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CHARACTER ASSOCIATION AND PATH ANALYSIS OF FRUIT YIELD AND YIELD COMPONENTS IN F_2 POPULATION OF INTRASPECIFIC HYBRID DERIVED FROM *CUCUMIS MELO* SSP. *AGRESTIS* (LOCAL CULTIVAR) AND *CUCUMIS MELO SSP. MOMORDICA* (SNAP MELON)

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ABSTRACT

F_2 population derived from inter botanical cross of UHSCS-12 (*Cucumis melo* ssp. *agrestis)* and Snap melon (*Cucumis melo* ssp. *momordica*) were developed and evaluated at college of horticulture, Bagalkot (Karnataka) to study the correlation and path coefficient analysis for yield and yield component traits. The studies on correlation values indicated the intensity and direction of character association in a crop. Path co-efficient analysis is used to detect characters having direct and indirect effects on fruit yield per vine. Correlation studies indicated that fruit yield per vine expressed highly significant and positive association with number of male flower (0.337), number of female flower (0.367), fruit length (0.291), fruit diameter (0.455), individual fruit weight (0.809), pulp thickness (0.414), number Of fruits per vine (0.504). Whereas, it was positive significantly correlated with β-carotene (0.152). Therefore, direct selection for these traits would be rewarding for improvement in yield.
***Keywords* :** Path co-efficient analysis, correlation analysis, Fruit yield per vine

Introduction

Melon (*Cucumis melo* L.) is a plant of considerable economic significance within the Cucurbitaceae family, cultivated extensively in both temperate and tropical regions (Fernandez-Trujillo *et al.,* 2011). It is classified as a diploid species with 2n = 24 chromosomes (Dane, 1991), and possesses a relatively compact genome size ranging from 4.5 to 5.0 × 108 base pairs (Arumuganathan and Earle, 1991; Wang *et al.,* 2006). In India, melons cover an area of 54,100 hectares with a production of 1,230,660 tonnes and a productivity rate of 22.74 tonnes per hectare (Anon., 2021). Melons are known for their high content of beta carotene and vitamin C, as well as being low in fat, salts, and cholesterol, while offering essential elements such as potassium. The nutritional composition of melon fruit per 100 grams of fresh weight includes protein (0.54 g), fat (0.14 g), carbohydrates (9.09 g), fiber (0.8 g), calcium (6 mg), iron (0.17 mg), magnesium (10 mg), phosphorus (11 mg), potassium (228 mg), sodium (18 mg), zinc (0.15 mg), and ascorbic acid (18 mg) (Rachmi *et al*., 2020). Melon is traditionally regarded as beneficial for heart and brain health, with laxative and diuretic properties.

To develop new varieties with higher-yielding characteristics, correlation studies are essential for estimating the association between variables. A positive correlation between component traits and yield is highly desirable because it allows for indirect selection for yield by focusing on highly heritable correlated traits. Conversely, negative correlations may reduce yield, making them less desirable for indirect selection. Dewey and Lu (1959) introduced path coefficient analysis to uncover cause-and-effect relationships between traits and the dependent variable. This analysis divides correlation coefficients into direct and indirect effects of attributes on the dependent variable. Understanding the link between yield and other qualities is crucial for crop improvement. Consequently, the current study aimed to assess the relationships among yield-related variables in F_2 population derived from inter botanical cross of UHSCS-12 (*Cucumis melo* ssp. *agrestis)* and Snap melon (*Cucumis melo* ssp. *agrestis* var. *momordica*). This study seeks to aid in the selection of desirable genotypes for future breeding programs.

Materials and Methods

Parental lines UHSCS-12 and AHS-10, each exhibiting distinct phenotypic traits, were crossed to produce an F_2 population. Initially, the parents were crossed to generate the F_1 generation, which was subsequently selfed to produce the F_2 mapping population. A total of 235 F_2 progenies, comprising 10 individuals each from UHSCS-12, AHS-10, and their F_1 hybrids, were evaluated during the kharif season of 2023 at the experimental block of the University of Horticultural Sciences Bagalkot in Augmented block design. Standard agricultural practices including watering, weed control and pest management were carried out according to industry standards to ensure normal climatic conditions. Fruit harvesting was determined based on the harvesting indicators as per the IPGRI descriptors. In this system, melon fruit is harvested when the fruit pedicel begins to split and emits an aromatic scent.

