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Standardization of Seed Production in fodder Berseem (*Trifolium alexandrinum* L.) through Sowing Dates and Foliar Nutrition

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ABSTRACT: Scarcity of green fodder and low seed setting forces the farmers not to prefer for seed production. Weather extremities like unbalanced or untimely rains or high speed winds also affected seed setting. All these extremities lead to scarcity of berseem seed production in Andhra Pradesh. Maintaining the proper sowing time and time of last cut for fodder and for leaving the crop for seed production may help in keeping the balance between vegetative and reproductive phases for high seed yield. Therefore, optimum sowing time and last cut is a very deciding factor to achieve maximum green fodder and seed yield. To tackle these problems an experiment was conducted during *Rabi* season 2018-19 & 2019-20 at Agricultural Research Station, Jangamaheswarapuram, Guntur District, Andhra Pradesh, India with an aim to standardize the seed production in fodder berseem through sowings dates and foliar nutrition. Among the four dates of sowings, sowing during first week of October performed better in terms of plant height, number of leaves plant^{-1}, number of heads plant^{-1}, head length, number of seedshead^{-1}, number of shoot plant^{-1} and seed yield. Among the foliar nutrition spraying of 2% MAP solution at flowering stage recorded the highest yield, which differs significantly from remaining three treatments. There was no significant interaction between dates of sowing and foliar nutrition for yield & yield attributing characters.

Keywords: Berseem, Seed yield, Foliar spray, Urea.

INTRODUCTION

The improvement in livestock production is possible with proper quality and quantity of feed (Amnaullah *et al.*, 2005). Berseem is an annual leguminous fodder and is well-known as king of forages, because of its high production potential, easy cultivation, capacity to fix enormous amounts of atmospheric nitrogen and of course quick growth (Pecetti *et al*., 2012). It has multiple benefits such more initial growth of vegetation, multi-cuttings, long term fodder provision, better forage productivity, and high nutritional value of 20-21% basic protein and 62% of palatable diet (Yadav *et al*., 2015). The main succulent stem gives branches and ended with three leaves. The stem remains soft upto flowering stage after that fiber content will increase. Fodder crop can be grown during *Rabi* season with a temperature requirement of 25 to 30°C for germination and 35 to 37°C for flowering stage.

Improved seed production of berseem and shaftal require proper sowing time
and efficient method of planting (Garza and Marquez 1994)

The success of any crop depends on mainly on availability of seed, which is the basic input for agriculture. The ever increasing demand for berseem seed is confirmed by the increase in import of berseem seeds into the country. EXIM (Export import) policy, 2018 approved to import 660 MTs Egyptian clover berseem seeds from the Egypt to India (Ministry of Agriculture, Farmers welfare, G.O.I, 2018). In general, the seed yield in forage berseem is comparatively low due to lower seed setting ability, growing of berseem for forage instead of seed. Seed production of berseem generally practiced after obtaining of 4-6 cuttings result in very poor seed yield because multi-cutting exhausts the root reserve and nutrients in the soil. Another causes for low yield because of the fact that farmers pay less attention to seed production and weather parameters like temperature and relative humidity prevailing during the reproduction phases causing serious seed shortage (Bakheit *et al.*, 2012). This reduction in seed production has resulted in import of clover seeds (Chaudhry *et al*., 1994). Garza and Marquez (1994) studied that improved seed production of berseem require proper sowing time and efficient method of planting. Sowing time is an important factor regulating germination, survival of seedlings, number of cuts, and development of herbage. Hence in the present study we investigated sowing windows suitable for palnadu region of Guntur district starting from October first week to November third week at every fortnight interval and for better seed setting through different foliar nutrients without green fodder cuttings.

