Evaluation of F₁ progenies for fruit, seed and yield character of okra (Abelmoschus esculentus (L.) Moench)

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Abstract
The present investigation entitled “Evaluation of F₁ progenies for fruit, seed and yield character of okra (Abelmoschus esculentus (L.) Moench)” was carried out during kharif season, 2016-2017, at the Instructional cum-Research-Farm, Department of Horticulture, College of Agriculture, Latur, VNMKV, Parbhani. The experiment was laid out in a Complete Randomized Block Design with eight treatments and three replications. The experiment consisted of eight different treatments viz.; T₁(Parbhani Kranti [checks]), T₂ (Pusa-A4 x Parbhani Bhendi), T₃ (Parbhani Bhendi x Phule Utkarsha), T₄ (Pusa A4 x BO-2), T₅ (BO-2 x Kashi Pragati), T₆ (Pusa-A4x Phule Utkarsha), T₇ (BO-2 x Phule Utkarsha), T₈(Hybrid No. 10 [Check]). Significantly maximum length of pod (cm), diameter of pod (cm), number of pods per plant, average weight of pod (g), were recorded by treatment T₅. The maximum number of seed per pod, seed yield per pod, were recorded by treatment T₇. The maximum fruit yield per plant (g), fruit yield per plot, fruit yield per hectare (q/ha) and no. of picking were obtained in treatment T₉. Present investigation indicated that, the highest fruits, seeds and yield (q/ha) of okra should be obtained by treatment T₉.

Keywords: F₁ progenies, fruit, seed and yield character, Abelmoschus esculentus (L.)

Introduction
The total commercial production of Okra in the world was estimated at 4.8 million tons, with India and Nigeria being the predominant producers. Other minor producers include Pakistan, Ghana, Egypt, Ethiopia, Iran, Japan and USA. Worldwide production of the Okra as a fruit vegetable is estimated at 6 million tonnes per year. In West Africa, it is estimated at 500,000 to 600,000 tonnes per year. In Nigeria, there are two distinct season of Okra, the peak and the lean seasons. During the lean season Okra fruits are produced in low quantities, scarce and expensive to get (Bamire and Oke, 2003) in the peak season, it is produced in large quantities much more than what the local populace can consume. To the total production of 4.8 million ton pods of okra in the world, India contributes 70%, Nigeria 15%, Pakistan 2%, Ghana 2%, Egypt 1.7% and Iraq 1.7%. To the total production of 4.8 million ton pods of okra in the world, India contributes 70%, Nigeria 15%, Pakistan 2%, Ghana 2%, Egypt 1.7% and Iraq 1.7%.

Materials and Methods
The present investigation entitled “studies on evaluation of F₁ progenies for fruit, seed and yield characters of okra (Abelmoschus esculentus (L) Moench.)” was undertaken at Experimental Farm, Department of Horticulture, College of Agriculture, Latur, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani with the object to evaluate F₁ progenies for fruit, seed and yield characters of okra and to study the correlation for different characters of F₁ progeny. The study involved six genetically diverse F₁ of okra viz; Pusa-A4 x Parbhani Bhendi, Parbhani Bhendi x Phule Utkarsha, Pusa-A4 x BO-2, BO-2 x Kashi Pragati, Pusa-A4 x Phule Utkarsha, BO-2 x Phule Utkarsha. The six F₁’s were evaluated along with two checks Parbhani Kranti and Hybrid No.10 during kharif-2016 in Randomized Block Design with three replications. The data was recorded on five randomly selected plants for the characters viz., length of pod (cm), diameter of pod (cm), number of pods per plant, average weight of pod (g), seed per pod, seed yield per pod, fruit yield per plot, fruit yield per hectare (q/ha).
Results and discussion

Various Fruit, Seed and Yield attributes showed significant differences for various Okra varieties.

Fruit Characters: fruit of okra is measured in terms of length of pod (cm), diameter of pod (cm), number of pods per plant, average weight of pod (g), all these parameters showed significant difference among various cultivars.

Length of pod (cm) at harvest the data showed in Table 1 in respect of length of pod revealed that maximum length of pod was recorded in treatment T2 (13.83) which was followed by treatment T4 (13.32) and treatment T7 (13.00) respectively. However T2 was at par with T4. The minimum length of pod was recorded in treatment T1 (10.72) which was followed by treatment T8 (10.93) and treatment T3 (11.93) respectively. However T1 was at par with T8. Rest of the treatments were intermediate. Kumar et al. (2015) reported that hybrids of okra IIHR-128 recorded maximum fruit length (12.05 cm) while minimum in Pusa Sawani (9.04 cm).