The assessment of fruit traits involved tagging all 235 plants and collecting data on various yield and fruit characteristics. The β-carotene content in melon fruit was quantified using the method outlined by Roy (1973). Total soluble solids (TSS) in the fruits were measured by expressing the juice through a hand refractometer calibrated on a scale of 0 to 32 °Brix, with results reported in terms of °Brix.

The mean data were analysed statistically using the R Studio software. The analysis of variance (ANOVA) and descriptive statistics was computed according to Panse and Sukathme's (1967). To determine the direction and strength of association between different traits, a simple correlation coefficient was employed following the method established by Singh and Chaudhary in 1985. Pearson correlation coefficient (r) using R studio statistical package was computed. To examine the cause-and-effect relationships between various traits, path analysis was conducted following the approach outlined by Dewey and Lu in 1959, utilizing the R studio statistical package.

Results and Discussion

(A) Association study

In this investigation, correlation coefficients were examined on all possible combinations of growth, yield and quality attributing characters in F_2 population. Traits related to yield and its components are polygenic and influenced by various degrees of nonheritable variation. The fruit yield per vine is determined by the interaction of multiple associated characteristics. Consequently, selection should be based on component traits, following an assessment of their correlation with yield per plant. A strong positive correlation between a trait and yield may be due to linkage and pleiotropy (Sparque, 1966). The data pertaining to character association studies is presented in Table 1.

(i) Association of fruit yield with its component characters

The fruit yield per vine showed positive and highly significant correlation with number of male flower (0.337), number of female flower (0.367), fruit length (0.291), fruit diameter (0.455), individual fruit weight (0.809), pulp thickness (0.414), number of fruits per vine (0.504). Whereas, it was positive significantly correlated with β-carotene (0.152) Similar results were reported by Kumbar *et al.,* 2021 in *acidulous*, Reddy *et al.,* 2017, Priyanka *et al.,* 2020 and Mehta *et al.*, 2009. These results suggested that yield can be enhanced by increase in average fruit weight, fruit length, fruit diameter and thickness of pulp.

(ii) Association among fruit yield component characters

Length of vine at 45 days showed highly significant positive association with vine length at harvest (0.930). Significant positive association with days to first female flower (0.148). Trait highly significant and negatively associated with fruit length (-0.293) and significant negative association with internodal length (-0.158), days to first male flower (-0.159). Vine length at harvest is significant positively associated with days to first female flower (0.153). Trait is highly significant negatively associated with days to first male flower (-0.172), fruit length (-0.302). High significant and positive association noted between days to first female flower appearance with days to first fruit harvest (0.300). Number of male flowers recorded highly significant and positive association with number of female flowers (0.814) and number of fruits per vine (0.480). Number of female flowers highly significant positively associated with seed cavity (0.186), number of fruits per vine (0.628). Trait is negatively significant associated with sex ratio (-0.428), days to first fruit harvest (-0.169). Sex ratio is significant positive associated with beta carotene (0.158) and highly significant negatively associated with number of fruits per vine. Days to first fruit harvest is high significant negative associated with seed cavity (-0.324). Fruit length is high significant positively associated with individual fruit weight (0.429). Fruit diameter is highly significant positively associated with pulp thickness (0.820), seed cavity (0.219) and individual fruit weight (0.549). Pulp thickness is significantly high and positively associated with individual fruit weight (0.504) and seed cavity is significant positive associated with number of fruits per vine (0.166). The results accordance with Ramana, 2000, Reddy *et al.,* 2007, Ibrahim, 2013, Nanthakumar *et al.,* 2021, by Kumbar *et al.,* 2021, Priyanka *et al.,* 2020 and Mehta *et al.*, 2009.