Foliar application is a technique of feeding nutrients to plants in the form of liquid directly to their leaves. Nutrients are important and crucial elements, which are required for the plant for its growth and development. Application of nutrients through foliar spray at appropriate stages of growth is becoming important for their efficient utilization and better performance of the

crop without subjecting to immobilization or leaching (Anandha *et al.,* 2004). Same results recognized as supplementary foliar fertilization during crop growth can improve the mineral status of plants and increase the crop yield (Elayaraja and Angayarkanni 2005). Foliar application is credited with the advantage of quick and efficient utilization of nutrients, elimination of losses through leaching and fixation and regulation on the uptake of nutrient by plants (Manonmani and Srimathi 2009). The translocation of photosynthates from source to sink is very important for the development of economic part. Certain plant development stages are considered critical to affect yield and quality. Appropriate sowing method is one of the important components in production technology of any crop. There are many factors affecting seed production but the sowing method is a major one. A study to assess the consequence of different sowing dates and foliar nutrition on seed production of berseem was concentrated. Hence, in this study we have taken up four treatments of sprayings at flowering stage to improve the seed setting in fodder berseem crop.

MATERIALS AND METHODS

A field experiment entitled "Standarization of seed production in fodder berseem (*Trifolium* L.) through sowing dates and foliar nutrition" laid out in split plot design with 3 replications with following objectives.

1. To identify the best sowing time for berseem seed production at palanadu region of Guntur ditrict.
2. To study the effect of foliar spray on seed yield& quality of berseem.
3. To workout the economics.

The treatments in main Plots dates of Sowing *viz*., D_1: First Week of October, D_2: Third Week of October, D_3: First Week of November and D_4: Third Week of November. In Sub Plots (Foliar nutrition) *viz.*, T_1: Foliar spray of 2.0% Urea, T_2: Foliar spray of 2.0% DAP, T_3: Foliar spray of 2.0% MAP and T_4: Foliar spray of 1% K_2SO_4 at the time of flowering were taken. The Experiment was conducted on black soil with a pH 7.5, EC 2.01 ds m^{-1} and organic matter content 0.45, Available Nitrogen (296 kg ha^{-1}), Available Phosphorus (26 kg ha^{-1}) and Available Potassium (458 kg ha^{-1}). Harvesting was done upto ground level with the help of sickle allowed to sundry and made bundles, seed separated by beating with sticks. Randomly five plants selected from each treatment and yield, yield attributing characters were recorded at the time of harvesting. The data was analyzed with ANOVA at 5% CD level.

RESULTS AND DISCUSSION

Plant height: Higher values of plant height recorded with first week of October sowing compared to next subsequent sowings 79.20 & 77.76 cm respectively (Table 1). This might be due to favourable low temperature during early vegetative growth stage which promotes the growth. These findings as similar with Surinder *et al.* (2019).

The maximum and minimum values of plant height recorded with spraying of 2% MAP and 1% K_2SO_4 at the time flowering 75.70 & 71.26 cm. However, the spraying of 2% MAP gave comparatively on par values with spraying of 2% urea & 2% DAP at the time of flowering.

Number of leaves plant^{-1}: At the time of harvesting total number of leaves plant^{-1} was more with first week of October sowing during two years as 28.52 & 31.23 respectively (Table 1). Among the foliar applications spraying of 2% MAP at the time of flowering recorded highest values, however the results are comparable with spraying of 2% urea & 2% DAP at flowering. The foliar fertilization of P at early growth stages improve root systems and help to increase the uptake of soil-derived P (Mallarino *et al*., 2001; Kannan, 2010).

Number of heads plant^{-1}: In berseem flowering portion is called as head. Flowering occurs in flushes and early flushes contains maximum numbers of flower heads. While later flushes have decreased number of flower heads (Yadav *et al.* 2015). Observations showed that number of heads plant^{-1} were maximum in first week of October *i.e.*, 22.12 & 19.83 respectively (Table 2). Minimum no. of heads plant^{-1} with sowing at third week of November (17.82 & 11.40 during consequent years). In subplot treatments highest values with 2% MAP, however the results are onpar with spraying of 2% urea and followed by 2% DAP.

Head length (cm): Different sowing dates and foliar nutrition had significant effect on heads length (Table 2). Maximum head length recorded with first week of October (1.92 & 1.89 cm respectively),

Whereas minimum head length is in third week of November (1.50 & 1.24 cm). The decrease in head length might be due to increase temperature with delay in sowing dates. Foliar nutrition at the time flowering significantly increases the head length. Higher values with 2% MAP, however the results are onpar with spraying of 2% urea followed by 2% DAP.

