International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(4): 1963-1965

Received: 04-05-2020
Accepted: 06-06-2020

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Correlation coefficient analysis for fruit yield and its component traits in Okra (*Abelmoschus esculentus* (L.) (Moench)

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DOI: https://doi.org/10.22271/chemi.2020.v8.i4u.9914

Abstract
Twenty five diverse genotypes of okra were evaluated at the Horticulture Research Farm, Department of Horticulture, Naini Agricultural Institute, SHUATS, Allahabad. The experiment was conducted in Randomized Block Design having 25 (genotypes) in three replications. The allocations of the treatments of the individual plots were using random number in each replication. In the present investigation, 25 genotypes have been grown in the *kharif*seasons of 2016. Fruit yield per plot (kg) showed significant and positive correlation with fruits/plant, fruit weight (g) and leaves/plant while it showed non-significant and positive correlation with while it showed non-significant and positive correlation with fruit yield per plant, first flowering node, branches/plant, days to first flowering and days to 50% flowering.

Keywords: Okra (*Abelmoschus esculentus* (L.), fruit yield and character association

Introduction
Okra (*Abelmoschus esculentus* (L.) Moench) commonly known as Lady's finger or bhendi belongs to the family Malvaceae. It is extensively grown in temperate, subtropical and tropical regions of the world (Kochhar,1986) [3]. It is a warm season fruit vegetable grown in the tropical and subtropical countries of the world**.** The crop is grown over a wide range of soils and climatic conditions both in summer and rainy seasons. Okra is especially valued for its tender and delicious pods in different parts of the country for internal and export markets as fresh vegetables, along with soothing properties for digestion. It is a specialty pod vegetable, which is very popular in India. Its fruits have high nutritive, medicinal and industrial value and export potential. Its fruits are rich in vitamins, calcium, potassium and other mineral matters (Camciuc *et al*., 1981) [2]. Okra seed oil is rich in unsaturated fatty acids such as linoleic acid (Savello *et al*., 1980) [4], which is essential for human nutrition. Unlike many other members of pod vegetable group, it is not strictly season-bound and hence can be gown twice a year.

Materials and Methods
Experimental material comprised 25 germplasm lines of okra. All germplasm lines were evaluated in a randomized block design with three replications at Department of Horticulture, SHUATS, Allahabad (U.P.) during in Kharif season (July-October 2016).The observations on 5 randomly selected plants from each genotypes in each replication were recorded for 15 quantitative and qualitative traits viz. plant height (cm), no. of branches/plant, no of leaves/plant, days to first flowering, days to 50% flowering, first flowering node, fruit length (cm), fruit diameter (cm), fresh fruit weight (g), no. of fruits/plant, fruit yield/plant (g), fruit yield/plot (g), YVMV incidence (%) YVMV severity (%) and crude fibre content(%). The selected plants were tagged for taking observations on various growth and yield contributing parameters. The picking of tender green pods was done at weekly intervals for vegetable purpose.

Result and Discussion
Complex characteristics such as yield must be related to many individually distinguishable characteristics. It is obvious that fruit yield is a complex character that depends up on many

independent yield contributing characters, which are regarded as yield components. All changes in the components need not however, be expressed by changes in yield. This is due to varying degree of positive and negative associations between yield and its components and among components themselves. Therefore, selection should be based on these component characters after assessing their association with fruit yield per plant.

Correlation studies on vegetable fruit yield and its component traits revealed that the values of genotypic correlation coefficients were higher than phenotypic correlation coefficient this was in confirmation with Patel and Chaudhary (2001). This suggests the strong inherent association among the traits.

The correlation coefficients between the characters at genotypic and phenotypic level were presented in Table1 respectively. In general magnitude of genotypic correlation coefficient was higher than phenotypic correlation coefficients.

