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Evaluation of ridge gourd hybrids for growth and yield

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Abstract

A study was carried out to study the performance of fifteen hybrids developed from the six parents of ridge gourd viz., IC 398599, IC 308561, IC 523892, IC 539714, ArkaSumeet, ArkaSujat in comparison with a standard check (Chitra) for nine characters for over a period of three seasons viz., summer, kharif and rabi in 2018 at vegetable block, College of Horticulture, Venkataramannagudem, Dr. YSR Horticultural University. The cross, IC 523892 × ArkaSujat recorded longest vine while highest number of leaves was observed in IC 539714 × ArkaSumeet. Maximum number of branches and leaf area were recorded by the hybrids IC 398599 × IC 308561 and IC 308561 × ArkaSujat respectively. Maximum fruit length was recorded in IC 523892 × ArkaSumeet while fruit girth was noticed in IC 523892 × ArkaSumeet. The cross IC 523892 × ArkaSujat was observed to be superior for average fruit weight. Four among the fifteen crosses viz., IC 398599 × ArkaSumeet, IC 398599 × ArkaSujat, IC 523892 × ArkaSumeet and IC 523892 × ArkaSujat recorded superior performance in respect of most of the characters and have recorded significantly higher yield per plant than the standard check Chitra.

Keywords: Ridge gourd, *Luffa acutangula*

Introduction

Ridge gourd (*Luffa acutangula* (L.) Roxb.) is one of the most important cucurbitaceous vegetables grown throughout India. It is considered to be the old world species and a native of tropical Africa and South-East Asian region including India. Ridge gourd belongs the genus *Luffa* of Cucurbitaceae. The genus derives its name from the product 'loofah' which is used in bathing sponges, door mats, pillows and also for cleaning utensils. The genus includes seven species of which only two are important and commonly cultivated vegetables viz., ridge gourd (*Luffa acutangula* (L.) Roxb.) and sponge gourd (*Luffa cylindrica* L.). Ridge gourd widely grown in tropical and sub-tropical parts of India and can be grown throughout the year. The fruit besides its use as vegetable is demulcent, diuretic and nutritive. The pounded leaves are applied locally to splenitis, haemorrhoides and leprosy. The juice of the fresh leaves is dropped into the eyes of children against granular conjunctivitis and also to prevent the eye lids sticking together at nights due to excessive meibomian secretion (Rahman *et al.*, 2008) [9]. Ridge gourd is estimated to be cultivated in approximately 9.920 hectares with a production of 3.17 lakh tonnes in India (Anonymous, 2017) [2]. The popular ridge gourd hybrids are mostly released by the private companies and those released from public sector organizations are limited in number. Thus, an attempt has been made to develop ridge gourd hybrids and to study their performance.

Material methods

The experiment was carried out in the year 2018 at the College of Horticulture, Venkataramannagudem, Dr. Y.S.R Horticultural University. The experimental material comprised six inbred lines IC 398599 (P₁), IC 308561 (P₂), IC 523892 (P₃), IC 539714 (P₄), ArkaSumeet (P₅), ArkaSujat (P₆) and fifteen hybrids developed from them in half diallel method. These genotypes were evaluated in the field with a standard check (Chitra of Esha Agri seeds Pvt. Ltd., Hyderabad) in three seasons viz., summer, kharif and rabi in 2018. The experiment was laid out in Completely Randomized Block Design with three replications. The plants were raised at spacing of 1.0 x 1.2 m and management practices as recommended by Dr. Y.S.R Horticultural University were adopted to raise a healthy crop. The observations were recorded from ten randomly selected plants in each genotype per replication. The on data nine characters viz., vine length (m) at final harvest, number of leaves vine, number of branches per vine, average leaf area (cm²), fruit length (cm), fruit girth (cm), number of fruits per vine,

average fruit weight (g) and fruit yield per plant (kg) were recorded.

Results and discussion

The pooled analysis of variance over the seasons (Table 1) showed significant differences among the genotypes indicating presence of sufficient amount of variability for all the characters studied.

