

Original Research Article

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Studies on Character Association in Cucumber (*Cucumis sativus* L.)

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ABSTRACT

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The present experiment was carried out to assess the degree of association of yield with its components, because yield is not an independent character and it is resultant of interaction of a number of component characters. Correlation provides information on the nature and extent of association between characters in a population. Most of the traits have shown significant correlation as revealed by the association study. Fruit yield per vine had positive and highly significant correlation with average fruit weight(g), vine length(cm), leaf area(cm²), fruit length(cm), number of fruits per vine, circumference of fruit(cm), number of female flowers per vine, number of leaves per vine, and internodal length(cm) at both genotypic and phenotypic level.

Introduction

Cucumber (*Cucumis sativus* L.) is an important member of the family Cucurbitaceae, with a chromosome number $2n = 14$ (Gopalakrishnan, 2007). It is one of the oldest vegetable crops and has been domesticated in India for 3000 years (De Candolle, 1982). Cucumber is thermophilic and frost susceptible crop, the optimum day and night temperature required for cucumber is 30°C and 18-21°C, respectively. The soil should be fertile, well-drained with a pH of 6.0-7.0. Flowering starts 40-45 days after sowing. Male flowers develop earlier than female flowers. Fruits can be harvested 1-2 weeks after flowering (Grubben and Denton,

2004). It is the 4th most important vegetable crop after tomato, cabbage and onion. Monoecious sex form is predominant in cucumber and it is highly cross pollinated due to monoecious and gynoecious sex forms. Fruit is a special type of berry, commonly known as 'pepo'. Immature fruits are eaten raw as salad, cooked as vegetable or pickled. It is ideal for people suffering from jaundice, constipation and indigestion. It is a rich source of vitamin B and C, carbohydrates, Ca and P (Robinson and Decker Walter, 1999).

A good knowledge of genetic wealth might help in identifying desirable cultivars for commercial production. Because of its nature of high cross pollination, hardly any

genetically pure strain is available to the growers. The basic key to a breeder is to develop high yielding varieties through selection, either from the genotypes or from the segregants of a crop. Expression of different plant character is controlled by genetic and environmental factors. So, the study of genetic parameters is necessary for a successful breeding program which will provide valuable information on the mode of inheritance of different characters which would be useful in selecting plants having desirable characters to develop new varieties. In a hybridization program knowledge of interrelationship among and between yield and yield components is necessary. Thus, determination of correlation between the characters is a matter of considerable importance in selection.

Materials and Methods

The present study was taken up at field unit of Department of Vegetable Science, Kittur Rani Channamma College of Horticulture, Arabhavi, Karnataka which comes under zone 3 of region-2 among the agro-climatic zones of Karnataka, at an altitude of 640 metres above mean sea level. It receives an annual rainfall of 530mm. The experimental material comprised of thirty genotypes collected from different sources. The experiment was laid out in randomized complete block design with two replications of each genotype. Seeds were directly sown in the field in the month of July 2017. Two seeds per hill were sown on ridges and furrows are opened at a spacing of 1.2 X 0.9m. FYM of 25 tons per hectare and recommended basal dose of fertilizers were incorporated into the soil (50% of N and full dose of P and K) just before the sowing. The remaining 50 percent of nitrogenous fertilizer was top dressed thirty days after sowing. Irrigation, weed control, spraying and other cultural practices were followed as per the package of practices of UHS, Bagalkot (Anon, 2013b). The observations were recorded from

five randomly selected plants in each replication for all characters except for fruit characters for which observations were recorded on five randomly selected fruits per replication.

The collected data was subjected to statistical analysis using INDOSTAT software to ascertain phenotypic and genotypic correlation.

Results and Discussion

Knowledge of degree of association of yield with its components is of great importance, because yield is a complex character and is resultant of interaction of a number of component characters. Genotypic correlation reveals the existence of real association, while phenotypic correlation may occur by chance. Without significant genetic correlation, there is no use of significant phenotypic correlation. Non-significant phenotypic correlation along with significant genotypic correlation revealed the existing real association which is masked by the environmental effect. Moharana *et al.*, (2017) in bitter gourd and Singh *et al.*, (2016) in pointed gourd.

In the present study genotypic and phenotypic correlation coefficient were worked out for yield and its components.