Table 1: Genotypic Correlation Coefficient (r_g) of fruit yield and its contributing traits of okra

S. No.	Character	Plant Height (cm)	Leaves/ Plant	Branches/ Plant	Days to First Flowering	Days to 50% Flowering	First Flowering Node	Fruits/ Plant	Fruit Length (cm)	Fruit Diameter (g)	Fruit Weight (g)	Fruit Yield/ Plant (g)	Fruit Yield/ Plot (kg)	YVMV Incidence (%)	YVMV Severity (%)	Crude Fibre Content (%)
1	Plant Height (cm)	1.00	0.39**	0.17	-0.30	-0.33	0.30	0.05	-0.30*	-0.26	-0.10	-0.06	-0.06	0.20	0.07	-0.24*
2	Leaves/ Plant		1.00	0.42*	-0.18	-0.27	0.63**	0.17	-0.28*	-0.09	0.34**	0.40*	0.40**	-0.07	-0.20	0.03
3	Branches/ Plant			1.00	0.43	0.25	0.46	0.39	0.06	-0.15	0.06	0.29	0.29	-0.30	-0.55**	0.40**
4	Days to First Flowering				1.00	0.94**	-0.25	-0.23	0.76**	0.47	0.17	0.03	0.03	-0.30	-0.07	0.27
5	Days to 50% Flowering					1.00	-0.43	-0.20	0.79**	0.37	0.12	0.01	0.01	-0.18	-0.03	0.14
6	First Flowering Node						1.00	0.16	-0.16	-0.14	0.20	0.27	0.27	-0.01	0.04	0.33**
7	Fruits/ Plant							1.00	-0.24	-0.18	-0.03	0.46**	0.46**	-0.48**	-0.48**	-0.12
8	Fruits length (cm)								1.00	0.17	0.08	-0.06	-0.06	-0.05	0.11	0.47**
9	Fruits diameter (cm)									1.00	-0.14	-0.25	-0.25	0.19	0.21	-0.08
10	Fruit Weight (g)										1.00	0.91**	0.91**	-0.37**	-0.40**	0.29*
11	Fruit Yield/ Plant (g)											1.00	1.00	-0.61**	-0.65**	0.18
12	Fruit Yield/ Plot (kg)												1.00	-0.61**	-0.65**	0.18
13	YVMV Incidence (%)													1.00	0.84**	-0.22
14	YVMV Severity (%)														1.00	-0.14
15	Crude Fibre Content (%)															1.00

Fruit yield per plot (kg) showed significant and positive correlation with fruits/plant (0.46), fruit weight (gm) (0.91) and leaves/plant (0.40) while it showed non-significant and positive correlation with fruit yield per plant (g) (1.00), first flowering node (0.27), branches/plant (0.29), days to first flowering (0.03) and days to 50% flowering (0.01).It showed non-significant and negative correlation with fruit length (cm) (0.06) and fruit diameter (cm) (0.25) and plant height (cm) (0.06). These results were similar to those found by Guddadamath *et al*. (2011); Nwangburuka *et al.* (2012) and Celestin *et al.* (2012).

Plant height (cm) showed significant and positive correlation with leaves/plant (0.39). It showed non-significant and positive correlation with branches/plant (0.17), first flowering node (0.30), fruits/plant (0.05), fruit yield/plant (g) (0.06), fruit yield/plot (kg) (0.06), YVMV incidence (%) (0.20) and YVMV severity (%) (0.07).The significant and negative association was observed with fruit length (cm) (0.30) while it showed negative and non-significance with days to first flowering (0.30), days to 50% flowering (0.33), fruit diameter (cm) (0.26), Fruit weight (g) (0.10).

Leaves/plant showed significant and positive correlation with branches/plant (0.42), first flowering node (0.63), fruit weight (g) (0.34), fruit yield/plant (g) (0.40), fruit yield/plant (g) (0.40) while non-significant and positive correlation is observed in fruits/ plant (0.17) and crude fibre content (%) (0.03). The significant and negative association was observed with fruit length (cm) (0.28) while it showednon-significant and negative for days to first flowering (0.18), days to 50% flowering (0.27), fruit diameter (0.09), YVMV incidence (0.07) and YVMV severity (0.20).

