The Pharma Innovation Journal 2022; 11(10): 1299-1303

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(10): 1299-1303

www.thepharmajournal.com
Received: 10-08-2022
Accepted: 15-09-2022

Jeetendra Kumar Sahu
Department of Agronomy, College of Agriculture, Indira Gandhi Agricultural University, Raipur, Chhattisgarh, India

SK Jha
Department of Agronomy, College of Agriculture, Indira Gandhi Agricultural University, Raipur, Chhattisgarh, India

Corresponding Author:
Jeetendra Kumar Sahu
Department of Agronomy, College of Agriculture, Indira Gandhi Agricultural University, Raipur, Chhattisgarh, India

Study on fodder yield and economics of different berseem varieties (*Trifolium alexandrinum* L.) under Chhattisgarh plains

Jeetendra Kumar Sahu and SK Jha

Abstract
The present investigation entitled "Study on fodder yield and economics of different berseem varieties (*Trifolium alexandrinum* L.) under Chhattisgarh plains." was carried out during Rabi 2021 at Instructional-cum- Research Farm, I.G.K.V., Raipur, Chhattisgarh. The experiment was conducted in Randomized Block Design with three replication. Twelve different berseem varieties namely Wardan, Bundel Berseem–, Bundel Berseem–3, Jawahar Berseem-1, Jawahar Berseem-5, Jawahar Berseem-9, Hisar Berseem–1, Hisar Berseem-2, Berseem Ludhiyana-10, Berseem Ludhiyana-42, Berseem Ludhiyana-43 and Berseem Ludhiyana-44 were studied for higher fodder yield and economics. Total four cuts were taken during study, first cut was taken at 60 days after sowing and subsequent cuts were done at 30 days interval. Variety BB-3 was recorded significantly maximum green fodder yield (530. q ha^{-1}), dry fodder yield (95.80 q ha^{-1}), productivity of green and dry fodder (3.53 q ha^{-1} day-1 and 0.64 q ha^{-1} day^{-1}), which was found at par with varieties JB-9, JB-1 and BB-2 (524, 498 and 497 q ha^{-1} green fodder yield respectively).Economics of berseem varieties shows that variety BB-3 recorded maximum gross monetary returns (1, 24,355 Rs ha^{-1}), net monetary returns (87,928 Rs ha^{-1}) and B: C ratio (2.97) followed by varieties JB-9, JB-1 and BB-2 (Rs 86,589, 80,044 and 79,797 ha^{-1} net monetary returns respectively).

Keywords: Berseem varieties, fodder yield, gross monetary returns, net monetary returns, B: C ratio

Introduction
Berseem (*Trifolium alexandrinum* L.) is an annual leguminous fodder crop and has been rightly described as the king of fodders. It is highly esteemed fodder which has a special place in animal husbandry programmes throughout the country. It is one of the most suitable fodder crops for areas below 1700 m altitude with irrigation facilities. It remains soft and succulent at all stages of growth. It can be grown without irrigation in areas with high water table and under water- logged conditions.

Berseem requires a cool and moderately cold climate for its normal growth. Berseem grows in areas where average rainfall ranges between 300-750 mm. It cannot be grown in damp and heavy rainfall areas. It needs temperature around 13-15.5 ºC for germination and establishment.

The crop growth is very fast at temperature 18-21 ºC. Frost period during winter checks the growth of crop. If the winter temperature falls to 6-8 ºC the crop growth is severely affected. Frost period during winter makes the crop dormant and no regernation is recorded. Similarly when temperature goes around 32-35 ºC re-growths after cut may not be possible. In North India, mid-October is the best time for sowing.

Berseem forms a major part of the animal diet from November to April in the central and northern- western parts of India. Owing to its high demand in milkshed areas and it has wider adaptability, high regeneration capacity, quick growth, high out turn of green fodder, high palatability, easy digestibility and easy cultivation practices the economic return of this crop are more than other fodder crops.

The berseem fodder is highly palatable due to its succulence and is also highly nutritious having 20% crude protein and 62% total digestible nutrients, 35-38% acid detergent fiber, 24-25% cellulose and 7- 10% hemicelluloses which increases the milching capacity of livestock. It behaves as a most potent milk multiplier in the lactating buffaloes, Sahiwal cows and crossbred cattle as compared to other forage crops.

