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Quantitative traits on different varieties/hybrids of okra [*Abelmoschus esculentus* (L.) Moench.]

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Abstract

The present investigation entitled "Quantitative traits on different varieties/hybrids of okra [*Abelmoschus esculentus* (L.) Moench.]" was conducted at the Research Farm of Department of Horticulture, College of Agriculture, Indore (M.P.) during late *kharif* the year 2015-2016. The experimental materials for the present investigation were comprised of fifteen varieties (Parbhani Kranti, Jhilmil, No.55, Shakti, Arya Mohini, Sahiba, NO.64, Okra Hrita, Sarmili, Hisar Unnat, Sonal, Shaan, Cos. 2106, and Ns-801 Saarika of the okra. The okra fruit yield q/ha was significantly affected due to various genotypes. The significantly highest 142.64q/ha fruit yield was recorded in the genotype Saarika and which was statistically superior and followed by Ns-801 (138.17 q/ha), Okra Hrita (135.02 q/ha) and Hissar Unnat (129.13 q/ha). However, the minimum 108.86 quintal fruit yield per hectare was recorded in genotype Cos-2106. All the genotypes have soft tender fruits except for genotypes Shakti, Sahiba, Sonal and Shaan which exhibited semi hard fruits. It is revealed that the fruit harvest index (%) was significantly influenced by the different genotypes. The genotype Saarika was found significantly superior (30.65 %) which was followed by Sahiba (30.32 %), Jhilmil (30.84 %) and Ns-801 (30.75 %). While, the lowest 28.86 % harvest index was noted in genotype Cos.2106.

Keywords: Okra, quantitative traits, varieties/hybrids and harvest index

Introduction

Okra [*Abelmoschus esculentus* (L.) Moench] Okra is a polyploid, belonging to the family Malvaceae with $2n = 8x = 72$ or 144 chromosome. According to Vavilov (1951), it was probably domesticated in the Ethiopian region. Okra is often cross pollinated crop, occurrence of out crossing to an extent of 4 – 19 % pollination. Okra is cultivated comprehensively in the tropical, subtropical and warm areas of the world like India, Africa, Turkey and other neighbouring countries.

It is a short duration crop propagated through seeds, cherished for its tender and scrumptious green fruits used in curries, soups or in canned, dehydrated or frozen forms for off-season consumption (Neerja *et al.*, 2004). Okra is more remunerative than the leafy vegetables, while crop has not adapted in India as leafy vegetable as in for East countries. The roots and stems are useful for clearing cane juice from which gur or jaggery is prepared (Chauhan, 1972) [3]. Its ripe seeds are roasted, ground and used as a substitute for coffee in Turkey (Mehta, 1959) [8]. The fruits are a green capsule containing numerous white seeds when immature (Jesus *et al.*, 2008) [7] and the flowers and upright plants give okra an ornamental value (Duzyaman, 1997). The okra fruit can be classified based on the shape, angular or circular (Mota *et al.*, 2005) [9].

Edible fresh and mature fruits contain 88% moisture and large number of chemical components including Vat. A 88 IU, Vat. B 63 IU and Vat. C 13 mg/100 gm. Unripe okra fruits contain 3100 calorie energy, 1.8gm Protein, 90 mg Calcium and 1.0 mg iron. Seeds of okra had the oil content 17.3% It strike out the nutritious ingredient of cattle feed. It has Ayurvedic medicinal properties. Its leaves are used for preparing a medicament to reduce inflammation. It is an excellent source of Iodine for control of goiter (Chadha, 2001) [2]. It is also very useful against genito-urinary disorders, spermatorrhoea and chronic dysentery (Nandkarni, 1927).

In India, Okra has occupied a prominent position among the export oriented vegetables because of its high nutritive value, palatability and good post-harvest life. It has an enormous potential as one of the foreign exchange earner crops and accounts for 60 per cent of the export of fresh vegetables. At present, it is being exported to the neighbouring countries in the Gulf And South-East Asia, particularly Singapore, Mauritius, Malaysia, Sri Lanka and Bangladesh.

