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B Shravani

M.Sc. Scholar, Department of
Vegetable Science, College of
Horticulture, SKLTGHU, Mojerla,
Telangana, India

J Srinivas

Assistant Professor, Department of
Vegetable Science, College of
Horticulture, SKLTGHU, Mojerla,
Telangana, India

P Saidaiah

Associate Professor, Department of
Genetics and Plant Breeding,
College of Horticulture,
SKLTGHU, Mojerla, Telangana,
India

N Shivaraj

Principal Scientist ICAR-NPBG,
Department of Economic botany,
Rajendranagar, Hyderabad,
Telangana, India

Evaluation of genotypes for growth, yield and yield attributes in okra [*Abelmoschus esculentus* (L.) Moench]

B Shravani, J Srinivas, P Saidaiah and N Shivaraj

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Abstract

Fifty three okra accessions were evaluated in randomized block design with three replications in Department of Vegetable Science at College of Horticulture, Mojerla, Wanaparthy District, Telangana, India during summer season, 2024 and assessed for their performance of genotypes for twenty one parameters concerned with growth, yield and quality. The analysis of variance revealed that significant difference for twenty one characters studied suggesting a considerable amount of variability existing among the genotypes. Wide range of variability was observed for plant height, number of fruits per plant, number of nodes per plant and fruit yield per Plot, fruit yield per plant indicating the scope for selection of suitable initial breeding material for further improvement. Based on mean performance, 53 genotypes out of which the most superior ones were (EC329370 x Punjab Suhavani), (EC329370 x (EC329370 x Parbhani Kranthi), (EC329370 x Parbhani Kranthi), (IC42456 x (IC42456 x Parbhani Kranthi)) was found superior over the check variety Arka Anamika for fruit yield per plant. Genotype (EC329370 x Punjab Suhavani), recorded superior number of branches per plant, for internodal length, which was less than Arka Anamika (EC329370). days taken for first flowering, IC40289 x Punjab Suhavani, for chlorophyll content, IC42456 x Parbhani Kranthi, for YVMV % resistance (IC42456 x (IC42456 x Kashi Lalima) which was less in % of incidence, these were performed better in contributing to yield and seed quality traits.

Keywords: Genotypes, okra, performance, yield and YVMV resistance

Introduction

Okra (*Abelmoschus esculentus* (L.) Moench) belongs to the Malvaceae family and is native to tropical Africa, although it may be grown anywhere in the world that is tropical or subtropical (Ali *et al.* 2012). Due to its tender greens, which are grown all over India in the summer and during the rainy season, it is the most widely consumed edible vegetable (Solankey *et al.* 2013) [22]. With over 72.9% of the world's okra produced there, India is the world's leading producer. In India, okra is farmed on 523 thousand hectares, accounting for 3.9% of all vegetables produced in the country. Its productivity is 11.90 metric tons per hectare, and its yearly production is 6,416 million tonnes (MoA & FW, 2021–2022) [12]. Telangana produces 83.45 thousand tons of okra annually on 4.01 thousand hectares of land. The states that produce the most okra include Andhra Pradesh, West Bengal, Bihar, Orissa, Gujarat, Jharkhand, Karnataka and Tamil Nadu (MoA & FW, 2022-2023) [13]. Okra fruits can be prepared in a variety of ways in the kitchen. It can be fried in butter or oil or prepared with the necessary ingredients. They can be cut into pieces and served with soup, boiled, or served as a salad. The stem and root of okra are used to filter the cane juice needed to produce brown sugar or gur (Chauhan, 1972) [7]. A large number of seeds per fruit, the high fruit set rate and the ease of setting make it easy to utilize the hybrid vigour of okra for commercial purposes. This plant is frequently cross-pollinated; reports of insect cross pollination at rates of 5-9% have resulted in notable genetic diversity (Duggi *et al.* 2013) [8].

Materials and Methods

The present investigation was undertaken with a view to estimating the “Mean performance of parents BC₁ Population and F₁ Hybrids over check varieties in okra (*Abelmoschus esculentus* L.)” The experiment included making sample crosses.