Among the parents, the vine length varied between 5.34 m (IC 308561) and 7.27 m (ArkaSumeet and ArkaSujat) while the hybrids recorded a range of 5.53 m (IC 308561 × IC 523892) to 7.85 m (IC 523892 × Arka Sujat). Three hybrids (IC 523892 × Arka Sujat, IC 539714 × ArkaSujat and ArkaSumeet × ArkaSujat) produced significantly longer vines over the standard check. The average number of leaves ranged between 37.33 (IC 398599) and 66.49 (IC 539714 × ArkaSumeet). Among the hybrids, IC 539714 × ArkaSumeet recorded significantly the highest number of leaves per vine (66.49) whereas the hybrid IC 118 398599 × IC 539714 had the lowest (45.22) while the check Chitra recorded a mean of 54.64 leaves per vine.

The genotypes differed significantly for number of branches per vine which ranged from 11.89 (ArkaSujat) to 24.93 (IC 398599 × IC 308561) with an overall mean of 18.39. The cross IC 398599 × IC 308561 (24.93) was significantly superior over the check Chitra (23.44). The cross IC 539714 × ArkaSumeet recorded minimum leaf area (119.95 cm²) whereas IC 308561 × Arka Sujat recorded the maximum (233.94 cm²). The leaf area was in the range of 127.17 (IC 308561) and 224.30 (ArkaSumeet) among the parents while five hybrids recorded higher leaf area over the check Chitra (150.47).

Vine length, number of leaves per vine, number of branches per plant and leaf area are the important growth parameters from production point of view. Genotypes having medium length, more number of leaves and branches and medium leaf area are reported to yield better. In the present study, parents and hybrids differed significantly among themselves for growth characters. The hybrid, IC 523892 × ArkaSujat recorded the highest vine length while more number of leaves was observed in IC 539714 × ArkaSumeet. Maximum number of branches was observed in IC 398599 × IC 308561 while the maximum leaf area was recorded in IC 308561 × Arka Sujat (Table 2). Similar observations were earlier reported by Chowdhury and Sarma (2002)^[5], Koppad *et al.* (2015b)^[7] and Bhargawa *et al.* (2017)^[3,4] in ridge gourd.

The genotypes differed significantly for fruit length over three

seasons and it ranged from 15.37 cm (IC 398599 × IC 308561) to 36.04 cm (Arka Sujat) with an overall mean of 23.42 cm. Among the hybrids, the trait ranged from 15.37 cm (IC 398599 × IC 308561) to 31.20 cm (IC 523892 × ArkaSumeet) while it was 35.13 cm in standard check Chitra (Table 2). The fruit girth significant differences among genotypes were observed for their fruit girth which ranged from 12.63 cm (IC 308561 × ArkaSumeet) to 18.20 cm (IC 523892 × ArkaSumeet) with an overall mean of 14.79 cm. The hybrid IC 523892 × ArkaSumeet (18.20 cm) was significantly superior over the check Chitra (14.90 cm). The observed average fruit weight of genotypes varied from 103.64 g (IC 398599) to 220.79 g (IC 523892 × Arka Sujat) with a general mean of 151.25g. The parent, IC 398599 recorded the minimum fruit weight of 103.64 g whereas ArkaSumeet recorded the maximum fruit weight of 160.08g. The fruit weight of hybrids was in the range of 113.31g (IC 308561 × IC 539714) to 220.79 g (IC 523892 × Arka Sujat). Five hybrids (IC 523892 × ArkaSujat, ArkaSumeet × ArkaSujat, IC 523892 × ArkaSumeet, IC 398599 × Arka Sujat and IC 398599 × ArkaSumeet) have recorded significantly higher fruit weight than the standard check Chitra (173.06g). The number of fruits ranged from 2.93 (ArkaSumeet × ArkaSujat) to 8.93 (IC 539714 × Arka Sujat) with an overall mean of 6.29. Six crosses (IC 539714 × ArkaSujat, IC 308561 × IC 539714, IC 308561 × Arka Sujat, IC 398599 × ArkaSumeet, IC 523892 × IC 539714 and IC 398599 × IC 308561) have recorded significantly higher number of fruits than the standard check Chitra (6.54).