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Okra is widely cultivated in plains of India mostly in Uttar Pradesh, Bihar, Orissa, West Bengal, Andhra Pradesh Karnataka and Assam. In India it is being cultivated in 5.33 lakh ha. Its annual production is 6346.0 thousand MT. (Anonymous: 2015). In Madhya Pradesh okra is grown in 26.51 thousand ha area and 305.91 thousand MT. (Anonymous: 2015).

It is a very wide range of adoptable crop and can be grown with considerable success on a wide range of soils and under variable environmental conditions. In India, it is grown twice in a year for getting regular supply. In the country, a large number of okra varieties are grown, the variation occurs with regards to quantitative and qualitative traits. The plant height, number of primary branches per plant, number of fruits per plant, size of fruit i.e. length as well as weight of fruits are the yield contributing characters while, colour of fruit and fiber content determine the quality of fruit.

Materials and Methods

This chapter comprises the details about the materials used and the methods adopted during the course of present investigation entitled “Evaluation of different varieties/hybrids of okra [*Abelmoschus esculentus* (L.) Moench.] Under late sown condition of Malwan region” carried out in late Kharif season during the year 2015-16.

Experimental site

The present experiment was laid out in the field of the Research Farm of Department of Horticulture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, College of Agriculture, and Indore during Kharif season, 2015-2016. The land topography of the experimental site was almost uniform with an adequate surface drainage. The internal drainage of the experimental was good.

Location and climate

Indore is situated in Malwan plateau region in the Western part of the state at an altitude of 555.5 meters above mean sea level (MSL). It is located at latitude 22.43° N and longitude of 75.66° E. It has sub-tropical climate having a temperature range from 29°C – 41°C as maximum and 7°C – 23°C as minimum in summer and winter season, respectively. It is hottest during March to May while coolest in December and January. Relative humidity generally fluctuates between 30 to 85%. In this area, most of the rainfall is received during midJune to early October while winter rains are occasional and uncertain. The average annual rainfall is 941 mm (AICRP, Indore).

Sampling

Five plants in each plot were randomly selected and tagged to record various observations as per the proposed schedule.

Observation

The data recorded on various parameters were subdivided into five categories during the period of experimentation.

1. Tenderness of fruit

Fruit tenderness was recorded by visual observation and categorized into following categories.

- Soft (tender)
- Semi hard
- Hard

2. Colour of fruit

Colour of fruit was recorded by visual observation and categorized into following categories.

- Green fruit
- Dark green fruit
- Light green fruit3.

3. Shelf life of fruit at room temperature

Shelf life of fruit at room temperature was recorded by visual observation and categorized into following categories.

- Good quality (Up to 4 or more days)
- Medium quality (Up to 3 days)
- Poor quality (Up to 2 days)

4. Fruit Surface

Surface of fruit was recorded by visual observation and categorized into following categories.

- Hairy
- Smooth

5. Fruit shape

Fruit shape was recorded by visual observation and categorized in following categories.

- Long slender fruit
- Medium slender fruit
- Finger shaped fruit

6. Pod pubescence

Pod pubescence was recorded by visual observation and categorized into following categories.

- Pubescent
- Not Pubescent

7. Leaf margin

Leaf margin was recorded by visual observation and categorized into following categories.

- Narrow fid
- Deeply fid

8. Flower size

Flower size was recorded by visual observation and categorized into following categories.

- Small
- Medium
- Large

9. Purple throat at the base of corolla:

Purple throat at the base of corolla size was recorded by visual observation and categorized into following categories.

- Present
- Absent

10. Colour of leaf vein

Colour of leaf vein was recorded by visual observation and categorized into following categories.