(B) Path coefficient analysis

Path coefficient analysis is an imperative means for division of correlation coefficients into direct and indirect effects of independent variables on dependent variable. It has been generally used to recognize attributes that have vast impact on yield and related traits for potential use in selection programmes. The data pertaining to Path coefficient analysis is presented in Table 2.

Out of twenty-one characters eleven characters had shown positive direct effect on fruit yield per vine. The traits like vine length at harvest (0.0430), internodal length (0.0076), days to first male flower (0.0487), number of female flowers (0.2399), sex ratio (0.1176), days to first fruit harvest (0.0263), fruit length (0.0085), fruit diameter (0.0609), individual fruit weight (0.7855), number of fruits per vine (0.4656) and beta carotene content (0.0155). Similar results were reported by Karadi *et al.,* 2016, Reddy *et al.,* 2017, Nagri *et al.*, 2009, Kalgudi *et al*., 2021, Reddy *et al.,* 2017, and Prajapati *et al.,* 2022.

Negative direct effect was exhibited by vine length at 45 days (-0.0110), number of primary branches (-0.0106), days to first female flower (-0.0485), node at first female flower appear (-0.0128), number of male flowers (-0.1564), pulp thickness (-0.0323), seed cavity (-0.0489), moisture content (-0.0207), shelf life (-0.0307) and TSS (0.0008). Similar results were reported by Priyanka *et al.,* 2020, Prajapati *et al.,* 2022, Ibrahim and Ramadan, 2013, Mehta *et al.,* 2009, Gulwane *et al.,* 2022, Nanthakumar *et al.,* 2021 and Khan *et al.,* 2015.

The residual effect provides a precise insight into how other potential components of yield interact. Essentially, it quantifies the impact of independent variables that weren't accounted for in the study on the dependent variable. In this particular investigation, the residual effect at the phenotypic level stands at 0.18. This suggests that the traits examined in this study contribute to more than 82% of the variability associated with the dependent variable, which is yield.

Conclusion

Correlation studies in revealed that total fruit yield per vine had significant positive correlation with fruit yield per vine showed positive and highly significant correlation with number of male flower, number of female flower, fruit length, fruit diameter, individual fruit weight, pulp thickness, number Of fruits per vine. Whereas, it was positive significantly correlated with β-carotene. Path analysis in the segregating population from the cross (UHSCS-12 X AHS-10) revealed that vine length at harvest, internodal length, days to first male flower, number of female flowers, sex ratio, days to first fruit harvest, fruit length, fruit diameter, individual fruit weight, number of fruits per vine and beta carotene content. Therefore, direct selection for individual fruit weight and number of fruits per vine would be rewarding improvement in yield due to its high positive association and direct effect on yield.

Future scope

Traits exhibiting a highly significant positive correlation and a substantial direct positive effect on fruit yield are suitable for selecting superior plants adaptable to all locations. The chosen plants can undergo genetic analysis to elucidate the genes responsible for expressing these specific traits.

Table 1 : Phenotypic correlation coefficients for various traits derived from F_2 population of cross UHSCS-12 X AHS-10

Traits	45D	VLH	IL	NPB	DFMF	DFFF	NFFF	NMF	NFF	SR	DFFH
45D	**1.000**	0.930**	-0.158*	0.048	-0.159*	0.148*	-0.005	0.012	-0.025	0.073	0.034
VLH		**1.000**	-0.165*	0.066	-0.172**	0.153*	0.008	0.041	-0.009	0.096	0.057
IL			**1.000**	-0.103	0.088	-0.161*	0.105	-0.006	-0.004	-0.023	-0.114
NPB				**1.000**	-0.035	0.033	0.068	-0.069	-0.033	-0.039	0.058
DFMF					**1.000**	0.014	-0.009	0.075	0.042	0.041	-0.026
DFFF						**1.000**	-0.037	-0.004	0.030	-0.025	0.300**
NFFF							**1.000**	0.009	-0.007	0.039	-0.060
NMF								**1.000**	0.814**	0.159*	-0.136*
NFF									**1.000**	-0.428**	-0.169**

