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EXPLORING THE POTENTIAL OF OKRA GENOTYPES UNDER WALK-IN TUNNEL GREENHOUSE IN COLD ARID ENVIRONMENT

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ABSTRACT

Growing warm-season vegetable crops like okra (*Abelmoschus esculentus* L. Moench) in the cold arid environment of Ladakh is traditionally challenging due to short growing seasons, low temperatures and harsh climatic conditions. However, greenhouse offers new opportunities for crop diversification and nutritional security in these high-altitude ecosystems. This study aimed to evaluate the growth, yield and adaptability of various okra genotypes under walk-in tunnel greenhouse in the cold arid environment of Ladakh to identify suitable high-yielding cultivars for the farming community. An experiment was conducted with forty-one diverse okra genotypes using a Randomized Block Design (RBD) with two replications. The results were compared against the standard check variety (P-8). Significant genetic variability was observed among the genotypes for almost all growth and yield-attributing traits. Genotype OC-55 recorded the highest yield, outperforming the standard check by approximately 190%. The exceptional productivity of OC-55 was driven by a superior number of fruits per plant and higher average fruit weight. OC-57 and Arka Anamika also demonstrated outstanding adaptability, fruit retention, and overall yield under the protected environment. The use of walk-in tunnel greenhouses effectively mitigates the environmental constraints of the Trans-Himalayan region, making okra cultivation highly viable. Genotypes OC-55, OC-57 and Arka Anamika exhibit superior genetic potential and adaptability, making them elite candidates for commercial cultivation and future crop improvement programs in the cold arid regions of Ladakh.
Keywords: Okra, cold arids, greenhouse, genotype evaluation, yield attributes

Introduction

Okra (*Abelmoschus esculentus* L. Moench), commonly known as lady's finger or bhindi, is one of the most important vegetable crops cultivated in tropical and subtropical regions of the world. It belongs to the family Malvaceae and is believed to have originated in Africa before spreading to Asia and other parts of the globe. The crop is highly valued for its tender immature fruits, which are consumed as a vegetable and constitute an important component of human nutrition. Okra pods are rich in carbohydrates, proteins, dietary fibre, vitamins A, B-complex and C, and minerals such as calcium, potassium, phosphorus, magnesium and iron. In addition to its nutritional value, okra possesses medicinal properties owing to the presence of bioactive compounds, antioxidants, flavonoids and mucilage that contribute to human health and disease prevention (Gemede *et al*., 2015; Petropoulos *et al*., 2018). Globally, okra is cultivated over a wide range of agro-climatic conditions and plays a significant role in vegetable production systems, particularly in developing countries. India is the largest producer of okra, contributing more than 70 per cent of global production (Mangena et.al., 2026). The crop occupies a significant position among vegetable crops due to its productivity, short duration, wide adaptability and continuous market demand. Furthermore, the increasing awareness regarding nutritional security and diversification of vegetable-based farming systems has enhanced the importance of okra cultivation in both peri-urban and rural areas

(FAOSTAT, 2024). Despite its wider adaptability, okra is essentially a warm-season crop that thrives under temperatures ranging from 24 to 35°C. Seed germination, vegetative growth, flowering and fruit development are influenced by environmental conditions, particularly temperature. Exposure to low temperatures during early growth stages adversely affects germination and seedling establishment, while cooler conditions during flowering may impair pollen viability, fruit set and pod development. Consequently, cultivation of okra in high-altitude cold arid regions remains a challenge due to the prevalence of low temperatures, short growing seasons and harsh climatic conditions (Maseko *et al*., 2025).

