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Path Coefficient Analysis among different diverse Okra (*Abelmoschus esculentus* L. Moench)) genotypes

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ABSTRACT

Path analysis were studied using 20 diverse okra genotypes along with four checks (Kashi Pragati (VRO 6), Kashi Kranti (VRO-22), Kashi Lalima and Arka Anamika). Observations were recorded on eleven quantative morphological and qualitative biochemical traits on yield per plant in okra during Rainy season, 2015-16. Among them, number of primary branches, Plant height, Fruit diameter, number of fruits per plant, Average Fruit Weight and Moisture percentage has positive effect. Average fruit weight (0.716) exhibited maximum positive direct effect on fruit yield per plant followed by number of fruits per Plant (0.686) and fruit diameter (0.066). Path coefficient analysis carried out at genotypic level revealed that number of primary branches, Plant height, Fruit Diameter, Number of Fruits per Plant, Average Fruit Weight and Moisture percentage recorded positive direct effect on fruit yield/plant. The highest negative direct effect was found in Number of Seeds per Pod (-0.062) followed by Crude fibre (-0.044) content and Plant Canopy Width (-0.026).

Keywords: *Okra, Path analysis, genotypic level, Positive effect*

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INTRODUCTION

Okra (*Abelmoschus esculentus* L. Moench) is one of the most economically important vegetable crop grown throughout India. It is a multipurpose and multifarious crop valued for its tender and delicious pods [4,5]. It is mostly grown in tropical and sub tropical's part of India as a warm season vegetable crop, require warm nights (>20°C) for proper growth and development [11]. In India 60 percent share of export goes to okra among fresh vegetables. Okra belongs to family Malvaceae and it is the only member of Malvaceae family which is consumed for vegetable purpose. So far, it is known by various common names such as lady's finger in England, Gumbo in USA and Bhendi in India. In India wide range of diversity among okra genotypes exist expressing wide range of variation for quantitative and qualitative traits. Yield is an important characters which results due to interactions of various yield components. Path coefficient analysis is a powerful tool to study the character association and their final impact on yield, which help the selection procedure accordingly. It determine the cause and effect which has been found beneficial in splitting the correlation into its direct and indirect effects contributing yield. Correlation study between different quantitative and qualitative characters provides an idea of association that could

be effectively beneficial to formulate any hybridization programme and selection strategies for improving yield components. To fulfill the objectives of any breeding programme, it would be essential to consider the relative magnitude of association of various characters with yield. By the help of Path analysis we can understand the direct and indirect contribution of each characters towards yield because the analysis splits the correlation coefficient into measures of direct and indirect effect.

MATERIAL AND METHODS

The present investigation was carried out using 20 okra genotypes including 4 checks i.e. Kashi Pragati (VRO 6), Kashi Kranti (VRO-22), Kashi Lalima and Arka Anamika procured from different national institutes *viz.*, All India Coordinated Research Project on Vegetable Crops, ICAR-IIVR, Varanasi, India and Indian Institute of Horticulture Research (IIHR), Bengaluru. Experiment was performed in randomize block design with three replications and germplasm evaluated at research farm of the Department of Horticulture (Vegetable & Floriculture), Bihar Agricultural College, Bihar Agricultural University, Sabour, Bhagalpur (Bihar) during Rainy season of 2015-16. The soil of the plot was sandy loam in texture having good fertility properly leveled and well drained. The rainfall of this region is mainly distributed between middle of June to middle of October. The meteorological observations of present investigation were collected from the Meteorological unit of the Department of Agronomy, B.A.U., Sabour. The total rainfall received during the crop period was 282.57 mm. The maximum temperature ranged from 23.9˚C - 35˚C during the plant growth and development phase. All the agronomic package and practices were adopted to raise the healthy crop. Data were recorded on eleven quantative morphological(Plant Canopy Width (cm), NOPP= Number of Primary Branches per Plant, PH= Plant Height (cm), FL= Fruit Length (cm), FD= Fruit Diameter (cm), NOFPP= Number of Fruits per Plant, AFW= Average Fruit Weight (g), NOSPP= Number of Seeds per Pod) and qualitative biochemical traits(Crude Fiber (%), MO= Moisture (%)) and their direct and indirect effect on yield per plant. Path coefficients were obtained according to the procedure suggested by Dewey and Lu (1959) using genotypic correlation coefficients.