Number of seeds per head: Maximum number of seeds per head was observed in first week of October sowing (30.33 & 31.28 during 2018-19 & 2019-20) and minimum number of seeds per head was observed in (23.05 & 22.03 during 2018-19 & 2019-20) (Table 3). The increase in number of seeds per head with early sowing might be longer time opportunity to fill seed and for maturity. Decrease in number of seeds head^{-1} might be due to high prevailing temperature at maturity. Berseem is a cross pollinated crop, highly depends on bees activity for fertilization. The increased temperature not only affects the bees activity but also reduced pollen fertility resulting in reduced seed setting (Bakheit *et al*. 2012). With respect to foliar sprayings maximum number of seeds per head was recorded with 2% MAP at flowering (30.25 & 29.10) whereas 1% K_2SO_4 (23.73 & 26.00) had minimum number of seeds per head (Table 3).

Number of shoots per plant: Berseem main stem grows as branches and terminate with trifoliate leaves. These branches are called as shoots. Maximum number of shoots recorded with treatment consisting of sowing during first week of October followed by sowing during third week of October. Minimum number of shoots recorded with first and third week of November sowing. The reason behind is may be low temperatures delay germination and result in weak growth and germination is sharply reduced when temperatures

rises. Among subplot treatments spraying of 2% MAP at flowering gave better results compared to other treatments. However, the results are onpar with spraying of 2% urea during first year and on par with 2% urea, 2% DAP and 1% K_2SO_4 during second year of investigation. According to Parimala *et al.* (2013) foliar application of 2% DAP and 2% urea on chickpea increased the number of branches plant^{-1}.

Test weight: There is no significant difference among different dates of sowing and foliar nutrition on test weight (Table 4).

Seed yield: Significantly highest seed yield was recorded with when the crop was sown during first week of October followed by third week of October. The lowest seed yield recorded with when the crop was sown during third week of November which may be due to poor production and translocation of photosynthates from source to sink. The highest seed yields were 470.70 & 483.71 kg ha^{-1} during 2018-19 & 2019-20 (Table 4). The Maximum seed yield might be due to the cumulative effect of physiologically younger plants and optimum exposure of growing period with favourable climatic conditions (Sardana and Narwal 2000; Singh, 1993). Ramadan *et al.,* (1994) reported that higher values of seed yield with berseem sown during first week of October and seed yield decreased when sowing was later than 20th December and the last harvest was after 20th March. He also reported that seed production was affected by sowing date and number of cuttings but mainly by the date of the last cut.

Among foliar application treatments higher values of seed yield was observed with spraying of 2% MAP solution at flowering stage *i.e* 436.74 & 466.03 kg ha^{-1} during successive years (Table 4). However the results are on par with spraying of 2% urea solution during first year of investigation and also on par results with spraying of 2% DAP solution during second year. The increase in yield might be due to, as foliar application induces numerous morphological, physiological, and biochemical responses within plants to affect the source-sink relationship. These results were according with Amanullah *et al.* (2005) findings that foliar spray with micronutrients significantly increased berseem forage yield.

Economics: The crop was sown during first week of October obtained the highest values of gross returns, net returns recorded as D1, 17,675 ha^{-1}, D 58,045ha^{-1} & D 74567ha^{-1}, D 40,802 ha^{-1} respectively during 2018-19 & 2019-20 when compared to other dates of sowing. Variation in gross returns, net returns from first year to second year due to fall in seed sale price even though approximately similar yields recorded. The higher values of return per rupee investment recorded with first week of October and lowest with third week of November sowing. Foliar spray of 2% MAP solution obtained maximum gross returns, net returns and returns per rupee investment.

Table 1: Growth parameters (plant height (cm) & Number of leaves plant^{-1}) as influenced by sowing dates and foliar sprayings in fodder berseem during *Rabi*, 2018-19 & 2019-20.