The cold arid region of Ladakh, situated in the trans-Himalayan zone of northern India, is characterized by unique environmental conditions including high altitude (2,800–4,500 m above mean sea level), low atmospheric pressure, intense solar radiation, limited precipitation, low relative humidity and large fluctuations between day and night temperatures. Agricultural production in this region is constrained by a short growing period, poor soil fertility and scarcity of irrigation water. Traditionally, vegetable cultivation in Ladakh has been limited to cool-season crops such as cabbage, cauliflower, turnip, carrot and leafy vegetables. However, with increasing demand for fresh vegetables, changing dietary patterns and the expansion of tourism, research efforts are directed in introducing and evaluating high-value vegetable crops that can diversify existing production systems and improve farm incomes. Vegetable diversification from traditional vegetables can be taken up to meet the demands in a sustainable manner (Kanwar and Spaldon, 2022). In recent years, climate variability and advancements in agricultural technologies especially greenhouse technologies have created opportunities for cultivating warm-season vegetables in high-altitude ecosystems. Nevertheless, successful introduction of such crops requires identification of genotypes capable of tolerating environmental stresses associated with cold arid conditions. Genotypic differences in growth, flowering behaviour, physiological responses and yield performance have been widely reported in okra. Considerable genetic variability exists among varieties and hybrids with respect to earliness, plant vigour, fruit characteristics, yield potential and adaptation to abiotic stresses. This variability provides a valuable resource for selecting cultivars suited to specific agro-climatic conditions (Mkhabela *et al*., 2022).

Varietal evaluation is a crucial component of crop improvement and technology development programmes. Testing varieties under target environments enables researchers to identify stable and high-performing genotypes, understand genotype × environment interactions and recommend suitable cultivars for commercial cultivation. Previous studies conducted in different agro-ecological regions have revealed significant differences among okra varieties in terms of plant height, number of branches, flowering duration, fruit yield and quality attributes. However, information regarding the performance of okra varieties under the cold arid conditions of Ladakh is extremely limited. Since environmental conditions prevailing in the region differ substantially from those of conventional okra-growing areas, varietal performance observed elsewhere may not necessarily be replicated under trans-Himalayan conditions. Exploring the potential and identification of suitable okra varieties for cold arid regions could contribute significantly to enhancing vegetable production, nutritional security and livelihood opportunities for local farmers. Moreover, the availability of adapted varieties would facilitate crop diversification, reduce dependence on imported vegetables during the growing season and improve the sustainability of agricultural systems in high-altitude ecosystems. Therefore, systematic evaluation of available varieties and collected genotypes under local conditions is essential for identifying genotypes with superior growth, yield and adaptability. In view of the above considerations, the present investigation was undertaken to explore the potential of different okra genotypes in walk in tunnel greenhouse under the cold arid conditions of Ladakh and to identify suitable genotype for sustainable cultivation in the region.

Materials and Methods

Experimental site

The experiment was conducted during the summer growing season of 2021 in the experimental farm of the Precision Farming Development Centre (PFDC), School of Agricultural Sciences and Technology, University of Ladakh, Leh, India. The experimental site is situated in the cold arid region of the Trans-Himalayas at an altitude of approximately 3319 m above mean sea level. The region is characterized by low precipitation, high solar radiation, low relative humidity, and large diurnal temperature fluctuations.

Weather parameters

Figure 1 illustrates the monthly variation in air temperature and relative humidity during the experimental period under open-field conditions. The maximum air temperature increased progressively from 10.21°C in March to a peak of 26.43°C in July, before declining to 15.19°C in October. Similarly, the minimum temperature rose from –5.46°C in March to 10.92°C in July and subsequently decreased to –1.56°C in October, indicating a distinct warming trend from spring to midsummer followed by gradual cooling towards autumn. Relative humidity remained comparatively low during March–May and increased during the warmer months, reaching its highest levels in July and August.

