Performance of different Pumpkin (*Cucurbita moschata*) hybrids for Growth, Yield and Quality under Prayagraj Agro-Climatic Condition

Abstract

An experimental material comprised of 10 hybrid of pumpkin *viz.,* SADABAHAR, PK-2507 F_1hybrid,P6 F_1 hybrid,P6 Gold F_1hybrid,SS-76 F_1 hybrid,SURAJ F_1hybrid,SIPRA F_1 hybrid,PRITVI F_1hybrid,LHP-SINGHAM F_1hybrid, SW-1001 F_1hybrid.The investigation was carried out in a Randomized Block Design with three replications. Main Experiment Station of the Department of Vegetable Science at Sam Higginbottom University of Agriculture, Technology and Sciences Prayagraj (U.P) during the spring season. Present investigation reveuled that pumpkin hybrids viz, vine length cm (SW-1001 F_1hybrid), no of braches (PK-2507 F_1hybrid) performance best in term of growth. Two hybrids namely LHP-SINGHAM F_1hybridand SW-1001 F_1hybridperformance best in term of yield. For the maximum number of fruit per plant and minimum node number for the first staminate flower anthesis was observed in the case of LHP-SINGHAM F_1hybrid which is promoted to earliness and high yielding. Two hybrids namely P6 Gold F_1hybrid **TSS (**°Brix),LHP-SINGHAM F_1hybrid Vitamin c /100gm**.**

Key word: Pumpkin, Hybrids, Earliness, Yield

INTRODUCTION

"Pumpkin (*Cucurbita moschata Duch. ex Poir)*originated in Central Mexico and is cultivated in the tropicaland subtropical regions of the world. It is an importantcucurbitaceous vegetable crop of India, constituting aprincipal ingredient in several Indian dishes. Pumpkin hasreceived little attention in crop improvement compared toother cucurbitaceous vegetables. Pumpkin belongs to the family Cucurbitaceae having chromosome number 2n=2x=40. There are 27 species under the genus Cucurbita, five of which are in cultivation. These are *C. moschata, C. maxima*, *C. ficifolia*, *C. pepo*, and *C. mixta*, commonly known as pumpkin" (Jahan *et al.,* 2012)."Pumpkin fruits are extensively used as vegetables both in the immature and mature stages and the matured fruits can be stored for 2-4 months" (Yawalkar,

1991).“Pumpkin is relatively high in energy values, and carbohydrates, a good source of vitamins, especially high in carotenoid, pigments and minerals” (Bose and Som 1998). *“*In India, it is mainly grown in Assam, West Bengal, Tamil Nadu, Karnataka, Madhya Pradesh, Uttar Pradesh, Orissa, Kerala, and Bihar. The total area of pumpkins in India is 108 ‘000 hectares whereas, the total production is 2245 (‘000 MT) with a productivity of 21.71 t/ha” (Anonymous, 2020-21***).*** Pumpkin is monoecious and highly cross-pollinated in nature. Like other cucurbits, inbreeding depression is negligible in *Cucurbita* even after prolonged selfing (Whitaker, 1974***).*** **“**Pumpkin is cultivated for its green and mature fruits which are used as a cooked vegetable, processed food, and stock feed. The flesh is delicious when stewed, boiled, or baked. The fully ripened fruit becomes sweetish, which can be used for preparing delicious *Halwa, Jam,* and other sweets. Pumpkin is a summer season vegetable under the north Indian climatic condition, it is mainly cultivated both in spring-summer (February-June) and rainy (July-November). The grower needs an early maturity and high-yielding pumpkin variety. Therefore, this study aimed to evaluate growth, earliness, and yield under the agro-climatic condition of the north Indian plain. Pumpkin has received little attention in crop improvement, as compared to other Cucurbitaceous vegetables. Since ancient times, a wide number of hybrids are available conscious evaluation and exploitation of hybrids have not been attended to until recently” (Panse and Sukhatme, 1984). This is very helpful for a plant breeder in developing a commercial variety with market preference by determining the component characters on which selection can be exercised based on the improvement in growth, yield and quality. “Collection and evaluation of hybrids is a pre-requisite in any improvement program to select high-yielding genotypes with desirable attributes *viz*., growth, earliness, high yield, and quality” (Verma et al., 2023). Therefore, a trial for characterization and evaluation of presently available pumpkin hybrid was carried out to identify the potential cultivar for growth, yield, earliness and quality.

