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Evaluation of the performance of parental lines and their F_1 hybrids for yield and attributing traits in pumpkin (*Cucurbita moschata* Duch. ex. Poir.)

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Abstract
The present investigation was carried out to obtain information based on per se performances of parents and their combinations for genetic improvement in pumpkin. Eight promising genotypes were crossed in a diallel manner (excluding reciprocals). Half diallel set of 28 F1's in pumpkin was evaluated in Randomized Complete Block Design (RBD) with three replications for fourteen traits during *Zaid* 2022-23 (Y1) and 2023-24 (Y2) at the Main Experimental Station (MES), Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Ayodhya (U.P.) India. The study evidently showed highly significant differences being observed for most of the traits under study. Based on per se performance, The parent Narendra Upkar (8.35 kg) exhibited highest fruit yield per plant followed by Narendra Agrim (7.69 kg), NDPK-76-1 (7.68 kg), NDPK-12-1 (7.68 kg) and NDPK-12-1 (6.69 kg). Among the hybrids, the highest fruit yield per plant exhibited by NDPK-12-1×NDPK-17-12-1 (14.34 kg) followed by Narendra Agrim×NDPK-17-12-1 (13.53 kg), Narendra Amrit×Narendra Upkar (10.42), Narendra Agrim×NDPK-12-1 (10.40kg) and Narendra Upkar×NDPK-76-1 (9.64 kg) in descending order.

Keywords: Evaluated, traits, hybrid, commercial

Introduction
Pumpkin (*Cucurbita moschata* Duch. ex. Poir) is a significant vegetable crop in the Cucurbitaceae family. The pumpkin word derived from Greek word "pepon" meaning "large melon" or something enormous and round. Because of its great yield to farmers and its beneficial nutritional and medicinal uses, it is grown in all over the world. The origin place of pumpkin is Central Mexico.

Pumpkin is comparatively high in energy, carbohydrates and also a good source of vitamins, minerals and especially high carotenoid pigments. It may undoubtedly help improve people's nutritional status, particularly for those who are more susceptible in terms of their need for vitamin-A. Night blindness is a very important problem in South Asian countries that can be treated with pumpkin.

India is home to five different cultivate species of pumpkin: *Cucurbita argyrosperma* (formerly known as *C. mixta*), *C. pepo*, *C. maxima*, *C. moschata*, and *C. ficifolia*. Foreign explorers and diplomats from South America, where *Cucurbita moschata* is more extensively grown than the other four domesticated species, brought pumpkins and squashes to India. *Cucurbita moschata* is the most extensively cultivated vegetable in the tropics of both hemispheres because it can withstand high temperatures than other domesticated species. Squash, including pumpkins are believed to have originated in North America.

Pumpkin showed more variability in their fruit size, colour, shape, fruit yield and also other agronomic attributes (Singh *et al.*, 2005) [6]. Similar to other gourds, pumpkins are summertime crops that can be grown all year round in the country's center and southern regions. In contrast, it is typically grown during the summer and rainy season, which is sowed from January to July, in the northern regions of the nation, where winters are colder. Farmers in northern India seed their crops in mounds or on Introduction 4 hills near their homes in July and August, following the start of the monsoon. The developing plants are supported by thatches, hutments, and other vacant areas.

The genotypes that are typically planted close to a household are land races that have historically been preserved by the locals and are known locally as Bhadhavaha Kohara, or pumpkins for the rainy season.

Materials and Methods

The experiment was conducted at main Experimental Station, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya. Geographically, experimental site falls under humid sub-tropical climate and is located in between 24.47º and 26.56º N latitude, 82.12º and 83.58 º E longitudes at an altitude of 113 m above the mean sea level. The soil type of experimental site was sandy-loam with average fertility level and Ph in the range of 7.5-8.5.

