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Interaction of varieties, Planting Dates, Growth Regulators on the Yield and Quality of Dolichos Bean (*Lablab purpureus* L.) under Shade Net instances

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ABSTRACT: Currently being conducted is a study with the "Interaction of varieties, planting dates, growth regulators on the yield and quality of Dolichos Bean (*Lablab purpureus* L.) under shade net instances" was carried out during summer at Horticultural Research Station, Ambajipeta, East Godavari District of Andhra Pradesh. A Factorial Randomised Block Design (FRBD) with 36 alternative treatment combinations that were each replicated three times in an open field was used to design the experiment. Four distinct varieties, including Arka Jay, ArkaAmog, ArkaSambhram, and ArkaSowmya, were used in the experiment. The sowing dates were December 15, January 1, and January 15, and the growth regulators used were NAA 25 ppm, Triacontanol 2 ppm, and control. The yield and quality metrics were collected, and the data were statistically analysed using ANOVA. Highest pod yield (237.72 g) was recorded in ArkaSowmya (V_4) followed by ArkaSambhram (V_3) (216.65). Arka Jay (V_1) recorded the lowest pod yield of 172.83 g. Dates of sowing also showed significant influence on pod yield per plant. Highest pod yield was recorded in January 1st sowing (S_1) (232.68 g), followed by January 15th sowing (S_3) (194.83 g). Highest pod yield was recorded in Triacontanol 2 ppm (G_2) (226.30 g), followed by NAA 25 ppm (G_1) (208.75 g) and without spray (control) (G_3) (186.26 g). The highest shelling per cent of fresh pod (35.63) was noticed in Arka Jay (V_1) and it was on par with ArkaSambhram (V_3) (34.16 %). The highest shelling per cent of fresh pod was observed in January 1st sown crop (S_2) (35.18 %), followed by December 15th sown crop (S_1) (34.58 %). Highest shelling per cent for fresh pod was recorded in Triacontanol 2 ppm (G_2) (36.44), followed by NAA 25 ppm spray (34.66). Growth regulators showed significant effect on protein content. The field bean crop sprayed with NAA 25 ppm foliar spray recorded the highest protein of 15.35 per cent followed by Triacontanol 2 ppm foliar spray(14.42%). Highest fibre content (33.69 %) was recorded in NAA 25 ppm spray (G_1) and it was on par with Triacontanol 2 ppm (G_2) (33.56 %). With a pod yield of 293.90 g, ArkaSowmya, which was planted on January 1st with Triacontanol 2 ppm spray ($V_4S_2G_2$), had the highest yield.

Keywords: Dolichos bean, Dates of sowing, NAA, Triacontanol, Shade net.

INTRODUCTION

Lablab is a field crop that is primarily grown in the peninsular region of India, with significant cultivation taking place in Karnataka and nearby districts of Tamil Nadu, Andhra Pradesh, and Maharashtra Karnataka makes a significant contribution, making up about 90% of the nation's area and production. Field bean often grows during the Rabi and Kharif seasons. After the month of February, the beans are not available in Andhra Pradesh. Beans can be grown in the summer, which is out of season, and will be available to consumers all year long. Farmers will also be able to sell their produce for more money. The best sowing time among agronomic practises is regarded as a significant non-cash input that significantly improves yield and quality. The majority of vegetable crops' productivity is influenced by the current environmental circumstances to which different phenological stages of the crop are exposed. The crop's growth, flowering, and yield may be impacted by the spaced-out planting dates. Plant growth regulators are either natural or synthetic substances that are applied to the target plants to modify either developmental or morphological structure or both by adjusting the hormonal levels in various plant organs at different growth stages of the plant in the life cycle in order to increase its yield and quality (Setia *et al.*, 1991). There is a lack of information regarding acceptable varieties, the ideal sowing date, and growth regulators for field bean production during the off-season. Therefore, the goal of the current study is to identify field bean varieties that may be grown in coastal Andhra Pradesh's off-season under shade net with the best planting date and growth regulator.

