



Plant Archives

Journal homepage: <http://www.plantarchives.org>

DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2026.v26.supplement-1.353>

CORRELATION AND PATH ANALYSIS OF YIELD-ATTRIBUTING TRAITS IN F₃ POPULATION OF SNAP MELON (*CUCUMIS MELO VAR. MOMORDICA*)

Kartik^{1*}, H. P. Hadimani¹, Renuka Muttappanavar¹, Ashok² and Sayeed Wajeed Mulla³

¹Department of vegetable science, College of Horticulture, U.H.S., Bagalkot, Karnataka, India

²Department of Crop Physiology, Directorate of Research, U.H.S., Bagalkot, Karnataka, India

³Department of Biotechnology, College of Horticulture, U.H.S., Bagalkot, Karnataka, India

*Corresponding author E-mail: kartikmadival123@gmail.com

(Date of Receiving : 22-08-2025; Date of Acceptance : 08-11-2025)

ABSTRACT

A field experiment was carried out during *Rabi* 2024 at the Department of Vegetable Science, College of Horticulture, Bagalkot, to determine the correlation and path analysis among yield and its contributing traits in the F₃ population of snap melon (*Cucumis melo var. momordica*). The correlation analysis revealed that fruit yield per vine had a significant positive association with vine length, number of branches per vine, number of female flowers, fruit length, fruit diameter, average fruit weight and number of fruits per vine, indicating that selection for these traits could effectively enhance yield potential. Path coefficient analysis further indicated that average fruit weight and number of fruits per vine had the highest direct positive effects on fruit yield, followed by vine length and fruit length. Hence, direct selection based on these parameters would be most effective for yield improvement, making them dependable selection criteria in breeding programmes aimed at developing high-yielding snap melon genotypes.

Keywords : Correlation, path analysis, snap melon.

Introduction

Snap melon (*Cucumis melo var. momordica*) is an economically and nutritionally important cucurbit cultivated widely in tropical and subtropical regions of India, especially in arid and semi-arid zones such as Rajasthan, Gujarat, Punjab and Uttar Pradesh. Known locally as “phut” for its tendency to split open at maturity, the crop is valued for its dual use-immature fruits are consumed as vegetables, while ripe fruits are eaten fresh, used in salads or processed into beverages and pickles (Hazara *et al.*, 2011). It is a good source of sugars, vitamin C, minerals and dietary fiber and its seeds provide edible oil and protein (Bates and Robinson, 1995). Beyond its nutritional significance, snap melon has medicinal properties and is traditionally used in treating burns, constipation and vomiting. Despite its adaptability and multiple uses, the crop’s productivity is relatively low due to issues

like fruit cracking, short shelf life and inconsistency in yield and quality.

The wide genetic diversity present among cultivated types and landraces provides an opportunity for improvement through selection and breeding (Pareek *et al.*, 1999). Since yield is a complex quantitative trait governed by multiple genes and influenced by the environment, simple selection is often insufficient. Correlation and path coefficient analyses are therefore important to understand the relationships among yield and quality traits and to identify those contributing most directly to yield Chahota *et al.* (2007). Segregating generations like F₃ exhibit extensive genetic recombination, enabling the identification of superior transgressive segregants. The present study entitled “Evaluation of F₃ segregating generation in snap melon (*Cucumis melo var. momordica*)” was undertaken to assess genetic

variability, correlation and path coefficient relationships among yield and quality traits and to identify promising segregants for use in future breeding programs aimed at improving yield.

Material and Methods

The field experiment entitled “Evaluation of F₃ segregating generation in snap melon (*Cucumis melo* var. *momordica*)” was conducted during *Rabi* 2024 at the Department of Vegetable Science, College of Horticulture, Bagalkot (UHS, Bagalkot), which lies in the Northern Dry Zone of Karnataka at 16°46' N latitude, 74°59' E longitude and 582 m above mean sea level. The area receives an average annual rainfall of 603 mm and weather data were recorded from MHREC, Bagalkot. The experimental material comprised four F₃ families derived from an F₂ population of the cross HUB-25 × HUB-3, along with parental lines (HUB-25 and HUB-3) and checks (Pusa Shandar, AHS-10 and AHS-82). The experiment was laid out in an augmented block design with 24 blocks, maintaining a spacing of 2 × 1 m and each F₃ family consisted of 100 plants.