Fruit length, fruit girth, fruit weight and number of fruits per plant are the important yield attributing characters. Maximum fruit length was recorded in IC 523892 × ArkaSumeet while fruit girth was noticed in IC 523892 × ArkaSumeet. The genotype IC 523892 × ArkaSujat recorded the highest average fruit weight. The cross IC 539714 × ArkaSujat has recorded maximum number of fruits per plant. Similar differential responses for yield and yield attributes in different genotypes of ridge gourd was earlier reported by Singh *et al.* (2002)^[10], Ananthan *et al.* (2005)^[1], Krishnamoorthy and Ananthan (2017)^[8], Bhargawa *et al.* (2017)^[3, 4] and Varalakshmi and Krishnamurthy (2017)^[11].

From the study, four hybrids *viz.*, IC 398599 × ArkaSumeet (1.50 kg), IC 398599 × ArkaSujat (1.28 kg), IC 523892 × ArkaSumeet (1.28 kg) and IC 523892 × ArkaSujat (1.26 kg) recording significantly higher yield per plant were observed to be superior over the standard check Chitra (1.14 kg) and can be studied for their stability over different environments.

Table 1: Pooled Analysis of variance for *per se* performance in respect of growth and yield characters in ridge gourd

| S. No. | Source of variation/character | Replications | Treatments | Error |
|--------|----------------------------------|--------------|------------|-------|
| | Degrees of freedom | 2 | 21 | 42 |
| I | Growth characters | | | |
| 1 | Vine length (m) at final harvest | 0.82 | 1.69** | 0.14 |
| 2 | Number of leaves per vine | 6.37 | 159.43** | 2.30 |
| 3 | Number of branches per vine | 0.75 | 35.77** | 1.50 |
| 4 | Leaf area (cm ²) | 27.98 | 3034.45** | 7.42 |
| II | Yield characters | | | |
| 5 | Fruit length (cm) | 3.15 | 125.52** | 0.08 |
| 6 | Fruit girth (cm) | 0.20 | 6.53** | 0.12 |
| 7 | Average fruit weight(g) | 3.18 | 4399.58** | 2.60 |
| 8 | Number of fruits per plant | 0.22 | 6.37** | 0.01 |
| 9 | Fruit yield per plant (kg) | 0.00 | 0.21** | 0.00 |

*: Significant at 5% level; **: Significant at 1% level

Table 2: Performance of parents and hybrids for growth and yield attributing traits in ridge gourd (Pooled over three seasons)