The analysis showed that fruit yield per vine exhibited positive and significant genotypic and phenotypic correlation with average fruit weight, vine length, leaf area, fruit length, circumference of fruit, internodal length, number of fruits per vine and number of female flowers per vine. Negative and significant association was recorded with number of male flowers per vine.

This finding was in confirmation with Chaudhary *et al.*, (2004) for vine length, fruit weight, fruits per plant (Table 1 and 2).

Table.1 Phenotypic correlation coefficient among fruit yield per vine and its components in cucumber

Characters	VL	NOL	NOB	IL	LA	N@FMF	N@FFF	DFMF	DFFF	NMF	NFF	NF/V	AFW	FL	CF	FY/V
VL	1.000	-0.085	-0.352**	0.572**	0.850**	0.251	-0.149	0.394 **	0.337**	-0.561 **	-0.057	0.196	0.630**	0.325 *	0.295*	0.677**
NOL		1.000	0.633**	-0.299*	0.0238	-0.059	0.391**	-0.383**	-0.327*	0.703**	0.653**	0.540**	-0.1849	0.181	-0.279 *	0.121
NOB			1.000	-0.502**	-0.340*	-0.333*	0.229	-0.493**	-0.432**	0.711**	0.608**	0.203	-0.301*	-0.014	-0.367**	-0.155
IL				1.000	0.617**	0.323*	-0.157	0.432**	0.461**	-0.692**	-0.197	-0.053	0.482**	0.323 *	0.408**	0.380**
LA					1.000	0.235	0.022	0.389**	0.334**	-0.452**	-0.021	0.224	0.643**	0.459**	0.438**	0.705**
N@FMF						1.000	-0.084	0.467**	0.326*	-0.165	-0.214	0.226	-0.012	-0.089	0.085	0.086
N@FFF							1.000	-0.281*	-0.244	0.360**	0.340**	0.242	-0.271 *	-0.104	-0.309*	-0.088
DFMF								1.000	0.804**	-0.476**	-0.428**	-0.109	0.272 *	0.096	0.254*	0.171
DFFF									1.000	-0.489**	-0.445**	-0.156	0.185	0.027	0.109	0.072
NMF										1.000	0.487**	0.284*	-0.517**	-0.184	-0.415**	-0.318*
NFF											1.000	0.428**	0.045	0.308*	-0.162	0.270*
NF/V												1.000	-0.146	-0.091	-0.091	0.376**
AFW													1.000	0.820**	0.619**	0.840**
FL														1.000	0.500**	0.707**
CF															1.000	0.478**
FY/V																1.000

Critical r value 1%=0.330, 5%=0.254*And ** indicate significant at 5 and 1 per cent probability

VL=Vine length (cm),
 NOL= Number of leaves @ 90 DAS,
 IL=Internodal length (cm),
 LA= Leaf area(cm²),
 NOB=Number of branches per vine @ 75 DAS
 DFMF=Days to first male flowering

DFFF=Days to first female flowering
 N@FMF=Node at first male flower
 N@FFF=Node at first female flower
 NMF=Number of male flowers per vine
 NFF=Number of female flowers per vine
 NF/Y=Number of fruits per vine

AFW=Average fruit weight (g)
 FL=Fruit length (cm)
 CF= circumference of fruit(cm)
 FY/V=Fruit yield per vine (kg).

Table.2 Genotypic correlation coefficient among fruit yield per vine and its components in cucumber

Characters	VL	NOL	NOB	IL	LA	N@FMF	N@FFF	DFMF	DFFF	NMF	NFF	NF/V	AFW	FL	CF	FY/V
VL	1.000	-0.117	-0.379**	0.619**	0.883**	0.344**	-0.131	0.418**	0.498**	-0.615**	-0.069	0.238	0.656**	0.337**	0.327*	0.772**
NOL		1.000	0.699**	-0.326*	-0.011	-0.011	0.610**	-0.412**	-0.472**	0.744**	0.758**	0.624**	-0.218	0.165	-0.352**	0.111
NOB			1.000	-0.572**	-0.373**	-0.447**	0.286*	-0.550**	-0.532**	0.779**	0.664**	0.254*	-0.329*	-0.004	-0.421**	-0.189
IL				1.000	0.644**	0.387**	-0.218	0.519**	0.670**	-0.745**	-0.248	-0.118	0.499**	0.333*	0.475**	0.376**
LA					1.000	0.323*	0.080	0.434**	0.403**	-0.485**	-0.007	0.235	0.654**	0.460**	0.503**	0.753**
N@FMF						1.000	-0.173	0.678**	0.761**	-0.224	-0.204	0.271*	-0.010	-0.064	-0.048	0.136
N@FFF							1.000	-0.470**	-0.302*	0.554**	0.494**	0.328*	-0.309*	-0.034	-0.261*	-0.133
DFMF								1.000	1.028**	-0.517**	-0.500**	-0.097	0.313*	0.122	0.357**	0.234
DFFF									1.000	-0.623**	-0.534**	-0.144	0.244	0.022	0.233	0.153
NMF										1.000	0.520**	0.302*	-0.563**	-0.197	-0.499**	-0.379**
NFF											1.000	0.448**	0.057	0.334*	-0.209	0.275*
NF/V												1.000	-0.181	-0.115	-0.106	0.287*
AFW													1.000	0.835**	0.691**	0.883**
FL														1.000	0.523**	0.745**
CF															1.000	0.588**
FY/V																1.000