Treatments	2018-19					2019-20				
	Plant height (cm)									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	81.80	74.27	90.53	70.20	**79.20**	78.23	77.47	79.17	76.17	**77.76**
M_2: 3rd Week of October	70.93	68.20	72.40	68.73	70.07	75.60	74.50	76.10	73.13	74.83
M_3: 1st Week of November	67.50	66.80	71.33	66.20	67.96	72.50	71.77	73.10	70.87	72.06
M_4:3rd Week of November	64.80	60.60	68.53	59.80	63.43	69.33	68.47	69.73	66.40	68.48
Mean	**71.26**	67.47	**75.70**	66.23		**73.92**	73.05	**74.53**	71.64	
	SE(m)±	C.D@5%	C.V (%)			SE(m)±	C.D@5%	C.V (%)		
M	0.81	2.82	13.93			0.36	0.51	15.91		
S	2.45	7.16	12.11			1.34	3.90	16.31		
M × S	4.90	14.32	NS			2.67	7.79	NS		
	Number of leaves plant^{-1}									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	28.67	26.60	34.60	24.20	**28.52**	31.33	31.07	32.10	30.40	**31.23**
M_2: 3rd Week of October	25.20	23.87	29.00	24.33	25.60	29.57	29.23	30.13	28.70	29.41
M_3: 1st Week of November	24.40	22.13	26.33	21.67	23.63	27.33	26.43	28.60	25.23	26.90
M_4:3rd Week of November	22.03	21.27	25.27	21.00	22.39	24.13	23.30	25.30	21.10	23.46
Mean	**25.08**	23.47	**28.80**	22.80		**28.09**	**27.51**	**29.03**	26.36	
	SE(m)±	C.D@5%	C.V (%)			SE(m)±	C.D@5%	C.V (%)		
M	0.33	1.13	15.60			0.15	0.54	16.69		
S	1.28	3.72	17.66			1.02	2.97	12.69		
M × S	2.55	7.45	NS			2.03	5.93	NS		

S_1: Foliar spray of 2.0% Urea at flowering; S_2: Foliar spray of 2.0% DAP at flowering; S_3: Foliar spray of 2.0% MAP at flowering; S_4: Foliar spray of 1% K_2SO_4 at flowering

Table 2: Growth parameters (Number of heads plant^{-1} & head length (cm.)) as influenced by sowing dates and foliar sprayings in fodder berseem during *Rabi*, 2018-19 & 2019-20.

Treatments	2018-19					2019-20				
	No. of heads plant^{-1}									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	22.53	19.60	26.87	19.47	**22.12**	20.00	19.33	21.33	18.67	**19.83**
M_2: 3rd Week of October	20.07	19.00	23.40	18.13	20.15	18.67	17.00	18.67	16.33	17.67
M_3: 1st Week of November	19.87	18.27	20.33	17.80	19.07	15.33	14.30	16.50	13.07	14.80
M_4:3rd Week of November	18.53	16.80	20.27	15.67	17.82	11.93	11.80	12.17	9.70	11.40
Mean	**20.25**	18.42	**22.72**	17.77		**16.48**	**15.61**	**17.17**	14.44	
	SE(m)±	C.D@5%	C.V (%)			SE(m)±	C.D@5%	C.V (%)		
M	0.23	0.80	13.94			0.17	0.60	13.05		
S	1.21	3.52	16.10			1.00	2.91	11.68		
M × S	2.41	7.03	NS			1.99	5.81	NS		
	head length (cm.)									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	1.98	1.77	2.26	1.69	**1.92**	1.96	1.87	2.01	1.73	**1.89**
M_2: 3rd Week of October	1.77	1.71	1.90	1.69	1.77	1.69	1.68	1.70	1.58	1.66
M_3: 1st Week of November	1.77	1.63	1.82	1.53	1.69	1.46	1.45	1.57	1.40	1.47
M_4:3rd Week of November	1.55	1.46	1.62	1.36	1.50	1.29	1.21	1.38	1.07	1.24
Mean	**1.77**	1.64	**1.90**	1.57		**1.60**	**1.55**	**1.67**	1.44	
	SE(m)±	C.D@5%	C.V (%)			SE(m)±	C.D@5%	C.V (%)		
M	0.02	0.06	12.45			0.02	0.06	13.19		
S	0.07	0.20	13.56			0.07	0.21	15.99		
M × S	0.13	0.39	NS			0.14	0.42	NS		

S_1: Foliar spray of 2.0% Urea at flowering; S_2: Foliar spray of 2.0% DAP at flowering; S_3: Foliar spray of 2.0% MAP at flowering; S_4: Foliar spray of 1% K_2SO_4 at flowering

Table 3: Growth parameters (Number of seeds head^{-1} & Number of shoots plant^{-1}) as influenced by sowing dates and foliar sprayings in fodder berseem during *Rabi*, 2018-19& 2019-20.

