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Short communication

Variability studies in chilli (*Capsicum annuum* L.) with reference to yield attributes

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ABSTRACT

Field experiments were conducted at Regional Agricultural Research Station, Lam, Guntur, Andhra Pradesh during the rainy season 2004-2007, with ten chilli genotypes supplied by AICRP on vegetables (from different geographical sources). This was to study genetic variability, heritability and genetic advance as per cent mean for several economic characters to identify promising cultivars suitable for the Krishna-Godavari zone of Andhra Pradesh. Data were collected on eight characters, viz., plant height, plant spread and number of fruits per plant; fruit length, fruit girth, number of seeds per fruit, ripe-chilli yield and dry-chilli yield. Significant differences were observed among genotypes in respect of all the characters studied. Phenotypic Coefficient of Variation (PCV) was slightly higher than Genotypic Coefficient of Variation (GCV) for all the traits, indicating a low environmental influence on expression of these traits. High GCV and PCV were observed for ripe-chilli yield, dry-chilli yield, number of fruits per plant, number of seeds per fruit and fruit length indicating a higher magnitude of variability in these traits and, consequently, a greater scope for improvement through simple selection. Low GCV and PCV were recorded for plant height, plant spread and fruit girth suggesting a limited variability, for these traits. High heritability, coupled with high Genetic Advance as per cent mean, was observed for ripe-chilli yield, dry chilli yield, number of fruits per plant, number of seeds per fruit and fruit length, indicating the influence of additive genes. These characters-with high GCV, PCV, Heritability and Genetic Advance as per cent mean-should be considered as reliable selection criteria for crop improvement for yield and yield attributing characters in chilli.

Key words: *Capsicum annuum*, variability, GCV, PCV, heritability, genetic advance

Crop improvement largely depends on existence of genetic variability. Improvement in any crop is based on the extent of genetic variation present in it and, the degree of improvement depends on magnitude of the available, beneficial genetic variability. The present study was undertaken in 10 chilli cultivars received from AICRP (vegetables) with the objective of obtaining information variability, heritability and genetic advance.

The experiment was conducted during rainy seasons of 2004-07 completely randomized block design with three replications. Treatment was in a plot of four rows each five metres long.

Recommended cultural practices were followed. Five plants were selected randomly from each genotype and observation on height, plant spread, number of fruits per plant, fruit length, fruit girth, number of seed per fruit, ripe chilli yield and dry chilli yield were recorded. Variability for different quantitative characters and expected genetic advance at 5% intensity of selection were calculated as per Burton (1952) and Johnson *et al* (1955), respectively

Analysis of Variance in these 10 improved chilli cultivars showed that highly significant differences were recorded for all the quantitative and qualitative characters studied indicating adequate genetic variability among the cultivars st-udied. This is in accordance with reports of Sarma and Roy (1995), Smitha (2005) and Biswadip Chatterjee (2006).

Genetic variability estimates, including means, genotypic and phenotypic variances, PCV, GCV, heritability, genetic advance and genetic advance as per cent mean for different characters, are presented in Table 1.

Height of plants ranged from 73.7cm (DSL-1) to 99.3cm (DCL-352), with a grand mean of 86.1cm. GV and

PV observed were 56.53 and 92.39, respectively, while, GCV and PCV were 8.73 % and 11.16 %, respectively. High heritability of 61.19, with a low GA of 12.11 and 14.07 GA as per cent mean, was recorded. Spread of plant ranged from 90.6cm (DSL-1) to 115.6cm (Ajeet-3), with a mean of 106.5cm. The GV and PV of the cultivars were observed to be 59.6 and 136.6, respectively. Estimates of GCV and PCV per cent were found to be 7.25 and 10.96, respectively. Heritability of 43.63 %, with GA of 10.51 and 9.87 GA as per cent mean, was recorded. Similar results were reported earlier by Karad *et al* (2006), Biswadip Chatterjee (2006) and Samadia D.K(2007).

