ADVANCE RESEARCH JOURNAL OF CROP IMPROVEMENT
Volume 2 Issue 2 (December, 2011) Page : 174-177

Received : August, 2011; *Revised :* September, 2011; *Accepted :* October, 2011

Research Paper

Influence of herbal pelleting on physiological and yield attributes in redgram [*Cajanus cajan* (L.) Millsp.]

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ABSTRACT

An experiment was conducted to gain information on the field performance of pelleted seeds using botanical *viz*., vitex and calotropis leaf powder with acacia and maida gum as adhesive in redgram cv. APK 1. Seed pelleting with *Calotropis* (100 g/kg of seeds) using maida gum (15 %) followed by drying recorded higher physiological and yield parameters.

Sujatha, K., Ramamoorthy, K. and Sivasubramaniam, K. (2011). Influence of herbal pelleting on physiological and yield attributes in redgram [*Cajanus cajan* (L.) Millsp.], *Adv. Res. J. Crop Improv.,* **2** (2) : 174-177.

KEY WORDS : Botanicals, Pelleting, Dry weight, Adhesive, Relative growth rate, Leaf area index, Redgram

The successful establishment of the crop mainly depends on achievement of desired population through high probability of successful establishment of each seed planted. Seed pelleting is the process of enclosing a seed with a small quantity of inert materials a bioactive substance just large enough to produce a globular unit of standard size to facilitate precision planting. The pelleted material creates natural water holding potential through absorption and provides nutrients to young seedlings. It also reduces the problem of thinning, gap filling and seed dressing chemicals are required in low quality. Redgram is raised mostly under rainfed condition. Poor fertility status and inadequacy of soil moisture can adversely impact productivity. To overcome these environmental and management crisis, which delay or prevent germination and establishment of seedlings, pelleting provides opportunity to package effective quantities of required materials so that they can positive influence the seed or soil at seed- soil interface. Against this background, the present study was, therefore, aimed to identify the efficacy of using herbal powders for pelleting on growth and yield parameters in redgram.

RESEARCH PROCEDURE

Air dried (3 days) leaves of calotropis (*Calotropis gigantea.* L.) and vitex (*Vitex negundo*) herbs were powdered and sieved through 60mm sieve and used for seed pelleting. Fresh acacia gum (10, 20 and 30 %) and maida (5, 10 and 15 %) were used as binding agents.

Graded seeds (12/64 round perforated sieves) of redgram cv. VBN 1 obtained from National Pulses Research Center, Vamban, Pudukottai, Tamil Nadu were pelleted. For every 100 g of seeds, 10 g of dry herbal powder in each of Calotropis and Vitex separately was used for coating with acacia and maida gum using different concentrations and the pelleted seeds were shade dried. The field experiment was carried out at Agricultural College and Research Institute, Madurai ($90^0$5' North and $78^0$5' East and altitude of 147 MSL). A spacing of 30 x 10 cm was adopted with other recommended crop management practices in a randomized block design replicated thrice. The experiment was conducted during *Kharif* and *Rabi* season, 2008 with a plot size of 2x2 m^2. Observations on dry weight (g) (drying at 80^0 C for 16 h), leaf area index, leaf area duration (Power *et al*.,1976), relative growth rate (Williams, 1946), pod weight $plot^{-1}$(g), grain yield per $plot^{-1}$ (g) and grain yield (kg ha^{-1}) were recorded on 60 days after sowing. Individual observations, ten plants per plot taken at random were pooled. Mean data were analyzed statically after Snedecor and Cochran (1961).