MATERIALS AND METHODS

The experiment was titled "Interaction of varieties, planting dates, growth regulators on the yield and

quality of Dolichos Bean (*Lablab purpureus* L.) under shade net instances" was done in the summer at the Horticultural Research Station in Ambajipeta, Andhra Pradesh, which is 34 metres above mean sea level and located at 16.40 N latitude and 81.50 E longitude. The experimental site has 1186 mm of yearly rainfall The irrigation water's pH was 7.3 and its EC was 0.7 dSm^{-1}. The experiment used a Factorial Randomised Block Design (FRBD) with 36 possible treatment combinations, each reproduced three times under a shade net. Four different types were used for the experiment, including Arka Jay (V_1), ArkaAmog (V_2), ArkaSambhram(V_3) and ArkaSowmya (V_4) using foliar sprays of growth regulators such as NAA 25 ppm (G_1), Triacontanol 2 ppm (G_2), and control (G_3) on three distinct sowing dates: December 15 (S_1), January 1 (S_2), and January 15 (S_3). Growth regulators were applied at the 30 and 60 DAS. The test area was completely tilled and made into a fine tilth. Before the last ploughing, the recommended FYM dose and the basal dose of fertilisers were integrated into the soil. Urea, single super phosphate, and muriate of potash were used to apply the necessary doses of N, P, and K (20:60:50 kg per ha), respectively. The application of nitrogen was done in two parts; the first half, or 10 kg, was used as a base dose, and the second half, or 10 kg, was used as a top dressing at 30 days after sowing. At the time of sowing, the complete phosphorus and potash dose was administered as the basal dose. On five plants that were tagged, several observations on growth and yield metrics were made. The number of days from the planting dates to the days to 50% flowering was calculated as the number of days. The yield and quality indicators were recorded over the course of two years, and the pooled results were statistically analysed using ANOVA.

RESULTS AND DISCUSSION

On field bean types grown under shade net conditions, the effects of sowing time, growth regulators, and their interactions for green pod yield per plant were examined. The results are shown in Table 1. The green pod yield per plant varied significantly between types. Highest pod yield (237.72 g) was recorded in ArkaSowmya (V_4) followed by ArkaSambhram (V_3) (216.65). Arka Jay (V_1) recorded the lowest pod yield of 172.83 g. A variety of factors, including genetic makeup, environmental factors, crop vigour, pod set %, pod length, number of pods per plant, pod weight, and plant sex, may contribute to variations in pod production per plant. These results support those of Khattak *et al*. (2007) for tomatoes and Vethamoni and Natarajan (2008) for chillies.

The sowing dates had a considerable impact on plant pod yield as well. The January 1st planting (S_1) produced the highest pod yield (232.68 g), which was followed by the January 15th sowing (S_3) (194.83 g). By seeding (S_1) on December 15th, the smallest pod yield was observed (193.81g). The conditions that prevailed during the January 1st sowings may have been more conducive to improved vegetative growth and higher photosynthate generation, which ultimately led to higher fresh pod output per plant in the dolichos bean. The increase in yield could be related to enhanced development of yield attributes, *i.e.*, number of pods per plant and pod weight due to optimum temperatures prevailed during reproductive period of the crop under shade net. These findings are very similar to those from the french bean study by Ranjit *et al*. (2015).

Growth regulators had a large impact on pod yield as well. Triacontanol 2 ppm (G2) (226.30 g) had the highest pod production, followed by NAA 25 ppm (G1) (208.75 g) and the control group (G3) (186.26 g) without any spray. Ries *et al.* (1976), Eriksen *et al*. (1982); Gunasekaran (1982) reported an increase in tomato yield due to triacontanol; Bharti *et al*. (2017); Prateek *et al.* (2017) reported similar results using NAA. V×S interactions had a considerable impact on pod yield as well. The maximum green pod yield was recorded by ArkaSowmya on January 1st (V4S2) and was 276.34 g. The dolichos bean produced more fresh pods per plant due to the climate conditions that prevailed during the January 1st sowings, which may have contributed to improved vegetative growth and higher photosynthate formation. The higher production could be attributable to the crop's improved development of yield characteristics, such as the number of pods per plant, during the reproductive phase. In regards to french bean, Uddin (2005); Moniruzzaman *et al*. (2007); Islam (2008) all expressed similar opinions.