- GWPT (Green with purple tinge)
- Green

Result and Discussion

Qualitative Traits

Qualitative traits like tenderness of fruit, Colour of fruit, Shelf life of fruit at room temperature and Fruit surface are summarized in Table 1.1, 1.2, 1.3 and 1.4 All the genotypes have soft tender fruits except for genotypes Shakti, Sahiba, Sonal and Shaan which exhibited semi soft fruits. These

finding are in agreement with the findings reported by Singh *et al.* (2003) [14]. Reported Colour of fruits had the lowest fiber content. Patro and Ravisankar (2004) [12] reported that the significant negative correlation of fruit yield per plant was recorded with longevity of tenderness. Patro and Ravisankar (2006) found that yield per plant was positively and directly affected by longevity of tenderness. Ekka and Chakrabati (2003), Hussaini and Babu (2007) [6] reported Storage, Shelf life and Fiber content. Viresh Hiremath Harshvardhan *et al.* (2009), Gernah and Daagema (2012) [5], Solankey *et al.* (2013) [13], Son *et al.* (2014) [16] reported other qualitative parameters related traits.

1. Tenderness of fruit

Tenderness of fruit is categorized into soft (tender), semi hard and hard. Genotypes Arya Mohini, Jhilmil, No. 55, Sonal and Saarika exhibited Soft (tender) fruits. Whereas, remaining genotypes exhibited semi hard fruit.

2. Colour of fruit

Colour of fruit is categorized into dark green, light green and green. Genotypes Saarika, Parbhani Kranti, Ns-801, and

Hissar Unnat, Shakti exhibited dark green fruits. Genotypes, Jhilmil and No.55 exhibited light green fruits. Whereas, remaining genotypes exhibited green fruits.

3. Shelf life of fruit at room temperature

Shelf life of fruit at room temperature was categorized into

- Good quality (Up to 4 or more days)
- Medium quality (Up to 3 days)
- Poor quality (Up to 2 days)

Genotypes Parbhani Kranti, Shakti, Sarmili, Saarika exhibited Good quality, Jhilmil, Sahiba No.-64 exhibited Medium quality. Whereas, remaining genotypes No.55, Sonal exhibited Poor quality.

4. Fruit Surface

Fruit surface is categorized into Hairy and Smooth fruit surface. Genotypes Parbhani Kranti, No.55, Arya Mohini, Sahiba, Okra Hrita, Jhilmil, and aarika exhibited Smooth fruits surface. Whereas, remaining genotypes exhibited Hairy fruits surface.

Table 1: Tenderness, Colour, Shelf life at room temperature and Fruit surface of different genotypes of okra fruits.

Treatment Symbol	Genotypes	Tenderness	Colour of fruit	Shelf life at room temperature	Fruit Surface
T ₁	Parbhani Kranti	Soft (tender)	Dark green	Good	Smooth
T ₂	Jhilmil	Soft (tender)	Green	Medium	Hairy
T ₃	No.55	Soft (tender)	Green	Poor	Smooth
T ₄	Shakti	Semi hard	Dark green	Good	Hairy
T ₅	Arya Mohini	Soft (tender)	Green	Medium	Smooth
T ₆	Sahiba	Semi hard	Green	Medium	Smooth
T ₇	NO.64	Soft (tender)	Green	Medium	Hairy
T ₈	Okra Hrita	Soft (tender)	Green	Medium	Smooth
T ₉	Sarmili	Soft (tender)	Green	Good	Rough
T ₁₀	Hissar Unnat	Soft (tender)	Dark green	Good	Smooth
T ₁₁	Sonal	Semi hard	Green	Poor	Hairy
T ₁₂	Shaan	Semi hard	Dark green	Poor	Smooth
T ₁₃	Cos.2106	Semi hard	Green	Poor	Rough
T ₁₄	Ns-801	Soft (tender)	Dark green	Good	Smooth
T ₁₅	Saarika	Soft (tender)	Dark green	Good	Smooth

5. Fruit shape

Shape. Genotypes Parbhani Kranti, Jhilmil, Shakti, Sahiba and Cos.2106 exhibited medium slender shape. Whereas,

remaining genotypes exhibited Finger shaped. The fruit surface as influenced by different genotypes is presented in Table 1.2.