Corresponding Author:

B Shravani

M.Sc. Scholar, Department of
Vegetable Science, College of
Horticulture, SKLTGHU, Mojerla
Telangana, India

6 elites, optimally divergent and nearly recurrent parents of okra namely IC40289, IC42464, IC42456, IC39136, EC329370 and EC329422 used as female parents and 10 F₁ hybrids IC40289 x Kashi Lalima, IC40289 x Punjab Suhavani, IC42464 x Kashi Lalima, IC42456 x Kashi Lalima, IC42456 x Parbhani Kranthi, IC42456 x Punjab Suhavani, IC39136 x Kashi Lalima, EC329370 x Parbhani Kranthi, EC329370 x Punjab Suhavani, EC329422 x Punjab Suhavani, used as a male parent's resistance to Yellow Vein Mosaic Virus (YVMV) disease. The ten selected recurrent parents and 10 F₁ hybrids were grown in separate plots with staggered sowings to ensure synchronization of flowering and each tester is crossed with all the ten lines. The adopted row spacing is 60 cm between rows and 45 cm within each plant. The recurrent parents were back crossed to obtain a 20 BC₁ population during *kharif*, 2023. Emasculation took place in the late afternoon (4-6.30 P.M.) and pollination took place in the morning (8-10.30 A.M.) The male and female flower buds of okra were selected on the evening before the day of opening. The hybridization program consists of the emasculation of floral buds of female parents, before the day of flower opening. These emasculated flowers and flowers of male parents were then quickly covered by butter paper bags. On the next day morning (8.00 AM to 10.00 AM), the crossing was attempted by gentle rubbing of dehiscent anthers of bagged male flowers on the stigma of the emasculated female flowers. The crosses were properly labelled and covered with a fresh paper bag. Simultaneously, both parents were selfed to get pure progeny by covering it with butter paper bags one day before its opening. Harvest from dried fruit after 60-80 days of pollination and preserved in brown paper bags. As and when the individual fruits reached maturity, the crossed seed of each cross combination was gathered separately.

The 20 BC₁ Population along with 20 parents [10 L +10 T], 10 F₁ hybrids and Three check varieties (Arka Anamika, CO-4 and PDKV Pragati) (53 treatments) were sown in a randomized block design replicating three times in *Rabi*, 2023 for evaluation. Five competing plants in each treatment were randomly selected and tagged to record all vegetative and reproductive observations in all three replications. The 21 yield and yield attributing traits are., plant height (cm), number of primary branches, Number of leaves per plant, internodal length (cm), days taken to first flowering, days to 50% flowering, days taken to first picking, days taken to last picking, number of locules per fruit, number of fruits per plant, fruit length (cm), fruit diameter (cm), number of seeds per fruit, fruit yield per plant (g), fruit yield per plot (kg), fruit yield per hectare(ton), YVMV resistance (%), fiber content(g), chlorophyll content (mg/g FW), iodine content (mg/100 g of fruits) and anthocyanin (mg/100 g of fruits).

Results and Discussion

Mean performance of genotypes

In any selection programme, the mean performance of the genotypes for individual characters serves as an important criterion for discarding the undesirable types. This indicates that germplasm studies may act as a potential source and offer scope for selecting high yielding genotypes with desirable horticultural attributes. The mean performance of genotypes of okra for various fruit yields and its seed quality attributes are described character wise below. Mean performances of fifty three (20 BC₁, Parents 20 [10 L +10 T], 10 F₁s and standard checks (03) genotypes for the twenty one characters are furnished in Table 1 and Fig no.1.

1. Plant height (cm)

The mean value for plant height exhibited a range from 60.22 cm to 77.25 cm with a total mean of 71.21 cm. The genotype IC42456 x Parbhani Kranthi recorded highest plant height (77.25 cm), while the check variety CO-4 had recorded least (60.22cm). Genotypes viz., IC40289 x Kashi Lalima with (76.99cm), IC42456 x Kashi Lalima (76.93cm) IC42464 x Kashi Lalima (76.48 cm),) were significantly noted maximum in height cm to check variety Arka Anamika., Plant height in okra was also reported by Nirosha *et al.* (2014)^[16].

2. Number of primary branches per plant

In fifty three genotypes, the average number of branches per plant is 2.0 with a range from 1.06 in (IC42464 x Kashi Lalima) to 2.80 in (EC329370 x Punjab Suhavani),. Followed by other genotypes viz., 2.80 in (EC329370), 2.80 in (EC329422), 2.66 in (EC329370 x (EC329370 x Parbhani Kranthi) and 2.667 in (EC329370 x Parbhani Kranthi). were significantly maximum number recorded when compared to check variety Arka Anamika. Similarly given by Nirosha *et al.* (2014)^[16].

3. Number of leaves per plant

The number of leaves per plant ranged from 14.0 lowest number observed in (IC39136 X (IC39136 x Kashi Lalima), highest was observed in check variety Arka Anamika with 20.26 in number and with a total mean of 16.12. Other genotypes followed were (EC329422), 18.46, (EC329422 x Punjab Suhavani) 18.33, CO-4 (Check variety) 18.33, (EC329370) 18.2 and (, EC329370 X Punjab Suhavani) 18.06. were followed significantly maximum with check variety Arka Anamika. Similarly given by Ahamed *et al.* (2015)^[3], Prajna *et al.* (2015)^[17].

