Performance of Different Varietiesof Sponge Gourd (*Luffacylindrica*L.) in Terms of Growth,YieldandQuality underprayagrajagro climatic condition

ABSTRACT

The present investigation was carried out at the department of horticulture, Naini Agricultural institute Sam Higginbottom university of Agricultural Technology and Sciences, Prayagraj Uttar Pradesh during Zaid season-2023-2024 with a view to check Performance of different varieties of sponge gourd in terms of growth, yield and quality under PrayagrajAgro climatic conditions The experiment was laid in Randomized block design (RBD) with 8 varieties and 3 replications for sponge gourd varietal evaluation. Varieties comprised of V_1 (AVT-2/2020/SPGVAR-1), V_2 (AVT-2/2020/SPGVAR-2), V_3 (AVT-2/2020/SPGVAR-3), V_4 (AVT-2/2020/SPGVAR-4), V_5 (AVT-2/2020/SPGVAR -5), V_6 (AVT-2/2020/SPGVAR -6), V_7 (AVT-2/2020 /SPGVAR-7) and V_8 (PUSA CHIKNI). Among the various varieties it was concluded that the variety AVT-2/2020/SPGVAR-5 performed best in terms of growth parameters like vine length (189.14 cm), earliness in maturity (55.33 days for first fruit picking) and yield parameters like fruit diameter (3.70 cm), fruit length (28.98 cm)and fruit yield per hectare (11.64 t/ha). AVT-2/2020/ SPGVAR-5 showed best performance for quality parameters also TSS (3.14°Brix) and Ascorbic acid content (10.66 mg/100g).

Keywords: Sponge gourd, TSS, Ascorbic acid, fruit yield per ha, maturity, Performance of variety.

INTRODUCTION

Sponge gourd[*Luffa cylindrica* (L.) Roem.] is a very popular and nutritious vegetable in the tropical and subtropical region. It alsois an important vegetable crop having chromosomes (2n=26). It is an annual climbing plant with cross pollinated nature.gourd is an essential yield It is difficult to assign The sponge gourd (*Luffa cylindrica*) is referred to as Kalitori. The plant is classified under the family Cucurbitaceae and is commonly referred to, 2009*). L. cylindrica* fruits are green, and large cylindrical in shape that is crawled on other materials According to a nutritionist, spongewith accuracy the indigenous area of Luffa species. They have a long history of cultivation in tropical countries of Asia and Africa. Indo-Burma is reported to be the center of diversity for sponge gourd and is originated in subtropical 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 sponge gourd is now widely cultivated in Malaysia, Korea, Japan, Taiwan and China for medicinal purpose. In India the crop is widely grown in U.P., Bihar, W.B., Orrisa and Kerala **(Arya and Prakash, 2002).** In Chhattisgarh, sponge gourd is being grown on about 2597 ha with an annual production of 23447 MT **(Anon2017)**particularly in Mahasamund, Kanker, Raigarh, Korba and Koria district.

The tender fruit used as vegetable which is easily digestible and increases appetite when consumed. The edible fresh and tender fruit contains 94 percent moisture and large number of chemical components including 16Cal per 100g with 9.5g carbohydrates, 2g of protein, 0.25g of fat, 10ug of vitamin A. Besides being a vegetable, the mature, dry fruit consist of a hard shell surrounding a stiff, dense network of cellulose fibre (sponge) which is a good source of fiber used in industries for filler and cleaning the motor car, glass wares **(Obah and Aluyor 2009,)**

Sponge gourd is an annual climber and monoecious vegetable. There is wide variability in size of fruit; ranging from a few centimeters to one meter, fruit shape and colour as traits are complex and controlled by several genes **(Beyer *et al.*, 2002; Zalapa *et al.*, 2006).** Evaluation of genotypes to assess the exiting variability is considered as preliminary step in any crop improvement programme. In order to pursue an effective breeding programme, the present investigation was carried out to gather information on genetic variability, heritability, correlation and path analysis for different characteristics of sponge gourd.

water management, disease control, pest management, and soil improvement practices is crucial for successful sponge gourd cultivation in Prayagraj. Few local varieties have gained importance in Uttar Pradesh climatic conditions. There are many good performing varieties and /ha estimate different varieties of Sponge gourd are available in the market also. According to Prayagrajagro-climatic conditions Sponge gourd can be grown successfully with higher yield. In view of the above-mentioned facts, the present study on the varietal evaluation of Sponge gourd varieties under Prayagraj agroclimatic condition.