Treatments	2018-19					2019-20				
	No. of seeds head^{-1}									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	30.67	28.87	35.40	26.40	**30.33**	31.40	30.77	32.17	30.77	**31.28**
M_2: 3rd Week of October	28.27	26.53	31.40	26.47	28.17	30.10	29.50	30.60	28.67	29.72
M_3: 1st Week of November	25.13	24.40	27.93	22.33	24.95	28.50	27.07	28.47	25.20	27.31
M_4:3rd Week of November	23.47	22.73	26.27	19.73	23.05	21.30	22.30	25.17	19.37	22.03
Mean	26.88	25.63	**30.25**	23.73		**27.83**	**27.41**	**29.10**	26.00	
	SE(m)±	C.D@5%	C.V (%)			SE(m)±	C.D@5%	C.V (%)		
M	0.37	1.29	16.85			0.19	0.66	8.31		
S	1.19	3.48	15.50			1.32	3.86	13.32		
M × S	2.38	6.95				2.64	7.72	NS		
	No. of shoots plant^{-1}									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	6.50	6.37	7.40	6.20	**6.62**	6.20	6.10	6.33	6.33	**6.24**
M_2: 3rd Week of October	6.33	6.20	6.57	6.13	**6.31**	5.88	5.80	6.10	5.67	5.86
M_3: 1st Week of November	6.00	5.90	6.40	5.67	**5.99**	5.54	5.42	5.77	5.30	5.51
M_4:3rd Week of November	5.87	5.70	6.00	5.40	5.74	5.13	4.87	5.37	4.67	5.01
Mean	**6.18**	6.04	**6.59**	5.85		**5.69**	**5.55**	**5.89**	**5.49**	
	SE(m)±	C.D@5%	C.V (%)			SE(m)±	C.D@5%	C.V (%)		
M	0.02	0.08	14.66			0.05	0.17	10.52		
S	0.15	0.44	8.53			0.20	0.60	12.54		
M × S	0.30	0.89	NS			0.40	1.19	NS		

S_1: Foliar spray of 2.0% Urea at flowering ; S_2: Foliar spray of 2.0% DAP at flowering ; S_3:Foliar spray of 2.0% MAP at flowering; S_4: Foliar spray of 1% K_2SO_4 at flowering

Table 4: Test weight (gms.) & Seed Yield (kg ha^{-1}) as influenced by sowing dates and foliar sprayings in fodder berseem during *Rabi*, 2018-19& 2019-20.

Treatments	2018-19					2019-20				
	Test weight (1000 seed weight) (g.)									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	2.85	2.76	2.96	2.71	2.82	3.03	3.07	2.67	2.67	2.86
M_2: 3rd Week of October	2.96	2.66	2.82	2.99	2.86	2.67	2.67	2.67	3.07	2.77
M_3: 1st Week of November	2.66	2.68	2.80	2.79	2.73	3.13	3.07	3.13	2.33	2.92
M_4:3rd Week of November	2.74	2.83	2.75	2.83	2.79	2.07	2.67	2.33	2.33	2.35
Mean	2.80	2.73	2.83	2.83		2.73	2.87	2.70	2.60	
	SE(m)±	C.D@5%	C.V (%)			SE(m)±	C.D@5%	C.V (%)		
M	0.02	0.06	NS			0.05	0.19	NS		
S	0.05	0.16	NS			0.33	0.95	NS		
M × S	0.11	0.31	NS			0.65	1.90	NS		
	Seed Yield (kg ha^{-1})									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	482.58	456.24	512.48	431.50	**470.70**	481.67	476.33	501.67	475.17	**483.71**
M_2: 3rd Week of October	417.68	406.60	452.10	399.08	418.87	471.13	470.40	474.27	427.07	460.72
M_3: 1st Week of November	409.38	370.65	411.76	351.76	385.89	451.07	440.13	465.07	426.27	445.63
M_4:3rd Week of November	353.02	341.80	370.62	305.23	342.67	400.27	360.27	423.13	335.37	379.76
Mean	**415.67**	393.82	**436.74**	371.90		**451.03**	**436.78**	**466.03**	415.97	
	SE(m)±	C.D@5%	C.V (%)			SE(m)±	C.D@5%	C.V (%)		
M	3.85	13.32	11.42			3.48	12.05	9.45		
S	13.69	39.96	11.72			10.57	30.86	8.28		
M × S	27.38	79.92	NS			21.14	61.17	NS		

