STUDIES ON GENETIC VARIABILITY AND HERITABILITY IN RIDGE GOURD (LUFFA ACUTANGULA)

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ABSTRACT

Genetic variability and heritability of different characters were studied in ridge gourd (Luffa acutangula L.) with 80 genotypes. High degree of variation was observed in respect of all the characters studied. The estimates of genotypic coefficient of variation were low as compared to phenotypic coefficient of variation for all the characters under study. The highest GCV and PCV was observed for sex ratio on branches. High heritability coupled with high genetic advance (%mean) was observed for node number for appearance of first male and female flower, length of main axis, number of primary branches, male and female flowers/plant, sex ratio on whole plant, main axis and branches, fruits/plant, fruit set (%), fruit length, fruit weight, seeds/fruit, 100-seed weight and yield/plant, indicating greater scope of improvement through selection.

The critical assessment of nature and magnitude of variability is one of the important pre-requisite in formulating effective breeding methods. The efficiency of selection depends mainly on the extent of genetic variability present in a population. The genetic improvement of any crop depends on magnitude of genetic variability and the extent of heritability of economically important characters. Of course, alongwith genetic component the part played by the environment in the expression of such characters also needs to be taken into account. Since information on these aspects in ridge gourd (Luffa acutangula L.) is meager. Reddy and Rao (1984) Kadam and Kale (1987); Sahni et al. (1987), an effort was made to assess the existing variability, heritability and genetic advance in the crop.

The experimental material comprised of 80 genetically diverse genotypes of ridge gourd, collected and maintained in the Department of Botany, J.B. College, Baraut, Meerut. These were grown in a randomized block design with two replications during the rainy season of 1993 and 1994 and summer 1994. Ten plants from each entry and each replication, selected at random, provided the material for the evaluation of 19 characters, viz., node number for appearance of first male and female flower, days taken for appearance of first male and female flower, length of main axis, number of primary branches, male and female flowers/plant, sex ratio on whole plant, main axis and branches, fruits/plant, fruit set (%), fruit length, fruit diameter, fruit weight, seeds/fruit, 100-seed weight and yield/plant. Genetic parameters namely genotypic and phenotypic coefficient of variation and heritability percentage were calculated by adopting standard procedure suggested by Burton and Devane (1953). Genetic advance was worked out as per the method given by Lush (1949).

Estimates of different genetic parameters are presented in Table 1. High pcv and gcv were observed for node number for appearance of first male flower, male flowers/plant, sex ratio on whole plant, main axis and branches, fruits/plant, fruit weight, seeds/fruit and yield/plant (Table 1). High differences between gcv and pcv indicate high degree of environmental influence. In our study the values of gcv and pcv were almost equal for most of the characters. This indicates that these characters are least influenced by the environment and are under the control of genotype itself.
Table 1. Estimates of range, phenotypic coefficient of variation (pcv), genotypic coefficient of variation(gcv), heritability and genetic advance (% mean) for 19 characters in ridge gourd