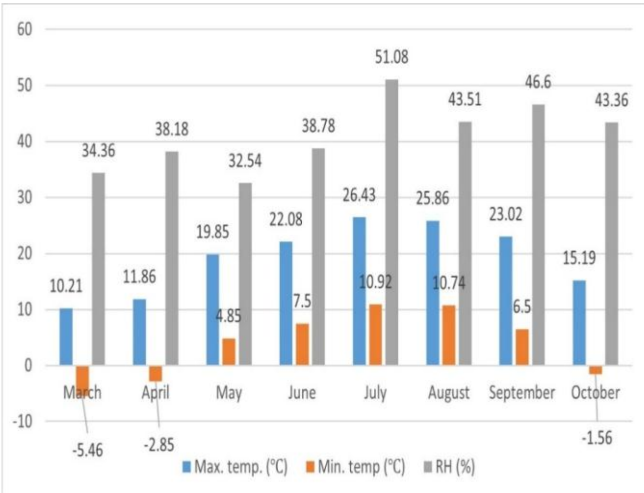

Fig. 1 : Weather parameter of experimental period

Although these meteorological data represent ambient open-field conditions, the walk-in tunnel greenhouse environment consistently maintained a more favourable microclimate, with temperatures averaging approximately 8-10°C higher (both maximum and minimum) and relative humidity about 10-12% higher than the outside environment. These modified conditions likely promoted improved crop growth and productivity by reducing exposure to low-temperature stress during the growing season.

Experimental material

A total of forty-one okra (*Abelmoschus esculentus* L. Moench) genotypes were evaluated for their growth, yield, and yield-attributing traits under protected cultivation. The genotypes comprised diverse germplasm lines collected from different sources to identify suitable cultivars for cultivation under cold arid conditions. The experiment was laid out in a Randomized Block Design (RBD) with two replications. Each genotype was randomly allocated within each replication. The crop was grown inside a walk-in tunnel structure (Size: 10m x4 m) to provide a favourable microclimate for growth and development.

Observations recorded

Seeds were sown directly at a distance of 30x15 cm inside the walk-in tunnel. Recommended agronomic and crop management practices were uniformly followed throughout the experimental period. Drip Irrigation was adopted. One weeding operation and organic nutrient management was followed as required to maintain healthy crop growth. Observations were recorded on five randomly selected plants from each experimental plot and averaged for statistical analysis. Data were collected on growth parameters such as plant height (cm), number of branches per plant, stem diameter (mm), and days to first flowering. Yield attributes including fruit length (cm), fruit diameter (cm), average fruit weight (g), number of fruits per plant, and fruit yield per plant (g) were recorded. Total yield was computed and expressed as quintal per hectare.

Statistical analysis

The recorded data were subjected to analysis of variance (ANOVA) as described by Gomez and Gomez (1984). The significance of treatment effects was tested at the 5% level of probability. Mean comparisons among genotypes were performed using the Critical Difference (CD) test wherever the treatment effects were found significant.

Results and Discussion

The evaluation of 41 okra genotypes under protected cultivation in the cold arid region revealed substantial variability for growth, yield, and fruit attributes (Table 1). Such variability is essential for the identification of superior genotypes and provides opportunities for selection and crop improvement. The significant differences observed for most of the traits indicate the existence of exploitable genetic variation among the evaluated germplasm. Similar observations of wide genetic variability in okra have been reported by Melaku *et al*. (2020); Temam *et al*. (2021); Mohammed *et al*. (2022); Parkash *et al*. (2022); Noopur *et al*. (2023) emphasizing the importance of genotype evaluation under specific agro-climatic conditions.

Plant Height

Plant height varied significantly among genotypes, ranging from 28.50 cm (OC-3) to 223.70 cm (Arka Anamika). Among the experimental lines, OC-55 (199.50 cm), OC-61 (172.50 cm), OC-60 (158.75 cm), OC-37 (152.25 cm), OC-13 (151.25 cm), and OC-7 (151.25 cm) exhibited vigorous vegetative growth. Taller plants under protected conditions may result from favourable microclimatic conditions, including enhanced temperature regulation, reduced wind stress, and improved soil moisture availability. The vigorous growth observed in these genotypes may also indicate greater photosynthetic surface area and assimilate production, which can subsequently contribute to reproductive development. Protected structures generally create a more favourable environment for crop growth by moderating extreme temperatures and reducing environmental stresses. According to Jha *et al*. (2018), controlled environmental conditions enhance vegetative growth in okra by maintaining optimal temperature and humidity levels. Similar genotypic differences for plant height were reported by Prakash *et al*. (2017); Ashraf *et al*. (2020); Manjunatha *et al*. (2025) who attributed such variation primarily to genetic constitution and differential adaptation of genotypes.