Livestock is symbolic to wealth and power across civilizations for centuries. India is blessed with diversified type of livestock. Its livestock sector is one of the largest in the world. It has 56.7% of world's buffaloes, 12.5% cattle, 20.4% small ruminants, 2.4% camel, 1.4% equine, 1.5% pigs and 3.1% poultry. Agriculture is the back bone of Indian economy and livestock sector is an integral part of agriculture. Livestock sector accounts for 25.6 % of the agricultural GDP and about 4.11 % of total GDP. According to 20th livestock census (2019) livestock population of about 193.46 million cattle, 109.85 million buffaloes, 74.26 million sheep, 148.88 million goat, 9.06 million pigs, 0.25 million camels and 1 million including other livestock. Using these resources, India ranked first with 22 per cent of global milk production. Chhattisgarh is very rich in its livestock wealth with 1.27 million , Cattle population is the highest with 9.98 million, followed by goats 4.0 million , buffaloes 1.17 million sheep 0.18 million and pigs being the 0.52 million and including 0.0008 million other animal . In spite of having huge livestock population, the milk productivity is very low as compared to the world average and much below than the developed countries. One of the major limitations to efficient livestock population in the country is the lack of adequate level of quality forage.

On all India bases, an overall deficit of 11.24% in green fodder availability was estimated. Total green fodder availability was estimated to be 734.2 mt. against requirement of 827.19 mt. Similarly for dry fodder availability was estimated to be 326.4mt against requirement of 426.1 mt., thereby making an overall deficit of 23.4%. For concentrate, our study indicated requirement of 85.78 million tons at national level, however, the estimated annual availability of total concentrate feed is only 61 million tons (Anonymous, 2018) which makes a deficit of approximately 24.78 million tons or 28.9% of the demand.

Materials and Methods

An experiment was conducted under Chhattisgarh agro-climatic conditions during Rabi season 2021 at the instructional cum research farm, the Department of Agronomy, College of Agriculture, Indira Gandhi Agricultural University Raipur (Chhattisgarh) India entitled "Study on fodder yield and economics of different berseem varieties (*Trifolium alexandrinum* L.) under Chhattisgarh plains." Raipur is situated at central - east of Chhattisgarh and lies at 21º16" Latitude and 81º 36" E Longitude with an altitude of 298.15 above the mean sea level.

The crop growth period receiving 156 mm total rainfall. Evaporation during November to April ranges from 1.33 mm-8.94 mm, weekly average Sunshine 1.26-8.89 hours, Relative humidity varies from 13%-93.57%, weekly average wind speed ranges between 0.76-5.60 kmph.

The experimental field was ploughed two times with the help of tractor, and two times disc harrowing. After levelling, the experiment layout was achieved in proper way. The soil of the experimental field was Vertisol, slightly alkaline in reaction (Ph 7.9), low in available nitrogen (150.5 kg ha-1), low in available phosphorus (7.41 kg ha-1) and potassium (319 kg ha-1). The experiment was carried out in randomized block design and replicated thrice. The experiment consisted of 12 berseem varieties i.e. Wardan, Bundel Berseem-2, Bundel Berseem-3, Jawahar Berseem- 1, Jawahar Berseem- 5, Jawahar Berseem- 9, Hisar Berseem–1, Hisar Berseem–2, Berseem Ludhiyana- 10, Berseem Ludhiyana- 42, Berseem Ludhiyana- 43 and Berseem Ludhiyana- 44.

