INFLUENCE OF SOWING TIME ON VARIED DURATION REDGRAM GENOTYPES IN YSR KADAPA DISTRICT

ABSTRACT

It is well known that redgram is a photo sensitive long duration crop of 180 days and taking up redgram will occupy the landfor the year. But now because of the availability of photo insensitive short (120 days) and medium duration redgram genotypes (150 days), farmers can able to go for double cropping after harvesting of redgram with additional benefits.So there is a pressing need to evaluate the performance of these photo insensitive varieties of redgram compared to popularly grown long and medium duration varieties.Hence the experiment was conducted during kharif seasons of 2018 and 2019 at Agricultural Research Station, Utukur, YSR kadapa district of Andhra Pradesh to evaluate the performance of varied duration redgram genotypes under changing climate.The experiment was laid out in split plot design by taking three dates of sowing i.e. July I F.N, July II F.N and august I F.N in main plots and three varied duration i.e. long (180 days) (ICPL 87119), medium (LRG-52) (150 days) and short duration genotypes (120 days) (ICPL 20338) in sub- plots in three replications.The seeds were sown by dibbling in furrows at a depth of 5 cm at a spacing of 120 cm x 20 cm for long and medium duration genotypes and 30 cm x 10 cm for short duration genotypes.Plot wise data on growth parameters like plant height , number of branches per plant , number of pods per plant and yield parameters like pod length, number of seeds per pod, and 100 seed weight was taken and analysed by using SPSS softwareThesoftware. The results indicated that **So**wing of long or medium duration redgram varieties in julyfirst or second fortnight depending on the onset of the monsoon is recommended for higher yield in redgram in YSR kadapa district of Andhra Pradeshwhereas the performance of short duration varieties of redgram was poor in both the years making them unsuitable underrainfed conditions during kharif as rainfall affect the flowering which finally reduced the yield.

Key words*: Growth, Time of sowing, Varied duration redgram genotypes, Yield*

1. INTRODUCTION

Redgram(Cajanuscajan L.) commonly known as pigeon pea, arhar or tur is a major pulse crop with its deep roots and drought resistance ability cultivated in around 3.86 M ha in India during *kharif* season under rainfed conditions. India ranks first in area and production of pigeon pea contributing to 70-80% of its world's production. Redgram with its virtue of having 22% protein in the seed, meeting the major share of protein needs of the vegetarians. Being a legume crop, Pigeon pea also enhances soil fertility through leaf litter and biological nitrogen fixation (Udaya et al., 2015). Though benefits of redgram to contribute to food security, nutrition, forage and income generation are indisputable, erratic climate patterns, long duration together with photo and thermo sensitivity of the crop restricted its expansion to wider latitudes andaltitudes. So efforts are being continuously made for reducing the duration for redgram crop and as a result medium (155-170 days) and short duration (120 days) varieties were released in to the market. It was further reported that these short duration varieties due to photoand thermo insensitive nature very well fit in to the intensive cropping areas in all the seasons. Further, the reasons for low yields of pulses in India were mainly attributed to growing in poor/marginal lands, unawareness of recommended package of practices especially optimum sowing time, suitable variety, improper plant population, non-fertilization and improper plant protection measures due to improper diagnosis of the pest and diseases. Among all these, time of sowing largely determines the growth and yield of any crop including pulses. Hence there is a great need to determine the performance of varied duration genotypes of redgram under changing climate scenario during kharif in YSR kadapa district of Andhra Pradesh.

2.MATERIAL AND METHODS

The experiment was conducted during kharif seasons of 2018 and 2019 at Agricultural Research Station, Utukur, YSRkadapa district of Andhra Pradesh to evaluate the performance of varied duration redgram genotypes under changing climate. The experimental site was sandy loam and it was neutral in reaction with a P^H of 7.38, EC of 0.20 dS m^{-1}, low in organic carbon and available nitrogen, medium in available phosphorus and high in available potassium.