4. Internodal length (cm)

Internodal length ranged between 4.22 cm (EC329370) which is minimum to 6.14 cm (IC39136 x Kashi Lalima) which is maximum with an average mean value of 5.07 cm. Maximum internal length (6.09 cm) was observed in check variety PDKV Pragati. Genotypes viz., IC42464 x Kashi Lalima 5.99cm, IC42456 x Kashi Lalima 5.88 cm, IC39136 x Kashi Lalima 5.60 were significantly more in internodal length (cm) these noted to be more with check variety Arka Anamika which were found similar in reports of Akotkar and De (2014)^[4], Mahaveer *et al.* (2010)^[11].

5. Days taken to first flowering

Days taken to first flowering ranged from 40.33 (IC40289 x Kashi Lalima (selfed)) which is minimum in days to 48.26 (EC329370) which is maximum in days with a total mean of 43.91. Genotypes viz., (IC40289 X Kashi Lalima) 46.80, (IC42456) 46.533, (IC42456 X Punjab Suhavani) 46.46, EC329422 X (EC329422xPunjab Suhavani) 46.06, EC329370 X (EC329370 x Punjab Suhavani) 46.0 which were significantly maximum in days taken to first flowering when compared with check variety Arka Anamika., similar were Reported by Adekoya *et al.* (2014)^[1] and Kumari *et al.* (2017)^[9].

6. Days taken to 50 percent flowering

The mean value of days taken to 50 percent flowering ranged from 46.86 (IC40289 x Punjab Suhavani) which is less in days to 52.86 (EC329370) which is highest in days and with a total mean of 49.74. Genotypes viz., (IC42456 X Punjab Suhavani) 51.93, (IC40289 X Kashi Lalima) 51.86 (IC42456 X Kashi Lalima) 51.46, (IC40289 X Punjab Suhavani) 51.33, were significantly maximum when compared with check variety Arka

Anamika., Similar reports given by Mahaveer *et al.* (2010) ^[11] and Adekoya *et al.* (2014) ^[1].

7. Days taken to first picking

The mean value of days taken to first picking grouped from (EC329422 x Punjab Suhavani) 43.40 which is minimum in days to (EC329370) 50.93 which is maximum in days and with a total mean of 46.78. Genotypes viz., (IC40289 x Kashi Lalima) 49.40, (IC42456 x Punjab Suhavani) 49.33, (IC42456) 49.33, (EC329370 x (EC329370 x Punjab Suhavani)) 48.86, (EC329422 x (EC329422 x Punjab Suhavani)) 48.73, were observed to be significantly maximum to check variety Arka Anamika.

8. Days taken to last pickings

The mean value of days taken to last picking ranged from 71.33 (EC329422 x Punjab Suhavani) which is lowest in days to (EC329370) 93.667 which is highest in days with an average of 88.37. Genotypes viz., 93.467 (IC42456), 93.60 (IC39136 x Kashi Lalima), 93.40 (IC40289 x Kashi Lalima), 93.33 (IC42456 x Punjab Suhavani), were observed to be non-significantly maximum to check variety Arka Anamika.

9. Number of Locules per fruit:

In Fifty three genotypes the number of locules per fruit ranged from 5.0 (IC40289 x (IC40289 x Kashi Lalima)), which is maximum in number to 7.80 (EC329370) where it is maximum in a number of locules and total mean of 5.48. Followed by genotypes 7.53 (EC329370 x Punjab Suhavani), 7.40 (EC329370) 7.26 (EC329370 X (EC329370 x Parbhani Kranthi)) were noted to be significantly more in number of locules to check variety Arka Anamika. Similar results are reported by Singh *et al.* (2016) ^[21].

10. Number of fruits per plant

In Fifty three genotypes the number of fruits per plant grouped from a range of 16.06 (IC42464 x Kashi Lalima) which is lowest to 21.40 (EC329370 x Parbhani Kranthi) with a total mean of 18.81. Genotypes viz., (EC329370 x Parbhani Kranthi) 21.40, (EC329370 x Punjab Suhavani) 21.26, (EC329422) 21.26, (EC329370 x (EC329370 x Parbhani Kranthi) 21.20, (EC329370 x Punjab Suhavani) 21.20 were found to be significantly more when interpreted with check variety Arka Anamika. Similarly reported by Mahaveer *et al.* (2010) ^[11].

11. Fruit Length (cm)

Fruit length (cm) measured in the range of 6.63cm (EC329370) which was minimum, to 14.98cm (IC40289 X (IC40289 x Kashi Lalima)) which was maximum and with a total mean of 11.57 cm. Genotypes viz., 14.70 cm (IC42456 x Kashi Lalima), 14.60cm (EC329422 X (EC329422xPunjab Suhavani)), 14.44 cm (IC42456 x Kashi Lalima), 14.25 cm (IC40289 X (IC40289 x Punjab Suhavani)), these were noted significantly more than check variety Arka Anamika found similar reports were given by Akotkar and De (2014) ^[4], Nbeaa *et al.* (2023) ^[15].