The observations like node at first male flower appearance, node at first female flower appearance, days to first male flower appearance, days to first female flower appearance, number of female flowers, number of branches per vine at last harvest, days to first harvest, days to last harvest, vine length(cm) at 50 days after transplanting, fruit length (cm), fruit diameter (cm), average fruit weight (g), number of fruits per vine, fruit yield per vine (kg), Total soluble solids (⁰B), rind firmness (kg/cm²), cavity diameter (cm), shelf-life were recorded. The data were statistically analysed using analysis of variance (ANOVA) for the augmented design. Genetic parameters such as genotypic and phenotypic coefficients of variation, heritability (broad sense) and genetic advance as a percentage of mean were estimated. Correlation coefficients were computed to study interrelationships among traits and path coefficient analysis (Wright, 1921; Dewey and Lu, 1959) was performed to partition direct and indirect effects of various traits on fruit yield per vine.

Results and Discussion

Correlation coefficient analysis

Yield enhancement can be accomplished through indirect selection of morphological traits based on their interrelationships. Correlation analysis in the F₃ generation (Table 1) was conducted to determine the associations between yield and its contributing traits.

Fruit yield per vine showed a positive and highly significant correlation with the number of female flowers (0.442), number of branches per vine (0.535), vine length (0.524), fruit length (0.575), fruit diameter (0.325), average fruit weight (0.657) and number of fruits per vine (0.230). Since these associations were in the desirable direction, selection for these traits could contribute to improving yield per vine. Negative and significant associations were observed with node at first male flower appearance (-0.099), node at first female flower appearance (-0.099) and days to first female flower appearance (-0.110) and some of them had negative and non-significant association with days to first male flower appearance (-0.077), days to first harvest (-0.084) and days to last harvest (-0.092). The present results are consistent with those reported by Priyanka *et al.* (2020) in muskmelon, Pasha *et al.* (2019) in snap melon, Dhiman and Prakash (2005) in cucumber.

Association among growth and yield attributing traits

Node at first male flower appearance showed a positive and significant association with days to first male flower appearance and node at first female flower appearance showed a positive and significant association with days to first female flower appearance. This suggest that genotypes producing flowers on early nodes likely to bear more no of fruits, there by enhancing the yield. Similar findings were reported by Reddy *et al.* (2017) and Nanthakumar *et al.* (2021) in muskmelon. Days to first male flower appearance showed a positive and significant association with days to first female flower appearance whereas days to first female appearance showed a positive significant association with days to first harvest. Comparable findings was reported by Pasha *et al.* (2019). The number of branches per vine and number of female flowers per vine showed a positive and significant correlation with vine length, fruit length and number of fruits per vine. Hence increase in no of branches and number of female flowers will increase the number of fruits per vine, ultimately leading to enhanced yield. Similar observations have been reported by Kanimozhi *et al.* (2015) and Nanthakumar *et al.* (2021) in musk melon. Days to first harvest showed a positive and significant association with days to last harvest and days to last harvest negative significantly associated with number of fruits per vine. Pasha *et al.* (2019) in snap melon and Kumbar *et al.* (2021) in Mangalore melon. Fruit length showed a significant positive association with fruit diameter and average fruit weight, while fruit diameter was also positively and significantly correlated with average

fruit weight. In contrast, fruit length, fruit diameter and average fruit weight exhibited a significant negative correlation with the number of fruits per vine. This suggests that applying selection pressure on these traits could contribute to yield improvement, as vines producing heavier fruits along with a higher number of fruits per vine tend to achieve greater overall yield. Similar observations were reported by Pasha *et al.* (2019) in snap melon and Priyanka *et al.* (2020) in muskmelon.