RESEARCH ANALYSIS AND REASONING

Among the herbal powders and gums, seed pelleting using Calotropis with 15 per cent maida gum proved better followed by Vitex. Maximum dry weight (110.3 and 103.8 g), leaf area index (3.01 and 2.91), leaf area duration (64.0 and 61.4), RGR(62.5 and 62.0), grain yield plot^{-1} (387 and 382 g) and grain yield kg. ha^{-1} (972 and 957 kg) could be observed for *Calotropis* with 15 per cent maida gum and *Vitex* with 30 per cent acacia gum, respectively (Tables 1, 2 and 3). Other concentrations of acacia gum with same herbals had beneficial effect, but the effect was less pronounced than that of maida gum (15 %) but was always better than untreated control (86.5 g for dry weight, 2.71 for leaf area index, 56.2 for LAD, 59.9 mg for RGR, 354 g for grain yield plot^{-1} and 886 kg ha^{-1} for grain yield (Tables 1, 2 and 3). Among the seasons, *Kharif* season recorded higher growth and yield parameters.

The increase in dry weight and yield enhancement might be due to early emergence leading to advancement in autotrophic stage (Lu *et al*., 1993), who suggested synergistic interaction of bio-inoculants with amino acids especially tryptophan to form IAA in the germinating seeds responsible for enhancement in seedling growth and subsequent dry matter accumulation. Presence of plant growth like substances in pungam leaf powder have been reported in ragi (Punithavathi, 1997). The beneficial effects of pelleting with bio-active substances especially botanicals emanating from Calotropis or Vitex resulted in improved photosynthetic efficiency was evidenced through yield attributing characters. In addition to adhesive property of maida and acacia gum, the starchy substrate present in them would have provided nutrient for

Table 2 : Effect of herbal pelleting on LAD (days) and RGR (mg g^{-1} d^{-1}) in redgram cv. APK 1 (40-60 Days after sowing)

	Acacia gum										Maida gum									
Treatments	10%			20%			30%			Mean	5%			10%			15%			Mean
	Kharif	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean		*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	
Leaf area duration (days)																				
Control	56.9	55.5	56.2	56.9	55.5	56.2	56.9	55.5	56.2	56.2	56.9	55.5	56.2	56.9	55.5	56.2	56.2	55.5	56.2	56.2
Calotropis	57.9	56.6	57.2	58.8	57.9	58.3	61.0	59.7	60.3	58.6	58.4	56.3	57.3	63.6	61.7	62.6	65.9	62.1	64.0	61.3
Vitox	59.1	58.1	58.6	61.1	58.5	59.8	62.9	61.1	62.0	60.1	59.9	58.1	59.0	61.0	58.9	59.9	62.6	60.2	61.4	60.1
Mean	57.9	56.7		58.9	57.3		60.2	58.7			58.4	56.6		60.5	58.7		61.8	59.2		
		Mean	57.3			58.1			59.5				57.5			59.6			60.5	
									Mean	58.3										59.2

	T	C	G	S	TG	GS	TS	TGS
S.E.	0.178	0.145	0.251	0.145	0.435	0.355	0.251	0.615
C.D. (P=0.05)	0.360**	0.2947**	0.509**	0.2947**	0.883**	NS	NS	1.248*

	Acacia gum										Maida gum									
Treatments	10%			20%			30%			Mean	5%			10%			15%			Mean
	Kharif	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean		*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	
Relative growth rate (mg g^{-1} d^{-1})																				
Control	60.1	59.8	59.9	60.1	59.8	59.9	60.1	59.8	59.9	59.9	60.1	59.8	59.9	60.1	59.8	59.9	60.1	59.8	59.9	59.9
Calotropis	61.0	60.2	60.6	61.8	61.6	61.7	62.1	61.0	61.5	61.2	61.4	60.6	61.0	63.2	61.9	62.5	63.0	62.1	62.5	62.0
Vitox	60.3	60.8	60.5	62.1	61.9	62.0	62.6	61.5	62.0	61.5	6.17	61.1	61.4	62.8	68.2	62.7	68.2	61.9	62.0	62.0
Mean	60.4	60.2		61.3	61.1		61.6	60.7			61.0	60.5		62.0	61.4		61.7	61.2		
		Mean	60.3			61.2			61.1				60.8			61.7			61.5	
									Mean	60.9										61.3

	T	C	G	S	TG	GS	TS	TGS
S.E.	0.0134	0.011	0.019	0.011	0.033	0.027	0.019	0.047
C.D. (P=0.05)	0.028**	0.023**	0.039**	0.023**	0.068**	0.055**	0.039**	0.096**