SR										**1.000**	**0**.064
DFFH											**1.000**
FL											
FD											
PT											
SC											
IFW											
NFPV											
MC											
SL											
TSS											
BC											
FYPV											

Table 1. ***Contd…***

Traits	FL	FD	PT	SC	IFW	NFPV	MC	SL	TSS	BC	FYPV
45D	-0.293**	-0.093	-0.014	0.008	-0.104	0.075	-0.026	0.104	-0.023	-0.08	-0.045
VLH	-0.302**	-0.137*	-0.036	0.012	-0.075	0.117	-0.059	0.106	-0.003	-0.08	0.001
IL	0.055	-0.035	-0.082	0.129*	-0.109	-0.032	-0.086	0.043	-0.021	-0.044	-0.097
NPB	-0.014	0.022	0.065	0.018	0.069	0.063	-0.073	-0.124	0.06	0.083	0.074
DFMF	0.081	0.075	0.025	-0.055	0.079	-0.03	0.135*	0.012	0.054	0.038	0.098
DFFF	-0.078	0.081	0.079	-0.028	0.051	0.064	0.041	0.015	-0.051	0.006	0.04
NFFF	-0.047	-0.05	-0.021	0.042	-0.112	0.054	-0.04	0.046	-0.08	-0.051	-0.08
NMF	-0.028	-0.021	0.006	0.1	0.07	0.480**	-0.094	-0.066	-0.151*	0.08	0.337**
NFF	0.003	-0.013	-0.02	0.186**	0.026	0.628**	-0.081	-0.122	-0.113	-0.004	0.367**
SR	-0.059	-0.02	0.044	-0.117	0.062	-0.263**	-0.013	0.111	-0.062	0.158*	-0.074
DFFH	-0.138*	0.007	0.037	-0.324**	0.034	-0.121	0.127	-0.012	0.059	0.034	-0.017
FL	**1**	0.117	0.064	0.064	0.429**	-0.093	0.107	0.095	0.152*	-0.075	0.291**
FD		**1**	0.820**	0.219**	0.549**	0.01	-0.03	-0.001	0.041	0.044	0.455**
PT			**1**	-0.027	0.504**	0.002	-0.08	0.004	0.024	0.043	0.414**
SC				**1**	0.08	0.166*	-0.012	-0.072	-0.029	-0.004	0.115
IFW					**1**	0.004	0.007	-0.013	0.045	0.112	0.809**
NFPV						**1**	-0.151*	0.014	-0.180**	0.09	0.504**
MC							**1**	-0.038	0.249**	0.001	-0.082
SL								**1**	-0.074	-0.049	-0.032
TSS									**1**	-0.077	-0.053
BC										**1**	0.152*
FYPV											**1**

Table 2 : Phenotypic path coefficient for various traits derived from the F_2 population of cross UHSCS-12 X AHS-10