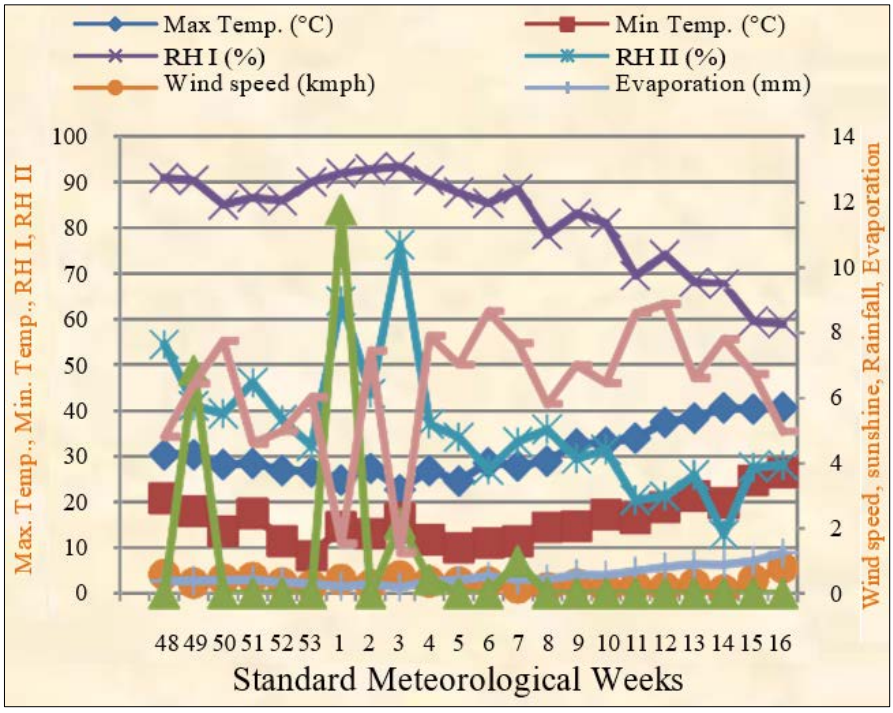

Fig 1: Weekly meteorological data during the crop season

The berseem varieties were sown manually on November 15, 2021 as per treatment in opened furrows at 30 cm apart using the seed rate of 25 kg ha-1. Nitrogen, Phosphorus and Potash was uniformly applied at the rate of 20, 80 and 30 Kg ha-1 as basal in each plot. Total four cuts were taken, of which first cut was taken at 60 days after sowing. Thereafter, cuts were taken 30 days intervals.

The green fodder harvested from each plot was weighed in

situ in kg plot-1 which was converted into q ha-1. Economics was worked out on the basis of prevailing market prices of inputs and outputs in the local market. The results are presented at five per cent level of significance (P=0.05).

Results and Discussion

Green fodder yield (q ha-1)

In the Barseem crop, the first cutting took place 60 days after sowing, and the subsequent cutting followed by 30 days interval. Data shows in Table 4.1 berseem variety had a significant impact on the yield of green fodder at the first, second, third, and fourth cuttings. Green fodder yield in different varieties, at the different cutting stages are significantly varied. Variety BB-3 was giving significantly maximum total green fodder yield (529.95 q ha^{-1}) which was at par with variety JB-9(524.59 q ha-1), JB-1 (498.41 q ha^{-1}) and BB-2 (497.42 q ha^{-1}). The results are conformity with the similar results was also reported by Singh et al. (2020) [13] and Kumar et al. (2021) [4].

Dry fodder yield (q ha-1)

The dry matter content increased along with the crop's age that is when the dry matter yield increased. Variety BB-3 was giving significantly maximum total dry fodder yield (95.80 q ha-1) which was at par with variety JB-9, JB-1 and BB-2. Variety HB-2 (67.71 q ha-1) giving lowest total green fodder yield followed by HB-1 and BL-44. The results are conformity with the similar results was also reported by Devi and Satpal (2019) [2], Singh et al. (2020) [13] and Kumar et al. (2021) [4].

Productivity of green fodder

Variety BB-3 (3.53 q ha^{-1} day-1) was giving significantly maximum total productivity of green fodder, which was at par with variety JB-9, JB-1 and BB-2. Variety HB-2 (2.5q ha-1 day-1) giving lowest total productivity of green fodder followed by BL-42 and HB-1. The results are conformity with the similar results was also reported by Kumar et al. (2021) [4].

Productivity of dry fodder

Variety BB-3 (0.639 q ha^{-1} day^{-1}) was giving significantly maximum total productivity of dry fodder which was at par with JB-9, JB-1 and BB-2, however variety HB-2 was found lowest total productivity of dry fodder followed by HB-1.

Economics

Economic data presented in Table 2 reveal that amongst berseem varietiess, variety BB-3 (132487 Rs. ha^{-1}) was received maximum gross return followed by JB-9 (131148 Rs. ha^{-1}), JB-1 (124603 Rs. ha^{-1}) and BB-2 (124603 Rs. ha^{-1}). Whereas, variety HB-2 (99663 Rs. ha-1) noted the lowest gross monetary return followed by BL-42 (103679 Rs. ha^{-1}).

Variety BB-3 (87929 Rs. ha^{-1}) received maximum net monetary return followed by JB-9(86590 Rs. ha-1), JB-1 (80045 Rs. ha^{-1}) and BB-2 (79797 Rs. ha-1). Variety HB-2 (49105 Rs. ha^{-1}) noted the lowest net monetary return followed by BL- 42 (59121 Rs. ha-1).