Branches/plant has shown significant and positive correlation with first flowering node (0.46) and crude fibre content (%) (0.40) whereas non-significant and positive correlation withdays to first flowering (0.43), days to 50% flowering(0.25), fruits/plant (0.39), fruit length (cm) (0.06), fruit weight (g) (0.06), fruit yield per plant (gm) (0.29), fruit yield per plant (gm) (0.29). The significant and negative association was observed with YVMV severity (%) (0.55) while it showed non-significant and negative with days to fruit diameter (cm) (0.15), YVMV incidence (%) (0.30). These results are in accordance with those reported by Muthuselvi *et al.* (2013a) [6], Kumar *et al.* (2014a) [5] and Seenaiah (2015) [7].

Days to first flowering showed significant and positive correlation with days to 50% flowering (0.94), fruit length (cm) (0.76) while it showed positive and non-significant with fruit diameter (cm) (0.47), fruit weight (g) (0.17), fruit yield per plant (g) (0.03), fruit yield per plant (g) (0.03) and crude fibre content (%) (0.27). It showed negative and non-significant with first flowering node (0.25), YVMV incidence (%) (0.30), YVMV severity (%) (0.07).

Days to 50% flowering showed significance and positive correlation with fruit length (cm) (0.79) while it showed positive and non-significant correlation with fruit diameter (cm) (0.37), fruit weight (g) (0.12), fruit yield per plant (g) (0.01), fruit yield per plant (g) (0.01) and crude fibre content (%) (0.14).while it showed negative and non-significant with first flowering node (0.43), fruits/plant (0.20), YVMV incidence (%) (0.18), YVMV severity (%) (0.03).

First flowering nodeshowed positive and significant correlation with crude fibre content (%) (0.33) while it showed non-significant and positive correlation with fruit/plant (0.16), fruit weight (g) (0.20), fruit yield per plant (g) (0.27), fruit yield per plot (kg) (0.27). The non-significant and negative association was observed with fruit length (cm) (0.16), fruit diameter (cm) (0.14), YVMV incidence (%) (0.01).

Fruit/plant showed significant and positive correlation with fruit yield per plant (g) (0.48), fruit yield per plot (kg) (0.48) while it showed non-significant and positive correlation with fruit diameter (cm) (0.18). The significant and negative association was observed with YVMV incidence (%) (0.48), YVMV severity (%) (0.48) while it showed negative and non-significant correlation with fruit length (cm) (0.24), fruit weight (g) (0.03), crude fibre content (%) (0.12).

Fruit length showed significant and positive correlation with crude fibre content (%) (0.47) while it showed non-significant and positive with fruit diameter (cm) (0.17), fruit weight (g) (0.08), YVMV severity (%) (0.11). The non-significant and negative association was observed with fruit yield per plant (g) (0.06), fruit yield per plot (kg) (0.06), YVMV incidence (%) (0.05).

Fruit diameter (cm) showed non-significant and positive correlation with YVMV incidence (%) (0.95), YVMV severity (%) (0.21). The non-significant and negative association was observed with fruit weight (g) (0.14), fruit yield per plant (g) (0.25), fruit yield per plot (kg) (025), and crude fibre content (%) (0.08).

Fruit weight (g) showed significant and positive correlation with fruit yield per plant (g) (0.91), fruit yield per plot (g) (0.91) and crude fibre content (%) (0.29) while it showed significant and negative correlation with YVMV incidence (%) (0.37), YVMV severity (%) (0.40).

Fruit Yield/Plant (g) showed non significant and positive correlation with fruit yield per plot (kg) (1.00) and crude fibre content (%) (0.18) while it showed negative and non-significant correlation with YVMV incidence (%) (0.61), YVMV severity (%) (0.65).

YVMV incidence (%) showed significant and positive correlation withYVMV severity (%) (0.84) while negative and non-significant correlation with crude fibre content (0.22). YVMV severity (%) showed negative and non-significant correlation with crude fibre content (%) (0.14).

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