The experimental materials for the present study comprised of eight promising and diverse inbreds and varieties of pumpkin selected on the basis of genetic variability from the germplasm stock maintained in the Department of Vegetable Science, A.N.D.U.A.T., Kumarganj, Ayodhya (U.P.) India. The selected parental lines *i.e*. Narendra Agrim (P_1), Narendra Amrit (P_2), Narendra Upkar (P_3), NDPK-73-1(P_4), NDPK-76-1(P_5), NDPK-12-1 (P_6), NDPK-13-1(P_7) and NDPK-17-12-1(P_8) were raised and crossed in the all-possible combinations, excluding reciprocals during *Zaid*, to develop 28 F_1 hybrid seeds for the study of the mean performance of parental line and their resultant F_1.

All thirty-six genotypes (eight parental lines and twenty-eight F_1) were evaluated in Randomized Complete Block Design (RBD) with three replications. The row to row spacing was kept 3.0 m and plant to plant spacing 0.50 m in both the season (Y1, Y2) and pooled. To raise a good crop, all agronomic techniques were followed. The data were recorded on fourteen quantitative traits viz., node number to first male flower appearance, node number to first female flower appearance, days to first male flower anthesis, days to first female flower anthesis, days to first fruit harvest, vine length (m), internodal length (cm), number of primary branches per plant, equatorial circumference of fruit (cm), polar circumference of fruit (cm), flesh thickness (cm), average fruit weight (kg), number of fruits per plant, fruit yield per plant (kg) .The following is a summary of the findings in relation to several aspects:

Results and Discussion

Choosing the right parents and using the right breeding techniques are fundamental steps in increasing yield and transferring traits. The parents chosen for the crossing program were assessed according to their per se performances since choosing parents with good per se performances would be beneficial in creating superior hybrids. Below is a discussion of various quality attribute results for pooled data, along with the most significant trait—fruit output per plant. A perusal of Table 1 revealed that In pooled, days to first male flower anthesis ranged from 39.15 to 44.51 anthesis for parents and 38.20 to 44.04 anthesis for hybrids. Parent NDPK-17-12-1 (39.15 anthesis) found earliest for days to first male flower anthesis among the parents which was followed by Narendra Agrim (39.35), NDPK-12-1 (39.87), NDPK-13-1 (43.00) and Narendra Amrit (44.14). The best F1 hybrids for days to first male flower were NDPK-12-1×NDPK-17-12-1 (38.20) followed by Narendra Agrim×NDPK-17-12-1 (38.42), Narendra Agrim×NDPK-12-1 (38.92), Narendra Amrit×Narendra Upkar (40.38) and Narendra Agrim×Narendra Amrit (41.38). Averages over the parental mean (42.34) and averages over the F1 hybrid mean (42.18).In pooled, days to first female flower anthesis ranged from 44.16 to 49.28 anthesis for parents and 41.98 to 49.62 anthesis for hybrids. Parent Narendra Agrim (44.16 anthesis) found earliest for days to first female flower anthesis among the parents which was followed by NDPK-12-1 (44.55), NDPK-17-12-1 (44.93), NDPK-13-1 (46.41) and NDPK-76-1 (46.79). The best F1 hybrids for days to first female flower were NDPK-12-1×NDPK-17-12-1 (41.98) followed by Narendra Agrim×Narendra Amrit (42.77), NDPK-76-1×NDPK-13-1 (42.99), Narendra Agrim×NDPK-12-1 (43.17) and Narendra Agrim×NDPK-17-12-1 (43.21). Averages over the parental mean (46.43) and averages over the F1 hybrid mean (42.18).In pooled, node number to first male flower appearance ranged from 4.27 to 7.10 nodes for parents and 4.04 to 8.44 nodes for hybrids. Parent Narendra Agrim (4.27 nodes) found earliest for node number to first male flower appearance among the parents which was followed by NDPK-12-1 (4.71), NDPK-17-12-1 (4.95 nodes) Narendra Amrit (5.13 nodes) and NDPK-13-1 (5.86 nodes). The best F1 hybrids for node number to first male flower appearance were Narendra Agrim×NDPK-12-1 (4.04 nodes) followed by NDPK-12-1×NDPK-17-12-1 (4.05 nodes), Narendra Agrim×NDPK-17-12-1 (4.08), NDPK-13-1×NDPK-17-12-1 (4.98 nodes) and NDPK-73-1×NDPK-17-12-1 (5.16 nodes). Averages over the parental mean (5.49 nodes) and averages over the F1 hybrid mean (6.12 nodes).In pooled, node number to first female flower appearance ranged from 8.43 to 12.80 nodes for parents and 8.05 to 14.51 nodes for hybrids. Parent Narendra Agrim (8.43 nodes) found earliest for node number to first female flower appearance among the parents which was followed by NDPK-12-1 (9.99), NDPK-17-12-1 (10.95 nodes), NDPK-73-1 (11.28 nodes) and NDPK-76-1 (12.01 nodes). The best F1 hybrids for node number to first female flower appearance were NDPK-12-1×NDPK-17-12-1 (8.05 nodes) followed by Narendra Agrim×NDPK-17-12-1 (8.08 nodes), Narendra Agrim×NDPK-12-1 (8.24), NDPK-73-1×NDPK-12-1 (10.97 nodes) and Narendra Agrim×NDPK-73-1 (10.99 nodes). Averages over the parental mean (11.33 nodes) and averages over the F1 hybrid mean (12.54 nodes).In pooled, days to first harvest ranged from 59.39 to 67.79 days for parents and 57.71 to 67.81 days for hybrids. Parent Narendra Agrim (59.39 days) found earliest for days to first harvest among the parents which was followed by Narendra Amrit (63.92), NDPK-12-1 (64.28), NDPK-76-1 (65.35 days) and Narendra Upkar (66.44 days). The best F1 hybrid for days to first harvest was Narendra Agrim×NDPK-12-1 (57.71 days) followed by Narendra Agrim×NDPK-17-12-1 (58.68 days), NDPK-12-1×NDPK-17-12-1 (59.05 days), Narendra Agrim×Narendra Amrit (61.03 days) and Narendra Agrim×NDPK-13-1 (61.85 days). Averages over the parental mean (65.21 days) and averages over the F1 hybrid mean (64.84 days). A perusal of Table 2 revealed that In pooled, vine length (m) ranged from 3.45 to 4.15 (m) for parents and 3.68 to 4.79 (m) for hybrids. Parent Narendra Upkar (4.15 m) found maximum for vine length among the parents which was followed by NDPK-76-1 (4.12 m), NDPK-13-1 (4.11m), NDPK-12-1 (3.96 m) and NDPK-17-12-1 (3.80 m). The best F1 hybrid for vine length (m) was Narendra Agrim×NDPK-17-12-1 (4.79 m) followed by NDPK-12-1×NDPK-17-12-1 (4.71 m),