12. Fruit Diameter (cm)

The mean value for fruit diameter ranged from 0.83cm (PDKV Pragati) minimum to 1.72cm (EC329370 x (EC329370 x Punjab Suhavani) maximum, with a grand mean of 1.28cm. Genotypes viz., 1.66 cm (EC329370 x (EC329370 x Parbhani Kranthi), 1.63 cm (IC40289 x Kashi Lalima), 1.59 cm (EC329370), 1.55 cm (Arka Anamika) these were significantly maximum in diameter when interpreted to Arka Anamika. similarly reported by Akotkar

and De (2014) ^[4].

13. Number of seeds per fruit

Number of seeds per fruit ranged from 24.1 (IC39136 x Kashi Lalima) which is the minimum to 80.73 (EC329370) maximum and a total mean of 46.63. Genotypes viz., 68.93 (EC329370 x Punjab Suhavani), 68.60 (EC329370 x (EC329370 x Punjab Suhavani), 64.33 (EC329370 x (EC329370 x Parbhani Kranthi) and 63.46 (EC329370) were significantly more in number of seeds per fruits to check variety Arka Anamika. Elucidated similar reports by Adewusi *et al.* (2013) ^[2], Adekoya *et al.* (2014) ^[1]

14. Fruit yield per plant (g)

Fruit yield per plant (g) was in the range of 141.97g (IC42464 x Kashi Lalima) to 190.13g (EC329370 x Punjab Suhavani), with a total mean of 165.52g. Genotypes viz., 189.3g (EC329370 x (EC329370 x Parbhani Kranthi), 188.9g (EC329370 x Parbhani Kranthi), 186.56g (EC329370 x Punjab Suhavani), 182.73g (IC42456 x (IC42456 x Parbhani Kranthi)) these were significantly more than check variety Arka Anamika Akotkar and De (2015) ^[4], Mahajan *et al.* (2017) ^[10], venkatesh *et al.* (2023) ^[24] and Mahaveer *et al.* (2010) ^[11].

15. Fruit yield per plot (kg)

Fruit yield per plot (kg) weighing in the range of 2.98kg (IC42464 x Kashi Lalima) to 3.99kg (EC329370 x Punjab Suhavani), with an average of 3.48kg. Genotypes viz., 3.97 kg (EC329370 x (EC329370 x Parbhani Kranthi), 3.91 kg (EC329370 x (EC329370 x Punjab Suhavani), 3.84 kg (IC42456 x (IC42456 x Parbhani Kranthi) and 3.80 kg (EC329422 X Punjab Suhavani) were noted to be more significantly interpreted in fruit yield per plant compared to check variety Arka Anamika.

16. Fruit yield per hectare (ton)

Fruit yield per hectare (ton) weighing in the range of 10.5 tons (IC42464 x Kashi Lalima) which is a minimum of 14.07 tons (EC329422), with a total mean of 12.24 tons. Genotypes viz., 13.32ton (IC42456 x Punjab Suhavani), 13.32ton (EC329370 x Punjab Suhavani (selfed), 13.28 ton (EC329370 x Punjab Suhavani) x EC329370) and 13.28 (IC42464 x Kashi Lalima) were interpreted more significant to that of check variety Arka Anamika. Were reported similar by venkatesh *et al.* (2023) ^[24].

17. YVMV Resistance (%)

YVMV resistance % in the range of 12.8% (Arka anamika) to 52.08% (PDKV pragathi) followed by genotypes 43% (CO-4) check variety, 41.45 (EC329370), 41.2% (IC39136 X (IC39136 x Kashi Lalima)), were non significantly observed with check variety Arka Anamika Seth *et al.* (2017), Senjam *et al.* (2018) ^[19], Bharathkumar *et al.* (2019) ^[6] and Prashanth *et al.* (2008) ^[18].

18. Fiber content (g)

Fiber content grouped in the range of 0.71g (EC329370) to 2.34g (IC40289 x Punjab Suhavani) with a total mean of 1.18g. Genotypes viz., 1.40g (IC42456 X Kashi Lalima), 1.37 g (IC42456 X (IC42456 x Kashi Lalima)), 1.36g (IC40289 X (IC40289 x Kashi Lalima)), 1.35g (IC39136 x Kashi Lalima), were significantly more to the check variety Arka Anamika. similar reports were reported by Srivastava *et al.* (2023) ^[23], Nazir *et al.* (2020) ^[14].