Data presented in Table 4.26 reveals that variety BB-3 (2.97) was recorded maximum B: C ratio followed by JB-9 (2.94), JB-1 (2.80) and BB-2 (2.79). Variety HB-2 (2.10) noted the lowest B: C ratio followed by BL-42 (2.33).

Table 1: Yield performance of different berseem varieties

Varieties	Total Green fodder yield (q ha^{-1})	Total dry fodder yield (q ha^{-1})	Average productivity of green fodder (q ha^{-1})	Average productivity of dry fodder (q ha^{-1})
Wardan	452.8	78.9	3.02	0.53
BB-2	497.4	90.1	3.32	0.60
BB-3	529.9	95.8	3.53	0.64
JB-1	498.4	93.0	3.32	0.62
JB-5	472.4	86.4	3.15	0.58
JB-9	524.6	93.9	3.50	0.63
HB-1	428.6	74.0	2.86	0.49
HB-2	374.7	67.7	2.50	0.45
BL-10	435.9	77.8	2.91	0.52
BL-42	414.7	75.0	2.76	0.50
BL-43	469.1	83.0	3.13	0.55
BL-44	435.1	74.9	2.90	0.50
SEm ±	11.36	1.99	0.08	0.01
CD(P=0.05)	33.33	5.84	0.22	0.04

Table 2: Economics of different berseem varieties

Varieties	Cost of cultivation (Rs. hi')	Gross monetary return (Rs. ha')	Net monetary return (Rs. hi')	B: C ratio
Warden	44558	113199	68640.8	2.54
BB-2	44558	124355	79797.0	2.79
BB-3	44558	132487	87928.7	2.97
18-1	44558	124603	80044.9	2.80
.1B-5	44558	118108	73549.5	2.65
.18-9	44558	131148	86589.9	2.94
HS-1	44558	107150	62591.6	2.40
1-18-2	44558	93663	49104.9	2.10
BL-10	44558	108984	64426.2	2.45
BL-42	44558	103679	59120.8	2.33
BL-43	44558	117265	72706.6	2.63
BL-44	44558	108786	64227.8	2.44

