E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; 7(1): 286-288
Received: 23-11-2023
Accepted: 26-12-2023

Rudragouda F Channagouda
Keladi Shivappa Nayaka Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka, India

Naveen NE
Keladi Shivappa Nayaka Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka, India

Gajendra TH
Keladi Shivappa Nayaka Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka, India

Corresponding Author:
Rudragouda F Channagouda
Keladi Shivappa Nayaka Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka, India

Performance of redgram (*Cajanus cajan*) genotypes under rainfed situation of central dry zone of Karnataka

Rudragouda F Channagouda, Naveen NE and Gajendra TH

DOI: https://doi.org/10.33545/2618060X.2024.v7.i1d.231

Abstract
Field experiment was conducted during the *kharif* season of June 2018 and 2019 in red soil in Farmer field at Shidlainakote, Krishi Vigyan Kendra, Hiriyur, Chitradurga Karnataka, India to identify productive redgram genotypes for central dry zone of Karnataka. Two years pooled data revealed that, significantly higher seed yield was recorded by variety, BSMR-736 (1060 kgha^{-1}) to the extent of 37.7% over the BRG-2. However, it was on par with BRG-5 (932 kgha^{-1}). The variety BSMR-736 recorded significantly higher number of pods plant^{-1} (218) and number of branches (14) over BRG-2 (94 and 5, respectively).The lowest percent incidence of sterility mosaic and wilt disease were recorded in BSMR-736 over BRG-2. The BSMR-736 recorded higher net returns (Rs. 33280 ha^{-1}) and B:C ratio (2.89) over BRG-2 (Rs. 18560 ha^{-1}, and 2.02, respectively) and closely followed by BRG-5. The presents the result of trend estimation for the study period, mean temperature in the crop growing period is 26.1 °C with a maximum of 32.5 °C and minimum of 19.7 °C. The difference between the average maximum and average minimum temperature is 12.7 °C. The average annual rainfall is 730.8 mm for the crop growing period. Based on above results, inferred that BSMR -736 and BRG-5 were superior in seed yield and net returns over BRG-2. Besides, these variety resistant to sterilty mosaic and wilt diseases.

Keywords: Economics, number of pods, seed yield and wilt

Introduction
Pulses are the main source of protein for the predominant vegetarian population of India. Besides, they are also used as fodder and concentrate for the cattle. Pulses mainly fix atmospheric nitrogen help to reduce dependence of inorganic nitrogenous fertilizers. Cultivation of pulses improv the physical, chemical and biological properties of soil. The growth in production of pulses is rather disappointing compared to growth rate in food grain consequent to Green Revolution. The area and productivity of pulses during the previous decades have been fluctuating and hence the production has remained stagnant.

The climatic change and global warming have deleterious effects on crop production in terms of period of maturity and yield in redgram (Singh and Sharma, 2014) [11]. Growth behavior of this crop differs in different seasons due to variation in temperature and photoperiod, humidity, rainfall and soil type. There are large variations among varieties with respect to growth habit, maturity duration, seed size, colour and yield performance (Dodwadiya and Sharma, 2012) [6]. Inadequate nodulation of pigeon pea can be associated with poor flowering, pod set and reduction in days to flowering are influenced by climate change (Prasad *et al*., 1998) [13]. Redgram grows well in warm tropical and subtropical climate. The crop prefers a fairly moist and warm climate during the period of its vegetative growth. During the flowering and ripening stages of its growth, it requires bright sunny weather for the setting of fruits. It is highly susceptible to frost at the time of flowering. Cloudy weather and excessive rainfall at flowering time damage the crop to a great extent.

Redgram is one of the most widely cultivated pulse crops of India next to gram. It is grown over an area of 26.7 lha with a production of 19.2 lt. The crop is extensively grown in Maharashtra, Uttar Pradesh, Madhya Pradesh, Karnataka, Andhra Pradesh and Gujarat. The state of Uttar Pradesh has a unique distinction of contributing about 40% of the total redgram production in the country (Anonymous, 2016) [3].

In Karnataka it is grown over an area of 6.0 lha with production of 2.8 lt and average productivity is 600 kgha^{-1}

The important pulses grown in Karnataka are bengal gram, redgram, greengram, horsegram and blackgram. Redgramis major pulse crop grown in Karnataka among all pulses inveiw of its adaptability to rainfed situations. Many improved varieties have been developed and released for general cultivations in Karnataka, but due to their performance is very much variable due to soil and climate. Therefore, in the present investigation attempts have been made to identify the suitable high yielding and disease resistant redgramvariety under climate change at central dry zone of Karnataka.