The influence of varieties, dates of sowing and growth regulators on shelling per cent of fresh pod shade net condition and are presented in Table 1. Among varieties, the highest shelling per cent of fresh pod (35.63) was noticed in Arka Jay (V_1) and it was on par with ArkaSambhram (V_3) (34.16 %). Lowest shelling per cent of fresh pod was noticed in ArkaSowmya (V_4) (33.75 %).

Dates of sowing showed significant effect on shelling per cent of fresh pod. The highest shelling per cent of fresh pod was observed in January 1st sown crop (S_2) (35.18 %), followed by December 15th sown crop (S_1) (34.58 %). The crop sown on January 15th (S_3) recorded the lowest shelling per cent (34.04).

Growth regulators showed significant effect on shelling per cent (fresh pod). Highest shelling per cent for fresh pod was recorded in Triacontanol 2 ppm (G_2) (36.44), followed by NAA 25 ppm spray (34.66). The lowest shelling per cent was recorded in control (G_3) (32.70).

In V × S interaction, Arka Jay sown on December 15th (V_1S_1) recorded the highest shelling per cent of fresh pod (36.64) and it was on par with ArkaAmog sown on January 1st (V_2S_2) (36.21 %), Arka Jay sown on January 15th (V_1S_3) and ArkaAmog sown on December 15th (V_2S_1) (35.36) and ArkaSambhram sown on January 15th (V_3S_2) (35.34). The lowest shelling per cent of fresh pod (32.39) was recorded in ArkaSambhram sown on December 15th (V_3S_1).

The interaction of V×G, S×G and V×S×G interaction showed non-significant effect on shelling per cent of fresh pod.

The effect of varieties, planting dates, growth regulators and their interactions on protein content of field bean

shade net condition are presented in Table 2. Growth regulators showed significant effect on protein content. The field bean crop sprayed with NAA 25ppm foliar spray recorded the highest protein of 15.35 per cent followed by Triacontanol 2 ppm foliar spray(14.42%). The lowest protein content was recorded in G_3 (control) (13.93 %). This might be due to more nitrogen uptake which influenced increase of protein content by the application of Triacontanol and NAA (Bhatnagar *et al.*, 1992; Radha, 2004 in french bean).

The influence of varieties, planting dates, growth regulators and their interactions on pod fibre content shade net condition are depicted in Table 2. Growth regulators showed significant influence on fibre content. Highest fibre content (33.69 %) was recorded in NAA 25 ppm spray (G_1) and it was on par with Triacontanol 2 ppm (G_2) (33.56 %) and the lowest fibre content was recorded in control (G_3) (32.34 %).

Table 1: Effect of varieties, dates of sowing, growth regulators and their interaction on green pod yield per plant and shelling percentage of fresh pod in field under shade net.

Varieties (V)	Green pod yield/plant (g)			
	Dates of sowing (S)			
	S_1	S_2	S_3	Mean
V_1	176.54	163.90	178.06	**172.83**
V_2	186.07	242.59	175.01	**201.23**
V_3	197.56	247.86	204.52	**216.65**
V_4	215.08	276.34	221.74	**237.72**
Mean	**193.81**	**232.68**	**194.83**	—

Varieties (V)	Growth Regulators (G)			
	G_1	G_2	G_3	Mean
V_1	169.43	190.80	158.27	**172.83**
V_2	202.42	210.59	190.66	**201.23**
V_3	211.62	242.19	196.13	**216.65**
V_4	251.54	261.63	199.99	**237.72**
Mean	**208.75**	**226.30**	**186.26**	—

