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Evaluation of Sponge gourd hybrids for growth, yield and quality traits (*Luffa cylindrica* L.)

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Abstract
A set of 15 hybrids of sponge gourd has been evaluated for the study of "Evaluation of sponge gourd hybrids for growth, yield and quality traits". The experiment was conducted in Randomized Block design in three replications at the Department of Horticulture, Naini Agriculture institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Naini during Spring summer 2020-2021. Analysis of variance has showed the significant differences among hybrids for all 10 characters. 5 out of 15 hybrids were found superior for different characters. These 5 hybrids were better for more than one character. High genetic advance as % mean (>20%) has been recorded for fruit yield per plot(kg) and fruit yield (kg/plant) along with high heritability. These traits are governed by additive genes resulting in improvement of traits. Hybrid AVT-2018/SPGHYB-7 (153.3) has performed well in Prayagraj, having highest fruit yield (q/ha) than other tested hybrids and showing superiority for yield and yield attributes. Fruit yield (kg/plant) showed a positive and significant correlation along with fruit yield (kg/plot) at both genotypic and phenotypic levels. The pattern of group constellation proves the existence of significant amount of variability. Thus, selection fir these charaters has been proved efficient for better yield and improvement of sponge gourd.

Keywords: sponge gourd, variability, correlation and path coefficient analysis, genetic diversity

Introduction
Sponge gourd [*Luffa cylindrica* (L). Roem] is an important vegetable crop having chromosomes (2n=26). It is usually an annual climbing plant with cross pollinated nature. It is difficult to assign with accuracy the indigenous area of Luffa species. The Luffa species have a long history of cultivation in tropical countries of Asia and Africa. Indo-Burma has been reported to be the centre of diversity for sponge gourd and is originated in sub-tropical Asian region particularly India. Luffa commonly called Sponge gourd, loofah, vegetable sponge, bath sponge or dish cloth gourd is a member of Cucurbitaceous family. The vernacular names of sponge gourd are kali tori, Ghia Tori, Torianemia, Nenuwa, Chiori, Dundul, Ghosaliginka, Bholortarada and Ghiraula in different parts of the world. Uttar Pradesh, Bihar, West Bengal, Orissa, Assam, Andhra Pradesh and Kerala are the states where Sponge gourd is widely grown. The Sponge gourd is commonly grown for its iature tender fruits as well as for sponge which is used for scrubbing purpose. The tender fruits of sponge gourd are rich in Vitamin A and iron. The fibrous vascular system inside can be used as a bathroom sponge and as a component of shock absorbers, as a sound proof linings, as a utensils cleaning sponge as a packaging materials for making crafts as a eaters factories and as a part of sole for shoes. Sponge gourd struts are characterized by a micro cellular architecture with continuous hollow micro channels, which form vascular bundles and yield a multimodel hierarchial pore system. The cellulose content of sponge gourd varies from 55 to 90%, th lignin content is within the range of 10 and 23%. The tender fruits are used as vegetable which is easily digestible and increases appetite when consumed. The edible fresh and tender fruits contains 94% moisture and a large number of chemical components including 16cal/100g with 9.5g carbohydrates, 2g of protein, 10ug of vitamin A.

Materials and Methods
The experimental materials is comprised of 15 hybrids which are grown at the Department of Horticulture. The sowing of the seeds was done on 20th feb 2020. Recommended dose of fertilizer and suitable cultural practices were adopted for better growth and yield. Five random plants were selected from each plot and following required observations were recorded.

The average value of each observation was calculated for each hybrids in every replication. The chemical analysis has been carried out for nitrogen, phosphorous, potash, organic matter and pH of the soil. Nitrogen was estimated by Kjeldahls method. Phosphorous and potash were estimated by "Pemberton" and "piper methods". The soil organic carbon was estimated by Walkley and Black method (1971). The pH was determined by pH meter (Elico pH meter model L.112).

Treatments	Names	Collection
.T_1	AVT-2018/SPGHYB-1	IIVR
.T_2	AVT-2018/SPGHYB-2	IIVR
.T_3	AVT-2018/SPGHYB-3	IIVR
.T_4	AVT-2018/SPGHYB-4	IIVR
.T_5	AVT-2018/SPGHYB-5	IIVR
.T_6	AVT-2018/SPGHYB-7	IIVR
.T_7	AVT-2018/SPGHYB-8	IIVR
.T_8	IET-2019/SPGHYB-1	IIVR
.T_9	IET-2019/SPGHYB-2	IIVR
.T_{10}	IET-2019/SPGHYB-3	IIVR
T_{11}	IET-2019/SPGHYB-4	IIVR
T_{12}	IET-2019/SPGHYB-5	IIVR
T_{13}	IET-2019/SPGHYB-6	IIVR
T_{14}	ALOK	PRAYAGRAJ
T_{15}	ANUSHKA	PRAYAGRAJ

Results and Discussion

The analysis of variance (ANOVA) has revealed the considerable amount of variability among the fourteen traits studied, suggesting ample scope to identify desirable hybrid. Clustering pattern of 15 hybrids of sponge gourd were grouped into 3 clusters following Mohalanobis D^2 analysis. Clustering pattern has indicated that cluster I is the largest cluster comprising 7 out of 15 hybrids. On the other hand cluster II comprises of 6 hybrids and cluster III comprises of 2 hybrids. The pattern of group constellation has proved the existence of significant amount of variability among 15 hybrids. The distribution of hybrids also indicated that the hybrids originated from different states were grouped into same cluster and genotypes of same states into other different clusters.

Table 1: Names and no of genotypes among clusters

Clusters	No. of genotypes	Name of genotype
1 Cluster	7	AVT-2018/SPGHYB-1
		AVT-2018/SPGHYB-2
		AVT-2018/SPGHYB-3
		AVT-2018/SPGHYB-4
		AVT-2018/SPGHYB-5
		AVT-2018/SPGHYB-7
		AVT-2018/SPGHYB-8
2 Cluster	6	IET-2019/SPGHYB-1
		IET-2019/SPGHYB-2
		IET-2019/SPGHYB-3
		IET-2019/SPGHYB-4
		IET-2019/SPGHYB-5
		IET-2019/SPGHYB-6
3 Cluster	**2**	ALOK
		ANUSHKA

Table 2: Average Intra and Inter Cluster Distance (D)

Cluster Group	Cluster1	Cluster2	Cluster3
Cluster1	20.48	45.55	54.52
Cluster2	45.55	21.66	37.57
Cluster3	54.52	37.57	0

Table 3: Cluster mean for different characters in sponge gourd.

Cluster Group	Days to first picking	Total Number of harvest	Vinelengthin (cm)	Number of fruits per plant	Average fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Fruit yield (g/plant)	Fruit yield (Kg/plot)	Fruit yield (q/ha)
Cluster 1	48.53	1.6	180.8	1.97	87.52	23.13	3.22	305.47	1.06	150.44
Cluster 2	48.68	1.33	180.46	1.51	103.02	22.46	2.86	282.42	0.98	148.08
Cluster 3	48.89	1.32	184.47	1.33	51.9	21.06	3.18	366.67	1.27	150.68

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