Days to First Harvest

Days to first harvest ranged from 95.0 days in OC-28, OC-32, and OC-59 to 126.5 days in Kashi Kirti. However, the differences were statistically non-significant, indicating that most genotypes responded similarly to the prevailing environmental conditions. Early harvesting genotypes are generally desirable under short growing seasons of cold arid regions because they permit quicker returns and reduce exposure to terminal low temperatures. The comparatively earlier maturity of OC-28, OC-32, and OC-59 may be attributed to their genetic predisposition for rapid flowering and fruit development. Variation for earliness in okra have been reported by Prasad *et al*. (2016). The lower temperatures experienced during the early crop growth period (April–May) may have slowed vegetative growth and reproductive development, thereby extending the time required to reach the first harvest in the genotypes. Earliness is often considered a valuable trait in breeding programmes targeting high-altitude and short-season production systems.

Number of Harvests and Harvest Duration

The number of harvests differed significantly among genotypes, ranging from 10.0 in OC-2 and OC-42 to 25.5 in OC-8. Commercial varieties Arka Anamika, Arka Nikitha, and Pusa Sawani also recorded higher harvest frequencies. Genotypes with a higher number of harvests generally maintained fruiting over a longer period and demonstrated continuous flowering and fruit setting. Harvest duration ranged from 81.0 days in OC-42 to 126.0 days in OC-28, OC-32, and OC-59; however, differences were statistically non-significant. Though statistically non-significant, longer harvest duration is agronomically advantageous because it allows sustained production and market supply over an extended period. Continuous fruit production under greenhouses may be attributed to reduced abiotic stress and favourable temperature regimes. Protected cultivation extends the productive phase of vegetable crops and enables to cultivate okra in Himalayan regions (Akbar *et al*., 2013; Kanwar and Akbar, 2019).

Fruits per Plant

The number of fruits per plant is one of the most important yield-contributing traits in okra. Significant differences were observed among the genotypes, with values ranging from 8.42 fruits per plant in OC-42 to 24.04 fruits per plant in OC-55. High fruit numbers were also recorded in OC-57 (23.92), Arka Anamika (23.94), OC-60 (19.75), OC-61 (19.37), Pusa Sawani (19.34), and OC-53 (19.13). The superior fruit production in these genotypes may be attributed to enhanced flower retention, reduced flower drop, and efficient partitioning of assimilates toward reproductive structures. Fruits per plant is often positively correlated with overall yield and is considered a reliable selection criterion in okra breeding programmes. Similar findings have been reported by Balai *et al*. (2015); and Verma and Sood (2015), who identified fruit number as a major determinant of yield.

Yield

Yield is the ultimate expression of the interaction between genetic potential and environmental conditions. Significant variation was observed among the genotypes for both yield per plant and yield per hectare. Yield per plant ranged from 69.17 g in OC-42 to 322.38 g in OC-55, while yield per hectare varied from 153.70 q ha^{-1} to 716.39 q ha^{-1}. The highest yield was recorded in OC-55 (716.39 q ha^{-1}), followed by OC-57 (679.44 q ha^{-1}), Arka Anamika (522.56 q ha^{-1}), OC-61 (497.12 q ha^{-1}) and OC-60 (491.99 q ha^{-1}). The outstanding performance of OC-55 can be attributed to a favourable combination of higher fruit number (24.04 fruits $plant^{-1}$) and greater fruit weight (13.37 g). Similarly, OC-57 combined a high fruit count (23.92 fruits $plant^{-1}$) with substantial fruit weight (12.92 g), resulting in superior yield.

The significantly higher yields obtained under protected conditions compared to conventional open-field production may be due to enhanced temperature regulation, lower incidence of environmental stress, and prolonged harvesting periods. Protected cultivation has been reported to improve crop productivity through efficient resource utilization and better plant physiological performance (Kumar *et al*., 2024; Pachiyappan *et al*., 2022). Similar increases in okra yield under protected environments have been documented by Jha *et al*. (2018).