Traits	45D	VLH	IL	NPB	DFMF	DFFF	NFFF	NMF	NFF	SR	DFFH
45D	**-0.0110**	0.0400	-0.0012	-0.0005	-0.0078	-0.0072	0.0001	-0.0020	-0.0060	0.0085	0.0009
VLH	-0.0102	**0.0430**	-0.0013	-0.0007	-0.0084	-0.0074	-0.0001	-0.0064	-0.0023	0.0113	0.0015
IL	0.0017	-0.0071	**0.0076**	0.0011	0.0043	0.0078	-0.0014	0.0009	-0.0009	-0.0027	-0.0030
NPB	-0.0005	0.0029	-0.0008	**-0.0106**	-0.0017	-0.0016	-0.0009	0.0107	-0.0080	-0.0046	0.0015
DFMF	0.0018	-0.0074	0.0007	0.0004	**0.0487**	-0.0007	0.0001	-0.0118	0.0101	0.0049	-0.0007
DFFF	-0.0016	0.0066	-0.0012	-0.0004	0.0007	**-0.0485**	0.0005	0.0006	0.0073	-0.0030	0.0079
NFFF	0.0001	0.0003	0.0008	-0.0007	-0.0004	0.0018	**-0.0128**	-0.0014	-0.0018	0.0045	-0.0016
NMF	-0.0001	0.0018	0.0000	0.0007	0.0037	0.0002	-0.0001	**-0.1564**	0.1952	0.0187	-0.0036
NFF	0.0003	-0.0004	0.0000	0.0004	0.0021	-0.0015	0.0001	-0.1272	**0.2399**	-0.0504	-0.0045
SR	-0.0008	0.0041	-0.0002	0.0004	0.0020	0.0012	-0.0005	-0.0248	-0.1028	**0.1176**	0.0017
DFFH	-0.0004	0.0025	-0.0009	-0.0006	-0.0013	-0.0146	0.0008	0.0212	-0.0406	0.0076	**0.0263**
FL	0.0032	-0.0130	0.0004	0.0002	0.0040	0.0038	0.0006	0.0044	0.0007	-0.0069	-0.0036
FD	0.0010	-0.0059	-0.0003	-0.0002	0.0037	-0.0039	0.0007	0.0032	-0.0031	-0.0024	0.0002
PT	0.0002	-0.0015	-0.0006	-0.0007	0.0012	-0.0039	0.0003	-0.0010	-0.0049	0.0052	0.0010

SC	-0.0001	0.0005	0.0010	-0.0002	-0.0027	0.0014	-0.0005	-0.0156	0.0446	-0.0138	-0.0085
IFW	0.0012	-0.0032	-0.0008	-0.0007	0.0038	-0.0025	0.0014	-0.0110	0.0061	0.0073	0.0009
NFPP	-0.0008	0.0050	-0.0002	-0.0007	-0.0015	-0.0031	-0.0007	-0.0751	0.1506	-0.0310	-0.0032
MC	0.0003	-0.0025	-0.0007	0.0008	0.0066	-0.0020	0.0005	0.0147	-0.0194	-0.0015	0.0033
SL	-0.0011	0.0046	0.0003	0.0013	0.0006	-0.0007	-0.0006	0.0104	-0.0293	0.0131	-0.0003
TSS	0.0003	-0.0001	-0.0002	-0.0006	0.0027	0.0025	0.0010	0.0236	-0.0271	-0.0073	0.0016
BC	0.0009	-0.0035	-0.0003	-0.0009	0.0018	-0.0003	0.0007	-0.0125	-0.0011	0.0185	0.0009