Diameter of pod at harvest the data showed in Table 1 in respect of diameter of pod revealed that maximum diameter of pod was recorded in treatment T3 (3.33) which was followed by treatment T6 (3.22) and treatment T4 (2.71) respectively. However T2 was at par with T6. The minimum diameter of pod was recorded in treatment T3 (2.48) which was followed by treatment T1 (2.51) and treatment T7 (2.54) respectively. However T3 was at par with T1 and T7. Rest of the treatments were intermediate. Maheshwari et al. (2016) reported that genotypes of okra Sonal recorded maximum diameter of fruit (3.44 cm) while minimum in Harita (2.41 cm).

Number of pods per plant at harvest the data showed in Table 1 in respect of number of pod per plant revealed that maximum number of pod was recorded in treatment T2 (11) which was followed by treatment T4 (10) and treatment T6(10) respectively. However T2 was at par with T4 and T6. The minimum number of pod was recorded in treatment T1 (8.43) which was followed by treatment T7 (8.46) and treatment T3 (9.13) respectively. However T1 was at par with T7 and T3. Rest of the treatments were intermediate. Average weight of pod (g) at harvest the data showed in Table 1 in respect of weight of pod per plant revealed that maximum number of weight of pod was recorded in treatment T2 (10.72) which was followed by treatment T1(9.97) and treatment T3 (9.93) respectively. However T2 was at par with T1 and T3. The minimum weight of pod was recorded in treatment T1 (6.43) which was followed by treatment T8 (7.03) and treatment T6 (9.0) respectively. However T1 was at par with T8. Rest of the treatments were intermediate.

Kumar et al. (2015) studied on evaluation of okra (Abelmoschus esculentus) genotypes for yield and yellow vein mosaic disease and reported that VRO-6 recorded maximum weight of fruit (13.86 g) while minimum in Arka Abhaya (10.35 g).

Table 1: Length of pod (cm), diameter of pod (cm), number of pods per plant and average weight of pod of different hybrids okra

<table>
<thead>
<tr>
<th>Tr. No.</th>
<th>Treatment</th>
<th>Length of pod (cm)</th>
<th>Diameter of pod (cm)</th>
<th>No. of pods/ plant</th>
<th>Average wt. of pod</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Parbhani kranti</td>
<td>10.72</td>
<td>2.51</td>
<td>8.43</td>
<td>6.43</td>
</tr>
<tr>
<td>T2</td>
<td>Pusa- A4x Parbhani Bhendi</td>
<td>13.83</td>
<td>3.33</td>
<td>11.0</td>
<td>10.0</td>
</tr>
<tr>
<td>T3</td>
<td>Parbhanni Bhendix Phule Utkarsha</td>
<td>12.43</td>
<td>2.48</td>
<td>9.13</td>
<td>9.93</td>
</tr>
<tr>
<td>T4</td>
<td>Pusa- A4 xBO-2</td>
<td>13.32</td>
<td>2.71</td>
<td>10.0</td>
<td>9.97</td>
</tr>
<tr>
<td>T5</td>
<td>BO-2X Kashi pragati</td>
<td>11.93</td>
<td>2.66</td>
<td>9.30</td>
<td>9.13</td>
</tr>
<tr>
<td>T6</td>
<td>Pusa- A4x Phule Utkarsha</td>
<td>12.90</td>
<td>3.22</td>
<td>10.0</td>
<td>9.0</td>
</tr>
<tr>
<td>T7</td>
<td>BO-2X Phule Utkarsha</td>
<td>13.00</td>
<td>2.54</td>
<td>8.46</td>
<td>9.93</td>
</tr>
<tr>
<td>T8</td>
<td>Hybrid No.-10</td>
<td>10.93</td>
<td>2.63</td>
<td>9.50</td>
<td>7.03</td>
</tr>
<tr>
<td>SE</td>
<td>0.23</td>
<td>0.14</td>
<td>0.48</td>
<td>0.52</td>
<td></td>
</tr>
<tr>
<td>CD 5%</td>
<td>0.72</td>
<td>0.45</td>
<td>1.46</td>
<td>1.60</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Number of seed per pod and seed yield per pod of different hybrids of okra