Path analysis

Path coefficient analysis, introduced by Wright (1921) and applied to plant breeding by Dewey and Lu (1959), partitions correlation coefficients into direct and indirect effects of traits on yield. Since fruit yield is a complex quantitative trait influenced by multiple factors, this method helps identify traits with direct and indirect contributions. Unlike simple correlation, which shows only overall associations, path analysis reveals cause-and-effect relationships, enabling breeders to determine key yield components and utilize genetic resources effectively. It serves as a standardized form of partial regression analysis, decomposing total correlation into specific causal effects.

In the present study, path coefficient analysis revealed a positive direct effect on fruit yield per vine

for traits such as days to first male flower (Ahirwar *et al.*, 2017), number of female flowers (Khan *et al.*, 2015), days to first harvest (Mehta *et al.*, 2009), vine length, fruit length, fruit diameter (Priyanka *et al.*, 2020), average fruit weight and number of fruits per vine. Hence, direct selection for these traits would be highly beneficial for yield improvement. Focusing on these parameters can lead to considerable yield gains, as they exert both positive direct and indirect effects through associated traits. In particular, emphasizing individual fruit weight and the number of fruits per vine could substantially enhance overall yield.

Conclusion

Correlation analysis revealed that fruit yield per vine had a highly significant positive association with number of female flowers, branches per vine, vine length at 50 DAT, fruit length, fruit diameter, average fruit weight and number of fruits per vine, suggesting that selection for these traits could enhance yield. Path analysis further indicated that days to first male flower, number of female flowers, days to first harvest, vine length at 50 days after transplanting, fruit length, fruit diameter, average fruit weight and number of fruits per vine had positive direct effects on yield, emphasizing their importance in yield improvement.

Table 1 : Phenotypic correlation coefficients for various traits in F₃ population

Traits	NFMA	NFFA	DMF	DFH	NFF	NBV	DFH	DLH	VL	FL	FD	AFW	NFV	FYV
NFMA	1.000	0.007	0.260**	0.043	-0.068	-0.123*	0.068	0.043	-0.074	0.001	0.072	-0.005	-0.110*	-0.099*
NFFA		1.000	-0.107*	0.134**	-0.134**	-0.107*	0.069	0.091	-0.114*	-0.094	0.002	-0.060	-0.029	-0.099*
DMF			1.000	0.135**	-0.057	-0.097	0.001	-0.027	-0.121*	0.024	0.069	0.033	-0.159**	-0.077
DFH				1.000	-0.075	-0.082	0.111*	0.065	-0.068	-0.051	-0.061	-0.020	-0.103*	-0.110*
NFF					1.000	0.681**	-0.064	-0.101*	0.597**	0.204**	0.034	0.081	0.432**	0.442**
NBV						1.000	-0.045	-0.053	0.743**	0.267**	0.138**	0.186**	0.434**	0.535**
DFH							1.000	0.720**	-0.059	-0.073	-0.028	-0.031	-0.054	-0.084
DLH								1.000	-0.050	0.052	-0.033	0.053	-0.159**	-0.092
VL									1.000	0.223**	0.059	0.041	0.554**	0.524**
FL										1.000	0.37**	0.777**	-0.377**	0.575**
FD											1.000	0.406**	-0.172**	0.325**
AFW												1.000	-0.511**	0.657**
NFV													1.000	0.230**
FYV														1.000

* and ** indicates significance at $P \leq 0.05$ and $P \leq 0.01$ respectively

NFMA = Node at first male flower appearance
 NFFA = Node at first female flower appearance
 DMF = Days to first male flower appearance
 DFH = Days to first female flower appearance
 NFF = Number of female flowers per vine