Narendra Agrim×NDPK-12-1 (4.63 m), NDPK-76-1×NDPK-13-1 (4.55 m) and Narendra Amrit×NDPK-76-1 (4.52 m). Averages over the parental mean (3.87 m) and averages over the F1 hybrid mean (4.26 m).In pooled, number of primary branches per plant ranged from 5.50 to 7.26 for parents and 5.54 to 8.71 for hybrids. Parent NDPK-12-1 (7.26 branches) found highest primary branches per plant among the parents which was followed by NDPK-13-1 (7.23 branches), NDPK-17-12-1 (7.21branches), Narendra Agrim (7.13) and NDPK-76-1 (6.99 branches). The best F1 hybrid for number primary branches per plant was Narendra Agrim×NDPK-12-1 (8.71 branches) followed by Narendra Agrim×NDPK-17-12-1 (8.61 branches), Narendra Agrim×NDPK-76-1 (8.28 branches), NDPK-12-1×NDPK-17-12-1 (8.21 branches) and Narendra Agrim×Narendra Amrit (7.74 branches). Averages over the parental mean (6.81 branches) and averages over the F1 hybrid mean (6.99 branches). In pooled, number of nodes per plant ranged from 45.51 to 52.71 for parents and 43.90 to 55.87 for hybrids. Parent NDPK-17-12-1 (52.71 nodes) found highest nodes per plant among the parents which was followed by NDPK-12-1 (51.58 nodes), Narendra Upkar (49.47 nodes), NDPK-76-1(48.26) and NDPK-13-1 (48.20 nodes). The best F1 hybrid for number of nodes per plant was Narendra Agrim×NDPK-12-1 (55.87 nodes) followed by NDPK-12-1×NDPK-17-12-1 (55.81 nodes), NDPK-13-1×NDPK-17-12-1 (55.80 nodes), Narendra Agrim×NDPK-17-12-1 (55.53 nodes) and Narendra Upkar×NDPK-73-1 (54.84 nodes). Averages over the parental mean (48.75 nodes) and averages over the F1 hybrid mean (50.37 nodes).In pooled, internodal lenght (cm) ranged from 6.92 to 8.25 (cm) for parents and 6.63 to 9.27 (cm) for hybrids. Parent NDPK-76-1 (8.25 cm) found maximum internodal lenght (cm) among the parents which was followed by NDPK-73-1 (8.15 cm), NDPK-12-1 (8.02 cm), Narendra Amrit (7.61 cm) and Narendra Upkar (7.58 cm). The best F1 hybrid for internodal lenght was NDPK-73-1×NDPK-76-1 (9.27 cm) followed by NDPK-76-1×NDPK-12-1 (8.59), Narendra Upkar×NDPK-73-1 (8.46 cm), Narendra Amrit×NDPK-73-1 (8.39 cm) and Narendra Amrit×NDPK-76-1 (8.28 cm). Averages over the parental mean (7.67 cm) and averages over the F1 hybrid mean (7.83 cm).In pooled, polar circumference (cm) ranged from 44.11 to 55.10 (cm) for parents and 45.12 to 57.03 (cm) for hybrids. Parent Narendra Upkar (55.10 cm) found maximum polar circumference (cm) among the parents which was followed by Narendra Amrit (52.21 cm), NDPK-73-1 (49.83 cm), NDPK-12-1 (48.22 cm) and NDPK-76-1 (47.08 cm). The best F1 hybrid for polar circumference was Narendra Amrit×Narendra Upkar (57.03 cm) followed by Narendra Upkar×NDPK-73-1 (53.08 cm), Narendra Upkar×NDPK-12-1 (53.05 cm), Narendra Amrit×NDPK-12-1 (52.38 cm) and Narendra Upkar×NDPK-76-1 (52.84 cm). Averages over the parental mean (48.35 cm) and averages over the F1 hybrid