Table 2. Contd…

Traits	FL	FD	PT	SC	IFW	NFPV	MC	SL	TSS	BC	r_p
45D	-0.0025	-0.0057	0.0004	-0.0004	-0.0819	0.0349	0.0005	-0.0032	0.0000	-0.0013	-0.0451
VLH	-0.0026	-0.0084	0.0012	-0.0006	-0.0592	0.0546	0.0012	-0.0032	0.0000	-0.0013	0.0008
IL	0.0005	-0.0021	0.0026	-0.0063	-0.0854	-0.0147	0.0018	-0.0013	0.0000	-0.0007	-0.0972
NPB	-0.0001	0.0013	-0.0021	-0.0009	0.0538	0.0295	0.0015	0.0038	-0.0001	0.0013	0.0745
DFMF	0.0007	0.0046	-0.0008	0.0027	0.0617	-0.0139	-0.0028	-0.0004	0.0000	0.0006	0.0984
DFFF	-0.0007	0.0049	-0.0026	0.0014	0.0399	0.0297	-0.0009	-0.0005	0.0000	0.0001	0.0403
NFFF	-0.0004	-0.0031	0.0007	-0.0020	-0.0880	0.0252	0.0008	-0.0014	0.0001	-0.0008	-0.0802
NMF	-0.0002	-0.0013	-0.0002	-0.0049	0.0551	0.2237	0.0020	0.0020	0.0001	0.0012	0.3374
NFF	0.0000	-0.0008	0.0007	-0.0091	0.0201	0.2923	0.0017	0.0038	0.0001	-0.0001	0.3674
SR	-0.0005	-0.0012	-0.0014	0.0057	0.0490	-0.1227	0.0003	-0.0034	0.0001	0.0024	-0.0737
DFFH	-0.0012	0.0005	-0.0012	0.0158	0.0269	-0.0563	-0.0026	0.0004	-0.0001	0.0005	-0.0173
FL	**0.0085**	0.0071	-0.0021	-0.0031	0.3368	-0.0433	-0.0022	-0.0029	-0.0001	-0.0012	0.2913
FD	0.0010	**0.0609**	-0.0265	-0.0107	0.4311	0.0045	0.0006	0.0000	0.0000	0.0007	0.4546
PT	0.0006	0.0499	**-0.0323**	0.0013	0.3958	0.0011	0.0017	-0.0001	0.0000	0.0007	0.4139
SC	0.0006	0.0133	0.0009	**-0.0489**	0.0631	0.0775	0.0003	0.0022	0.0000	-0.0001	0.1149
IFW	0.0037	0.0334	-0.0163	-0.0039	**0.7855**	0.0019	-0.0001	0.0004	0.0000	0.0017	0.8088
NFPP	-0.0008	0.0006	-0.0001	-0.0081	0.0033	**0.4656**	0.0031	-0.0004	0.0001	0.0014	0.5041
MC	0.0009	-0.0018	0.0026	0.0006	0.0053	-0.0703	**-0.0207**	0.0012	-0.0002	0.0000	-0.0823
SL	0.0008	-0.0001	-0.0001	0.0035	-0.0100	0.0065	0.0008	**-0.0307**	0.0001	-0.0008	-0.0318
TSS	0.0013	0.0025	-0.0008	0.0014	0.0354	-0.0840	-0.0052	0.0023	**-0.0008**	-0.0012	-0.0527
BC	-0.0006	0.0027	-0.0014	0.0002	0.0881	0.0420	0.0000	0.0015	0.0001	**0.0155**	0.1523

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Conflict of Interest. None

References

Anonymous (2021). Area and production of horticulture crops for 2021-2022 (3rd Advance Estimates), Ministry of Agriculture and Farmers Welfare, Government of India.

Arumuganathan, K., Earle, E.D. (1991). Nuclear DNA content of some important plant species. *Plant Mol Biol Rep*., **9**: 211–215

Dane F (1991) Cytogenetics of the genus Cucumis. In: Tsuchiya T, Gupta PK (eds) Chromosome engineering in plants: Genetics, breeding, evolution, Part B. Elsevier, Amsterdam

Dewey, D. R., & Lu, K. H. (1959). A correlation and path-coefficient analysis of components of crested Wheatgrass seed production. *Agronomy Journal*, **51**(9): 515–518.

Fernandez-Trujillo, J.P., Pico, B., Garcia-Mas, J., Alvarez, J.M., Monforte, A.J. (2011). Breeding for fruit quality in melon. In: Bebeli PJ (ed) Jenks MA. Breeding for fruit quality. John Wiley & Sons Inc, Hoboken

Gulwane V.P., Deore G.N. and Thakare D.S. (2022). Correlation and path analysis studies in chickpea (*Cicer arietinum* L.).

Ibrahim, E.A. and Ramadan, A.Y. (2013). Correlation and path coefficient analysis in sweet melon (*Cucumis melo* var. *Aegyptiacus* L.) under irrigated and drought conditions. *Pak. J. Biol. Sci.*, **16**(13): 610-616.

Kalgudi, A., Shet, R.M., Shantappa, T., Lakshmidevamma, T.N., Hongal, S. and Rathod, V. (2021). Assessment of heterosis in intra-specific hybrids derived from muskmelon (*Cucumis melo* L.) and mangalore melon (*Cucumis melo* var. *acidulus*) for yield and quality traits including shelf-life. *Biol. Forum.,* **13**(3): 423-428.