19. Chlorophyll content(mg/g/FW)

Chlorophyll content mg. g/FW range from 0.1025 (IC42464 X (IC42464 x Kashi Lalima)), to 1.88 (IC42456 x (IC42456 x Parbhani Kranthi)) with a total mean of 0.6920. Genotypes viz. 1.8825 (IC42456 X Parbhani Kranthi) 1.48 (Arka Anamika), 1.36 (EC329370 x Punjab Suhavani), 0.986 (IC42456 x Punjab Suhavani), 0.985 (CO-4) were noted to be significantly maximum to check variety Arka Anamika similarly given by Akotkar and De (2015)^[4] and Srivastava *et al.* (2023)^[23]

20. Iodine content (mg/100g of fruit)

Iodine content was calculated to be in the range of 1.230 mg/100g of fruit (IC39136) minimum to 4.60 mg/100g of fruit (IC42456 x Kashi Lalima), maximum with a total mean of 2.48 mg/100g of fruit. Genotypes viz., 3.84 mg/100g of fruit

(IC42456 x (IC42456 x Kashi Lalima), 3.73 mg/100g of fruit (IC42456 x Kashi Lalima), 3.61 mg/100g of fruit (IC42464 x (IC42464 x Kashi Lalima) and 3.2 (IC42464 x Kashi Lalima) were significantly maximum with check variety Arka Anamika (2.730). similar reports were given by Srivastava *et al.* (2023)^[23]

21. Anthocyanin (mg/100g of fruits)

Anthocyanin content grouping in the range of 0.127 mg/100g of fruits (EC329370), to 15.77 mg/100g of fruits (IC42456 x Kashi Lalima), with a mean of 3.74 mg/100g of fruits. Genotypes viz., 15.63 mg/100g of fruits (IC42456 x Kashi Lalima), 15.58 mg/100g of fruits (IC42456 x Kashi Lalima), 15.50 (IC39136 x Kashi Lalima), these significantly differed with a pair of treatments. Similar reports were given by Srivastava *et al.* (2023)^[23].

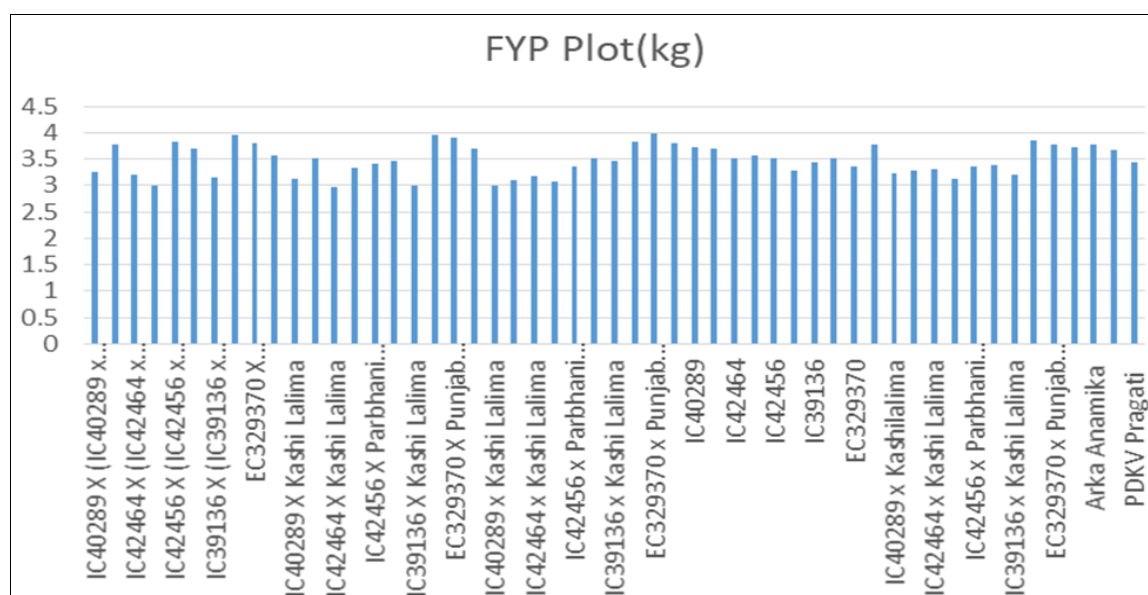


Fig 1: Estimation of mean performance of fruit yield per plot (kg) in okra

Table 1: Mean performance of fifty three genotypes of okra in terms of growth, flowering, yield parameters and quality and its related characters.