mean (49.46 cm). A perusal of Table 3 revealed that In pooled, Equatorial circumference of fruit (cm) ranged from 51.35 to 62.54 for parents and 54.51to 64.64 for hybrids. Narendra Agrim (62.54 cm) found maximum for equatorial circumference of fruit (cm) among the parents which was followed by Narendra Amrit (62.50), NDPK-76-1 (61.66), Narendra Upkar (61.65) and NDPK-73-1(60.41). The best F1 hybrids for equatorial circumference of fruit (cm) was Narendra Amrit×NDPK-17-12-1 (64.64cm) followed by NDPK-12-1×NDPK-17-12-1 (64.56cm), Narendra Agrim×NDPK-12-1(63.90cm), Narendra Amrit×NDPK-17-12-1 (63.78cm) and Narendra Upkar×NDPK-17-12-1 (63.54cm). Averages over the parental mean (59.37cm) and averages over the F1 hybrid mean (60.73cm).In pooled, average fruit weight (kg) at varied from 1.34 to 2.13(kg) for parents and 1.54 to 2.96 (kg) for hybrids. The parent Narendra Upkar (2.13 kg) produced heaviest average fruit weight among the parents which was followed by NDPK-12-1 (1.93kg), NDPK-76-1 (1.91kg), NDPK-17-12-1(1.87kg) and Narendra Amrit (1.78kg). Among the hybrids in Y1, the highest average fruit weight was exhibited by Narendra Agrim×NDPK-17-12-1(2.96 kg) followed by NDPK-12-1×NDPK-17-12-1 (2.92 kg), Narendra Amrit×Narendra Upkar (2.65 kg), Narendra Upkar×NDPK-12-1 (2.50) and Narendra Upkar×NDPK-76-1 (2.38 kg) in descending order. Averages over the parental mean (1.76 kg) and averages over the F1 hybrid mean (2.05 kg).In pooled, number of fruits per plant varied from 3.00 to 3.8 fruits for parents and 3.06 to 4.91 fruits for hybrids. The parent NDPK-76-1 (3.8 fruit) produced maximum number of fruits per plant among the parents which was followed by NDPK-12-1 (3.75 fruit), NDPK-73-1 (3.35fruits), NDPK-17-12-1 (3.27 fruits) and NDPK-13-1 (3.23fruits). Among the hybrids, the maximum number of fruits was exhibited by NDPK-12-1×NDPK-17-12-1 (4.91 fruits) followed by Narendra Agrim×NDPK-12-1 (4.63 fruits), Narendra Agrim×NDPK-17-12-1 (4.57 fruits), NDPK-76-1×NDPK-13-1 (4.49 fruit) and Narendra Amrit×NDPK-17-12-1 (4.46 fruit) in descending order. Averages over the parental mean (3.34 fruits per plant) and averages over the F1 hybrid mean (3.97 fruits per plant). In pooled, the fruit yield per plant (kg) varied from 5.00 to 8.35 kg for parents and 5.30 to 14.34 kg fruit for hybrids. The parent Narendra Upkar (8.35 kg) exhibited highest fruit yield per plant followed by Narendra Agrim (7.69 kg), NDPK-76-1 (7.68 kg), NDPK-12-1 (7.68 kg) and NDPK-12-1 (6.69 kg). Among the hybrids, the highest fruit yield per plant exhibited by NDPK-12-1×NDPK-17-12-1 (14.34 kg) followed by Narendra Agrim×NDPK-17-12-1 (13.53 kg), Narendra Amrit×Narendra Upkar (10.42), Narendra Agrim×NDPK-12-1 (10.40kg) and Narendra Upkar×NDPK-76-1 (9.64 kg) in descending order. Averages over the parental mean (5.64 kg) and averages over the F1 hybrid mean (8.29 kg).