Table 2: Fruit shape of different genotypes of okra

Treatment Symbol	Genotypes	Fruit shape
T ₁	Parbhani Kranti	Medium slender shape
T ₂	Jhilmil	Medium slender shape
T ₃	No.55	Long slender shape
T ₄	Shakti	Medium slender shape
T ₅	Arya Mohini	Finger shaped
T ₆	Sahiba	Medium slender shape
T ₇	NO.64	Long slender shape
T ₈	Okra Hrita	Finger shaped
T ₉	Sarmili	Long slender shape
T ₁₀	Hissar Unnat	Medium slender shape
T ₁₁	Sonal	Long slender shape
T ₁₂	Shaan	Long slender shape
T ₁₃	Cos.2106	Medium slender shape
T ₁₄	Ns-801	Long slender shape
T ₁₅	Saarika	Long slender shape

6. Pod pubescence: Pod pubescence is categorized into Pubescent and Not Pubescent pod. All genotypes exhibited not Pubescent nature in pod.

7. Leaf margin: Leaf margin is categorized into Narrow fid and deeply fid. Genotypes Arya Mohini and Sonal exhibited Narrow fid. Whereas, remaining genotypes exhibited Deeply fid.

Table 3: Pod pubescence, Leaf margin, Flower size, Purple throat at the base of corolla and Colour of leaf vein of different genotypes of okra fruits.

Treatment Symbol	Genotypes	Pod pubescence	Leaf margin	Flower size	Purple throat at the base of corolla	Colour of leaf vein
T ₁	Parbhani Kranti	Not pubescent	Deeply fid	Medium	Present	GWPT
T ₂	Jhilmil	Not pubescent	Deeply fid	Medium	Present	Green
T ₃	No.55	Not pubescent	Deeply fid	Medium	Present	GWPT
T ₄	Shakti	Not pubescent	Deeply fid	Medium	Present	GWPT
T ₅	Arya Mohini	Not pubescent	Narrow fid	Small	Present	Green
T ₆	Sahiba	Not pubescent	Narrow fid	Small	Present	GWPT
T ₇	NO.64	Not pubescent	Deeply fid	Medium	Present	GWPT
T ₈	Okra Hrita	Not pubescent	Deeply fid	Medium	Present	GWPT
T ₉	Sarmili	Not pubescent	Deeply fid	Comparatively Large	Present	GWPT
T ₁₀	Hisar Unnat	Not pubescent	Deeply fid	Medium	Present	GWPT
T ₁₁	Sonal	Not pubescent	Narrow fid	Large	Present	Green
T ₁₂	Shaan	Not pubescent	Deeply fid	Small	Present	GWPT
T ₁₃	Cos.2106	Not pubescent	Deeply fid	Small	Present	Green
T ₁₄	Ns-801	Not pubescent	Deeply fid	Medium	Present	GWPT
T ₁₅	Saarika	Not pubescent	Deeply fid	Medium	Present	GWPT

GWPT- Green with purple tinge

8. Flower size

Flower size is categorized into small, medium and large. Genotypes Arya Mohini, Shaan, Sahiba and Cos.2106 exhibited small flower and genotype Sonal exhibited comparatively large flower whereas, remaining genotypes exhibited medium flower.

9. Purple throat at the base of corolla

Purple throat at the base of corolla is categorized into present and absent. All genotypes have exhibited Purple throat at the base of corolla.

10. Colour of leaf vein

Colour of leaf vein is categorized into GWPT (Green with purple tinge) and Green colour. Genotypes Arya Mohini, Jhilmil, Sonal, Cos.2106 were exhibited Green colour of leaf vein. Whereas, remaining genotypes exhibited GWPT (Green with purple tinge).

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