Dates of sowing(S)	Growth Regulators (G)			
	G_1	G_2	G_3	Mean
S_1	194.84	213.61	172.99	**193.81**
S_2	232.24	250.34	215.43	**232.68**
S_3	199.17	215.00	170.37	**192.02**
Mean	**208.75**	**226.30**	**186.26**	—

Interaction (V×S×G)		Growth Regulators (G)			
		G_1	G_2	G_3	
V_1	S_1	167.26	201.89	160.46	—
	S_2	167.51	180.46	143.74	—
	S_3	173.51	190.06	170.61	—
V_2	S_1	187.04	187.07	184.11	—
	S_2	237.24	254.71	235.84	—
	S_3	182.99	190.00	152.04	—
V_3	S_1	192.93	218.35	181.41	—
	S_2	245.48	272.31	225.78	—
	S_3	196.45	235.92	181.19	—
V_4	S_1	232.13	247.14	165.97	—
	S_2	278.75	293.90	256.36	—
	S_3	243.75	243.84	177.63	—

Source	SE.m ±	C.D at 5 %
V	3.76	10.51
S	3.26	9.10
G	3.26	9.10
V×S	6.52	18.21
V×G	6.52	NS
S×G	5.65	NS
V×S×G	11.30	31.54

Varieties (V)	Shelling percentage of fresh pod (%)			
	Dates of sowing (S)			
	S_1	S_2	S_3	Mean
V_1	36.64	34.90	35.36	**35.63**
V_2	35.36	36.21	33.02	**34.86**
V_3	32.39	35.34	34.73	**34.16**
V_4	33.91	34.26	33.08	**33.75**
Mean	**34.58**	**35.18**	**34.04**	

Varieties (V)	Growth Regulators (G)			
	G_1	G_2	G_3	Mean
V_1	35.95	37.37	33.58	**35.63**
V_2	34.17	37.16	33.25	**34.86**
V_3	34.58	35.97	31.92	**34.16**
V_4	33.93	35.24	32.07	**33.75**
Mean	**34.66**	**36.44**	**32.70**	

Dates of sowing (S)	Growth Regulators (G)			
	G_1	G_2	G_3	Mean
S_1	34.89	37.02	31.81	**34.58**
S_2	35.40	36.22	33.91	**35.18**
S_3	33.69	36.06	32.39	**34.04**
Mean	**34.66**	**36.44**	**32.70**	

Interaction (VxSxG)		Growth Regulators (G)			
		G_1	G_2	G_3	
V_1	S_1	37.55	40.03	32.32	—
	S_2	35.01	36.36	33.32	—
	S_3	35.27	35.70	35.09	—
V_2	S_1	34.51	37.74	33.83	—
	S_2	35.52	38.25	34.84	—
	S_3	32.48	35.49	31.07	—
V_3	S_1	32.48	34.40	30.30	—
	S_2	36.75	35.14	34.13	—
	S_3	34.51	38.36	31.31	—
V_4	S_1	35.01	35.90	30.80	—
	S_2	34.30	35.14	33.32	—
	S_3	32.48	34.68	32.07	—

SE.m ±	C.D at 5 %
0.35	0.99
0.30	0.86
0.30	0.86
0.61	1.72
0.61	NS
0.53	NS
1.07	NS

Varieties (V)

V_1 - Arka Jay
V_2 - ArkaAmog
V_3 - ArkaSambhram
V_4 - ArkaSowmya

Dates of sowing (S)

S_1 - December 15th
S_2 - January 1st
S_3 - January 15th

Growth Regulators (G)

G_1 - NAA 25 ppm
G_2 - Triacontanol 2 ppm
G_3 - Control

Table 2: Effect of varieties, dates of sowing, growth regulators and their interaction on protein content and fibre content in field bean under shade net.