Table 1: Mean performance of parental lines and F_1 hybrids including range and coefficient of variation for fourteen characters of diallel set of 28 F1's and their 8 parents in pumpkin during over season pooled.

Sr. No	Genotypes	Days to first male flower anthesis	Days to first female flower anthesis	Node number to first male flower appearance	Node number to first female flower appearance	Days to first fruit harvest
1	Narendra Agrim	39.35	44.16	4.27	8.43	59.39
2	Narendra Amrit	44.14	46.79	5.13	12.01	63.92
3	Narendra Upkar	44.22	48.08	7.10	12.75	66.44
4	NDPK-73-1	44.51	47.22	5.99	11.28	67.79
5	NDPK-76-1	44.51	49.28	5.89	12.80	65.35
6	NDPK-12-1	39.87	44.55	4.71	9.99	64.28
7	NDPK-13-1	43.00	46.41	5.86	12.40	67.55
8	NDPK-17-12-1	39.15	44.93	4.95	10.95	66.97
	Parental Mean	42.82	46.51	5.44	11.23	63.96
	Min	38.90	44.15	4.22	8.41	59.22
	Max	45.82	49.42	7.41	12.81	66.78
9	Narendra Agrim×Narendra Amrit	41.38	42.77	5.45	12.14	61.03
10	Narendra Agrim×Narendra Upkar	43.19	44.37	6.50	13.85	65.08
11	Narendra Agrim×NDPK-73-1	42.88	44.63	5.97	10.99	62.89
12	Narendra Agrim×NDPK-76-1	42.57	44.71	5.49	11.72	63.52
13	Narendra Agrim×NDPK-12-1	38.92	43.17	4.04	8.24	57.71
14	Narendra Agrim×NDPK-13-1	41.75	44.40	5.31	12.99	61.85
15	Narendra Agrim×NDPK-17-12-1	38.42	43.21	4.08	8.08	58.68
16	Narendra Amrit×Narendra Upkar	40.38	47.65	8.26	14.21	67.56
17	Narendra Amrit×NDPK-73-1	42.06	46.17	5.97	12.91	64.24
18	Narendra Amrit×NDPK-76-1	41.81	45.85	7.50	13.39	65.13
19	Narendra Amrit×NDPK-12-1	42.55	46.96	6.82	13.33	67.66
20	Narendra Amrit×NDPK-13-1	43.34	46.29	7.22	13.16	66.38
21	Narendra Amrit×NDPK-17-12-1	43.93	45.48	5.49	12.95	67.81
22	Narendra Upkar×NDPK-73-1	42.19	46.56	7.32	14.33	67.64
23	Narendra Upkar×NDPK-76-1	43.53	47.28	7.05	14.12	67.55
24	Narendra Upkar×NDPK-12-1	41.81	46.45	7.45	13.96	67.77
25	Narendra Upkar×NDPK-13-1	42.46	46.66	8.44	14.00	66.01
26	Narendra Upkar×NDPK-17-12-1	43.99	47.19	7.21	14.51	65.29
27	NDPK-73-1×NDPK-76-1	43.42	47.15	6.38	12.83	66.14
28	NDPK-73-1×NDPK-12-1	41.47	47.51	5.62	10.97	66.45
29	NDPK-73-1×NDPK-13-1	43.27	45.60	6.40	12.85	67.74
30	NDPK-73-1×NDPK-17-12-1	41.64	47.66	5.16	11.84	65.17
31	NDPK-76-1×P6 NDPK-12-1	42.82	47.29	5.79	12.62	67.44
32	NDPK-76-1×NDPK-13-1	44.04	42.99	6.28	13.54	64.90
33	NDPK-76-1×NDPK-17-12-1	43.59	49.62	5.49	13.09	65.62
34	NDPK-12-1×NDPK-13-1	41.88	47.55	5.70	13.98	64.64
35	NDPK-12-1×NDPK-17-12-1	38.20	41.98	4.05	8.05	59.05
36	NDPK-13-1×NDPK-17-12-1	43.65	48.51	4.98	12.62	64.56
	F1 Hybrid mean	42.18	45.92	6.12	12.54	64.84
	Min	38.15	41.71	4.04	8.04	58.16
	Max	44.90	49.10	8.01	14.49	68.15
	Grand Mean	42.36	46.20	6.04	12.13	64.82
	C.V.	5.74	5.82	4.60	4.15	6.57

Table 2: Revealed that in pooled, vine length (m) ranged from 3.45 to 4.15 (m) for parents and 3.68 to 4.79 (m) for hybrids

