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Short communication

Variability, heritability and genetic advance in landraces of culinary melon (*Cucumis melo* L.)

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Abstract

Forty two landraces of culinary melons (*Cucumis melo* L.) were evaluated for variability, heritability and genetic advance. Genotypic coefficient of variation and phenotypic coefficient of variation were highest for yield per plant followed by fruit weight, fruit per plant, keeping quality of fruits and 1000-seed weight. High heritability coupled with high genetic advance was noted for fruit length, 1000-seed weight, average fruit weight and keeping quality of fruit indicating the scope for improvement of culinary melon through selection.

Keywords: Genetic improvement, selection, summer vegetables, yield attributes

Melon (*Cucumis melo* L.) is an important summer vegetable crop especially in the rice fallows of Kerala. Melons of Kerala, however, exhibit tremendous variability in fruit shape, size, skin characters, flesh colour, cavity space, keeping quality and reaction towards pest and disease incidence. But systematic work to characterize the variability of culinary melons in Kerala is scarce. Information on genetic parameters being basic to any crop improvement programme, an attempt was made to estimate the genetic variability, heritability and genetic advance in the landraces of culinary melon.

Forty two landraces of culinary melons collected from different parts of Kerala (Table 1) were evaluated in a randomized block design with two replications at Vellayani (8.5°N, 76.9°E and 29 m above mean sea level) during the summer season of 1998-1999. The site has laterite red loam soil and experiences a humid tropical climate. The crop was sown in pits with a spacing of 2 x 1.5 m (8 plants per plot). The plants were managed under irrigated conditions as per local recommendations (KAU, 2002). Four plants per replication for each landrace were selected for biometrical observations *viz*., plant characters, flowering characters, fruit and yield characters. Analysis of variance was performed to test variations among the genotypes. Variability for different quantitative characters and expected genetic advance at 5% intensity of selection were calculated (Burton,1952; Jain 1982).

Analysis of variance revealed that the melon types exhibited significant differences for all characters except the number of primary branches and branch of first male and female flower produced. Furthermore, high genotypic and phenotypic coefficients of variation were recorded for yield per plant, average fruit weight, fruits per plant, keeping quality of fruits, 1000-seed weight, leaf area index and sex ratio (Table 2; Fig. 1). Although estimates of phenotypic coefficient of variation (PCV) were higher than that of genotypic coefficient of variation (GCV), they were close to one another implying that genotype contributed more than environment in the expression of these characters and hence selection based on phenotypic

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values is feasible. Similar observations were reported earlier by Rastogi and Deep (1990) for cucumber. Comparatively wide differences between PCV and GCV estimates for vine length, number of primary and secondary branches and leaf petiole length, however, indicate a greater degree of environmental control for these traits. Indeed, the lowest GCV was noted for days to first harvest.

A comparison of the data in Table 2 also indicate that

Table 1. Details of 42 landraces of melons and their source

Accession	Source	Fruit shape	Stripes of fruit colour
CM 2	Kakamola, Thiruvananthapuram	Cylindrical	White in green
CM 3	Nemom, Thiruvananthapuram	Slender	Green in white
CM 4	Balaramapuram, Thiruvananthapuram	Cylindrical	Yellow in green
CM 5	Kattakada, Thiruvananthapuram	Cylindrical	White in green
CM 6	Aryanad, Thiruvananthapuram	Cylindrical	White in green
CM 7	Nedumangad, Thiruvananthapuram	Cylindrical	Green in white
CM 8	Nedumangad, Thiruvananthapuram	Cylindrical	White in green
CM 9	Vembayam	Cylindrical	Green in yellow
CM 10	Palapoor, Thiruvananthapuram	Cylindrical	Yellow in green
CM 11	Ochira, Kollam	Slender	White in green
CM 13	Kottarakkara, Kollam,	Cylindrical	Yellow in green
CM 14	Chengannur	Oblong	Yellow in green
CM 16	Kalavoor, Kottayam	Cylindrical	White in green
CM 17	Manimala, Pathanamthitta	Oblong	White in green
CM 18	Thiruvalla, Pathanamthitta	Cylindrical	Dark green with ridges
CM 19	Madapalli, Kottayam	Cylindrical	Greenish yellow
CM 22	Neezhoor, Kottayam	Oblong	Yellow in green
CM 23	Ettumanoor, Kottayam	Oblong	Yellow in green
CM 24	Vakathanam, Kottayam	Oblong	Yellow in green
CM 25	Vakathanam, Kottayam	Oblong	Yellow in green
CM 26	Kuravilangad, Kottayam	Cylindrical	White in green
CM 28	Vakathanam, Kottayam	Cylindrical	White in green
CM 31	Pambadi, Kottayam	Oblong	White in green
CM 32	Velloor, Kottayam	Oblong	Green in yellow
CM 33	Ikkattoor, Kottayam	Cylindrical	Yellow in green
CM 34	Thrikkodithanam, Kottayam	Oblong	Yellow in green
CM 35	Kattappana, Idukki	Cylindrical	Yellow in green
CM 36	Kattappana, Idukki	Oblong	Green in yellow
CM 37	Kattappana, Idukki	Oblong	Yellow in green
CM 38	Kunnukara, Ernakulam	Cylindrical	Green in yellow
CM 39	Moovattupuzha, Ernakulam	Slender	Yellow in green
CM 40	Manjapra, Ernakulam	Oblong	White in green
CM 41	Chalakudi, Thrissur	Slender	Yellow in green
CM 42	Alathur, Palakkad	Cylindrical	Green in yellow
CM 43	Nenmara, Palakkad	Oblong	White in green
CM 44	Anakkayam, Malappuram	Slender	Yellow in green
CM 45	Vadakara, Kozhikode	Oblong	Light green in dark green
CM 46	Periya, Wayanad	Oblong	Yellow in green
CM 47	Edakkad, Kannur	Slender	Dark green in light green
CM 48	Periya, Wayanad	Oblong	Yellow
CM 49	Edakkad, Kannur	Slender	White in green
CM 50	Kanhangad, Kasargod	Round	Yellow in green