Fruit Weight

Fruit weight showed significant variation among the genotypes, ranging from 7.30 g in OC-26 to 13.37 g in OC-55. Higher fruit weights were also observed in OC-57 (12.92 g), OC-24 (12.31 g), OC-27 (12.13 g), OC-61 (11.61 g), and OC-60 (11.24 g). Fruit weight is influenced by both genetic factors and growing conditions. Under protected environments, consistent moisture availability and reduced physiological stress favour cell expansion and accumulation of assimilates in fruits. The positive association between fruit weight and yield observed in the present study is in agreement with reports by Balai *et al*. (2015), who identified fruit weight as a key component influencing total yield in okra.

Fruit Length and Fruit Diameter

Fruit length differed significantly among genotypes and ranged from 9.90 cm in OC-2 to 17.08 cm in OC-37. Other genotypes exhibiting longer fruits included Nemo (17.05 cm), Arka Anamika (17.00 cm), OC-55 (16.50 cm), and Ritu (16.45 cm). Fruit length is an important quality trait influencing consumer preference and market acceptability. Genetic and morphological variations in fruit size and shape are heavily linked to differences in cellular development and the regulation of endogenous hormones like auxin (Liu *et al*., 2020). Similar variability in fruit length among okra genotypes has been reported by Ashraf *et al*. (2020); Rajesh *et al*. (2018).

Fruit diameter ranged from 13.62 mm to 20.03 mm; however, differences among genotypes were non-significant. This suggests that fruit diameter was less influenced by genetic variation under the prevailing environmental conditions. Similar findings were reported by Prasad *et al*. 2016; Prakash *et al*. (2017), who observed limited variation in fruit girth among certain okra germplasm lines.

Number of Ridges per Fruit

The number of ridges per fruit varied significantly from 5.0 to 7.5. The highest values were recorded in OC-60 and OC-61 (7.5 ridges), followed by OC-8 (7.0 ridges). Ridge number is primarily a varietal characteristic and is often used as a descriptor in germplasm characterization. Variations in ridge number have been reported by Prasad *et al*. (2016) and the descriptors developed by the Bioversity International and are considered useful for distinguishing genotypes. The observed differences therefore reflect the diverse genetic background of the evaluated material.

Performance of Genotypes in Comparison to Check Variety P-8

The standard check P-8 recorded a plant height of 210.00 cm, 23 harvests, 12.19 fruits per plant, fruit weight of 9.11 g, yield per plant of 111.18 g and yield of 247.06 q ha^{-1} (Table 2). Several experimental genotypes surpassed the check variety for yield-contributing traits and overall productivity under greenhouse in the cold arid region. Genotype OC-55 emerged as the best performer with a significantly higher yield of 716.39 q ha^{-1}, which was approximately 190% higher than the check variety P-8. The superior yield of OC-55 was associated with a higher number of fruits per plant (24.04), greater fruit weight (13.37 g) and higher yield per plant (322.38 g) compared to P-8. Likewise, OC-57 produced 679.44 q ha^{-1} representing yield advantage of about 175% over the check. The enhanced productivity of these genotypes suggests their superior adaptation to the greenhouse environment under cold arid conditions. Genotypes OC-55, OC-57, Arka Anamika, OC-61 and OC-60 were found statistically superior to P-8. Genotype OC-55 (24.04), Arka Anamika (23.94), OC-57 (23.92), OC-60 (19.75), OC-61 (19.37) and Pusa Sawani (19.34) produced substantially more fruits than P-8 (12.19 fruits $plant^{-1}$). Similarly, fruit weight was higher in OC-55 (13.37 g), OC-57 (12.92 g), OC-24 (12.31 g) and OC-27 (12.13 g) compared to P-8 (9.11 g) contributing to enhanced yield.