Sr. No	Genotypes	Vine length (m)	Number of primary branches per plant	Number of nodes per plant	Internodal length (cm)	Polar circumference of fruit (cm)
1	Narendra Agrim	3.55	7.13	45.51	7.48	44.17
2	Narendra Amrit	3.45	6.74	47.94	7.61	52.21
3	Narendra Upkar	4.15	5.50	49.47	7.58	55.10
4	NDPK-73-1	3.80	6.44	46.29	8.15	49.83
5	NDPK-76-1	4.12	6.99	48.26	8.25	47.08
6	NDPK-12-1	3.96	7.26	51.58	8.02	48.22
7	NDPK-13-1	4.11	7.23	48.20	6.92	44.11
8	NDPK-17-12-1	3.80	7.21	52.71	7.36	46.05
	Parental Mean	3.75	6.84	50.34	7.72	47.70
	Min	3.25	5.61	45.43	6.75	44.10
	Max	4.35	7.21	53.47	8.21	51.64
9	Narendra Agrim×Narendra Amrit	3.72	7.74	46.78	8.24	50.05
10	Narendra Agrim×Narendra Upkar	4.48	6.87	46.44	8.27	51.91
11	Narendra Agrim×NDPK-73-1	3.68	7.29	46.97	8.16	48.12
12	Narendra Agrim×NDPK-76-1	4.12	8.28	43.90	7.77	46.84
13	Narendra Agrim×NDPK-12-1	4.63	8.71	55.87	7.37	48.05
14	Narendra Agrim×NDPK-13-1	3.92	7.10	44.70	7.41	45.12
15	Narendra Agrim×NDPK-17-12-1	4.79	8.61	55.53	7.14	48.07
16	Narendra Amrit×Narendra Upkar	4.28	6.57	47.30	8.26	57.03
17	Narendra Amrit×NDPK-73-1	4.33	5.70	50.61	8.39	52.17
18	Narendra Amrit×NDPK-76-1	4.52	7.51	47.99	8.28	52.36
19	Narendra Amrit×NDPK-12-1	4.06	7.12	51.01	7.95	52.98
20	Narendra Amrit×NDPK-13-1	4.39	7.12	52.71	7.29	50.78
21	Narendra Amrit×NDPK-17-12-1	4.34	6.57	54.77	7.60	51.22
22	Narendra Upkar×NDPK-73-1	3.90	5.54	54.84	8.46	53.08
23	Narendra Upkar×NDPK-76-1	4.49	6.70	46.77	7.70	52.84
24	Narendra Upkar×NDPK-12-1	4.45	6.16	47.50	7.27	53.05
25	Narendra Upkar×NDPK-13-1	4.13	6.39	53.83	7.33	51.21
26	Narendra Upkar×NDPK-17-12-1	3.95	5.69	52.03	7.31	50.23
27	NDPK-73-1×NDPK-76-1	4.27	7.05	45.41	9.27	47.84
28	NDPK-73-1×NDPK-12-1	4.05	6.45	48.00	8.23	48.18
29	NDPK-73-1×NDPK-13-1	4.07	6.44	49.59	8.05	46.83
30	NDPK-73-1×NDPK-17-12-1	3.95	6.07	49.60	7.32	46.88
31	NDPK-76-1×P6 NDPK-12-1	4.44	7.71	49.34	8.59	47.18
32	NDPK-76-1×NDPK-13-1	4.55	7.45	52.97	8.05	45.95
33	NDPK-76-1×NDPK-17-12-1	4.32	7.26	50.55	8.10	46.22
34	NDPK-12-1×NDPK-13-1	4.50	7.05	53.64	7.64	46.62
35	NDPK-12-1×NDPK-17-12-1	4.71	8.21	55.81	7.20	48.16
36	NDPK-13-1×NDPK-17-12-1	4.39	6.44	55.80	6.63	46.06
	F1 Hybrid mean	4.17	6.98	50.64	7.73	49.89
	Min	3.58	5.49	43.90	6.29	45.67
	Max	4.68	8.66	55.82	9.22	57.01
	Grand Mean	4.14	6.90	49.91	7.81	49.31
	C.V.	5.38	5.61	4.87	4.00	6.88

Table 3: Revealed that in pooled, Equatorial circumference of fruit (cm) ranged from 51.35 to 62.54 for parents and 54.51to 64.64 for hybrids