S.no	Genotypes	PH	NPB	NLP	INL	DTFF	DT50F	DTFP	DTLP	NLPF	NEFP	FL	FD	NSPF	FYPL	FYP	FYPH	YVMV %	FC	CC	IC	AC
1	BC1-1	69.55	1.60	15.20	4.68	44.46	49.20	47.26	92.33	5.00	17.13	14.98	1.40	48.40	154.8	3.25	11.4	21.63	1.36	0.12	2.16	5.04
2	BC1-2	68.47	1.93	15.53	4.72	44.86	50.00	47.60	92.86	5.33	18.33	14.25	1.35	44.06	180.8	3.79	13.3	21.63	1.27	0.96	2.02	0.82
3	BC1-3	71.08	1.66	15.46	5.34	44.53	49.86	47.33	91.86	5.00	17.60	12.64	1.28	34.00	152.5	3.20	11.2	26.77	1.31	0.10	3.61	4.88
4	BC1-4	74.48	1.26	15.06	5.06	44.20	50.00	47.13	91.66	5.13	16.60	10.13	1.12	40.40	142.5	2.99	10.5	17.87	1.34	0.12	3.84	11.28
5	BC1-5	77.24	2.20	16.00	5.54	44.33	50.93	48.20	91.86	5.06	19.46	13.91	1.39	61.73	182.9	3.84	13.53	29.53	0.94	0.79	2.79	1.87
6	BC-6	73.31	2.20	16.60	5.44	44.66	50.00	47.53	91.66	5.00	20.33	10.50	1.26	44.53	176.5	3.71	13.06	24.77	0.93	0.82	2.62	2.27
7	BC1-7	71.83	1.13	14.00	5.37	44.33	49.13	47.26	90.60	5.13	17.00	10.62	1.23	33.73	150.1	3.15	11.11	29.82	1.34	0.12	2.73	4.48
8	BC1-8	66.56	2.66	18.00	4.24	45.86	51.13	48.60	89.26	7.26	21.20	13.52	1.66	64.33	189.3	3.97	14.00	23.66	1.14	0.83	2.10	1.76
9	BC1-9	66.44	2.33	17.20	4.23	46.00	51.66	48.86	90.73	7.13	19.80	13.84	1.72	68.60	181.2	3.80	13.41	24.33	1.16	0.77	2.17	2.73
10	BC1-10	69.50	2.20	17.33	4.52	46.06	51.60	48.73	90.06	5.20	19.33	14.60	1.28	43.33	169.5	3.56	12.54	25.04	1.17	0.79	2.15	1.59
11	BC1-11	73.29	1.46	14.46	5.44	46.80	51.86	49.40	93.40	5.06	17.13	10.14	1.06	44.13	149.6	3.14	11.07	24.35	1.34	0.15	2.41	6.48
12	BC1-12	73.03	1.86	14.93	5.41	45.40	51.33	48.33	92.86	5.06	19.06	13.82	1.33	59.66	168.3	3.53	12.46	28.41	1.25	0.82	2.14	1.52
13	BC1-13	75.66	1.06	14.13	5.46	45.66	51.00	48.53	92.46	5.13	16.06	11.64	1.19	26.93	141.9	2.98	10.50	25.83	1.37	0.11	3.40	5.33
14	BC1-14	75.76	1.53	15.00	5.12	45.33	51.46	48.53	92.20	5.00	17.66	10.26	1.14	33.60	158.9	3.34	11.76	24.13	1.40	0.18	4.16	15.63
15	BC1-15	75.55	2.00	16.33	5.16	45.20	50.93	47.73	92.73	5.00	18.93	11.22	1.19	44.06	163.0	3.42	12.06	24.41	1.04	1.88	3.24	1.42
16	BC1-16	75.28	2.00	16.00	5.10	46.46	52.33	49.33	93.33	5.06	18.86	12.48	1.14	27.73	165.4	3.47	12.24	26.58	1.08	0.98	2.68	0.47
17	BC1-17	74.59	1.20	14.13	5.52	46.00	51.80	48.80	93.60	5.00	16.26	11.54	1.14	51.73	142.5	2.99	10.55	29.47	1.34	0.13	2.62	15.28
18	BC1-18	67.07	2.60	14.13	4.39	45.26	50.93	48.06	92.80	7.06	21.40	12.82	1.51	54.20	188.9	3.97	13.9	30.33	1.15	0.93	2.12	1.39
19	BC1-19	65.78	2.80	18.06	4.42	43.93	48.80	46.66	90.60	7.13	21.26	10.62	1.39	51.40	186.5	3.91	13.8	26.12	1.14	0.91	2.41	1.43
20	BC1-20	69.54	2.60	18.33	4.49	44.46	50.46	47.33	91.86	5.00	20.06	10.70	1.11	63.06	176.5	3.71	13.0	22.87	1.17	0.86	2.16	1.31
21	T1	73.90	1.26	14.40	5.57	41.60	47.60	45.13	88.06	5.06	16.60	12.84	1.41	43.20	143.7	3.01	10.6	29.3	1.24	0.91	2.32	8.72
22	T2	72.5	1.53	14.86	6.12	41.20	46.86	44.53	87.40	5.00	16.93	11.95	1.21	40.86	147.8	3.10	10.9	28.0	2.34	0.90	2.11	1.36
23	T3	74.6	1.53	15.13	5.99	40.73	47.20	44.06	88.00	5.00	17.26	10.40	1.30	63.06	151.9	3.18	11.2	28.6	1.22	0.11	3.18	5.60
24	T4	74.17	1.40	15.13	5.88	41.06	47.66	43.86	89.40	5.00	16.86	14.44	1.36	37.06	146.6	3.08	10.8	26.0	1.40	0.11	3.73	15.5
25	T5	74.97	1.80	15.13	5.58	41.46	48.26	44.53	88.86	5.00	18.13	11.82	1.26	51.13	160.1	3.36	11.8	26.4	1.08	0.87	3.04	1.22
26	T6	74.48	2.13	16.06	5.56	41.26	48.33	44.73	88.60	5.06	19.06	10.74	1.18	35.66	167.2	3.51	12.3	26.06	1.04	0.94	2.57	1.26
27	T7	73.46	2.00	15.40	6.14	42.40	48.33	45.33	89.66	5.00	18.20	10.60	1.17	24.13	164.8	3.46	12.1	31.8	1.35	0.11	2.44	15.50

