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Growth And Yield of Transplanted Redgram as Influenced by Varities and Age of Seedlings

A Thirumala Rao, B Venkateswarlu, K Chandrasekhar, P R K Prasad and G Subbaiah
Department of Agronomy, Agricultural College, Bapatla 522101

ABSTRACT

A field experiment was conducted at the Agricultural College Farm, Bapatla on a sandy clay loam soil during *kharif,* 2010-11 to study the effect of varieties and age of seedlings on the growth and yield of transplanted redgram. The findings of the experiment revealed that transplanting 15 day aged seedlings of LRG-41 variety registered significantly the highest drymatter production at harvest, number of pods plant^{-1}, seed yield and stalk yield over other treatment combinations. Among the varieties tested, LRG-41 recorded significantly the highest test weight (9.8 g) and harvest index (16.8%) than other varieties. Among the age of seedlings tested, transplanting 15 day aged seedlings recorded numerically and significantly higher number of primary and secondary branches, highest test weight, seed yield and harvest index.

Key words : Age of seedlings, Growth, Redgram, Transplanting, Yield .

Redgram (*Cajanus cajan* (L.) Millsp.) is one of the major grain legume (pulse) crops of the tropics and subtropics, endowed with several unique characteristics. The main reason for the poor performance of redgram crop in semi-arid tropics is cultivating the local varieties under late sown conditions due to delay in onset of monsoons. The higher redgram yield per unit area per unit time can be enhanced by introducing newly evolved redgram varieties with high yielding potential, besides adopting improved agronomic management practices. In order to ensure timely sowing due to late onset of monsoon, transplanting of redgram seedlings will be one of the agronomic measures to overcome delayed sowing. Transplanting technique involves raising of seedlings in the polythene bags in the nursery and transplanting those seedlings in the main field, soon after getting the monsoonal rains. The transplanted seedlings establish well in the main field and save time. The nursery maintenance for production of vigorous and healthy seedlings is considered as one of the important factors for transplanting technique.

Acharya N.G Ranga Agricultural University, Hyderabad recently released LRG-41 (from RARS, Lam Farm), PRG-158 (from RARS, Palem) and WRG-53 (from RARS, Warangal) redgram varieties with 150-180 days duration and a yield potential of 15-25 q ha $^{-1}$. The information on the comparative performance of these varieties that too under late transplanted conditions with different age of seedlings is lacking in order to recommend to the farmers. Keeping these facts in view, the present experiment was conducted to study performance of redgram cultivars under transplanted conditions.

MATERIAL AND METHODS

A field experiment was conducted during *kharif,* 2010-11 at the Agricultural College Farm, Bapatla campus of Acharya N. G. Ranga Agricultural University which is situated at an altitude of 5.49 m above mean sea level at 15º 54¹ North latitude, 80 º 30¹ East longitude and 8 km away from the east coast of Bay of Bengal. The soil was sandy clay loam (sand 67.3 %, silt 5.1 % and clay 27.6 %) with pH 7.8, organic carbon 0.25 % and 160, 62 and 323 kg ha^{-1} of available N, P_2O_5 and K_2O, respectively. The experiment was laid out in Randomized Block Design with Factorial concept having twelve treatments and replicated thrice using three redgram varieties viz., LRG-41 (V_1), PRG-158 (V_2) and WRG-53 (V_3) and four ages of seedlings viz., conventional sowing (A_1), 15 (A_2), 30 (A_3) and 45 day aged seedlings (A_4). A recommended dose of 20 kg N ha^{-1} and 50 kg P_2O_5 ha^{-1} was applied through urea and diammonium phosphate, respectively. Healthy seeds of redgram varieties were sown on 5th August, 2010 in polythene bags of size (17.5 × 8× 8 cm) for nursery raising and at the same time two seeds were dibbled in shallow furrows made

Table 1. Plant height, number of primary and secondary branches at harvest, days to maturity, Number of seeds^{-1}, test weight and harvest index of redgram as influenced by varieties and age of seedlings.

Treatments	Plant height (cm)	Primary branches	Secondary branches	Days to maturity	Number of seeds pod^{-1}	Test weight (g)	Harvest index (%)
Varieties							
V_1: LRG-41	254	17.5	22.5	208	4	9.8	16.8
V_2: PRG-158	252	17.3	22.0	183	3	9.6	14.4
V_3: WRG-53	261	17.5	22.3	206	4	9.6	15.8
SEm ±	6	0.2	0.2	2	0	0.0	0.1
CD (0.05)	NS	NS	NS	4	NS	0.1	0.3
Age of seedlings							
A_1: Conventional sowing	259	16.0	20.6	202	3	9.6	15.5
A_2: 15 day aged seedlings	260	19.0	25.0	200	4	9.9	15.9
A_3: 30 day aged seedlings	253	18.2	23.0	197	4	9.7	15.8
A_3: 45 day aged seedlings	248	16.3	21.7	198	3	9.6	15.4
SEm ±	6	0.2	0.2	1	0	0.0	0.1
CD (0.05)	NS	0.8	0.8	NS	0	0.0	0.3
Interaction							
SEm ±		0.5	0.5	2	0	0.0	0.2
CD (0.05)		NS	NS	NS	NS	NS	NS
CV %		8.9	7.8	8	7	4.1	4.3

NS: Non Significant

with a hand hoe at a depth of 4 cm to 5 cm adopting a spacing of 150 cm × 50 cm for conventional sowing (A_1). Recommended agronomic practices and plant protection measures were followed.