Sr. No	Genotypes	Equatorial circumference of fruit (cm)	Average fruit weight (kg)	Number of fruit per plant	Fruit yield per plant (kg)
1	Narendra Agrim	51.35	1.74	3.17	7.69
2	Narendra Amrit	62.50	1.78	3.00	6.46
3	Narendra Upkar	61.65	2.13	3.13	8.35
4	NDPK-73-1	60.41	1.38	3.35	5.00
5	NDPK-76-1	59.65	1.91	3.82	7.68
6	NDPK-12-1	61.66	1.93	3.75	6.69
7	NDPK-13-1	55.23	1.34	3.23	5.80
8	NDPK-17-12-1	62.54	1.87	3.27	7.68
	Parental Mean	59.14	1.69	3.19	6.75
	Min	53.80	1.25	2.99	4.90
	Max	62.02	1.92	3.33	8.05
9	Narendra Agrim×Narendra Amrit	56.17	1.93	3.87	7.42
10	Narendra Agrim×Narendra Upkar	56.60	2.30	4.11	9.45
11	Narendra Agrim×NDPK-73-1	54.91	1.54	3.81	5.54
12	Narendra Agrim×NDPK-76-1	54.73	1.88	4.05	7.61
13	Narendra Agrim×NDPK-12-1	63.90	2.25	4.63	10.40
14	Narendra Agrim×NDPK-13-1	54.51	1.67	4.06	6.79
15	Narendra Agrim×NDPK-17-12-1	63.78	2.96	4.57	13.53
16	Narendra Amrit×Narendra Upkar	62.72	2.65	3.94	10.42
17	Narendra Amrit×NDPK-73-1	61.89	1.96	3.96	7.76
18	Narendra Amrit×NDPK-76-1	61.63	2.16	4.16	9.00
19	Narendra Amrit×NDPK-12-1	63.45	2.00	4.07	8.16
20	Narendra Amrit×NDPK-13-1	61.34	1.74	4.27	7.41
21	Narendra Amrit×NDPK-17-12-1	64.64	1.99	4.46	8.87
22	Narendra Upkar×NDPK-73-1	61.75	2.12	4.27	9.05
23	Narendra Upkar×NDPK-76-1	60.18	2.38	4.05	9.64
24	Narendra Upkar×NDPK-12-1	62.15	2.50	3.38	8.44
25	Narendra Upkar×NDPK-13-1	60.66	2.08	3.52	7.37
26	Narendra Upkar×NDPK-17-12-1	63.54	2.33	3.97	9.24
27	NDPK-73-1×NDPK-76-1	61.05	1.62	4.17	6.75
28	NDPK-73-1×NDPK-12-1	62.06	1.74	3.06	5.30
29	NDPK-73-1×NDPK-13-1	59.54	1.65	3.23	5.33
30	NDPK-73-1×NDPK-17-12-1	62.19	1.82	3.37	6.14
31	NDPK-76-1×P6 NDPK-12-1	60.41	1.94	4.27	8.44
32	NDPK-76-1×NDPK-13-1	58.77	1.73	4.49	7.75
33	NDPK-76-1×NDPK-17-12-1	61.18	1.89	3.56	6.70
34	NDPK-12-1×NDPK-13-1	60.84	1.73	3.33	6.93
35	NDPK-12-1×NDPK-17-12-1	64.56	2.92	4.91	14.34
36	NDPK-13-1×NDPK-17-12-1	61.36	1.83	3.61	8.45
	F1 Hybrid mean	60.73	2.05	3.97	8.10
	Min	55.34	1.52	3.01	4.83
	Max	64.54	2.95	4.83	13.95
	Grand Mean	60.11	1.98	3.80	7.92
	C.V.	5.53	6.07	5.41	5.71

Conclusion

Based on performance, The parent Narendra Upkar (8.35 kg) exhibited highest fruit yield per plant followed by Narendra Agrim (7.69 kg), NDPK-76-1 (7.68 kg), NDPK-12-1 (7.68 kg) and NDPK-12-1 (6.69 kg). Among the hybrids, the highest fruit yield per plant exhibited by NDPK-12-1×NDPK-17-12-1 (14.34 kg) followed by Narendra Agrim×NDPK-17-12-1 (13.53 kg), Narendra Amrit×Narendra Upkar (10.42), Narendra Agrim×NDPK-12-1 (10.40kg) and Narendra Upkar×NDPK-76-1 (9.64 kg) in descending order. After selection, these hybrids could be used as a new variety and put through multi-locational trials before being released for commercial cultivation.

Future scope

The results validate the subsequent recommendations for further investigation: These studies should be repeated in the next two to three years to confirm the results. These cultivars can be evaluated at different sowing dates depending on the agroclimatic conditions in the area. Other types can be utilized in subsequent experiments.

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