MATERIALSANDMETHODS

The present investigation entitledwas done to understand the plant growth, fruit yield and different quality of sponge gourd varieties under Prayagrajagro-climatic condition. The details of the materials used, and the methods adopted in the investigation, which was carried out at CentralHorticultural Research Farm (HCRF),

Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Prayagraj during the Jan-Jun season of 2023.The experiment was laid in Randomized block design with 8 varieties and 3 replications. Varieties comprised of V1 (AVT-2/2020/SPGVAR-1), V2 (AVT-2/2020/SPGVAR-2), V3 (AVT-2/2020/SP GVAR-3), V4 (AVT-2/2020/SPGVAR-4), V5 (AVT-2/2020/ SPGVAR -5), V6 (AVT-2/2020/SPGVAR -6), V7 (AVT-2/2020/ SPGVAR-7) and V8 (PUSA CHIKNI). Observations were recorded at different stages of growth for parameters like vine length, days to flower emergence, fruit length and yield per plot and quality parameters like TSS and vitamin C content. The data were statistically analysed by the method suggested by Fisher and Yates.

1. RESULTSANDDISCUSSION

1.1 VineLength(m)andNumberofBranchesPer Vine

The data pertaining to Vine length and number ofbranchespervinesignificantlyvariedamongdifferent Varieties (Table 1). Among the different varieties maximum vine length (189.14 cm) was observed with AVT-2/2020/ SPGVAR-5 and minimum vine length (120.99) was observed AVT-2/2020/SPGVAR-3. The difference in vine length among varieties can be explained by a blend of genetic elements and the surrounding environment. Varieties that are genetically suited to specific environmental conditions or have been selectively bred for longer vine length are likely to exhibit superior vine elongation performance. Similar findings were reported by Rathore et al., [2]; Pongen et al., [3]; in sponge gourd; Quamruzzaman et al., [4] in bottle gourd; Ara et al., [5] in pointed gourd; Ramya et al., [6] in Bitter gourd. Among the different varieties maximum number of nodes (40.12 nodes) was observed with AVT-2/2020/SPGVAR-5and minimum number of nodes (29.14 nodes) was observed AVT-2/2020/ SPGVAR-3. The higher number of nodes in one variety of sponge gourd, compared to other varieties, can be attributed to a combination of genetic and environmental factors. This specific variety may possess genetic traits that promote enhanced branching and internode elongation, leading to more nodes. Additionally, favorable environmental conditions, such as ample sunlight, optimal temperature, and nutrient-rich soil, may further stimulate robust growth and node development.. Similar findings were reported by Haque et al.,; Sangma et al., in sponge gourd; Ara et al., ; Ramya et al., in Bitter gourd.

1.2 DaystoFirstMaleandFemaleFloweringandDaystoFirstFruitHarvest

Thedata (Table 1)pertainingtodaystoemergence of first male flower and female floweralong with first fruit harvest significantly variedamongdifferentVarieties.AmongthedifferentVarietiesminimumdaystofirstmaleflowering(30.78days)wasobservedinwithAVT-2/22020/SPGVAR-5and maximumdaystofirstmaleflowering(39.28 days)wasobserved in AVT-2/22020/SPGVAR-3Among the different varieties minimum days to emergence of first female flower (33.69 days) was observed with AVT-2/2020/SPGVAR-3 and maximum days to emergence of first female flower (49.05 days) was observed AVT-2/2020/SPGVAR-5. Among the different varieties minimum days to first fruit picking (55.33 days) was observed with AVT-2/2020/ SPGVAR-5and maximum days to first fruit picking (71.92 days) was observed AVT-2/2020/SPGVAR-3

The better performance of one variety over another in terms of earliness in flowering and maturing can be attributed to genetic factors and environmental conditions. Varieties with genetic traits that promote early flowering, such as early maturation genes or shorter vegetative growth phases, can exhibit faster initiation of flowering and so maturing. Additionally, environmental factors such as temperature, photoperiod, and nutrient availability can influence flowering time. Varieties that are genetically predisposed to respond more favorably to the prevailing environmental conditions, or those that have been selectively bred for early flowering, may show superior performance in terms of early initiation of flowering and thus maturing too. The findings were reported similarly earlier by Reddy et al., in sponge gourd; Ramya et al. in Bitter gourd.