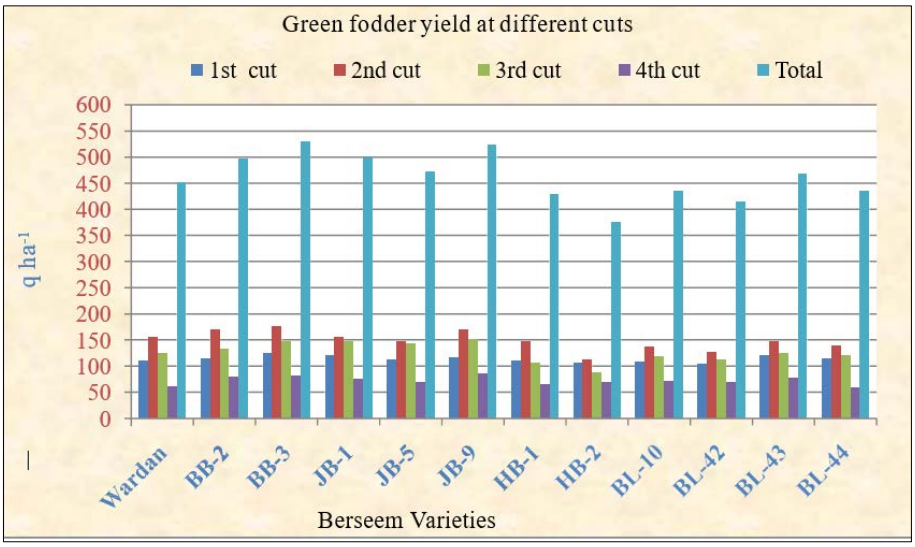

Fig 2: Green fodder yield of different berseem varieties at different cuts

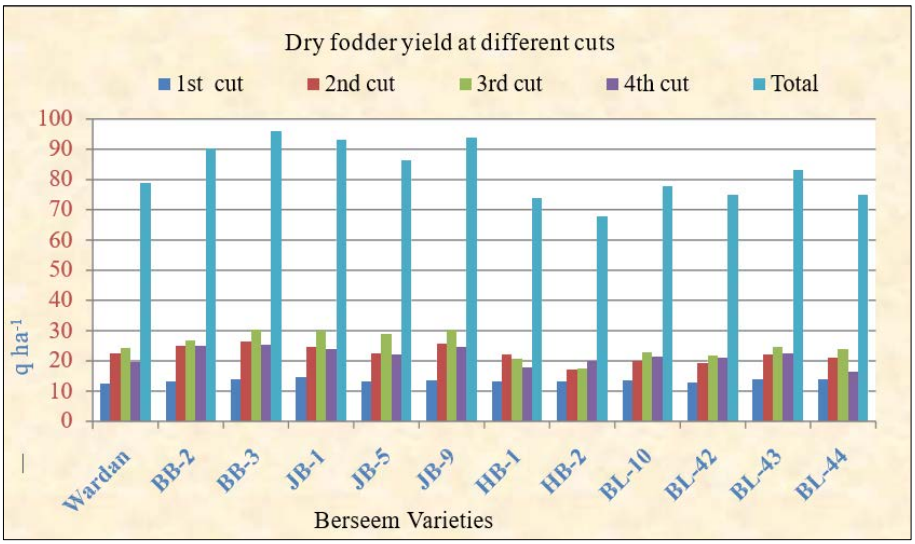

Fig 3: Dry fodder yield of different berseem varieties at different cuts

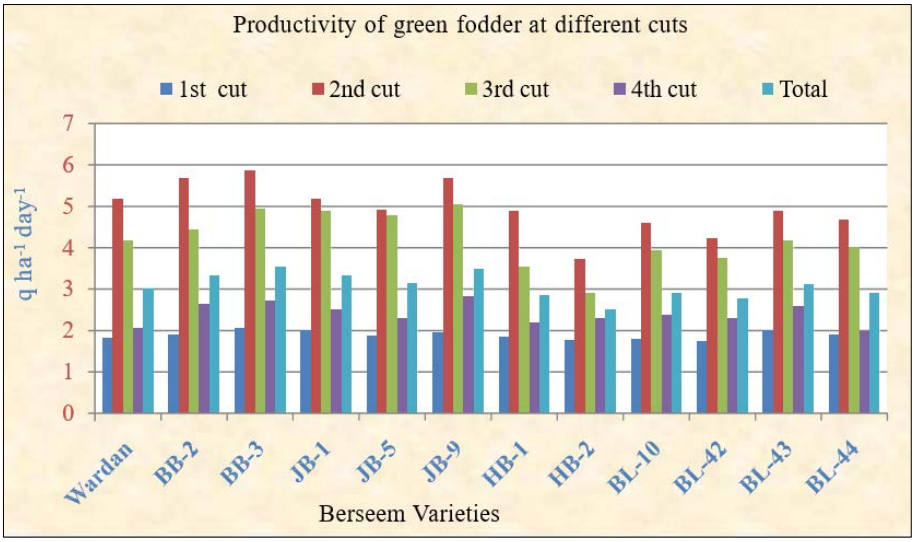

Fig 4: Productivity of green fodder yield of different berseem varieties at different cuts

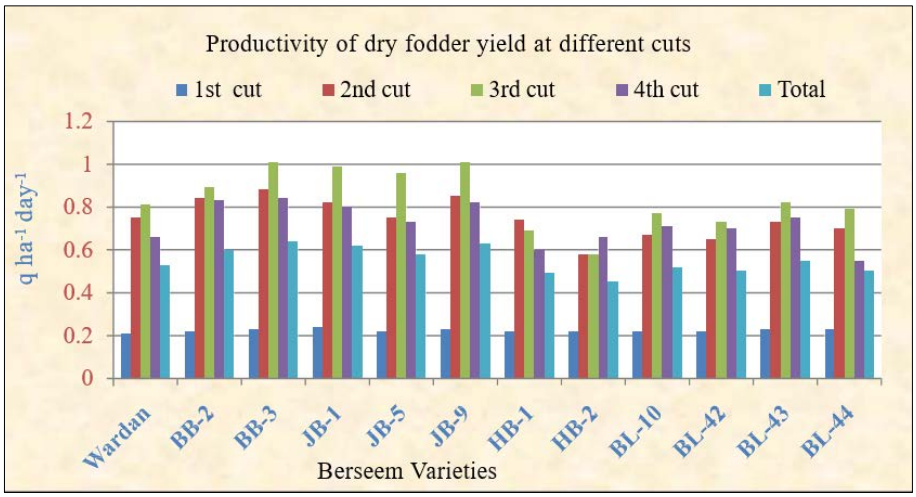

Fig 5: Productivity of dry fodder yield of different berseem varieties at different cut

Conclusion

Among different varieties of berseem studied for Chhattisgarh plains, variety BB-3 was recorded significantly maximum green fodder yield (530. q ha-1), dry fodder yield (95.80 q ha-1), productivity of green and dry fodder (3.53 q ha-1 day-1 and 0.64 q ha-1 day- 1), which was found at par with varieties JB- 9, JB-1 and BB-2 (524, 498 and 497q ha-1 green fodder yield respectively).Economics of berseem varieties shows that variety BB-3 recorded maximum gross monetary returns (1, 24,355 Rs ha-1), net monetary returns (87,928 Rs ha-1) and B: C ratio (2.97) followed by varieties JB-9, JB-1 and BB-2 (Rs 86,589, 80,044 and 79,797 ha-1 net monetary returns respectively).