28	T8	66.94	2.66	17.26	4.70	43.06	49.40	45.93	90.93	7.06	21.40	11.42	1.50	56.33	182.7	3.83	13.5	29.06	1.19	0.92	2.05	1.34
29	T9	68.26	2.66	17.20	4.49	41.40	47.66	44.40	88.40	7.06	21.20	12.08	1.44	57.46	190.1	3.99	14.0	25.6	1.24	0.92	2.24	1.28
30	T10	69.59	2.46	16.80	4.47	40.73	46.93	43.60	88.00	5.13	20.86	9.04	1.11	53.93	181.2	3.80	13.4	25.08	1.22	0.76	2.23	1.24
31	L1	68.60	2.20	16.13	4.45	44.53	50.66	47.46	92.13	5.00	19.80	11.76	1.13	44.60	177.7	3.73	13.1	26.18	1.05	0.83	1.70	0.33
32	L2	68.65	2.40	16.60	4.54	45.26	50.20	47.20	92.53	5.00	20.40	10.42	1.04	51.40	179.5	3.77	13.2	24.71	1.04	0.89	1.30	0.28
33	L3	67.68	1.93	15.73	4.46	45.53	51.60	48.20	93.00	5.00	18.93	10.99	1.16	44.60	167.7	3.52	12.4	28.56	1.02	0.94	2.47	0.20
34	L4	68.66	2.46	16.26	4.50	45.53	51.33	48.26	92.60	5.06	19.46	8.45	1.14	27.20	170.7	3.58	12.6	26.19	1.08	0.92	2.67	0.22
35	L5	68.63	2.06	15.66	4.53	46.53	52.40	49.33	93.46	5.00	18.53	10.55	1.25	35.00	167.2	3.51	12.3	26.90	0.89	0.91	1.89	0.15
36	L6	69.48	1.60	15.33	4.62	44.66	50.86	47.60	91.73	5.13	17.80	9.76	1.05	41.66	156.0	3.28	11.5	27.67	0.88	0.82	1.87	0.17
37	L7	67.55	1.86	15.53	4.67	45.66	50.20	48.40	91.80	5.00	19.00	12.67	1.22	43.00	163.6	3.43	12.1	41.23	0.73	0.73	1.23	0.90
38	L8	66.08	2.80	18.20	4.22	48.26	52.86	50.93	93.66	7.40	20.06	12.38	1.59	63.46	167.4	3.51	12.3	41.40	0.91	0.85	1.63	0.12
39	L9	66.53	2.60	17.73	4.31	45.80	51.13	48.46	92.20	7.80	19.80	6.63	1.21	80.73	160.4	3.36	11.8	29.12	0.71	0.74	1.55	0.17
40	L10	69.78	2.80	18.46	4.33	45.06	51.06	47.73	92.60	5.20	21.26	7.37	0.96	52.80	180.8	3.79	13.3	25.69	0.95	0.73	2.32	0.29
41	F1-1	76.99	1.66	15.13	5.50	40.33	47.73	43.73	87.73	5.00	18.26	14.25	1.63	41.60	154.2	3.24	11.4	27.19	1.37	0.17	2.11	6.55
42	F1-2	76.45	1.60	14.73	5.56	40.60	49.13	43.66	87.60	5.00	17.80	12.46	1.34	43.06	156.0	3.28	11.5	28.40	1.18	0.71	2.54	1.72
43	F1-3	76.48	1.66	15.06	5.58	41.33	47.33	44.73	87.80	5.00	17.86	12.14	1.45	54.33	157.8	3.31	11.6	28.07	1.38	0.12	3.27	5.63
44	F1-4	76.93	1.53	14.80	5.54	41.53	47.60	44.46	88.20	5.13	17.13	14.70	1.31	34.46	149.6	3.14	11.0	28.86	1.39	0.18	3.23	15.77
45	F1-5	77.25	1.86	16.06	5.52	41.93	47.80	44.60	89.40	5.00	18.33	12.38	1.33	52.13	160.7	3.37	11.8	26.46	0.88	0.82	3.13	1.16
46	F1-6	74.93	1.93	15.80	5.50	43.06	47.66	45.53	73.40	5.00	18.40	10.03	1.05	34.46	161.9	3.40	11.9	26.90	0.97	0.77	2.50	1.29
47	F1-7	73.96	1.60	14.93	5.60	41.26	47.13	44.33	71.53	5.00	17.53	11.54	1.05	26.13	153.1	3.21	11.3	29.79	1.32	0.18	2.52	15.46
48	F1-8	68.25	2.53	17.73	4.68	45.26	50.46	48.00	75.26	7.40	20.60	13.11	1.51	63.20	183.6	3.85	13.5	35.92	1.13	0.78	2.09	1.06
49	F1-9	69.55	2.46	16.53	4.54	43.93	49.93	46.66	75.00	7.53	20.40	12.90	1.42	68.93	180.1	3.78	13.3	25.54	1.12	1.36	2.20	1.74
50	F1-10	69.38	2.40	16.46	5.38	40.53	47.00	43.40	71.33	5.20	20.13	8.89	0.83	53.60	177.1	3.72	13.1	25.67	1.08	0.79	2.14	1.51
51	CV-1	68.44	2.53	20.26	4.92	42.26	48.33	44.93	73.33	5.13	20.40	9.02	1.55	34.73	180.1	3.78	13.3	20.49	1.16	1.48	2.73	1.13
52	CV-2	60.22	2.46	18.33	5.41	44.13	50.60	46.86	75.53	5.13	20.06	10.82	1.29	25.93	174.8	3.67	12.9	43.00	1.22	0.98	2.63	1.13
53	CV-3	66.69	2.00	16.60	6.09	45.53	50.73	47.80	75.86	5.40	19.06	10.72	1.33	51.93	164.2	3.45	12.1	51.01	1.25	0.85	2.30	1.14
	Grand mean	71.21	2.01	16.12	5.07	43.91	49.74	46.78	88.37	5.48	18.8	11.5	1.28	46.6	166.1	3.48	12.2	28.0	1.18	0.69	2.48	3.74
	SEm ±	0.83	0.13	0.48	0.04	0.53	0.59	0.53	5.99	0.07	0.60	0.11	0.02	0.48	5.10	0.10	0.37	3.31	0.01	0.01	0.04	0.09
	CV (%)	2.01	11.5	5.20	1.46	2.09	2.06	1.97	11.7	2.35	5.51	1.68	3.34	1.81	5.32	5.31	5.33	20.4	1.78	4.11	2.80	4.38
	CD P=0.05	2.32	0.37	1.35	0.12	1.49	1.65	1.49	Non Sig	0.20	1.68	0.31	0.06	1.36	14.3	0.30	1.06	9.30	0.03	0.04	0.11	0.26