<table>
<thead>
<tr>
<th>Tr. No.</th>
<th>Treatment</th>
<th>No. of seed /pod</th>
<th>Seed yield/pod (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Parbhani kranti</td>
<td>41.33</td>
<td>2.62</td>
</tr>
<tr>
<td>T2</td>
<td>Pusa- A4x Parbhani Bhendi</td>
<td>47.80</td>
<td>3.28</td>
</tr>
<tr>
<td>T3</td>
<td>Parbhanni Bhendix Phule Utkarsha</td>
<td>44.20</td>
<td>2.78</td>
</tr>
<tr>
<td>T4</td>
<td>Pusa- A4 xBO-2</td>
<td>46.80</td>
<td>2.94</td>
</tr>
<tr>
<td>T5</td>
<td>BO-2X Kashi pragati</td>
<td>43.46</td>
<td>2.74</td>
</tr>
<tr>
<td>T6</td>
<td>Pusa- A4x Phule Utkarsha</td>
<td>45.04</td>
<td>2.90</td>
</tr>
<tr>
<td>T7</td>
<td>BO-2X Phule Utkarsha</td>
<td>41.43</td>
<td>2.61</td>
</tr>
<tr>
<td>T8</td>
<td>Hybrid No.-10</td>
<td>43.30</td>
<td>2.73</td>
</tr>
<tr>
<td>SE</td>
<td>1.36</td>
<td>0.12</td>
<td></td>
</tr>
<tr>
<td>CD 5%</td>
<td>4.15</td>
<td>0.37</td>
<td></td>
</tr>
</tbody>
</table>

Seed character: Number of seed per pod at harvest the data showed in Table 2 in respect of number of seed per pod revealed that maximum number of seed per pod was recorded in treatment T2(47.8) which was followed by treatment T4 (46.8) and treatment T6(45.4) respectively. However T2 was at par with T6. The minimum number of seed of pod was recorded in treatment T1 (41.33) which was followed by treatment T7 (41.43) and treatment T8 (43.3) respectively. However T1 was at par with T7 and T8. Rest of the treatments were intermediate. Anwanonbong and Brisibe (2015) reported that okra hybrids local variety recorded maximum number of seed per pod (43.50) while minimum in LD88 (33.40).

Seed yield per pod (g) at harvest the data showed in Table 2 in respect of seed yield per pod revealed that maximum number of seed yield of pod was recorded in treatment T2(3.28) which was followed by treatment T4 (2.94) and treatment T6 (2.90) respectively. However T2 was at par with T4. The minimum number of seed yield of pod was recorded in treatment T7 (2.62) which was followed by treatment T1 (2.62) and treatment T8 (2.73) respectively. However T7 was at par with T1 and T8. Rest of the treatments were intermediate.
Yield attributes: Yield per plant (kg) at harvest the data showed in Table 3 in respect of yield per plant revealed that maximum yield per plant was recorded in treatment T2 (0.11) which was followed by treatment T1 (0.099) and treatment T3 (0.090) respectively. However T2 was at par with T3 and T5. The minimum number of yield per plant was recorded in treatment T1 (0.054) which was followed by treatment T8 (0.066) and treatment T2 (0.084) respectively. Rest of the treatments were intermediate. Farook et al. (2002) [3] reported that okra Pusa Green was recorded maximum yield (17.85 t/ha). It was followed by (16.67 and 16.07 t ha yield) obtained from Clemson and Penta Green.

Yield per plot (kg) at harvest the data showed in Table 3 in respect of yield per plot revealed that maximum yield per plot was recorded in treatment T2 (3.74) which was followed by treatment T4 (3.38) and treatment T3 (3.08) respectively. The minimum yield per plot was recorded in treatment T1 (1.84) which was followed by treatment T5 (2.27) and treatment T7 (2.85) respectively. Rest of the treatments were intermediate.