MATERIALS AND METHODS

An experimental material comprised of 10 pumpkin hybrid. The investigation was carried out in a Randomized Block Design with three replications at the Main Experiment Station of the Department of Horticulture Vegetable Science at Sam Higginbottom University of Agriculture, Technology and Sciences Prayagraj (U.P)during the spring season with 10 pumpkin hybrids. Each hybrids was sown in one rows with 1.5 m length spaced,1.5 m with plant to plant spacing of 1.5 m in each replication. The experiment was sown on 02 Feb, 2023. All the recommended agronomic package of practices and plant protection measure were followed to raise a good crop. Observations were recorded for node number to first male flower, node number to first female flower, days to first male flower, days to first female flower, days to first fruit harvest, number of primary branches, fruit polar diameter (cm), fruit equatorial circumference (cm), vine length (m), number of fruits per plant, average fruit weight (kg) and fruit yield per plant (kg.).All the statistical analysis was carried out using OPSTAT statistical software. The analysis of variance among genotypes was estimated by using statistics analysis (Panse and Sukhatme, 1984).

RESULT AND DISCUSSION

The mean performances of 10 hybrids in respect of 4 characters have been presented in (**Table 1**) and the same is described character-wise in the ensuing paragraphs for the mean performance of hybrids respectively. The mean performances of 10 hybrids in respect of 7 characters have been presented in **(Table 2)** and the same is described character-wise in the ensuing paragraphs for the mean performance of hybrids respectively. The mean performances of 10 hybrids in respect of 4 characters have been presented in **(Table 3)** and the same is described character-wise in the ensuing paragraphs for the mean performance of hybrids respectively. The mean performances of 10 hybrids in respect of 5 characters have been presented in (**Table 4**) and the same is described character-wise in the ensuing paragraphs for the mean performance of hybrids respectively.Mean performances of 10 hybrids in respect of 2 characters have been presented in (**Table 5**) and the same is described character-wise in the ensuing paragraphs for the mean performance of hybrids respectively.

Growth parameter

1. In terms of growth parameter like, no of leaves were highest in hybrid PK-2507 F_1hybrid (49.08).(**Table 1**)This might be due to the genetic constitution of the varieties. The differential response of vegetative growth of the different may be due to differences in genetic constituents of the varieties.
2. In terms of growth parameter like vine lengthwere highest in hybridSW-1001 F_1hybrid 322.25 cm (**Table 1**) for the better yield and healthy growth of plant, the provide certain amount of nutrients which help in the growth of plants. The differential response of vegetative growth of the different may be due to differences in genetic constituents of the varieties.
3. In terms of growth parameter like no of Branches per plantwere highest in hybridPK-2507 F_1hybrid (3.08) (**Table 1**)for the better yield and healthy growth of plant, the provide certain amount of nutrients which help in the growth of plants. The differential response of vegetative growth of the different may be due to differences in genetic constituents of the varieties.
4. In terms of growth parameter likeno of nodes per plant were highest in hybrid SADABAHAR (48.58). (**Table 1**)The differential response of vegetative growth of the different may be due to differences in genetic constituents of the varieties.

Earliness parameter

1. Days to first appearance of male flower was observed in SW-1001 F_1hybrid (59.83),days to first appearance of female flower was also found in the same hybrid at SW-1001 F_1hybrid (58.33). (**Table 2**)This may be due occurrence of early flowering is basically a genetic character of each hybrids. The male flower come early reason high temperature. Better environmental conditions and available nutrients seems to have brought quick changes in plant growth and development.
2. Node no. at which male flower appears was observed in PK-2507 F_1hybrid (2.33), Node no. at which female flower appears was observed in SURAJ F_1hybrid (11.5). (**Table 2**)Better environmental conditions and available nutrients seems to

have brought quick changes in plant growth and development.

3. Number of male flower was observed in hybrid SW-1001F_1hybrid (7.83), Number of female flowerwas observed in hybrid LHP-SINGHAM F_1hybrid (4.16) (**Table 2**) due to the influence of environment the number of male : female flower more and less.

4. Days of 50% Flowering female (57.33) to PK-2507 F_1hybrid (61.33).(**Table 2**)Better environmental conditions and available nutrients seems to have brought quick changes in plant growth and development.