NBV = Number of branches per vine at last harvest
 DFH = Days to first harvest
 DLH = Days to last harvest
 VL = Vine length(cm) at 50 days after transplanting
 FL = Fruit length (cm)

FD = Fruit diameter (cm)
 AFW = Average fruit weight (g)
 NFV = Number of fruits per vine
 FYV = Fruit yield per vine (kg)

Table 2 : Phenotypic path coefficients of various traits in F₃ population

Traits	NFMA	NFFA	DMF	DDF	NFF	NBV	DFH	DLH	VL	FL	FD	AFW	NFV	rP
NFMA	-0.0174	0.0000	0.0030	-0.0001	-0.0013	0.0085	0.0021	-0.0018	-0.0076	0.0000	0.0021	-0.0094	-0.0781	-0.099*
NFFA	-0.0002	-0.0031	-0.0013	-0.0003	-0.0024	0.0078	0.0021	-0.0039	-0.0120	-0.0088	0.0000	-0.0566	-0.0213	-0.099*
DMF	-0.0045	0.0003	0.0115	-0.0003	-0.0011	0.0071	0.0000	0.0013	-0.0131	0.0020	0.0021	0.0283	-0.1137	-0.077
DDF	-0.0007	-0.0004	0.0016	-0.0021	-0.0013	0.0057	0.0024	-0.0039	-0.0076	-0.0049	-0.0018	-0.0472	-0.0497	-0.11*
NFF	0.0012	0.0004	-0.0007	0.0001	0.0186	-0.0483	-0.0021	0.0039	0.0653	0.0196	0.0009	0.0754	0.3054	0.442**
NBV	0.0021	0.0003	-0.0011	0.0002	0.0127	-0.0711	-0.0012	0.0022	0.0805	0.0265	0.0043	0.1792	0.3054	0.535**
DFH	-0.0012	-0.0002	0.0000	-0.0002	-0.0013	0.0028	0.0298	-0.0316	-0.0065	-0.0069	-0.0009	-0.0283	-0.0355	-0.084
DLH	-0.0007	-0.0003	-0.0003	-0.0002	-0.0017	0.0036	0.0214	-0.0439	-0.0054	0.0049	-0.0009	0.0472	-0.1137	-0.092
VL	0.0012	0.0003	-0.0014	0.0001	0.0112	-0.0526	-0.0018	0.0022	0.1088	0.0216	0.0018	0.0377	0.3907	0.524**
FL	0.0000	0.0003	0.0002	0.0001	0.0037	-0.0192	-0.0021	-0.0022	0.0239	0.0982	0.0113	0.7356	-0.2699	0.575**
FD	-0.0012	0.0000	0.0008	0.0001	0.0006	-0.0100	-0.0009	0.0013	0.0065	0.0363	0.0305	0.3867	-0.1208	0.325**
AFW	0.0002	0.0002	0.0003	0.0001	0.0015	-0.0135	-0.0009	-0.0022	0.0044	0.0766	0.0125	0.9431	-0.3623	0.657**
NFV	0.0019	0.0001	-0.0018	0.0001	0.0080	-0.0306	-0.0015	0.0070	0.0599	-0.0373	-0.0052	-0.4810	0.7103	0.23**

Residual effect = **0.1178**

Diagonal values indicate direct effect

rP: Phenotypic correlation coefficient of fruit yield per vine

* and ** indicates significance at $P \leq 0.05$ and $P \leq 0.01$ respectively

NFMA = Node at first male flower appearance

NBV = Number of branches per vine at last harvest

FD = Fruit diameter (cm)

NFFA = Node at first female flower appearance

DFH = Days to first harvest

AFW = Average fruit weight (g)

DMF = Days to first male flower appearance

DLH = Days to last harvest

NFV = Number of fruits per vine

DDF = Days to first female flower appearance

VL = Vine length(cm) at 50 days after transplanting

NFF = Number of female flowers per vine

FL = Fruit length (cm)