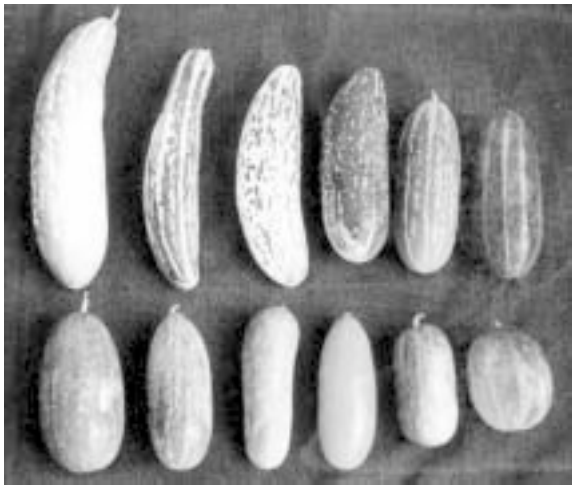

Fig. 1. Variability in fruit characters of *Cucumis melo*

heritability was high for fruit length, fruit girth, 1000-seed weight, average fruit weight, keeping quality of fruit, flesh-cavity ratio and yield per plant, signifying that these characters are genetically controlled and there could be greater correspondence between phenotypes and breeding value while selecting individuals. In particular, high values of heritability associated with high genetic advance were observed for average fruit weight, 1000-seed weight and keeping quality of fruits. It shows that variation for these characters is due to high additive gene effects and consequently the scope for improving yield through selection is more. This is consistent with the findings of Mariappan and Pappiah (1990) who reported high heritability for fruit girth and 1000-seed weight in cucumber and Chacko (1992) who noted high heritability

Table 2. Variability parameters for different characters in culinary melon

Characters	Range	Mean ± SE	GCV	PCV	Heritability	Genetic advance (%)
Branch of first female flower	1 – 3	2±0.38	14.06	23.50	35.81	17.35
Branch of first male flower	2– 3	2±0.39	21.92	29.33	55.83	33.79
Days to first harvest	50 – 61	54±0.78*	4.12	4.37	88.96	7.99
Days to produce 1st female flower	32 – 42	35±0.89*	5.88	6.43	83.65	11.05
Days to produce 1st male flower	23 – 36	29±0.64*	6.95	7.27	91.30	13.78
Flesh-cavity ratio	0.78 – 1.57	1.10±0.05*	16.57	17.22	92.58	32.85
Fruit girth (cm)	14.9 – 31.7	23.83±0.44*	14.42	14.53	98.42	29.46
Fruit length (cm)	14.6 – 40.63	24.28±0.31*	25.23	25.26	99.74	51.9
Fruit weight (cm)	0.27 – 1.52	0.71±4.32*	42.24	42.68	97.97	86.09
Fruits/plant	2 – 17	7±1.00*	37.41	40.03	87.33	72.02
Fruits-keeping quality (days)[1]	3–12	5±0.44*	35.45	36.58	93.89	70.87
Inter node length (cm)	7.8 –12.4	9.89±0.95*	7.83	12.34	40.31	10.24
Leaf area index	0.89 – 0.31	0.57±0.06*	29.05	30.85	88.70	55.39
Leaf petiole length (cm)	7.5 – 11.5	9.67±1.08*	6.42	12.89	24.80	6.59
Node of first female flower	6 – 12	9±0.72*	12.96	15.15	73.22	22.86
Node of first male flower	2 – 7	4±0.44*	18.12	20.62	77.25	32.83
Number of primary branches	3 – 4	3±0.43	8.6	16.21	28.16	9.39
Number of secondary branches	2 – 5	3±0.65*	14.39	25.25	32.49	16.86
Number of seeds/fruit	388 – 1103	580±58.1*	25.99	27.88	87.11	49.98
Pollen viability (%)	58.35 – 77.74	84.64±3.78*	6.38	7.79	67.05	10.76
Sex ratio	9.89 – 38.15	26.97±3.22*	26.12	28.72	82.76	48.96
Vine length (cm)	112.5 – 307	208.1±33.54*	16.75	23.25	51.89	40.24
Yield/plant (kg)	1.01 – 13.89	4.69±0.78*	57.05	59.42	92.13	11.28
1000-seed weight (g)	4.9 – 16.75	7.37±0.32*	31.26	31.57	98.09	63.79

GCV= genotypic coefficient of variation; PCV=phenotypic coefficient of variation; *Significantly different at 5% level; [1]'Kani vellari' grown with organic manures can be stored for several weeks. In the present study, however, the plants were grown with organic manures+chemical fertilizers.

for flesh-cavity ratio in muskmelon. Characters like number of primary branches and number of secondary branches, however, recorded low heritability. Although heritability was high for fruit length, fruit girth and yield per plant, genetic advance was moderate to low, indicating the role of non-additive gene action, which may result in no scope of selection. Overall, selection for high yielding melon types should focus on average fruit weight, number of fruits per plant, 1000-seed weight and keeping quality.

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