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Genetic variability, heritability and genetic advance in spine gourd (*Momordica dioica* Roxb.)

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Abstract
Twelve genotype of spine gourd were evaluated to estimate the variability, heritability and genetic advance in Randomized Block Design with three replications at Horticulture Instructional farm, COA, IGKV, Raipur (C.G) during *Kharif* 2018. Results of genetic variability indicated that mean sum of squares due to genotypes were highly significant for all the characters. On the basis of mean performance, genotypes like C.G Kankoda-2, RMD 15-2, NDMD 16-1, ASG 16-1 and ASG 18-1 were found higher yielder, early flowering and better growth along with other desirable characters. Higher GCV and PCV was observed for fruit yield per plant, number of branches per plant, number of fruits per plant, 100 seed weight and average fruit weight. High heritability accompanied with high genetic advance as percentage of mean was found for traits viz., fruit yield per plant, number of fruits per plant, average fruit weight, 100 seed weight and days to first female flowering node which indicated predominance of additive gene action.

Keywords: Spine gourd, variability, heritability, genetic advance

Introduction
Spine gourd (*Momordica dioica* Roxb., 2n = 2X= it is 28) is a nutritionally rich, dioecious and perennial cucurbit having a wide range of adaptability, distributed throughout India, China, Nepal, Pakistan Shri Lanka and Bangladesh (Rai, *et al.*, 2012) [9]. It has originated from Indo-Malayan region (Rashid, 1976) [11]. It is widely cultivated in Odisha, Maharastra, Bihar, West Bengal and Chhattisgarh and slowly gaining popularly as a commercial vegetable crop because of its rich taste and high nutritional value. Spine gourd climber plant commonly known as Kankoda, Kheksi, Teasle gourd, Kakrol, Kantola, Meetha Karela, and Kantroli. Various plant parts are consumed in a variety of ways, viz., immature green fruits, young twigs and leaves of this crop are used for controlling diabetes, blood pressure, heart attack, fever, eye disease respectively. Average nutritional value per 100 g edible fruit of spine gourd was found to contain 84.1% moisture, 7.7 g carbohydrate, 3.1g protein, 3.1 g fat, 2.8 g fiber, 4.1 g iron, 3.3 g calcium, 176.1 mg riboflavin and 275 mg ascorbic acid. Improvement in any crop depends upon the genetic variability coupled with high genetic advance are more useful for selection of desirable genotypes. Hence, an attempt was made to estimate genetic variability, heritability and genetic advance in genotype of spine gourd.

Materials and Methods
Twelve promising genotypes including two checks of spine gourd were evaluated during *Kharif* season of 2018. All these genotypes were obtain from Raj Mohani Devi College of Agriculture and Research Station, Ambikapur (C.G.), Narendra Dev University of Agriculture and Technology, Faizabad (U.P.) and Main campus (Voluntary centre) College of Agriculture, IGKV, Raipur. The crop was raised in Randomized Complete Block Design with three replications. Each genotype and checks was sown in plot size of 1m X 1m. Biometric observations on five plants randomly selected were recorded for the trait listed in Table 1. All the recommended agronomical package of practices was followed to facilitate better crop growth. The crop was maintained under semi-irrigated condition. The mean data were subjected to Statistical analysis of variance (Burton and De Vane, 1953) [2], heritability (Lush, 1949) [5], and genetic advance as percentage of mean (Johnson *et al.*1955) [4] respectively.

Results and Discussion

The statistical analysis showed highly significant differences among the genotypes for all the characters studied, indicating presence of wide range of genetic variability (Table 1). The phenotypic coefficient of variation (PCV) was higher than the correspondence coefficient of variation (GCV) for all fifteen traits. The highest value of genotypic co-efficient of variation (GCV) and phenotypic co-efficient of variation (PCV) were observed for fruit yield per plant (49.4% and 49.91%, respectively) followed by number of branches per plant (32.72% and 35.98%), number of fruits per plant (28.54%and 29.34%), 100 seed weight (20.99% and 22.89%) and average fruit weight (20.43% and 20.64%). Similar kind of results have been reported by Maharana (1995) [6], Ram *et al.* (2004) [10]. Panchbhai *et al.* (2006) [7], Chattopdhyay *et al.* (2016) [3], Prabhakar *et al.* (2017) [8] and Yadav *et al.* (2018) [12] for fruit yield per plant and number of fruits per plant in spine gourd.