1.3 NumberFruitsPerPlant,FruitLength,FruitDiameterandFruit Weight

Table 2 depicts the data pertaining to number of fruits per plant, fruit length, diameter and fruit weight. among the different varieties maximum number of fruits per plant (25.3 fruits) was observed with AVT-2/2020/SPGVAR-5and minimum number of fruits per plant (14.28fruits) was observed AVT-2/2020/SPGVAR-3. The better performance of one variety over another in terms of producing a higher number of fruits per plant can be attributed to genetic factors and environmental conditions. Among the different varieties maximum fruit length (28.96 cm) was observed with AVT-2/2020/ SPGVAR-5and minimum fruit length (16.76 cm) was observed AVT-2/2020/SPGVAR-3. Among the different varieties maximum fruitdiameter (3.70 cm) was observed with AVT-2/ 2020/SPGVAR-5and minimum fruit diameter (3.11 cm) was observed AVT-2/2020/SPGVAR-3.Among the different varieties maximum average fruit weight (51.45 g) was observed with AVT-2/2020/SPGVAR-6 and minimum average fruit

weight (38.38 g) was observed AVT-2/2020/SPGVAR-3. The better performance of one variety over another in terms of enhanced fruit length, diameter and weight can be attributed to genetic factors and environmental conditions [16-20]. Varieties with genetic traits that promote increased cell division and elongation in fruits can result in longer and larger fruits. Environmental factors such as optimal temperature, sunlight exposure, and nutrient availability can also influence fruit growth and development. Varieties that are genetically predisposed or have been selectively bred for longer and thicker fruits may demonstrate superior performance in terms of fruit length, diameter and weight. Similar conclusions were drawn earlier by Pongen et al., [3] in sponge gourd; Ramya et al., [6] in Bitter gourd per plant, fruit length andgirth, fruit weight canbeattributedtogeneticfactorsandenvironmentalconditions.Varieteswithgenetictraits that promote increased fruit set, such ashigherflower-to-fruitconversionratesorenhanced reproductive capacity, can result in agreater number of fruits per plant. Additionally,environmentalfactorssuchasoptimaltemperature,sunlightexposure,andnutrientavailabilitycan playasignificantroleindeterminingfruitweight.Varietiesthataregenetically predisposed or have been selectivelybredforhigherfruitweightmaydemonstratesuperiorperformanceintermsofproducingheavier fruits. The findings were in accordancewith earlier reports of Haque et al. [9]; Ramya etal.

Table 1.PerformanceofdifferentVarietiesofsponge gourd intermsofyieldand qualityparameters

Varieties Notation	Varietiesdetails	Vine length (cm)	No of Nodes	Days to firstmale flowering	Daystofirst female flowering	Days to firstfruit harvest
V_1	AVT-2/2020/SPGVAR-1	150.28	33.84	34.61	38.84	56.65
V_2	AVT-2/2020/SPGVAR-2	128.29	35.76	33.43	35.55	60.32
V_3	AVT-2/2020/SPGVAR-3	120.97	29.14	39.28	33.69	71.92
V_4	AVT-2/2020/SPGVAR-4	161.60	34.38	36.76	37.57	60.06
V_5	AVT-2/2020/SPGVAR-5	189.14	40.12	30.78	49.05	55.33
V_6	AVT-2/2020/SPGVAR-6	140.87	35.13	32.98	36.48	58.95
V_7	AVT-2/2020/SPGVAR-7	170.76	31.08	37.82	33.11	61.19
V_8	Pusa Chikni	134.82	38.43	34.11	34.10	68.17
'F'Test		S	S	S	S	S
SE(d)		0.46	1.14	0.79	1.43	0.93
C.D.at 5%		0.84	2.84	3.83	3.77	4.43
C.V.		5.43	4.91	0.58	1.74	8.93

Table2.PerformanceofdifferentVarietiesofsponge gourd intermsofyieldand qualityparameters

Varieties Notation	Varieties details	Number offruits perplant	Fruit Length (cm)	Fruit diameter (cm)	Fruit weight (g)	Fruit yieldper Hectare (qt/ha)	TSS [°Brix]	VitaminC content (mg/100g)
V_1	AVT-2/2020/ SPGVAR-1	19.5	24.01	3.61	42.01	6.86	2.00	6.00
V_2	AVT-2/2020/ SPGVAR-2	20.6	25.00	3.80	46.22	10.83	1.71	10.00
V_3	AVT-2/2020/ SPGVAR-3	14.2	16.76	3.11	38.38	6.04	1.50	7.66
V_4	AVT-2/2020/ SPGVAR-4	18.7	24.00	3.34	49.37	9.83	1.50	9.00
V_5	AVT-2/2020/ SPGVAR-5	25.3	28.98	3.70	51.47	11.64	3.14	11.55