| | Vine length (m) at final harvest | Number of leaves per vine | Number of branches per vine | Leaf area (cm ²) | Fruit length (cm) | Fruit girth (cm) | Number of fruits per vine | Average fruit weight (g) | Fruit yield per Plant (kg) |
|------------------------|----------------------------------|---------------------------|-----------------------------|------------------------------|-------------------|------------------|---------------------------|--------------------------|----------------------------|
| Parents | | | | | | | | | |
| IC 398599 | 5.84 | 37.33 | 17.33 | 130.12 | 16.53 | 15.63 | 6.64 | 103.64 | 0.69 |
| IC 308561 | 5.34 | 49.71 | 24.68 | 127.17 | 17.67 | 13.59 | 8.86 | 130.59 | 1.17 |
| IC 523892 | 5.44 | 44.33 | 14.35 | 164.57 | 16.44 | 15.61 | 5.64 | 123.27 | 0.69 |
| IC 539714 | 6.08 | 45.44 | 17.55 | 132.24 | 16.47 | 15.18 | 6.11 | 113.16 | 0.69 |
| ArkaSumeet | 7.27 | 66.24 | 13.42 | 224.30 | 32.33 | 15.27 | 5.29 | 160.08 | 0.84 |
| Arka Sujat | 7.27 | 63.07 | 11.89 | 215.74 | 36.04 | 15.39 | 4.75 | 146.12 | 0.69 |
| Mean | 6.20 | 51.02 | 16.53 | 165.69 | 22.58 | 15.11 | 6.21 | 129.47 | 0.79 |
| Crosses | | | | | | | | | |
| IC 398599 × IC 308561 | 6.55 | 53.64 | 24.93 | 158.84 | 15.37 | 16.35 | 6.91 | 126.59 | 0.88 |
| IC 398599 × IC 523892 | 5.63 | 46.75 | 19.13 | 138.52 | 16.97 | 16.32 | 6.17 | 125.60 | 0.78 |
| IC 398599 × IC 539714 | 5.88 | 45.22 | 16.24 | 138.64 | 19.14 | 16.42 | 5.75 | 136.67 | 0.79 |
| IC 398599 × ArkaSumeet | 6.99 | 57.15 | 18.15 | 180.51 | 26.39 | 15.50 | 7.31 | 203.21 | 1.50 |
| IC 398599 × Arka Sujat | 6.99 | 52.82 | 23.86 | 141.45 | 26.20 | 13.34 | 6.13 | 208.66 | 1.28 |
| IC 308561 × IC 523892 | 5.53 | 53.35 | 17.73 | 134.00 | 16.79 | 14.36 | 4.47 | 118.68 | 0.53 |
| IC 308561 × IC 539714 | 5.88 | 50.44 | 18.28 | 147.87 | 20.16 | 12.70 | 8.84 | 113.31 | 1.00 |
| IC 308561 × ArkaSumeet | 6.54 | 48.33 | 17.44 | 155.26 | 23.00 | 12.63 | 5.04 | 117.63 | 0.59 |
| IC 308561 × Arka Sujat | 6.66 | 49.53 | 14.71 | 233.94 | 21.63 | 12.64 | 7.47 | 153.02 | 1.17 |
| IC 523892 × IC 539714 | 6.02 | 48.26 | 17.44 | 131.09 | 20.26 | 15.88 | 7.04 | 135.55 | 0.96 |
| IC 523892 × ArkaSumeet | 7.00 | 56.06 | 18.55 | 164.60 | 31.20 | 18.20 | 6.24 | 211.29 | 1.28 |
| IC 523892 × Arka Sujat | 7.85 | 61.24 | 18.31 | 144.20 | 29.04 | 12.66 | 5.78 | 220.79 | 1.26 |
| IC 539714 × ArkaSumeet | 6.70 | 66.49 | 19.11 | 119.95 | 26.35 | 13.99 | 5.67 | 167.09 | 0.91 |
| IC 539714 × Arka Sujat | 7.54 | 56.26 | 20.60 | 167.35 | 25.27 | 14.26 | 8.93 | 119.15 | 1.09 |
| ArkaSumeet × ArkaSujat | 7.42 | 52.66 | 17.42 | 181.23 | 26.90 | 14.62 | 2.93 | 215.89 | 0.63 |
| Crosses Mean | 6.61 | 53.21 | 18.79 | 155.83 | 22.97 | 14.65 | 6.31 | 158.20 | 0.97 |
| Check | | | | | | | | | |
| Chitra | 7.11 | 54.64 | 23.44 | 150.47 | 35.13 | 14.90 | 6.54 | 173.06 | 1.14 |
| Population Mean | 6.52 | 52.68 | 18.39 | 158.27 | 23.42 | 14.79 | 6.29 | 151.25 | 0.93 |
| C.V. | 8.74 | 5.88 | 9.58 | 6.72 | 4.20 | 7.42 | 12.18 | 7.06 | 12.94 |
| SE(m) ± | 0.21 | 0.87 | 0.59 | 1.57 | 0.16 | 0.20 | 0.07 | 0.93 | 0.01 |
| C.D. 5% | 0.61 | 2.50 | 1.69 | 4.90 | 0.46 | 0.59 | 0.22 | 2.65 | 0.04 |
| Range Lowest | 5.34 | 37.33 | 11.89 | 119.95 | 2.59 | 4.43 | 69.34 | 9.46 | 10.65 |
| Range Highest | 7.85 | 66.49 | 24.93 | 233.94 | 6.92 | 7.03 | 184.69 | 18.75 | 32.09 |

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