of all sub-plots and the rest was left for seed production. However, the sub-plots from where 4th cut fodder was harvested were left for seed production. Finally, crops of all sub-plots were harvested at 160 days of crop duration to record total biomass and seed yield. Dry matter content in fodder, straw and seeds was estimated (AOAC, 2005). The data were analysed for test of significance as per Snedecor and Cochran (1994).

The results showed that the highest (P<0.01) cumulative fodder yield was recorded in Wardan variety irrespective of total cuttings than JHB-146, however, fodder yield of hybrid berseem was at par with Wardan variety. Cumulative maximum fodder yield from Wardan variety was found to be 35.63±0.37 and 47.25±0.75 t/ha in 3rd and 4th cuts, respectively which appear to be sufficient to meet fodder needs (25 kg/d/head) of 20 adult cattle unit for 70 or 100 days. Sardana and Narwal (2000) also reported maximum cumulative fodder yield from more number of cuttings. Similar type of trend was observed for DM yield. The cumulative fresh yield of Mescavi variety of berseem (3 cuts) ranged from 35.0 to 42.5 t/ha in Tripura state of north-east India having acidic soil conditions (Chander Datt *et al.*, 2009). The straw yield after third cut of fodder was

recorded to be highest (P<0.05) in hybrid berseem than 4th cut. However, no significant difference was observed between hybrid and Wardan varieties with respect to straw yield. Fourth cut was obtained in last week of March when ambient temperature increases and humidity reduces which results into retarded plant growth and straw yield.

The maximum berseem seed yield was recorded in Wardan variety (3.24±0.04 q/ha) after third cut fodder in 1st week of March than JHB-146 (2.53±0.06 q/ha) and Hybrid (1.07±0.07 q/ha) varieties. However, seed yield reduced to the level of 38.73, 41.67 and 20.56% in JHB-146, Wardan and Hybrid berseem varieties, respectively after 4th cut of fodder in last week of March. Maximum flowering was observed after 3rd cut fodder in 1st week of March with favourable weather conditions that might be the probable reason for maximum seed yield (Yadav *et al.*, 2015). Total biomass yield was the highest in Wardan variety irrespective of cuttings of fodder. However, total biomass yield increased after 4th cut in each variety.

Hence, berseem fodder may be harvested only three times and then left for maximum seed yield, however, reasonably good seed yield could be taken from Wardan variety even after 4th cut of fodder in last week of March.

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