Yield parameter

1. In terms of yield parameter like, fruit diameterwere high in hybrid PRITVI F_1hybrid (17.82). (**Table 3**)This might be due to the favourable climatic conditions and sufficient accumulation of nutrients in the open condition.

2. In terms of yield parameter like, number of fruits per plant were high in hybrid LHP-SINGHAM F_1hybrid (4.16). (**Table 3**)This might be due to the favourable climatic conditions and sufficient accumulation of nutrients in the open condition.

3. In terms of yield parameter like, fruit weight in kg were high in hybrid SS-76 F_1 hybrid (2.52). (**Table 3**)This might be due to the favourable climatic conditions and sufficient accumulation of nutrients in the open condition.

4. In terms of yield parameter like, Yield Per plant in kg were high in hybrid LHP-SINGHAM F_1hybrid (9.03). (**Table 3**)This might be due to the favourable climatic conditions and sufficient accumulation of nutrients in the open condition.

Quality parameter

1. In quality parameter the maximum tss (°Brix)conentP6 Gold F_1 hybrid (3.33)(**Table 4**)TSS is an important quality attribute of pumpkin . An increase in this parameter improves the flavour and increases the palatability.

2. The highVitamin c /100gm LHP-SINGHAM F_1hybrid (1.93)(**Table 4**)Generally, the higher ascorbic acid content would increase the nutritive value of pumpkin, Pumpkin varieties and hybrids possessing ascorbic acid content are in great demand in export markets which may be due to differences in genetic constituents of the varieties.

Notations	Hybrids	No. of leaves	Vine Length in cm	No of Branches per plant	No of Nodes per plant

H1	SADABAHAR	48.58	**280.50**	2.41	**48.58**
H2	PK-2507 F_1hybrid	**49.08**	295.41	**3.08**	48.41
H3	P6 F_1 hybrid	46.91	292.75	2.25	46.91
H4	P6 Gold F_1 hybrid	45.58	283.41	**2.25**	44.66
H5	SS-76 F_1 hybrid	**43.75**	310.50	2.5	**43.41**
H6	SURAJ F_1 hybrid	44.66	282.08	2.5	45.33
H7	SIPRA F_1 hybrid	45.66	311.33	2.75	45.66
H8	PRITVI F_1hybrid	45.58	306.50	3.00	45.58
H9	LHP-SINGHAM F_1hybrid	46.33	321.00	2.95	46.33
H10	SW-1001 F_1hybrid	45.66	**322.25**	2.58	45.66
F test (S/NS)		S	S	S	S
S.Ed (+)		0.888	9.556	0.165	0.889
C.D. 5%		2.639	28.392	0.49	2.641
C.V.		3.331	5.507	10.861	3.343

Table 1:Performance Of different Hybrids of pumpkin for Growth Parameters

Table 2: Performance Of different Hybrids of pumpkin forFlowering Parameters

Notations	Hybrids	Days to first appear of male flower	Days to first appear of female flower	Node no. at which male flower appears	Node no. at which female flower appears
H1	SADABAHAR	61.16	60.16	2.83	14.16
H2	PK-2507 F_1hybrid	62.33	**61.67**	**2.33**	14.25
H3	P6 F_1 hybrid	63.16	58.58	3.91	14.83
H4	P6 Gold F_1 hybrid	60.83	61.16	3.16	14
H5	SS-76 F_1 hybrid	62.83	60.5	2.91	14.16
H6	SURAJ F_1 hybrid	**64.33**	60.25	**4.66**	**11.5**
H7	SIPRA F_1 hybrid	60.58	60.08	3.58	14.08
H8	PRITVI F_1hybrid	64.83	60.67	3.33	13.67
H9	LHP-SINGHAM F_1hybrid	62.66	60.33	3	**15.41**
H10	SW-1001 F_1hybrid	**59.83**	**58.33**	2.41	14.25
F test (S/NS)		**S**	**S**	**S**	**S**
S.Ed (+)		**0.721**	**0.602**	**0.239**	**0.629**
C.D. 5%		**2.141**	**1.79**	**0.711**	**1.868**
C.V.		**2.005**	**1.734**	**12.893**	**7.76**