RESULTS AND DISCUSSION

All the varieties registered comparable plant height at harvest. However, WRG-53 recorded taller plants (261cm) at harvest, numerically higher over other two varieties and transplanting 15 day aged seedlings recorded taller plants i.e. 261cm (Table 1) over other aged seedlings. Number of primary and secondary branches at harvest was uninfluenced by varieties but significantly influenced due to age of seedlings. LRG-41 variety recorded numerically more number of primary (17.5) and secondary (22.5) branches plant.$^{-1}$ Transplanting 15 day aged seedlings recorded significantly higher primary and secondary branches i.e. 19 and 25 respectively (Table 1), over other aged seedlings.

Drymatter production at harvest was significantly influenced by varieties, age of seedlings and also by their interaction. Among the varieties tested, LRG-41 registered significantly higher drymatter production at harvest i.e. 11,835 kg ha,$^{-1}$ over other varieties. Among the age of seedlings tested, transplanting 15 day aged seedlings registered significantly higher drymatter production i. e.12,061 kg ha,$^{-1}$ over other aged seedlings. At all the phases of redgram growth, transplanting 15 day aged seedlings of LRG-41 variety registered significantly higher drymatter production of 12,369 kg ha^{-1} (Table 2) over other treatment combinations. When the younger seedlings were transplanted they offered a great root length and density than the older seedlings after transplanting. This might have helped the seedlings to take up more nutrients and water from the soil due to higher root surface area resulting in taller plants with more number of primary and secondary branches. These higher values of growth

Table 2. Drymatter production (kg ha^{-1}), days to 50 percent flowering and number of pods $plant^{-1}$ of redgram as influenced by varieties and age of seedlings.

Treatments	Drymatter production (kg ha^{-1})				Days to 50 percent flowering				Number of pods $plant^{-1}$			
	V_1	V_2	V_3	Mean	V_1	V_2	V_3	Mean	V_1	V_2	V_3	Mean
A_1	11660	11286	11405	11450	123	100	123	115	265	243	249	252
A_2	12369	11631	12183	12061	121	115	120	119	295	263	257	271
A_3	11764	11434	11729	11642	121	116	123	120	275	253	252	260
A_4	11545	10871	10890	11102	120	118	119	119	208	229	235	224
Mean	11835	11305	11551		122	112	121		260	247	248	
	SEm±	CD (0.05)	CV%		SEm±	CD	CV% (0.05)		SEm±	CD	CV% (0.05)	
V	45	131			1	2			3	8		
A	51	151	9		1	2	9		3	9	10	
V×A	89	308			2	5			6	19		

parameters registered in redgram crop transplanted by using 15 day aged seedlings might have contributed to the higher drymatter accumulation. Similar results were also reported by Anil Kumar *et al.,* (2011).

Days to 50 percent flowering was significantly influenced by varieties, age of seedlings and also by their interaction. Conventional sowing of PRG-158 variety took less number of days (100) to 50 percent flowering (Table 2). Days to maturity was significantly influenced by varieties only but not due to age of seedlings and their interaction (Table 1). Among the varieties tested, LRG-41 took more number of days (208) to mature compared to other varieties and PRG-158 required the lowest number of days (183) for maturity. Conventional method of sowing took numerically higher number of days (202) to maturity over other aged seedlings (Table 1). The dominant role of photoperiod and temperature on flowering and fruiting and ultimately on seed production emphasizes the importance of varietal selection. Shoot meristem produce either leaf or inflorescence primordia depending upon photoperiod and possible interaction with temperature. Flower induction occurs in response to a specific number of favourable photo induction cycles. The minimum number of cycles required varies with plant species and varieties. (Gardner *et al.*, 1988).

Number of pods $plant^{-1}$ was significantly influenced by varieties, age of seedlings and also by their interaction. LRG-41variety registered the highest number of pods $plant^{-1}$ (260) over other varieties and transplanting 15 day aged seedlings registered significantly the highest number of pods $plant^{-1}$ (271). Transplanting 15 day aged seedlings of LRG-41 variety registered significantly more number of pods $plant^{-1}$ (295) (Table 2). The higher dry matter production and its accumulation in reproductive parts depends on photosynthetic ability of LRG-41 at pod filling stage, and also due to higher number of primary and secondary branches when 15 days old seedlings were transplanted and more number of pods $plant^{-1}$ were registered in LRG-41 by transplanting of 15 days aged seedlings. Similar findings were obtained by Pal and Biswas (2002) and Pavan *et al.*, (2009).