Reference

1. Anonymous. Demand and supply projections towards 2033. Crops, livestock, fisheries and agricultural inputs. The Working Group Report (February, 2018). Niti Ayog, New Delhi; 2018.
2. Devi U, Satpal. Performance of berseem (*Trifolium alexandrinum* L.) genotypes at different phosphorus levels. Forage Res. 2019;44(4):260-263.
3. Gaikwad. Effect of nutrient management on green forage yield and quality of berseem. M.Sc. (Agronomy) Thesis, Mahatma Phule Krishi Vidyapeeth, RAHURI - 413722, dist. Ahmednagar, Maharashtra, India; 2009. p.75.
4. Kumar, et al. Genotypic response of berseem (*Trifolium alexandrinum* L.) To different phosphorus levels. Ccs haryana Agricultural University. Forage Res. 2021;47(3):329-333.
5. Kumar H, Kumar S, Yadav SS. Integrated nutrient management in berseem (*Trifolium alexandrinum* L.). Forage res. 2007;33(1):67-69.
6. Livestock Census, 20th. All India report, Ministry of Agriculture & Farmers Welfare, Department of Animal Husbandry, Dairying & Fisheries (Animal Husbandry Statistics Division) Krishi Bhawan, New Delhi; c2019.
7. Muhammad D, Misri B, El-Nahrawy M, Khan S, Serkan A. Egyptian clover (*Trifolium alexandrinum*) king of forage crops. FAO, Regional Office for the Near East and North Africa, Cairo, Egypt; c2014. p. 127.
8. Mukesh K, Bhagat S, Dhaka AK. Integrated nutrient management strategies for increasing annual forage crops productivity-a review. Forage Research. 2017;43(1):9-16.
9. Nargesh D. Performance of berseem varieties at different levels of nitrogen and phosphorus (Doctoral dissertation, M. Sc thesis., Department of Soil Science & Agricultural Chemistry, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya College of Agriculture, Gwalior (MP); c2012.
10. Roy DC, Jana K. Biomass production and quality of berseem fodder (*Trifolium alexandrinum* L.) as influenced by application of phosphorus and phosphate solubilizing bacteria. Adv Life Sci. 2016;5:225-1229.
11. Satpal RS, Sheoran JTY, Jindal. Phosphorus influenced nutritive value, yield and economics of berseem (*Trifolium alexandrinum* L.) genotypes. Chemical Science Review and Letters. 2020;9(34):365-373.
12. Shrivastava AK, Sarvade S, Bisen NK, Prajapati B, Agrawal SB, Goswami P. Growth and Yield of Rabi Season Forage Crops under Chhattisgarh Plain of Madhya Pradesh, India. Int. J Curr. Microbiol. App. Sci. 2020;9(2):878-885.
13. Singh D, et al. Comparative analysis of exotic and notified berseem (*Trifolium alexandrinum* L.) Varieties for fodder, Quality and nutrients uptake; c2020.
14. Tomar GS. Effect of phosphorus fertilization and organic Manuring on growth, quality, forage and seed yield of berseem (*Trifolium alexandrinum* L.) Ph.D. Thesis (Agronomy) IGKV, Raipur; c2009.
15. Vijay D, Manjunatha N, Maity A, Kumar S, Wasnik VK, Gupta CK, Ghosh PK.. Berseem- Intricacies of seed production in India. ICAR-IGFRI Technical Bulletin. Indian Grassland and Fodder Research Institute (IGFRI), Jhansi, UP, India; c2017. bit.ly/2EtAm1q.
16. Vision. Indian Grassland and Fodder Research Institute (Indian Council of Agricultural Research) Gwalior Road, Jhansi, 2050, 284 003.
17. Yucel C. Forage yield and quality attributes of berseem clover genotypes under mediterranean climate. Int. J Innov. Approaches Agric. Res. 2019;3:491-503.