Varieties (V)	Protein content (%)			
	Dates of sowing (S)			
	S_1	S_2	S_3	Mean
V_1	14.72	13.99	15.26	**14.66**
V_2	14.61	13.90	14.50	**14.34**
V_3	14.02	15.52	14.07	**14.54**
V_4	15.03	14.96	14.20	**14.73**
Mean	**14.59**	**15.0**	**14.51**	—

Varieties (V)	Growth Regulators (G)			
	G_1	G_2	G_3	Mean
V_1	15.03	14.54	14.40	**14.66**
V_2	15.05	14.88	13.08	**14.34**
V_3	15.65	13.86	14.10	**14.54**
V_4	15.66	14.39	14.14	**14.73**
Mean	**15.35**	**14.42**	**13.93**	--

Dates of sowing(S)	Growth Regulators (G)			
	G_1	G_2	G_3	Mean
S_1	15.42	14.28	14.08	**14.59**
S_2	15.11	14.80	13.88	**15.0**
S_3	15.52	14.18	13.83	**14.51**
Mean	**15.35**	**14.42**	**13.93**	—

Interaction (V×S×G)		Growth Regulators (G)			
		G_1	G_2	G_3	
V_1	S_1	14.74	14.44	14.99	—
	S_2	14.09	13.79	14.09	—
	S_3	14.80	14.96	16.02	—
V_2	S_1	14.59	13.16	16.08	—
	S_2	14.74	12.62	14.35	—
	S_3	15.31	13.46	14.74	—
V_3	S_1	12.88	13.79	15.38	—
	S_2	14.99	14.67	16.91	—
	S_3	13.71	13.84	14.67	—
V_4	S_1	14.93	14.91	15.23	—
	S_2	15.38	14.44	15.08	—
	S_3	12.88	13.07	16.66	—

Source	SE.m ±	C.D at 5 %
V	0.34	NS
S	0.29	NS
G	0.29	0.83
VxS	0.59	NS
VxG	0.59	NS
SxG	0.51	NS
V×S×G	1.03	NS

Pod Fibre content (%)				
Dates of sowing (S)				
Varieties (V)	S_1	S_2	S_3	Mean
V_1	33.26	33.27	33.18	**33.24**
V_2	34.32	32.91	33.89	**33.71**
V_3	33.04	34.26	32.98	**33.43**
V_4	31.80	33.01	32.45	**32.42**
Mean	**33.11**	**33.36**	**33.13**	

Varieties (V)	Growth Regulators (G)			
	G_1	G_2	G_3	Mean
V_1	33.32	33.76	32.63	**33.24**
V_2	34.76	33.95	32.41	**33.71**
V_3	34.02	33.45	32.81	**33.43**
V_4	32.66	33.09	31.52	**32.42**
Mean	**33.69**	**33.56**	**32.34**	

Dates of sowing (S)	Growth Regulators (G)			
	G_1	G_2	G_3	Mean
S_1	33.57	33.33	32.42	**33.11**
S_2	33.92	33.66	32.51	**33.36**
S_3	33.57	33.71	32.11	**33.13**
Mean	**33.69**	**33.56**	**32.34**	

Interaction (VxSxG)		Growth Regulators (G)			
		G_1	G_2	G_3	Mean
V_1	S_1	34.79	32.84	32.15	—
	S_2	32.44	34.36	33.01	—
	S_3	32.74	34.08	32.72	—
V_2	S_1	34.95	35.08	32.90	—
	S_2	34.59	32.56	31.56	—
	S_3	34.72	34.19	32.76	—
V_3	S_1	33.08	32.73	33.31	—
	S_2	35.39	33.87	33.51	—
	S_3	33.57	33.74	31.61	—
V_4	S_1	31.46	32.64	31.29	—
	S_2	33.27	33.82	31.93	—
	S_3	33.23	32.80	31.30	—

Source	SE.m ±	C.D at 5 %
V	0.34	NS
S	0.29	NS
G	0.29	0.82
VxS	0.59	NS
VxG	0.59	NS
SxG	0.51	NS
V×S×G	1.02	NS

Varieties (V)
V_1 - Arka Jay
V_2 - ArkaAmog
V_3 - ArkaSambhram
V_4 - ArkaSowmya

Dates of sowing (S)
S_1 - December 15th
S_2 - January 1st
S_3 - January 15th

Growth Regulators (G)
G_1 - NAA 25 ppm
G_2 - Triacontanol 2 ppm
G_3 - Control

CONCLUSIONS

Arka Sowmya which was planted on January 1st with Triacontanol 2 ppm spray ($V_4S_2G_2$), had the highest yield under shade net.