V_6	AVT-2/2020/ SPGVAR-6	16.4	22.89	3.20	50.81	9.57	2.14	7.36
V_7	AVT-2/2020/ SPGVAR-7	22.4	25.67	3.30	48.38	8.44	3.10	9.00
V_8	PUSA CHIKNI	19.6	20.41	3.44	42.12	7.67	2.13	11.00
'F'Test		S	S	S	S	S	S	S
SE(d)		1.30	1.17	0.61	1.58	0.75	0.24	0.69
C.D.at5%		1.08	1.08	0.45	10.02	0.30	0.40	12.30
C.V.		0.24	1.20	0.06	0.60	1.96	7.54	2.17

1.4 FruitYieldPerHectare(qt/ha)

Among the different Varieties maximum averagefruit yield per vine (11.64 qt/ha) was observed inwithAVT-2/2020/SPGVAR-5and minimumaveragefruityieldperhectare(6.04qt/ha) was observed in AVT-2/2020/SPGVAR-3 (Table2) The better performance of one Variety overanother in terms of enhanced fruit yield can beattributed to genetic factors and environmentalconditions.Varietieswithgenetictraitsthatpromotehigher flower-to-fruit conversionrates,increasedbranching, or enhancedreproductivecapacitycanresultinagreateryield of fruits. Additionally, environmental factorssuchaspollinationefficiency,availabilityofnutrients and water, and optimalgrowingconditionscansignificantlyinfluencefruitproduction.Varietiesthataregeneticallypredisposed or have been selectivelybredforhigherfruityieldcandemonstratesuperiorperformanceintermsofoverallfruitproductionperplant.Thefindingswereinaccordance with earlier reports of Ramya et al.

Table3.Costofcultivationofsponge gourd

Sr	Particular	Unit	Quantity	Rate/Unit	Cost(Rs/ha)
A.	LandPreparations	Hrs.	5	900	4,500
1	Ploughing	Hrs.	4	800	3,200
2	levellingwithcultivars	Labour	10	300	3,000
B.	Fertilizers,manures,andseed				
1	Costofseed	Kg	1.5	3500	5,250
2	FarmyardManure	Tones	25	800	2,0000
3	Urea	Kg	458	6.5	2,977
4	DAP	Kg	217	24.4	5,294.8
5	MOP	Kg	166	18.5	3,071
6	Labourfor SeedSowing	Mandays	10	300	3,000
7	Labourforfertilizerapplication	Mandays	15	300	4,500
8	Gapfilling	Mandays	10	200	2,000
C.	InterculturalOperations				
1	WeedingandHoeing	Mandays	15	300	4,500
2	InsecticidesandPesticides		8	800	6,400
3	NeemOil		4	400	1,600
4	SprayingofChemicals6times	Mandays	15	300	4,500
D.	Irrigation				
1	Irrigation	Labour	24	300	7,200
2	TuberwellCharges	Irrigation	8	500	4,000
F.	Harvesting				
1	Mandays	Labour	30	300	9,000
2	Transportation		L.S		8,000
3	Rentalvalueof land	Months	3	2000	6,000
4	Supervisioncharges	Days	90	150	13,500
			TotalCostof	Cultivation	1,21,493

1.5 T.S.S.[°Brix]andVitaminCContent(mg/100g)

Among the different varieties maximum Total Soluble Solid (43.14°Brix) was observed with AVT-2/2020/SPGVAR-5and minimum Total Soluble Solid (1.50°Brix) was observed AVT-2/2020/SPGVAR-3. Among the different varieties maximum Ascorbic acid content (11.55 mg/100g) was observed with AVT-2/2020/SPGVAR-5and minimum Ascorbic acid content (7.66 mg/100g) was observed AVT-2/2020/SPGVAR-3. The better performance of one variety over another in terms of better Ascorbic acid and TSS content can be attributed to genetic factors and environmental conditions. Varieties with genetic traits that promote higher Vitamin C synthesis and accumulation in fruits can result in increased Ascorbic acid content. Additionally, environmental factors such as sunlight exposure, temperature, and nutrient availability can influence the production of Vitamin C in fruits. Varieties that are genetically predisposed or have been selectively bred for higher Ascorbic acid content may demonstrate superior performance in terms of producing fruits with a better concentration of this essential nutrient. The findings were in accordance with earlier reports of Pongen et al., [3] in sponge gourd; Ramya et al., [6] in Bitter gourd

CONCLUSION

Fromtheaboveexperimentalfindingitisconcluded that the varieties super AVT-2/ 2020/SPGVAR-5 performedbestintermsofgrowthparameterslikevinelength, earliness in flowering and maturity andyield parameters like fruit length, fruit diameter,andfruityieldpervine.Itshowedbestperformance for quality parameters also TSS andVitaminCcontent.

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