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Genetic variability studies on short duration redgram genotypes

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Abstract

Twenty-eight short duration redgram genotypes were evaluated for yield and its components during two seasons Kharif 2013 Kharif 2014. Wide range of variability was observed for various characters. Considerable amount of phenotypic and genotypic variability was observed for number of pods per plant and number of clusters per plant. High heritability and high genotypic coefficient of variation observed for plant height. High heritability and low genetic advance as percentage of mean were recorded for number of seeds per pod, plant height and days to 50 per cent flowering suggesting that selection based on these characters could be effective.

Keywords: Variability, heritability, redgram and *Cajanus Cajan* (L.) Millsp

Introduction

Redgram (*Cajanus Cajan* L. Millsp) is an important pulse crop of India, which is cultivated in rainfed condition. Yield is a complex character governed by large number of quantitative characters which are especially important in plant breeding. The present investigation was undertaken to evaluate available genotypes for yield and its components during Kharif to estimate the variability, heritability and other genetic parameters.

Materials and Methods

Twenty-eight genotypes of redgram available at TNAU, Agricultural Research Station, Virinjipuram Vellore were grown in a randomized block design with four replications during Kharif 2013, Kharif 2014. Each genotype was sown in a plot of 3 x 4 m² in length with 60 x 30 cm spacing between and within rows. Observations were recorded on 10 randomly selected plants for each genotype in each replication for days to 50% flowering, days to maturity, plant height (cm), number of pods per plant, number of clusters per plant, number of seeds per pod, 100 seed weight (g) and seed yield (g). Phenotypic and genotypic coefficients of variation and expected genetic advance were estimated as per standard procedure of Johnson *et al.*, (1995) [2].

Results

The variability study was imposed in short duration redgram for assessing parental ability of the genotypes in future crop improvement programme in redgram. Eight biometrical characters were recorded. The following parameters namely PCV, GCV, Heritability and Genetic advance and mean percentage for genetic advance were taken for variability study. The highest range of PCV is observed in the character single plant yield followed by number of clusters per plant, number of pods per plants and days to fifty percent flowering which highest GCV percentage in the following characters namely number of pods per plant followed by number of clusters per plant. Heritability was higher in number of seeds per plant and days to fifty percent flowering and plant height. As genetic advance is concern, single plant yield is more followed by number of seeds per plant. The mean percentage of genetic advance is highest in single plant yield followed by hundred seed eight and number of pods per plant. The estimates of genetic parameters are presented in Table 1

Table 1: Genetic parameters for different characters in redgram

Characters*	General mean	Range	PCV	GCV	Heritability	Genetic advance	Genetic advance as % of mean
Days to 50% flowering	60.75	50-95	28.67	4.35	22.85	2.42	5.23
Days to maturity	105	90-150	23.88	1.52	15.65	1.51	2.12
Plant height (cm)	133.27	75-150	18.03	6.45	21.67	4.32	6.52
Number of pods per plant	125.0	73-180	45.68	8.72	18.32	2.63	9.43
Number of clusters per plant	45.0	35-90	50.60	16.20	14.52	0.26	5.16
Number of seeds per pod	3.7	2-5	6.82	18.32	39.50	8.42	5.30
100 seed weight (g)	7.5	5-9	9.54	8.88	6.12	0.44	12.00
Single plant yield (g)	8.5	5.8-228	57.75	7.65	4.87	8.43	13.52

*Pooled estimates of genetic parameters for grain yield and yield traits in redgram

Discussion

The phenotypic coefficient of variation is higher than the genotypic coefficient of variation it depends on environment. The measure of transmission of a character from parent to offspring is termed as heritability and consistent performance of a character under selection in succeeding generations depends on the magnitude of heritable variation present in relation to the observed variation. The values of phenotypic coefficients of variation are higher than genotypic coefficients of variation indicating the influence of environmental factor. The highest genotypic coefficient of variation was observed for number of pods per pod followed by number of clusters per plant. Thus, there is a scope for improvement of these traits by selection. Similar results were reported earlier by Joshi *et al* (1998) [3]. Similar results were also reported by Khan (1984), Malik and Singh (1983), Renganayaki (1985) [1], Reddy (1997) [1] and Venkateswarlu (2001) [1] in greengram. The wide difference between the GCV and PCV for the characters *viz.*, days to maturity observed in this investigation were in accordance with the findings of Malik and Singh (1983) [4], Renganayaki (1985) [5], Reddy (1997) [6] and Venkateswarlu (2001) [7] indicating that the expression of these traits were masked by environmental components.

High heritability and high genotypic coefficient of variation observed for plant height, this character may be effective for selection that showed additive gene action. High heritability and low genetic advance for number of clusters per plant, days to fifty percent flowering and days to maturity suggests non-additive gene action and indirect selection of these traits may be beneficial.

High genetic advance as percentage of mean observed for the traits, single plant yield, and number of seeds per pod, suggesting scope for selection for these traits in the core collection. High genetic advance coupled with high heritability and GCV was observed for seeds per pod and single plant yield indicating the predominance of additive gene action for this trait. Johnson *et al.*, (1955) [2] suggested that the heritability and genetic advance when calculated together would be more useful in predicting the effectiveness of the character for improvement. High genetic advance as percentage of mean together with high heritability and GCV was noted for number of pods per plant and single plant yield. This indicated the preponderance of additive gene action. In greengram, high heritability and genetic advance were also reported by Malik and Singh (1983) [4], Renganayaki (1985) [5], Ganesh Ram (1993) [1], Reddy (1997) [1] and Venkateswarlu (2001) [7] for plant height, length of pod, number of clusters per plant and number of pods per plant. For number of branches per plant high heritability and genetic advance values were reported by Renganayaki (1985) [5], Ganesh Ram (1993) [1] and Reddy (1997) [6]. Therefore,

simple unidirectional selection could be effective for improving the aforesaid traits.

Conclusion

On the basis of the results of the present investigation, it can be concluded that selection based on number of pods per plant, number of clusters per plant, number of seeds per pod and days to 50% flowering along with a medium plant height could be useful for improving the yield in redgram.

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