Although P-8 exhibited greater plant height (210.00 cm) than most of the genotypes, plant height was not directly associated with higher yield. OC-55 produced significantly higher yield despite having a comparatively shorter plant stature (199.50 cm). This suggests that fruit number and fruit weight were more influential determinants of yield than vegetative growth under the protected environment. The superior performance of genotypes such as OC-55, OC-57, OC-60 and OC-61 over the check variety P-8 may be attributed to their better adaptation to the protected environment prevailing inside the walk-in tunnel. Protected cultivation moderates temperature fluctuations, reduces wind stress and provides a favourable microclimate that promotes vegetative growth, flowering and fruit development. Consequently, genotypes with superior genetic potential are able to express their yield attributes more effectively under such congenial conditions. The enhanced productivity of OC-55 was associated with a greater number of fruits per plant and higher fruit weight, indicating efficient assimilate partitioning towards economic yield. Similar conclusions were drawn by Kumar *et al*. (2015) who reported that fruit number and fruit weight are the principal components governing yield variation among okra genotypes. Likewise, Shravani *et al*. (2025) observed significant variability among 53 okra genotypes and identified superior genotypes with fruit yield per plant exceeding the check variety emphasizing the importance of genotype evaluation for identifying high-yielding material. The higher fruit yield obtained under protected cultivation can also be attributed to improved resource-use efficiency and reduced abiotic stress. Recent greenhouse studies have demonstrated that okra grown under controlled environments achieves substantially greater productivity than crops grown under open conditions due to favourable temperature and moisture regimes.

Based on overall performance, OC-55 emerged as the most promising genotype owing to its superior fruit number, fruit weight and yield followed by OC-57 and Arka Anamika, demonstrating their adaptability to greenhouse conditions in cold arid environments. The superior performance of OC-55, OC-57, OC-60, and OC-61 indicates their potential as elite breeding materials and candidate cultivars for protected cultivation in the cold arid regions of Ladakh. Their ability to maintain higher fruit production under a short growing season and low-temperature environment makes them valuable genetic resources for future varietal improvement programmes.

Table 1: Performance of okra genotypes under walk in tunnel greenhouse

Genotype	Characters										
	Plant height (cm)	**Days to first harvest**	**Number of harvests**	**Harvest duration (days)**	**Fruits per plant**	**Yield per plant (g)**	**Yield per ha (Q)**	**Fruit weight (g)**	**Fruit length (cm)**	**Fruit diameter (mm)**	**Number of ridge per fruit**
OC-2	113.500	109.000	10.000	105.000	8.750	72.250	160.555	8.595	9.900	14.695	5.000
OC-3	28.500	111.000	12.500	103.000	10.000	112.585	250.190	11.090	10.650	18.110	6.500
OC-7	151.250	100.000	17.000	114.000	11.500	100.335	222.970	8.765	14.950	20.030	5.500
OC-8	103.500	99.000	25.500	122.000	11.000	112.640	250.315	10.230	13.750	16.610	7.000
OC-13	151.250	100.000	23.000	121.000	12.800	113.980	253.290	8.805	11.400	15.980	5.000
OC-14	71.750	104.000	15.000	113.500	9.850	74.350	165.220	7.605	13.000	17.045	5.000
OC-15	137.250	112.500	22.000	105.000	11.155	89.045	197.880	7.985	11.400	13.620	5.500
OC-17	83.500	100.000	21.000	121.000	9.665	103.835	230.745	10.895	14.050	15.225	5.000
OC-20	94.000	100.000	13.000	110.500	9.250	86.375	191.945	9.365	11.500	15.920	5.000
OC-24	97.500	100.000	21.500	121.000	14.480	175.000	388.890	12.310	12.150	16.235	5.000
OC-25	89.750	100.000	19.500	121.000	11.875	105.500	234.440	9.010	10.650	16.760	6.000
OC-26	45.750	116.000	10.500	105.000	11.835	83.500	185.555	7.295	12.750	19.670	5.500
OC-27	88.000	104.000	19.500	117.000	11.335	135.000	300.000	12.125	11.075	18.325	6.000
OC-28	32.250	95.000	21.000	126.000	11.4000	93.115	206.925	8.275	10.000	14.130	6.500
OC-29	40.750	99.000	20.000	122.000	11.355	96.735	214.965	8.470	12.450	17.165	5.000
OC-32	97.000	95.000	19.000	126.000	10.745	80.855	179.680	7.320	12.175	15.355	6.500
OC-35	84.500	100.000	21.500	117.500	12.655	128.900	286.445	10.000	14.100	16.970	5.500
OC-37	152.250	99.000	20.000	118.500	8.430	85.380	189.730	10.240	17.075	16.555	6.000
OC-38	60.250	116.000	19.000	105.000	17.665	169.540	376.755	9.490	12.000	14.840	5.500
OC-42	85.250	100.000	10.000	81.000	8.415	69.165	153.700	8.210	12.450	15.725	6.000
OC-46	57.250	104.000	20.000	117.000	16.635	170.300	378.445	10.155	12.250	15.850	5.000
OC-48	112.750	99.000	20.000	122.000	13.730	122.855	273.010	9.025	13.250	17.250	6.000
OC-50	71.000	104.000	22.500	117.000	14.230	153.015	340.035	10.380	13.000	17.830	5.000
OC-53	90.250	109.000	18.000	108.500	19.125	176.125	391.390	9.365	15.600	17.650	5.000
OC-54	118.750	123.000	19.500	98.000	15.335	172.335	382.965	11.130	12.500	17.105	6.000
OC-55	199.500	111.000	20.500	106.500	24.040	322.375	716.385	13.365	16.500	16.155	6.000
OC-57	43.750	116.000	21.500	105.000	23.915	305.750	679.440	12.920	13.750	14.950	6.000
OC-59	77.750	95.000	19.000	126.000	17.200	188.300	418.445	10.890	11.350	19.460	6.000
OC-60	158.750	99.000	21.500	118.500	19.750	221.395	491.990	11.235	11.875	18.025	7.500
OC-61	172.500	110.500	19.000	107.000	19.365	223.700	497.115	11.605	12.450	15.550	7.500
SOR-1	175.250	104.000	17.000	99.500	10.585	106.020	235.600	10.070	14.775	14.050	5.000
Arka Anamika	223.700	99.000	25.000	122.000	23.940	235.150	522.555	9.830	17.000	19.280	6.000
Arka Nikitha	191.100	99.000	24.000	122.000	18.565	186.210	413.800	9.945	13.915	16.920	5.750
P-8	210.000	103.500	23.000	117.500	12.190	111.175	247.060	9.110	12.250	15.070	5.000
Pusa Sawani	175.200	99.000	24.000	122.000	19.335	177.450	394.335	9.335	11.500	15.925	5.000