Number of seeds pod^{-1} was not significantly influenced by varieties, age of seedlings and also their interaction. However, LRG-41 and WRG-53 varieties registered numerically higher number of seeds pod^{-1} (4) and PRG-158 variety registered lesser no. of seeds pod^{-1}. Among the age of seedlings, transplanting 15 and 30 day aged seedlings recorded numerically higher number of seeds pod^{-1} (4) over other aged seedlings. Test

Table 4. Seed and stalk yield (kg ha^{-1}) of redgram as affected by varieties and age of seedlings.

Treatments	Seed yield (kg ha^{-1})				Stalk yield (kg ha^{-1})			
	V_1	V_2	V_3	Mean	V_1	V_2	V_3	Mean
A_1	1969	1622	1756	1782	9691	9664	9648	9668
A_2	2057	1721	1964	1914	10312	9910	10208	10143
A_3	1968	1662	1892	1841	9778	9772	9837	9795
A_4	1922	1526	1690	1712	9623	9200	9345	9390
Mean	1979	1632	1825		9851	9637	9770	
	SEm±	CD (0.05)	CV%		SEm±	CD (0.05)	CV%	
V	13	37			42	123		
A	15	43	8		48	142	9	
V×A	25	78			84	290		

weight was significantly influenced by varieties and age of seedlings but not due to their interaction. Among the varieties tested, LRG-41 recorded the highest test weight (9.8 g) and the remaining two varieties were on a par with each other (9.6 g). Transplanting 15 day aged seedlings recorded the highest test weight (9.9 g) over other aged seedlings (Table 3).

Seed yield was significantly influenced by varieties, age of seedlings and also by their interaction. LRG-41 variety recorded significantly the highest seed yield (1979 kg ha^{-1}) over other varieties and transplanting 15 day aged seedlings recorded significantly highest seed yield (1914 kg ha^{-1}) over other aged seedlings. Transplanting 15 day aged seedlings of LRG-41 variety recorded the highest seed yield (2057 kg ha^{-1}), which was significantly the highest among all other treatment combinations. Significantly the lowest seed yield (1526 kg ha^{-1}) was recorded in PRG-158 variety by transplanting 45 day aged seedlings. (Table 4). Similar results were reported by Ibrahim and Gopalasamy (1989). Stalk yield was significantly influenced by varieties, age of seedlings and also their interaction. Among the varieties tested, LRG-41 recorded significantly the highest stalk yield (9851 kg ha^{-1}) over other varieties. Among the age of seedlings tested, transplanting 15 day aged seedlings recorded significantly the highest stalk yield (10143 kg ha^{-1}) over other aged seedlings. Transplanting 15 day aged seedlings of LRG-41 variety recorded significantly the highest stalk yield (10,312 kg ha^{-1}) compared to other treatment combinations and the lowest stalk yield (9200 kg ha^{-1}) was recorded in PRG-158 variety with 45 day aged seedlings.

The higher vegetative growth, longer duration and better drymatter production of LRG-41 variety transplanted by using 15 day old seedlings might have resulted in higher stalk yields (Table 4). Similar results were reported by Anil Kumar *et al.* (2011).

Harvest index was significantly influenced by varieties and age of seedlings but not by their interaction. LRG-41 recorded significantly the highest harvest index (16.8 %) over other varieties. Transplanting 15 day aged seedlings recorded significantly the highest harvest index (15.9 %) over other aged seedlings. Higher harvest index (Table 3) was recorded by transplanting of 15 day aged seedlings could be due to its highest seed yield and stalk yield. Similar results were also reported by Fanadzo *et al.,* (2009) in Maize and Upadhyay *et al.,* (2001) in Pearl millet.

It can be concluded that among the varieties tested, LRG-41 recorded numerically the higher number of primary and secondary branches plant^{-1} (17.5 and 22.5 respectively), number of seeds pod^{-1} (4) and significantly the highest test weight (9.8 g) and harvest index (16.8) was recorded in LRG-41. WRG-53 recorded numerically taller plants (261 cm) over other varieties. Among the age of seedlings tested, transplanting 15 day aged seedlings recorded numerically taller plants (260 cm), number of seeds pod^{-1} (4) and significantly higher number of primary and secondary branches (19 and 25 respectively) and the highest test weight (9.9 g) and harvest index (15.9 %). Conventional sowing of PRG-158 variety took less number of days (100) for 50 percent flowering.

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