Reference

- Ahirwar, C. S., Singh, D. K., & Kushwaha, M. L. (2017). Assessment of genetic variation in cucumber (*Cucumis sativus* L.) germplasm on correlation, path analysis and cluster analysis. *Chemical Science Review and Letters*, **6**(23), 1886–1893.
- Bates, D. M., & Robinson, R. W. (1995). Cucumber, melons and watermelons, *Cucumis* and *Citrullus* (Cucurbitaceae). In N. W. Simmonds (Ed.), *Evolution of crop plants* (pp. 89–111). John Wiley & Sons.
- Chahota, R. K., Kishore, N., Dhiman, K. C., Sharma, T. R., & Sharma, S. K. (2007). Predicting transgressive segregants in early generation using single seed descent method derived micro-macrosperma genepool of lentil (*Lens culinaris* Medikus). *Euphytica*, **156**, 305–310.
- Dewey, D. R., & Lu, K. (1959). A correlation and path-coefficient analysis of components of crested wheatgrass seed production. *Agronomy Journal*, **51**(9), 515–518.
- Dhiman, M. R., & Parkash, C. (2005). Correlation and path coefficient analysis in cucumber. *Haryana Journal of Horticultural Sciences*, **34**(1–2), 111.
- Hazara, P., Chattopadhyay, A., Karmakar, K., & Dutta, S. (2011). *Modern technology in vegetable production*. New India Publishing Agency.
- Kanimozhi, R., Yassin, G. M., Kumar, S. R., Kanthaswamy, V., & Thirumeni, S. (2015). Genetic analysis in segregating generation of wax gourd. *International Journal of Vegetable Science*, **21**(3), 281–296.
- Khan, M. H., Bhuiyan, S. R., Saha, K. C., Bhuyin, M. R., & Ali, A. S. M. Y. (2015). Variability, correlation and path co-efficient analysis of bitter melon (*Momordica charantia* L.). *Bangladesh Journal of Agricultural Research*, **40**(4), 607–618.
- Kumbar, S., Tirakannanavar, S., Shet, R. M., Satish, D., Jagadeesha, R. C., Gasti, V. D., & Gunnaiah, R. (2021). Genetic variability and correlation studies in intervarietal hybrids of Mangalore melon (*Cucumis melo* var. *acidulous*) for productivity traits. *The Pharma Innovation Journal*, **10**(7), 448–451.
- Mehta, R., Singh, D., & Bhalala, M. K. (2009). Correlation and path analysis in muskmelon. *Indian Journal of Horticulture*, **66**(3), 396–399.
- Nanthakumar, S., Sankar, R. S., & Rameshkumar, D. (2021). Correlation and path analysis studies on yield and yield components in musk melon (*Cucumis melo* L.). *International Journal of Plant & Soil Science*, **33**(21), 130–136.
- Pareek, O. P., Vashistha, B. B., & Samadia, D. K. (1999). Genetic diversity in drought hardy cucurbits from hot arid zone of India. *IPGRI Newsletter for Asia, Pacific and Oceania*, **28**, 22–23.
- Pasha, S. G., Marker, S., & Chandra, G. S. (2019). Genetic variability, correlation and path analysis study on snap melon (*Cucumis melo* L. var. *momordica*) farmer's varieties. *International Journal of Bioresource and Stress Management*, **10**(6), 636–644.
- Priyanka, Choudhary, S., & Moond, S. K. (2020). Correlation and path analysis in muskmelon (*Cucumis melo* L.) genotypes. *The Pharma Innovation Journal*, **9**(3), 764–768.
- Reddy, B. P., Begum, H., Sunil, N., Reddy, M. T., Babu, J. D., & Reddy, R. S. K. (2017). Correlation and path coefficient analysis in muskmelon (*Cucumis melo* L.). *International Journal of Current Microbiology and Applied Sciences*, **6**(6), 2261–2276.
- Wright, S. (1921). Correlation and causation. *Journal of Agricultural Research*, **20**(7), 557–585.