<table>
<thead>
<tr>
<th>Tr. No.</th>
<th>Treatment</th>
<th>Yield/plant (kg)</th>
<th>Yield/plot(kg)</th>
<th>Yield/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Parbhan ki</td>
<td>0.054</td>
<td>1.84</td>
<td>102.22</td>
</tr>
<tr>
<td>T2</td>
<td>Pusa- A4x Parbhan Bhendi</td>
<td>0.11</td>
<td>3.74</td>
<td>207.58</td>
</tr>
<tr>
<td>T3</td>
<td>Parbhanni Bhendi Phule Utkarsha</td>
<td>0.090</td>
<td>3.08</td>
<td>170.92</td>
</tr>
<tr>
<td>T4</td>
<td>Pusa- A4 xBO-2</td>
<td>0.099</td>
<td>3.38</td>
<td>184.06</td>
</tr>
<tr>
<td>T5</td>
<td>BO-2X Kash Karagati</td>
<td>0.084</td>
<td>2.88</td>
<td>159.99</td>
</tr>
<tr>
<td>T6</td>
<td>Pusa- A4x Phule Utkarsha</td>
<td>0.090</td>
<td>3.06</td>
<td>169.99</td>
</tr>
<tr>
<td>T7</td>
<td>BO-2X Phule Utkarsha</td>
<td>0.084</td>
<td>2.85</td>
<td>158.51</td>
</tr>
<tr>
<td>T8</td>
<td>Hybrid No-10</td>
<td>0.066</td>
<td>2.27</td>
<td>125.92</td>
</tr>
<tr>
<td>SE</td>
<td></td>
<td>0.02</td>
<td>0.07</td>
<td>4.94</td>
</tr>
<tr>
<td>CD 5%</td>
<td></td>
<td>0.006</td>
<td>0.23</td>
<td>15.0</td>
</tr>
</tbody>
</table>

Table 3: Yield per plant, yield per plot and yield per hectare of different hybrids of okra

Yield per ha (q/ha) at harvest the data showed in Table 3 in respect of yield per hectare revealed that maximum yield per hectare was recorded in treatment T2 (207.58) which was followed by treatment T1 (184.06) and treatment T3 (170.92) respectively. However T2 was at par with T3. The minimum yield per hectare was recorded in treatment T1 (102.22) which was followed by treatment T8 (125.92) and treatment T7 (158.51) respectively. Rest of the treatments were intermediate. Number of picking at harvest the data showed in Table 4 in respect of number of pickings revealed that maximum number of picking (8) were recorded in treatment T3 which was followed by treatment T5 (7) and treatment T7 (7) respectively. The minimum number of pickings (5) were recorded in treatment T1 (5) which was followed by treatment T3 (6) and treatment T7 (6) respectively. However T2 was at par with T8 and T5. Rest of the treatments were intermediate.

Table 4: Number of picking of different hybrids of okra

<table>
<thead>
<tr>
<th>Tr. No.</th>
<th>Treatment</th>
<th>Number of picking</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Parbhanni kranti</td>
<td>5</td>
</tr>
<tr>
<td>T2</td>
<td>Pusa- A4x Parbhan Bhendi</td>
<td>8</td>
</tr>
<tr>
<td>T3</td>
<td>Parbhanni Bhendi Phule Utkarsha</td>
<td>6</td>
</tr>
<tr>
<td>T4</td>
<td>Pusa- A4 xBO-2</td>
<td>7</td>
</tr>
<tr>
<td>T5</td>
<td>BO-2X Kash Karagati</td>
<td>7</td>
</tr>
<tr>
<td>T6</td>
<td>Pusa- A4x Phule Utkarsha</td>
<td>7</td>
</tr>
<tr>
<td>T7</td>
<td>BO-2X Phule Utkarsha</td>
<td>6</td>
</tr>
<tr>
<td>T8</td>
<td>Hybrid No-10</td>
<td>7</td>
</tr>
</tbody>
</table>

Conclusion
The studies revealed that the treatment T2 (Pusa-A4 x Parbhan Bhendi) had shown significantly superior results in terms of fruit, seed and yield attributes like length of pod (cm), diameter of pod (cm), number of pods per plant, average weight of pod (g), seed per pod, seed yield per pod, fruit yield per plant (g), fruit yield per plot, fruit yield per hectare (q/ha) and no. of pickings were obtained in treatment T2 and Pusa-A4xBo-2 were being the second of okra followed by pusa-A4x Phule Utkarsha. Therefore, on the basis of result obtained in present studies, it is suggested that the variety Pusa-A4 x Parbhan Bhendi these variety are suggested for commercial cultivation.

References