Materials and Methods

Field experiment was conducted during the *kharif* season of June 2018 and 2019 in red soil in Farmer field at Shidlainakote, Krishi Vigyan Kendra, Hiriyur, Chitradurga, Karnataka, India The soil was red soil having pH of 6.2 and is low in available nitrogen and phosphorous but rich in available potassium. Three redgram genotypes *viz*., BRG-2, BRG-5, TTB-7, BRG-2, BRG-4 and BSMR-736 were sown in a randomized block design with four replications. Rows were spaced at 90 cm with 15 cm intra plant spacing. The crop was sown on 10. 6. 2018 and all recommended package of practices was followed. Observations were recorded on number of pods per plant, plant height (cm) number of branches, number of damaged podsplant^{-1} percent incidence of wilt and sterility mosaic disease. Seed yield ha^{-1} was calculated based on the net plot basis. The data were subjected to statistical analysis as suggested by (Panse and Sukhatme, 1967) [10]. The economics of the crop was workout with rate of Rs. 45 kg^{-1} seeds.

Results and Discussion

Several abiotic factors like temperature, rainfall and humidity greatly influenced the plant growth, yield parameters and seed yield of redgram. Genotypes differed significantly for their seed yield. The results of the experiment data revealed that, among the different genotypes, BSMR-736 recorded significantly (Table 1) higher seed yield (1060 kgha^{-1}) over BRG-2 (660 kg ha^{-1}).However, it was on par with BRG-5 (932 kg ha^{-1}). The higher yield in BSMR-736 is due higher number of pods plant^{-1} (218) and number of branches (14) over BRG-2 (94 and 5, respectively). Nagaraja *et al*. (1999) [10] also reported similar findings in horsegram. Higher seed yield with BSMR-736 was mainly a consequence of more number of pods plant^{-1} and plant height. The higher growth parameter in BSMR-736 is mainly due this variety is tolerance to variation in temperature, rainfall and humidity. Silim *et al*. (2007) [14] tried to study the impact of photoperiod and temperature on flowering of redgram in Kenya and could not find clear patterns in sensitivity to temperature. The lower yield in BRG-2 to due heavy rainfall (290.8 mm in one month) coincide with low temperature (14.5 °C) during peak flowering period results flower drops and improper opening of flowers.

The presents the result of trend estimation for the study period. The mean temperature in the crop growing period is 26.1 °C with a maximum of 32.5 °C and minimum of 19.7 °C. The difference between the average maximum and average minimum temperature is 12.7 °C. The average annual rainfall is 730.8 mm for the crop growing period. The effect of heavy rainfall with low temperature during flower initiation has been found negative impact on grain yield of BRG-2 (Birthal *et al*., 2014) [5]. The crop duration plays an important role in its productivity. Generally, longer the duration higher would be the yielding ability. It is an indicative of better yield potentiality of the varieties coupled with other desirable yield components of an ideal type. Significantly higher seed yield might be due to their reaction to the available soil moisture during pod filling and developmental stages. Similar results were also reported by Ahlawat *et al*. (1975) [1]. Longer duration varieties recorded much longer vegetative phase and produced more leaves which in turn produced a large amount of photosynthates resulted higher seed yield. Further, more drymatter production, higher number of pods plant per plant and test weight might have contributed for the higher yields in BSMR-736. Similar results were also reported by Ahuja (1984) [2].

The wide variations in growth and yield attributing parameters persisted among the different varieties obtained from the different parental origin. Attainments of particularly higher or lower yield attributing character among the different varieties are mainly due variation in weather parameters. Shakya (2016) [15] observed that the variety TARM- 18 was found superior over rest of the varieties by obtaining higher grain yield (709.77 kgha^{-1}). The TARM -18 was most suitable variety of greengram of rainfed situation of *kymore* plateau.

Variation in the phenological parameters among the varieties of redgram reflects that, there were wide differences in the duration of vegetative growth, thereby duration in the reproductive phase which are genetically controlled. Such type of variability is likely to persist with the effort of genetic advancement for acquiring desirable traits with the existing parent materials. The variation in phenological parameters among the varieties is mainly due variation temperature, rainfall and humidity has been reported by Pandey and Singh (2000) [9] and Bhowmick *et al*. (2008) [4]. The percent incidence of sterility mosaic and wilt disease were low in BSMR-736 and BRG-5, respectively over BRG-2. Because BSMR-736 and BRG-5 are tolerant to wilt and sterility mosaic disease and aberrant climate situations.

Maximum net monetary return per hectare is the main aim of any crop producer. The gross and net monetary returns were estimated for each variety under test. Among three genotypes, BSMR-736recorded higher net returns (Rs. 33280 ha^{-1}) and B:C ratio (2.89) over BRG-2 (Rs. 18560 ha^{-1} and 2.02, respectively) and closely followed by BRG-5 (Srinivasa Reddy *et al*., 2004) [12].