Karadi, S.M., Ganiger, V.M., Siddappa Mangi, V. and Bhuvaneshwari, G. (2016). Character association and path analysis studies in wild melon (*Cucumis melo* sub sp *agrestis*). *Green Farming Int. J.,* 7(3): 666-669.

Khan, M.H., Bhuiyan, S.R., Saha, K.C.M.R., Bhuyin, M.R. and Ali, A.S.M.Y. (2015). Variability correlation and path coefficient analysis of bitter gourd (*Momordica charantia* L.). *Bangladesh J. Agril. Res.,* 40(4): 607- 618.

Kumbar, S., Tirakannanavar, S., Shet, R.M., Satish, D., Jagadeesha, R.C., Gasti, V. D. and Gunnaiah, R. (2021).

Genetic variability and correlation studies in intervarietal hybrids of Mangalore melon (*Cucumis melo* var. *acidulous*) for productivity traits. *J. Pharm. Innov*., **10**(7): 448-451.

Mehta, R., Singh, D. and Bhalala, M.K. (2009). Correlation and path analysis in muskmelon. *Indian J. Hortic*., **66**(3): 396-399.

Nagri, P.K., Raut, V.U., Wagh, A.P., Chandan, P.M. and Dod, V.N. (2009). Variability, correlation and path analysis studies in musk melon (abstract). In: *Abstracts, International Conference on Horticuture*; 9-12.

Nanthakumar, S., Sankar, R.S. and Rameshkumar, D. (2021). Correlation and path analysis studies on yield and yield components in musk melon (*Cucumis melo* L.). *Int. J. Plant Soil Sci.,* **33**(21): 130-136.

Panse, V.G. and Sukathme, P.V. (1967). Statistical method for agricultural workers p. 381. Indian Council of Agricultural Research.

Prajapati, P.J., Acharya R.R., Patel, N.D., Pandya, M.M. and Patel, N.A. (2022). Character association and path analysis for fruit yield and it's contributing traits in muskmelon (*Cucumis melo* L.). *J. Pharm. Innov*., 11(1): 670-674.

Priyanka, C.S. and Moond, S.K. (2020). Correlation and path analysis in muskmelon (*Cucumis melo* L.) genotypes. *J. Pharm. Innov*., **9**(3): 764-768.

Rachmi, D., Samanhudi, and Purnomo, D. (2020). The effectiveness of fruit extract and temperature for in vitro culture of kepok banana (*Musa balbisiana*). *IOP Conf. Series*: *Earth Environ. Sci*., **466**(1): 012008.

Ramana, N.V. (2000). Studies on genetic divergence in oriental pickling melon. *M. Sc Thesis,* Acharya N G Ranga Agri Univ, Hyderabad (India).

Reddy, A.N.K., Munshi, A.D., Behera, T.K. and Sureja, A.K. (2007). Correlation and path analyses for yield and biochemical characters in snap melon (*Cucumis melo* var. *momordica*). *SABRAO J. Breed. Genet.,* **39**(1): 65-72.

Reddy, B.P., Begum, H., Sunil, N., Reddy, M.T., Babu, J.D. and Reddy, R.S.K., (2017). Correlation and path coefficient analysis in muskmelon (*Cucumis melo* L.). *Int. J. Curr. Microbiol*., **6**(6): 2261-2276.

Singh, R.K. and Chaudhary, B.D. (1985). Biometrical Methods in Quantitative Genetic Analysis, *2nd Edition, Kalyani Publishers*, New Delhi.

Sparque, G.F. (1966). Quantitative genetics in plant improvement in plant Breeding. K. J. Frey Edition, 315–354.

Wang, Y.H., Dean, R.A., Joobeur, T. (2006). Genetic mapping and molecular breed ing in cucurbits. *Plant Breeding Rev*., **27**: 213–244.