PH-Plant height (cm), NPB-Number of primary branches, NLP-Number of leaves per plant, INL-Internodal length(cm),DTFF-Days Taken for first flowering,DT50F-Days taken for 50 percent flowering, DTFF-Days taken for first picking, DTLF-Days taken for last pickings, NLPF - Number of locules per fruit, NFPP- Number of fruits per plant, FL-Fruit length (cm), FD-Fruit diameter(cm).NSPF-Number of seeds per fruit, FYPL-Fruit Yield per plant(gm), FYPH-fruit yield per hectare(ton), FYP-Fruit yield per plot.FC-Fiber content (g),CC-Chlorophyll content mg/100mg-FW,IC-iodine Content mg/100mg FW,AC-Anthocyanin content mg/100mg-FW

Conclusions

Mean performance of parents BC₁ Population and F₁ Hybrids over check varieties in okra in selection programme, the mean performance of the genotypes for individual characters serves as an important criterion for discarding the undesirable types. This indicates that germplasm studies may act as a potential source and offer scope for selecting high yielding genotypes with desirable attributes. based on per the performance for the yield and yield contributing characters viz., number of fruits per plant, fruit yield per plot (kg), fruit yield per hectare (tonn) of EC329370 x Parbhani Kranthi, EC329370 x Punjab Suhavani, and EC329422 respectively.

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