The experiment was laid out in split plot design by taking three dates of sowing i.e. July I F.N, July II F.N and August I F.N in main plots and three varied duration i.e. long (180 days) (ICPL 87119), medium (LRG-52) (150 days) and short duration genotypes (120 days) (ICPL 20338) in sub- plots in three replications. By using tractor drawn cultivator the field was ploughed twice and levelled by using blade harrow. Healthy seeds of redgram varieties with good germination per cent (95%) were used for sowing purpose. The seeds were sown by dibbling in furrows at a depth of 5 cm at a spacing of 120 cm x 20 cm for long and medium duration genotypes and 30 cm x 10 cm for short duration genotypes and which were covered and compacted immediately for better germination after receipt of sufficient rainfall. Thinning was done at 15 days after sowing by retaining one healthy seedling $hill^{-1}$ and gap filling was done wherever necessary. The recommended dose of 20 and 50 kg N and P_2O_5 ha^{-1} was applied through urea and single super phosphate respectively at the time of sowing. Inter cultivation was done in inter rows and hand hoe weeding was done between the plants. Other crop husbandry practices like plant protection were followed as per ANGRAU recommendation for successful raising of the crop. Plot wise data on growth parameters like plant height , number of branches per plant , number of pods per plant taken by selecting five plants randomly in each plot at the time of harvest and yield parameters like pod length, number of seeds per pod by collecting 10 pods from each plot and 100 seed weight was taken by taking seed from the yield obtained from each plot. The data used in the study are the mean values of replicated observations, which was tabulated and subjected to statistical analysis using analysis of variance (ANOVA)as applicable to split plot design by using SPSS software. A total rainfall of 147 and 766 mm was received in 13 and 48 days during 2018 and 2019 respectively against the average rainfall of 750 mm for the region.The weather data during the crop period is presented in table 3.

3. RESULTS AND DISCUSSION

3.1 Effect of time of sowing

Plant height was not significantly influenced by the time of sowing in both the years. The number of branches per plant were also not significantly influenced by the time of sowing during 2018 where as during 2019, August I fortnight sown crop recorded lower number of branches compared to july sown crop**.** The time periods of days to 50%flowering and number of days to maturity were not significantly influenced by the time of sowing in both the years**.** During both the years, the number of pods per plantwere more in early sown crop and with delay in sowing time the number of pods were decreased. Rain fall also significantly influenced the length of pods, the number of seeds per pod, 100 seed weight with lower values during 2018 which was drought year compared to 2019. But all these yield attributing characters like length of pods, number of seeds per pod, and 100 seed weight were not significantly influenced by the time of sowing. Consequently, there is significant impact of rainfall on the productivity of the redgram with lower yields during drought year of 2018 compared to 2019. Higher seed yield of redgram was recorded in july I fort night sown crop which was on par with july II fortnight crop but was significantly superior to august I fortnight sown crop. The beneficial effect of early sowing on yield of redgram was also confirmed by Nagaraju*et al.* (2022) and Kithan*et al.* (2020).The higher seed yield from first fortnight of july may be due to cumulative favourable effect of various growth and yieldattributes. As early sowing get favourable environmental condition for proper growth and development which resulted in higher leaf area development and high biomass accumulation which ultimately lead to significant improvement in seed yield. The crop sown on first fortnight of july produced more number of primary and secondary branches which ultimately resulted in production of more number of pods per plant which contributed towards higher seed yield. With delay in sowing, flowering was induced earlier resulting in less vegetative growth and earliness in maturity resulting in low seed yield. These results are in close conformity with those of (Reddy *et al.,* 2015) and Nene and Sheila, 1990. Pigeonpea suffers more when sowing is delayed (Padhi 1995). Reddy *et al.* (2012) reported that significant reduction occurs in branches/plant and dry weight/plant at harvest with delayed sowing than normal sowing. Ram *et al.* (2011) revealed that the time to achieve harvest maturity was decreased in case of late sowing as compared to early sowing.

3.2 Effect of genotype

Taller plants with a greater number of branches per plant was recorded in long and medium duration genotypes compared to short duration genotype. This might be due to genetic makeup of the plant.The long duration variety ICPL 87119 recorded higher number of pods per plant which was closely followed by medium duration variety LRG-52. Whereas the short duration variety (ICPL 20338) recorded significantly lower number of pods per plant. The pod length and number of seeds per pod were not significantly influenced by the varied duration genotypes. Higher 100 seed weight was reported with long and medium duration genotypes which was on par with each other but significantly lower seed weight was recorded with short duration genotype i.e ICPL 20338. Long duration genotype ICPL 87119 recorded higher seed yield followed by medium duration genotype (LRG- 52) but both are on par with each other. Lower seed yieldwas recorded with short duration genotype in both the years.Sahajadeva et al (2021) also reported higher yield and BC ratio with long duration varieties like LRG 41 but suggested to go for short duration varieties for late sown conditions under rain fed situation which can escape terminal moisture stress and under intensive cropping situations.The difference in grain yield of pigeonpea varieties was also reported by Prashanthi*et al.,* (2001).cultivars have a profound impact on the crop performance. Long duration genotypes produce maximum yield than early maturing genotypes, but they take more time to mature which may delay the sowing of succeeding crop such as wheat in a cropping system (Singh 2006).