Critical r value 1%=0.330, 5%=0.254*And ** indicate significant at 5 and 1 per cent probability

VL=Vine length (cm),
 NOL= Number of leaves @ 90 DAS,
 IL= Internodal length (cm),
 LA= Leaf area(cm²),
 NOB=Number of branches per vine @ 75 DAS
 DFMF=Days to first male flowering

DFFF=Days to first female flowering
 N@FMF=Node at first male flower
 N@FFF=Node at first female flower
 NMF=Number of male flowers per vine
 NFF=Number of female flowers per vine
 NF/Y=Number of fruits per vine

AFW=Average fruit weight (g)
 FL=Fruit length (cm)
 CF= circumference of fruit(cm)
 FY/V=Fruit yield per vine (kg).

Hanchinamani and Patil (2009) for vine length, internodal length, fruit length, circumference of fruit, average fruit weight, total number of fruits per vine and number of male flowers per vine. Ene *et al.*, (2016) for vine length, number of branches per vine, leaf area, number of female flowers per vine, number of fruits per vine, fruit length, circumference of fruit and fruit weight. Ullah *et al.*, (2012) for fruits per plant, fruit weight, fruit diameter and leaves per plant.

Among other attributes, vine length exhibited significant positive correlation genotypically and phenotypically with leaf area and average fruit weight, Negative and significantly associated with number of male flowers per vine. Earlier Choudhary *et al.*, (2004) reported similar results for average fruit weight and internodal length. Number of leaves per vine showed significant positive association with number of male and female flowers per vine, number of branches per vine. Number of branches per vine had positive significant correlation with number of male flowers per vine and number of female flowers per vine. Hanchinamani and Patil (2009) and Kumari *et al.*, (2018) found similar results. Internodal length showed highly significant positive correlation with leaf area, average fruit weight, days to first male and female flowering. Leaf area exhibited positive and significant association with average fruit weight, fruit length and circumference of fruit. Node at first male flower was positive and significantly interrelated with days to first male and female flowering, node at first female flower showed positive significant correlation with number of male flowers per vine and number of female flowers per vine, this was in accordance with the earlier work of Babu *et al.*, (2013) in oriental pickling melon and Kumar *et al.*, (2010).

At both genotypic and phenotypic level, days to first male flowering had positive significant

association with days to first female flowering. Number of male flowers per vine had positive significant correlation with number of female flowers per vine. Number of female flowers per vine showed positive significant interrelation with number of fruits per vine and fruit length, these results are in accordance with Kumari *et al.*, (2018) and Singh and Singh (2015) in bitter gourd. Days first male and female flower opening had highly significant positive correlation with node at first male and female flower, similar results noted by Khan *et al.*, (2016) in snake gourd. Average fruit weight was positive and significantly associated with fruit length and circumference of fruit. Fruit length had highly significant positive correlation with circumference of fruit these results are in accordance with findings of Mehta *et al.*, (2009) in musk melon, Ene *et al.*, (2016) and Pal *et al.*, (2014) in cucumber. The study reveals that values of genotypic correlations were higher than those of their respective phenotypic correlation coefficients in majority of the cases suggesting that genotypic correlations were stronger reliable and free from the environmental factors.

The results of present study concluded that most important positive characters contributing towards yield per plant at genotypic level were average fruit weight, vine length, leaf area, fruit length, circumference of fruit, number of fruits per vine and number of female flowers per vine, suggesting that selection procedure applied for increasing these traits will help in eventually increasing the yield.

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