Table 3: Performance Of different Hybrids of pumpkin forFlowering Parameters

Notations	Hybrids	Number of male flower	Number of female flowers	Male:Female ratio	Days of 50% Flowering female
H1	SADABAHAR	12.50	7.61	1.64	57.33
H2	PK-2507 F_1hybrid	9.70	6.59	1.47	**61.33**
H3	P6 F_1 hybrid	11.30	7.34	1.54	61
H4	P6 Gold F_1 hybrid	13.24	5.69	2.33	60.67
H5	SS-76 F_1 hybrid	9.10	6.53	1.39	57.67
H6	SURAJ F_1 hybrid	**8.56**	8.34	1.03	59.67
H7	SIPRA F_1 hybrid	10.36	9.40	1.10	59.67
H8	PRITVI F_1hybrid	11.20	7.89	1.42	57.33
H9	LHP-SINGHAM F_1hybrid	12.50	8.96	1.40	60
H10	SW-1001 F_1hybrid	**14.65**	8.01	1.83	**57.33**
F test (S/NS)		**S**	**S**	**S**	**S**
S.Ed (+)		**0.33**	**0.22**	**0.17**	**0.623**
C.D. 5%		**0.70**	**0.47**	**0.37**	**1.85**
C.V.		**3.64**	**3.60**	**13.77**	**1.822**

Table 4: Performance Of different Hybrids of pumpkin forYield Parameters

Notations	Hybrids	Fruit Diameter in cm	Number of fruits per plant	Fruit weight in kg	Yield Per plant in kg	Fruit yield ton/ hectare
H1	SADABAHAR	16.69	3.08	**1.57**	4.84	21.49
H2	PK-2507 F_1hybrid	16.19	3.08	1.9	5.85	26.01
H3	P6 F_1 hybrid	16.69	3.11	2.27	7.06	31.37
H4	P6 Gold F_1 hybrid	16.86	**2.41**	2.38	5.74	25.49
H5	SS-76 F_1 hybrid	17.37	2.66	**2.52**	6.70	29.79
H6	SURAJ F_1 hybrid	**14.83**	3.25	1.55	5.04	22.39
H7	SIPRA F_1 hybrid	17.26	2.66	2.27	6.04	26.83
H8	PRITVI F_1hybrid	**17.82**	3.83	1.81	6.93	30.81
H9	LHP-SINGHAM F_1hybrid	16.70	**4.16**	2.17	9.03	40.12
H10	SW-1001 F_1hybrid	17.6	3.33	2.31	7.69	34.18
F test (S/NS)		**S**	**S**	**S**	**S**	**S**
S.Ed (+)		**0.436**	**0.288**	**0.093**	**0.17**	**0.31**
C.D. 5%		**1.295**	**0.856**	**0.276**	**0.37**	**0.65**
C.V.		**4.492**	**15.791**	**7.747**	**--**	**1.33**

Table 5: Performance Of different Hybrids of pumpkin forQuality Parameters

Notations	Hybrids	TSS (°Brix).	Vitamin c /100gm
H1	SADABAHAR	2.33	1.30
H2	PK-2507 F_1hybrid	2.82	1.63
H3	P6 F_1 hybrid	2.38	1.58
H4	P6 Gold F_1 hybrid	3.33	1.86
H5	SS-76 F_1 hybrid	2.76	1.9
H6	SURAJ F_1 hybrid	2.78	1.6
H7	SIPRA F_1 hybrid	2.48	1.84
H8	PRITVI F_1hybrid	2.83	1.87
H9	LHP-SINGHAM F_1hybrid	2.76	1.93
H10	SW-1001 F_1hybrid	3.06	1.88
F test (S/NS)		**S**	**S**
S.Ed (+)		**0.144**	**0.066**
C.D. 5%		**0.428**	**0.197**
C.V.		**9.056**	**6.61**

CONCLUSIONS

From the present investigation it is concluded that among 10 hybrids of Pumpkin evaluated for growth term hybrid PK-2507 F_1hybrid 49.08 leaves, vine length SWS-1001 322.25 cm, yield term hybrid LHP-SINGHAM F_1hybrid 40.12 tonne/ha fruit yield and quality term hybrid P6 Gold F_1 hybrid 3.33 TSS (°Brix), under Prayagraj Agro-climatic condition . Among 10 hybrids evaluated, hybrid LHP-SINGHAM F_1hybrid performed best in terms of yield.

The highest benefit cost ratio was also seen in the same hybrid LHP-SINGHAM F_1hybrid with (3.56)

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