FUTURE SCOPE

Other varieties of dolichos bean which can be grown in off season can be explored. Integrated nutrient management can be standardised. Different percentages of shade net and various coloured shade nets can be studied.

REFERENCES

Bharti, N., Sanjeev, K., Lathiya, J. B. and Kamlesh. K. C. V. (2017). Effect of exogenous application of plant growth regulators on quality and yield of bell pepper (*Capsicum annuum* L.) under NVPH. *International Journal of Farm Sciences, 7*(2), 108-112.

Bhatnagar, G. S., Porwal, M. K. and Nanwati, G. C. (1992). Effect of nitrogen and mixtalol on french bean (*Phaseolus vulgaris* L.) during winter. *Indian Journal of Agricultural Science, 62*(4), 280-281.

Eriksen, A. B., Hangstad, M. K. and Nilsen, S. (1982). Yield of tomato and maize in response to foliar and root

applications of triacontanol. *Plant Growth Regulation*, *1*, 11-14.

Gunasekaran, N. (1982). Studies on the effect of triacontanol on tomato (*Lycopersican esculentum* Mill) cv.Co.3. *M.Sc. (Hort.) Thesis*, Tamil Nadu Agricultural University.

Islam, M. D. A. (2005). Effect of sowing time and nitrogen on the growth and yield of French bean (*Phaseolus vulgaris* L.). *M.Sc. Thesis*. Shere-E-Bangla Agricultural University, Dhaka, Bangladesh

Khattak, A. M., Abdul, S. and Khalid, N. (2007). Response of exotic tomato lines to different light intensities. *Sarhad Journal of Agriculture, 23*(4), 927-932.

Moniruzzaman, M., Rahman, S. M. L., Kibria, M. G., Rahman, M. A. and Kaisar, M. O. (2007). Performance of vegetable french bean as influenced by varieties and sowing dates in *rabi* season. *International Journal Sustainable Crop Production*, *2*, 69-73.

Prateek, S., Devi, S., Deepak, K. J., Singh D. K. and Vaibhav, S. (2017). Impact of Naphthalene Acetic Acid and Gibberellic Acid on growth and yield of capsicum (*Capsicum annum* (L.)) cv. Indra under shade net conditions. *International Journal of Current Microbiology*, *6*(6), 2457-2462.

Radha, K. C. (2004). Effect of NAA and Triacontanol on growth and yield of french bean (*Phaseolus vulgaris* L.) *M.Sc. (Agri.) Thesis*, Acharya N.G. Ranga Agricultural University.

Ranjit Chatterjee, Ravikiran, T. and Dipika, M. (2015). Off season production of french bean (*Phaseolus vulgaris* L.) cultivation inside agro shade net: Influence of planting dates and nutrient sources. *Journal of Agricultural Technology*, *2*(1 and 2), 87-91.

Ries, S. K., Violet Wert, Sweeley, C. C. and Leavitt, R. A. (1976). Triacontanol: A new naturally occurring plant growth regulator. *Science*, *195*, 1339-1341.

Setia, R. C., Setia, N. and Malik, C. P. (1991). Plant growth regulators: Overview and role in crop productivity. *In: Recent Advances in Plant Biology*, (Ed.) C.P. Malik and Y.P. Abrol. Narendra Publishing House, New Delhi. pp. 417-476.

Uddin, A. S. M. M. (2005). Influence of sowing time and plant population on growth and yield of french bean (*Phaseolus vulgaris* L.). *M.Sc. Thesis*. Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh.

Vethamoni, I. P. and Natarajan, S. (2008). Effect of natural resources on plant growth, yield and quality in chilli cultivars (*Capsicum annuum* L.). *The Asian Journal of Horticulture, 3*(2), 319-322.

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