S_1: Foliar spray of 2.0% Urea at flowering; S_2: Foliar spray of 2.0% DAP at flowering; S_3: Foliar spray of 2.0% MAP at flowering; S_4: Foliar spray of 1% K_2SO_4 at flowering

Table 5: Economics of fodder berseem as influenced by sowing dates and foliar sprayings during *Rabi*, 2018-19& 2019-20.

Treatments	2018-19					2019-20				
	Gross returns (Rs. ha^{-1})									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	120645	114060	128120	107875	**117675**	57800	57159	60200	57020	**58045**
M_2: 3rd Week of October	104420	101650	113025	99770	104716	56535	56448	56912	51248	55286
M_3: 1st Week of November	102345	92663	102940	87940	96472	54128	52815	55808	51152	53476
M_4:3rd Week of November	88255	85450	92655	76308	85667	48032	43232	50775	40244	45571
Mean	103916	98456	**109185**	92973		54124	52413	**55924**	49916	
	Net returns (Rs. ha^{-1})									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	77806	71181	84601	64681	**74567**	40664	40007	42792	39742	40802
M_2: 3rd Week of October	61581	58771	69506	56576	61608	39399	39296	39504	33970	38042
M_3: 1st Week of November	59506	49783	59421	44746	53364	36992	35663	38400	33874	36233
M_4:3rd Week of November	45416	42571	49136	33113	42559	30896	26080	33367	22966	28328
Mean	61077	55577	**65666**	49779		36988	35262	38516	32638	
	Return Per Rupee Investment									
	S_1	**S_2**	**S_3**	**S_4**	**Mean**	**S_1**	**S_2**	**S_3**	**S_4**	**Mean**
M_1: 1st Week of October	4.54	4.15	4.86	3.74	**4.32**	2.37	2.33	2.46	2.30	**2.37**
M_2: 3rd Week of October	3.59	3.43	3.99	3.27	3.57	2.30	2.29	2.27	1.97	2.21
M_3: 1st Week of November	3.47	2.90	3.41	2.59	3.09	2.16	2.08	2.21	1.96	2.10
M_4:3rd Week of November	2.65	2.48	2.82	1.92	2.47	1.80	1.52	1.92	1.33	1.64
Mean	3.56	3.24	**3.77**	2.88		2.16	2.06	2.21	1.89	

S_1: Foliar spray of 2.0% Urea at flowering; S_2: Foliar spray of 2.0% DAP at flowering; S_3: Foliar spray of 2.0% MAP at flowering; S_4: Foliar spray of 1% K_2SO_4 at flowering

CONCLUSIONS

Berseem is regarded as 'the king of fodder' due to its increased production capacity, succulence, palatability, nutritional content, and constant supply of fodder over several months. Sowing of berseem in first week of October along with spraying of 2% MAP at the time of flowering good for getting highest yield & yield attributing characters followed by sowing at third week of October. Sowing done beyond the November may not good for seed germination due to low temperatures coincidence with germination stage. Taking of Berseem seed production will be good in terms of returns per rupee investment in palnadu region in place of normal sown *rabi* crops like paddy/blackgram/bengalgram. But, still there were some bottleneck problems for production, storage and marketing of berseem seed. Generally the crop is allowed to take 3-4 green forage cuttings after that last cutting will be left for seed production means it will take 250-270 days. In this investigation we conducted experiment without allowing for green forage cuttings with main focus on seed production than forage production, then the crop matured within 118- 140 days.

FUTURE SCOPE

Time of seeding and appropriate variety is most important agronomic factors for realizing the yield potential of improved varieties. Sowing time has prominent influence on vegetative and reproductive stages of berseem. Hence, identification of best sowing time helps in the changes in the environment on sustained production.

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