RESULTS AND DISCUSSION

The genotypic correlation coefficients between yield and other traits have been partitioned into direct and indirect effects by path coefficient analysis. Fruit yield is a complex character which is affected by many independent yield contributing characters, which are regarded as yield components. The results are presented in Table 1.In this experiment, average fruit weight (0.716) exhibited maximum positive direct effect on fruit yield per plant followed by number of fruits per Plant (0.686) and fruit diameter (0.066) similar results was obtained by the investigation of Medagam *et al.* [6], in which path coefficient analysis revealed that pod weight and number of marketable pods/plant had a positively high direct effect on marketable pod yield/plant. Path coefficient analysis by Aminu *et al.* [3] further revealed that number of pods/plants exhibited positive and direct influence on the pod yield and these all results also corroborates with the findings of Sood *et al.* [12]. Whereas, the highest negative direct effect was found in Number of Seeds per Pod (-0.062) followed by Crude fibre (-0.044) content and Plant Canopy Width(-0.026).Whereas the highest positive indirect effect was also found in average fruit weight (0.505) followed by Number of Fruits per Plant(0.170), Fruit Diameter (0.045), plant height (0.036), Number of Primary Branches per Plant(0.014) an Moisture percentage (0.013) while, highest negative indirect effect was observed in Average Fruit Weight (-0.269) followed by Number of fruits per plant (-0.104). This analysis results are in conformity with Ahamed *et al.* [1] and Muluken *et al.* [7] and Sood *et al.* [12].

Fruit diameter (0.066) was the third highest contributor for pod yield/plant. Neeraj *et al.* [8] reported similar results in path analysis trail conducted on okra genotypes. Furthermore, Akinyele and Osekita [2] and Prasath *et al.* [10] observed that pod diameter was the major contributors among the different characters responsible for pod yield per plant in okra.

Table 1: Estimates of genotypic direct and indirect effects of 11 characters on yield per plant in okra during Rainy season, 2016-17.

Characters	PCW	NOPP	PH	FL	FD	NOFPP	AFW	NOSPP	CF	MO	Genotypic correlation coefficients
PCW	**-0.026**	-0.002	0.036	0.001	0.005	0.170	-0.269	0.015	-0.006	-0.001	-0.077 NS
NOPP	0.001	**0.047**	0.002	0.003	0.000	-0.104	0.004	-0.010	-0.011	0.013	-0.056 NS
PH	-0.022	0.002	**0.042**	-0.001	0.003	0.038	-0.267	0.012	-0.006	-0.001	-0.200 NS
FL	0.001	-0.007	0.002	**-0.022**	-0.027	-0.008	0.132	0.002	0.004	0.004	0.081 NS
FD	-0.002	0.000	0.002	0.009	**0.066**	0.080	0.303	-0.042	-0.023	-0.014	0.379**
NOFPP	-0.006	-0.007	0.002	0.000	0.008	**0.686**	0.067	-0.004	0.000	0.001	0.747**
AFW	0.010	0.000	-0.016	-0.004	0.028	0.064	**0.716**	-0.044	-0.023	-0.006	0.726**
NOSPP	0.006	0.008	-0.008	0.001	0.045	0.041	0.505	**-0.062**	-0.025	-0.007	0.504**
Crude Fibre	-0.003	0.012	0.006	0.002	0.035	0.006	0.375	-0.035	**-0.044**	-0.009	0.343**
Moisture	0.001	0.014	-0.001	-0.002	-0.022	0.022	-0.100	0.009	0.009	**0.044**	-0.027 NS

Residual effect = 0.00067, Bold lines indicates direct effect

Where, PCW= Plant Canopy Width (cm), NOPP= Number of Primary Branches per Plant, PH= Plant Height (cm), FL= Fruit Length (cm), FD= Fruit Diameter (cm), NOFPP= Number of Fruits per Plant, AFW= Average Fruit Weight (g), NOSPP= Number of Seeds per Pod, CF= Crude Fiber (%), MO= Moisture (%)

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