T=Treatment, G=Gum, C=Concentration, S=Season ** indicate significance of value at P=0.01 NS=Non-significant

Table 3 : Effect of herbal pelleting on grain yield plot^{-1} (g) and grain yield (kg ha^{-1}) in redgram cv. APK 1 (40-60 Days after sowing)

	Acacia gum										Maida gum									
Treatments	10%			20%			30%			Mean	5%			10%			15%			Mean
	Kharif	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean		*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	
Grain yield plot^{-1} (g)																				
Control	362	347	354	362	347	354	362	347	354	354	362	347	354	362	347	354	362	347	354	354
Calotropis	370	355	363	376	365	370	381	367	374	368	367	361	362	381	375	378	390	387	387	376
Vitox	375	363	369	381	372	375	385	374	379	374	370	364	367	378	363	373	384	381	382	374
Mean	369	355		372	361		376	362			365	357		374	363		378	372		
		Mean	362			366			369				361			368			374	
									Mean	365										368

	T	C	G	S	TG	GS	TS	TGS
S.E.	0.312	0.254	0.440	0.254	0.763	0.623	0.441	1.08
C.D. (P=0.05)	0.630**	0.520**	0.900**	0.520**	1.550**	1.270**	0.890**	2.190**

	Acacia gum										Maida gum									
Treatments	10%			20%			30%			Mean	5%			10%			15%			Mean
	Kharif	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean		*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	*Kharif*	*Rabi*	Mean	
Grain yield (kg ha^{-1})																				
Control	905	867	886	905	867	886	905	867	886	886	905	867	886	905	867	886	905	867	886	886
Calotropis	925	887	906	940	913	926	952	917	934	922	918	903	911	953	938	945	975	968	972	943
Vitox	937	907	922	952	930	935	962	935	948	935	925	910	917	945	908	927	960	953	957	933
Mean	922	887		932	930		939	906			916	893		934	904		946	929		
		Mean	905			916			923				905			919			938	
									Mean	914										921

	T	C	G	S	TG	GS	TS	TGS
S.E.	3.05	2.49	4.32	2.49	7.49	6.11	4.32	10.59
C.D. (P=0.05)	6.210**	5.070**	8.780**	5.070**	15.21**	NS	8.782**	NS

T=Treatment, G=Gum, C=Concentration, S=Season ** indicate significance of value at P=0.01 NS=Non-significant

better physiological efficiency, particularly germination and growth, similar to DAP pelleting as reported by Begam and Krishnasamy (2003) in blackgram and Srimathi *et al*. (2007) in greengram.

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LITERATURE CITED

Begam,J.B. and Krishnasamy,V. (2003). Effect of seed hardening and pelleting on seed germination and vigour in blackgram. *Seed Res*., **31**(2): 194-199

Lu, S.D., Zing and Hang, T. (1993). A preliminary report on the effect of $CaCO_3$ pelleted seed of Chinese milk vetch on its yield. *Shanghai Agric. Sci. & Technol*., **6** : 9170-9173.

Power, J.E., Wills, W.O., Granes, D.L and Richman, G.A. (1976). Effect of soil temperature, phosphorus and plant age on growth and analysis of barley. *Agron. J*., **59** : 231-34

Punithavathi,M. (1997). Seed hardening and pelleting studies in ragi cv. CO 13. M.Sc (Ag.) Thesis, Tamil Nadu Agricultural University, COIMBATORE, T.N. (India).

Snedecor, G.W. and Cochran, W.G. (1961). *Statistical methods* AMES, Iowa State University Press.

Srimathi, P., Kavitha, S. and Renugadevi, J. (2007). Influence of seed hardening and pelleting on seed yield and quality in greengram cv. CO 6. *Indian J. Agric.Res*., **41**(2): 122-126.

Williams, R.E. (1946). The physiology of plant growth with special to the concept of NAR *Ann. Bot*., **10** : 41-71.

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