The moderate GCV and PCV were observed for days to first female flowering node (15.00% and 15.36%) followed by fruiting period (12.86% and 13.14%), days to first female flower appearance (12.94% and 13.44%), days to first fruit harvest (10.93% and 12.00%) and internode length (10.27% and 12.56%). These findings were contrary with the findings of Yadav (2018) [12] for days to last fruit harvest, Prabhakar *et al.* (2017) [8] for fruiting period, Panchbhai *et al.* (2006) [7] and Ram *et al.* (2004) [10] for days to female flower anthesis. Rest of the characters exhibited low GCV and PCV.

The estimates of heritability (bs) and genetic advance as percentage of mean are presented in Table1. Heritability (bs) ranged from 45.37 to 98.04 percent. It was found high for most of the traits under study. The highest heritability was recorded for average fruit weight (98.04%), fruit yield per plant(97.95%), fruiting period(95.80%), days to first female flowering node(95.35%), days to last fruit harvest(94.68%), number of fruits per plant(94.60%), days to first female flower appearance(92.68%), 100 seed weight (84.11%), fruit length (83.77%), number of branches per plant (82.72%), days to first fruit harvest (82.17%), vine length (78.12%) and fruit width(71.97%). The medium and low heritability observed for internode length (66.94%) and number of seeds per fruit (45.37%) respectively. Heritability estimates would be reliable if it is limited in broad sense, additive and non additive gene effects are accompanied with high genetic advance. To facilitate the comparison of progress in various characters of different genotypes of spine gourd genetic advance was calculated as percentage of mean.

High heritability coupled with high genetic advance as percentage of mean was found for fruit yield per plant, number of branches per plant, number of fruits per plant, average fruit weight, 100 seed weight and days to first female flowering node which indicated that predominance of additive gene action in the expression of these characters which could be utilized through selection for the genetic improvement of these characters. These results were in line with the present finding of Ram *et al.* (2004) [10], Bharathi *et al.* (2006) [1], Singh *et al.* (2009) [9], Chattopadhyay *et al.* (2016) [3] and Yadav (2018) [12]. Medium heritability with medium genetic advance were also reported for rest of the characters except number of seeds per fruit.

Table 1: Genetic parameters of variation for fruit yield and its components in spine gourd

Sl. No.	Characters	Mean	GCV (%)	PCV (%)	H^2 (bs) %	Genetic advance	Genetic advance as % of mean
1	Vine length(cm)	115.63	8.4	9.50	78.12	17.68	15.29
2	Number of branches per plant	7.97	32.72	35.98	82.72	4.88	61.32
3	Internode length(cm)	4.43	10.27	12.56	66.94	0.76	17.32
4	Days to first female flower appearance	44.08	12.94	13.44	92.68	11.31	25.66
5	Days to first female flowering node	36.19	15.00	15.36	95.35	10.92	30.18
6	Days to first fruit harvest	72.97	10.93	12.00	82.17	14.90	20.42
7	Days to last fruit harvest	129.72	5.48	5.64	94.68	14.27	11.00
8	Number of fruits per plant	35.36	28.54	29.34	94.60	20.22	57.19
9	Fruiting period	69.52	12.86	13.14	95.80	18.04	25.94
10	Fruit length(cm)	4.10	9.27	10.13	83.77	0.71	17.48
11	Fruit width(cm)	2.74	8.25	9.72	71.97	0.39	14.41
12	Average fruit weight(g)	7.34	20.43	20.64	98.04	3.06	41.69
13	Number of seeds per fruit	19.86	9.81	14.56	45.37	2.70	13.61
14	100 seed weight(g)	10.83	20.99	22.89	84.11	4.29	39.67
15	Fruit yield per plant(g)	68.55	49.4	49.91	97.95	67.04	97.81

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