4.CONCLUSION

Delay in sowing significantly reduced the number of primary and secondary branches per plant, pods per plant, seeds per pod, test weight and seed yield as compared to early sown crop and found highest in crop sown on first fortnight of July followed by second fortnight of July and first fortnight of august sown crops.**So**wing of long or medium duration redgram varieties in julyfirst or second fortnightis recommended for higher yield in redgram in YSR kadapa district of Andhra Pradesh. The performance of short duration varieties in this region isnot lucrative to farmers.

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Table 1 Growth of varied duration redgramgenotypes as influenced by time of sowing

Treatments	Plant height (cm)		Number of Branches per plant		Days to 50% flowering		Days to maturity	
	2018	2019	2018	2019	2018	2019	2018	2019
Time of sowing								
July I F.N	145	139	13.4	12.43	135	140	180	186
July II F.N	140	134	13.0	12.42	130	136	175	178
August I FN	141	145	13.6	10.88	128	130	170	175
Sig	NS	NS	NS	*	NS	NS	NS	NS
***P* value**	0.72	0.07	0.67	0.015	0.08	0.07	0.09	0.07
Varieties								
ICPL-87119	146	152	19.2	12.36	146	149	180	185
LRG-52	142	139	21.0	13.13	130	134	170	175
ICPL-20338	102	107	3.00	3.24	50	55	110	115
Sig	**	**	**	**	**	**	**	**
***P* value**	0.00	0.00	0.00	0.000	0.00	0.00	0.00	0.00

Table 2 Yield attributes and yield of varied duration redgram genotypes as influenced by time of sowing

Treatments	No. of Pods/ plant		Pod length (cm)		Seeds/pod		100 seed wt (g)		seed yield (kg ha^{-1})	
	2018	2019	2018	2019	2018	2019	2018	2019	2018	2019
Time of sowing										
July I F.N	86.08	109.75	3.03	4.79	2.11	3.67	7.33	10.05	452	832
July II F.N	81.99	93.77	3.13	4.99	2.16	3.87	7.22	10.22	406	814
August I FN	64.99	76.93	3.20	4.90	2.12	3.87	7.22	10.55	311	788
Sig	*	*	NS	NS	NS	NS	NS	NS	NS	**
***P* value**	0.04	0.64	0.14	0.36	0.74	0.11	0.78	0.08	0.16	0.07
Varieties										
ICPL-87119	100.6	113.84	4.37	4.82	3.68	3.82	11.0	10.44	652	1010
LRG-52	94.5	107.91	4.98	5.01	3.79	3.78	10.7	10.83	516	930
ICPL-20338	20.3	25.04	3.98	4.00	3.60	3.80	7.38	7.55	405	495
Sig	**	**	NS	NS	NS	NS	**	**	**	**
***P* value**	0.000	0.000	0.35	0.33	0.63	0.94	0.00	0.00	0.007	0.008

Table 3. Month wise Rainfall distribution during the crop period

Month	2018		2019		2018		2019	
	Rainfall (mm)	Rainy days	Rainfall (mm)	Rainy days	Maximum Temperature (^{o}C)	Minimum Temperature (^{o}C)	Maximum Temperature (^{o}C)	Minimum Temperature (^{o}C)
July	0	0	125.2	6	35.70	27.0	36.20	27.25
August	51.6	5	168.8	8	34.30	26.1	33.95	26.83
September	19.8	2	126.6	9	35.15	25.3	33.43	25.35
October	37.0	2	181.2	10	35.04	23.0	31.97	24.29
November	14.8	2	50.6	5	32.25	21.8	31.42	21.96
December	0	0	23.4	2	31.14	20.8	29.35	19.87
January	0	0	9.0	2	31.43	17.5	31.92	19.30
February	0	0	0	0	35.71	21.4	33.91	20.02