Table 1: Growth, Yield, yield parameters of redgram as influenced by different genotypes

Treatments	Plant height (cm)	Number of branches plant^{-1}	Number of pods plant^{-1}	Number of damage pods	Yield (kg ha^{-1})
BRG-2	149.1	5	94	10	660
BRG-5	171.3	11	205	7	932
BSMR-736	184.4	14	218	5	1060
TTB-7	156.5	6	98	9	695
BRG-4	160.2	6	102	9	708
SEm±	1.69	0.50	2.29	0.29	46.3
CD (0.05)	10.30	3.04	13.94	1.76	138.2

Table 2: Net returns, B:C ratio, percent incidence of wilt and sterility mosaic disease of redgram as influenced by different genotypes

Treatments	Net returns (Rs. ha^{-1})	B:C ratio	Percent wilt incidence	Percent sterility mosaic incidence
BRG-2	18560	2.02	6.3	25.7
BRG-5	27536	2.60	0	0
BSMR-736	33280	2.89	0	0
TTB-7	18910	2.16	3.1	2.3
BRG-4	19364	2.18	2.2	2.0
SEm±	-	-	-	-
CD (0.05)	-	-	-	-

Table 3: Weather condition during cropping period

Month	Rainfall (mm)	Temperature °C		Relative Humidity (%)
		Maximum	Minimum	
April -17	15.4	39.0	24.1	60.0
May -17	152.2	36.7	23.1	62.5
June-17	18.6	32.1	22.1	70.0
July-17	29.6	31.1	21.7	72.0
August-17	60.2	31.2	21.7	64.5
September-17	160	30.9	21.4	71.5
October-17	290.8	30.1	21.0	71.5
November-17	2	30.0	18.8	74.0
December -17	0	29.8	15.7	75.5
January-18	0	30.8	14.2	64.0
February-18	0	32.4	15.2	57.5
March-18	02	35.4	17.7	51.0

Conclusion

Based on two years pooled data results, inferred that BSMR -736 and BRG-5 were superior in seed yield and net returns over BRG-2. Besides, these varieties suitable to any kind climate change and also resistant to sterility mosaic and wilt disease.

References

1. Ahlawat IPS, Saraf CS, Singh A. Studies on the performance of pigeonpea varieties to dates of planting and row spacing. Indian J Agron. 1975;20(3):245-247.
2. Ahuja KN. Response of pigeonpea to plant density and phosphate fertilization. Indian J Agron. 1984;29(4):528-532.
3. Anonymous. Area, production and yield of cotton in India (major states). Directorate of Economics and Statistics, Department of Agriculture and Cooperation, New Delhi; c2016. Technical Report, 77.
4. Bhowmick MK, Sadhukhan R, Saha PK. Response of new mungbean genotypes to sowing time during spring-summer in West Bengal. J Crop Weed. 2008;4(1):1-3.
5. Birthal PS, Negi DS, Kumar S, Agarwal S, Suresh A, Khan TM. How sensitive is Indian agriculture to climate change? Indian J Agric Econ. 2014;69(4):474-487.
6. Dodwadiya KS, Sharma AR. Effect of tillage and method of sowing on performance of greengram (*Vigna radiata*) varieties during summer and rainy seasons. Indian J Agric Sci. 2012;82(5):462-465.
7. John D, Peter C, Rao K. Climate change impact on crop productivity in the semi-arid tropics of Zimbabwe in the 21st century. In: Proceedings of the Workshop on Increasing the Productivity and Sustainability of Rainfed Cropping Systems of Poor, Smallholder Farmers. Tamale, Ghana; c2008. p. 22-25.
8. Nagaraja N, Nehru SD, Manjuantha A. Plant type for high yield in horse gram as evidenced by path coefficients and selection indices. Karnataka J Agric Sci. 1999;12(1-4):32-37.
9. Pandey AK, Singh SP. Growth pattern in relation to yield in mungbean (*Vigna radiata* (L.) Wilczek). Indian J Genet Plant Breed. 2000;60(2):237-238.
10. Panse VG, Sukhatme DV. Statistical methods of Agricultural Workers. New Delhi: ICAR; c1967. p. 115.
11. Singh T, Sharma A. Identification of stable genotypes under varying environments in mung bean. Legume Res - Int J 2014;37(3):253-258.
12. Srinivasa Reddy M, Srinivasalu Reddy D. Economic Evaluation of organic farming in rice-based cropping system. The Andhra Agric. 2004;51(3&4):273-276.
13. Prasad M, Pillai A, Faber G, Field S, Dowling T. Molybdenum response of pigeonpea on Ferruginous Latosols in Fiji. Int Chickpea Pigeonpea Newsl. 1998;5:55-56.
14. Silim SN, Gwata ET, Coeb R, OMANGA PA. Response of pigeonpea genotypes of different maturity duration to temperature and photoperiod in Kenya. Afr Crop Sci J. 2007;15(2):73-81.
15. Shakya AK. Medicinal plants: Future source of new drugs. International journal of herbal medicine. 2016;4(4):59-64.