Kashi Kirti	179.450	126.500	19.000	94.500	9.240	76.945	170.990	8.300	10.900	14.585	5.000
Kashi Pragti	106.200	111.000	22.000	110.000	12.140	105.570	234.600	8.695	10.600	15.515	5.500
Ananya-2001	121.200	104.000	22.000	117.000	13.770	130.000	288.885	9.430	12.850	15.760	5.000
Ritu	124.850	104.000	23.000	117.000	15.320	142.375	316.390	9.230	16.450	17.855	5.000
Diana	116.600	99.000	21.500	122.000	14.430	133.360	296.355	9.230	12.600	15.705	5.500
Nemo	114.950	109.000	22.500	112.000	14.710	131.670	292.600	8.960	17.050	15.955	5.500
CD (5%)	81.263	NS	7.151	NS	7.503	72.554	161.232	2.685	4.172	NS	1.223
SE (m)	28.327	6.817	2.493	10.612	2.615	25.291	56.202	0.936	1.454	1.248	0.426
SE (d)	40.060	9.640	3.525	15.008	3.699	35.767	79.482	1.324	2.056	1.766	0.603
CV	35.333	9.218	17.955	13.215	26.525	25.817	25.817	13.627	15.912	10.718	10.693

Table 2 : Performance of some elite genotypes over standard check

Genotype	Yield (q ha^{-1})	Increase over P-8 (%)
OC-55	716.39	189.96
OC-57	679.44	174.99
Arka Anamika	522.56	111.51
OC-61	497.12	101.21
OC-60	491.99	99.14
OC-59	418.45	69.37
Arka Nikitha	413.80	67.49
Pusa Sawani	394.34	59.61
OC-53	391.39	58.42
OC-24	388.89	57.41

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