Maximum variation was observed for number of fruits per plant. Mean number of fruits per plant was found to be 148, with a minimum of 88.60 (Indra chilli-1), and a maximum of 315 (LCA-353). GV and PV were 3922.10 and 4024.60, respectively. GCV and PCV obtained were 40.15 and 40.67, respectively. High heritability per cent (97.5), coupled with high genetic advance of 127.36 and 81.64 as GA as per cent mean, was recorded. A wide range of variation for fruit length was observed. Fruit length ranged from a minimum of 5.6cm (DSL-1) to 11.5cm (PC-6), with a mean of 8.20cm. The GV and PV observed were 3.35 and 4.07, respectively, while GCV and PCV per cent were observed to be 22.29 and 24.57, respectively. High heritability per cent of 82.28, with low genetic advance of 3. 2 and 41.66 GA as per cent mean, was recorded. Fruit girth ranged from a minimum of 3.1cm (Indra chilli -1) to a maximum of 4.1cm (PC-6), with a mean of 3.4cm. The GV and PV were found to be 0.09 and 0.14, respectively. Estimates for GCV and PCV per cent were 8.85 and 10.91, respectively. Heritability per cent of 66.67, coupled with low GA of 0.51 and low per cent of 15.04 GA as per cent mean, was recorded for this character. These results were in agreement with findings of Gogoi and Gautam (2002), Rathod *et al* (2002), Nandadevi and Hosamani (2003), Sreelathakumary and Rajamony (2004), Wasule *et al* (2004), Mishra *et al* (2005), Singh *et al* (2005), Karad *et al* (2006) and Biswadip Chatterjee (2006).

Maximum variation among cultivars was observed for ripe-fruit weight per hectare. Mean weight of ripe-fruit per hectare was 186.9q, with a minimum weight of 73.7q/ha (DSL-1) and maximum weight of 342.7q/ha (LCA353). The GV and PV recorded were 7587.4 and 8059.6, respectively. GCV and PCV per cent recorded were observed to be 48.31 and 49.79, respectively. A high heritability per cent of 94.14, coupled with high GA of 174.09 and 96.56 GA as per cent mean, was observed. Dry-fruit weight per hectare ranged from a minimum of 23.6q/ha (DSL-1) to a maximum of 75.25q/ha (LCA-353), with a grand mean of 46.65q/ha. The GV and PV recorded were 371.3 and 19.9, respectively. GCV and PCV were 41.17 % and 42.46 %, respectively. A high heritability percentage of 93.99, coupled with GA of 38.47 and 82.21 GA as per cent mean, was observed. These results are in concurrence with reports of Gogoi and Gautam (2002), Rathod *et al* (2002) Sreelathakumary and Rajamony (2002) and Biswadip Chatterjee (2006).

Number of seeds per fruit ranged from a minimum of 39.2 (Ajeet-3) to a maximum of 84.23 (DCL-352) with a

Table 1. Genetic variation for quantitative traits in chilli (*Caspsicum annuum* L.) cultivars

Sl.No.	Character	Mean	Range		Genotypic variation ^2g	Phenotypic variation ^2v	Genotypic coefficient of variation GCV (%)	Phenotypic coefficient of variation PCV (%)	Broad sense heritability % (h^2)	Genetic advance (GA) at 5%	GA as per cent mean at 5%
			Min.	Max.							
1	Plant height (cm)	86.1	73.7	99.3	56.53	92.39	8.73	11.16	61.19	12.11	14.07
2	Plant spread (cm)	106.5	90.6	115.6	59.6	136.6	7.25	10.96	43.63	10.51	9.87
3	No. of fruits per plant	148	88.6	315.0	3922.1	4024.6	40.15	40.67	97.45	127.36	81.64
4	Fruit length (cm)	8.2	5.6	11.5	3.35	4.072	22.29	24.57	82.27	3.42	41.66
5	Fruit girth (cm)	3.4	3.1	4.1	0.09	0.135	8.85	10.91	66.67	0.51	15.04
6	No. of seeds per fruit	52.4	39.2	84.2	147.12	187.52	23.15	26.13	78.46	22.13	42.23
7	Ripe chilli yield (q/ha)	186.9	73.7	342.7	7587.4	8059.6	48.31	49.79	94.14	174.09	96.56
8	Dry chilli yield (q/ha)	46.7	23.6	75.3	371.26	395.01	41.17	42.46	93.99	38.47	82.21

mean of 52.38. GV and PV were 147.12 and 187.2, respectively. GCV and PCV estimates were 23.15 and 26.13, respectively. Heritability of 78.46, coupled with GA of 22.13 and 42.23 GA as per cent mean was observed. Verma *et al* (2004) reported similar results in chilli.

Higher PCV and GCV were observed for number of fruits per plant, ripe-fruit yield, dry-fruit yield per hectare, number of seeds per fruit and fruit length, indicating higher magnitude of variability for these traits and, consequently, greater scope for improvement these traits through simple selection. Low GCV & PCV were recorded for plant height, plant spread and fruit girth, suggesting limited variability for these traits. High heritability, coupled with high Genetic Advance as per cent mean, was observed for ripe-chilli yield, dry-chilli yield, number of fruits per plant, number of seeds per fruit and fruit length, indicating the influence of additive genes. These characters, with high GCV, PCV, heritability and Genetic Advance as per cent mean should be considered as reliable selection criteria for crop improvement in terms of yield and yield-attributing characters in chilli.

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