<table>
<thead>
<tr>
<th>Characters</th>
<th>Range</th>
<th>General mean</th>
<th>PCV</th>
<th>GCV</th>
<th>H²</th>
<th>GA (% mean)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Node no. for appearance of first male flower</td>
<td>3.12-10.10</td>
<td>5.72</td>
<td>51.22</td>
<td>48.78</td>
<td>90.48</td>
<td>95.63</td>
</tr>
<tr>
<td>Node no. for appearance of first female flower</td>
<td>12.80-35.89</td>
<td>18.58</td>
<td>40.96</td>
<td>39.61</td>
<td>93.58</td>
<td>78.96</td>
</tr>
<tr>
<td>Days taken for appearance of first male flower</td>
<td>34.61-56.30</td>
<td>42.20</td>
<td>13.84</td>
<td>12.54</td>
<td>82.39</td>
<td>23.48</td>
</tr>
<tr>
<td>Days taken for appearance of first female flower</td>
<td>37.17-63.70</td>
<td>48.47</td>
<td>17.54</td>
<td>16.67</td>
<td>90.49</td>
<td>32.68</td>
</tr>
<tr>
<td>Length of main axis (cm)</td>
<td>256.04-620.0</td>
<td>383.70</td>
<td>32.59</td>
<td>32.42</td>
<td>98.98</td>
<td>66.45</td>
</tr>
<tr>
<td>Primary branches/plant</td>
<td>4.40-13.04</td>
<td>8.09</td>
<td>40.30</td>
<td>39.96</td>
<td>83.87</td>
<td>69.72</td>
</tr>
<tr>
<td>Female flowers/plant</td>
<td>91.70-473.70</td>
<td>307.50</td>
<td>55.86</td>
<td>55.22</td>
<td>97.71</td>
<td>112.43</td>
</tr>
<tr>
<td>Male flowers/plant</td>
<td>8.55-23.07</td>
<td>13.22</td>
<td>38.19</td>
<td>34.46</td>
<td>91.05</td>
<td>71.65</td>
</tr>
<tr>
<td>Sex ratio on whole plant</td>
<td>4.12-53.93</td>
<td>28.17</td>
<td>79.66</td>
<td>77.39</td>
<td>94.39</td>
<td>154.89</td>
</tr>
<tr>
<td>Sex ratio on main axis</td>
<td>6.70-186.20</td>
<td>78.57</td>
<td>97.42</td>
<td>92.86</td>
<td>90.86</td>
<td>182.34</td>
</tr>
<tr>
<td>Sex ratio on branches</td>
<td>3.00-62.90</td>
<td>19.21</td>
<td>116.76</td>
<td>108.54</td>
<td>86.38</td>
<td>207.77</td>
</tr>
<tr>
<td>Fruits/plant</td>
<td>3.26-11.78</td>
<td>5.70</td>
<td>52.11</td>
<td>48.42</td>
<td>86.27</td>
<td>92.59</td>
</tr>
<tr>
<td>Fruit set (%)</td>
<td>25.34-59.11</td>
<td>45.46</td>
<td>33.19</td>
<td>27.28</td>
<td>67.57</td>
<td>46.20</td>
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<tr>
<td>Fruit length (cm)</td>
<td>12.63-31.33</td>
<td>19.35</td>
<td>32.51</td>
<td>30.49</td>
<td>88.10</td>
<td>59.05</td>
</tr>
<tr>
<td>Fruit diameter (cm)</td>
<td>3.84-5.52</td>
<td>4.63</td>
<td>12.74</td>
<td>8.64</td>
<td>45.71</td>
<td>11.99</td>
</tr>
<tr>
<td>Fruit weight (g)</td>
<td>102.31-351.68</td>
<td>145.80</td>
<td>43.59</td>
<td>42.29</td>
<td>94.18</td>
<td>84.56</td>
</tr>
<tr>
<td>Seeds/fruit</td>
<td>39.06-177.89</td>
<td>102.20</td>
<td>46.05</td>
<td>45.78</td>
<td>98.89</td>
<td>93.80</td>
</tr>
<tr>
<td>100-seed weight</td>
<td>11.18-19.64</td>
<td>14.23</td>
<td>23.05</td>
<td>21.50</td>
<td>86.64</td>
<td>41.14</td>
</tr>
<tr>
<td>Yield/plant (kg)</td>
<td>0.36-1.77</td>
<td>0.82</td>
<td>62.19</td>
<td>57.32</td>
<td>88.46</td>
<td>113.34</td>
</tr>
</tbody>
</table>

The heritability estimates in broad sense were high for all the characters, indicating that substantial improvement can be made using standard selection criteria. This result confirms the findings of Reddy and Rao (1984), Kadam and Kale (1987) and Sahni et al. (1987) for node number for appearance of first female flower, and of Sahni et al. (1987) for number of primary branches, male flowers/plant, sex ratio on main axis and fruit weight. Heritability estimates in conjunction with the estimates of genetic advance are more useful in selecting superior genotypes. High heritability along with high genetic advance (% mean) was observed for node number for appearance of first male and female flower, length of main axis, number of primary branches, male and female flowers/plant, sex ratio on whole plant, main axis and branches, fruits/plant, fruit set (%), fruit length, fruit weight, seeds/fruit, 100-seed weight and yield/plant, indicating the presence of additive gene action.

The high variability and high heritability along with high genetic advance (% mean), as expressed by the above mentioned characters, indicate that the genotypes could be evaluated in multi-location trials and selected as straight introductions for these characters or used as a parent in the hybridization programme for further improvement.

REFERENCES