ESTIMATING COMBINING ABILITY THROUGH LINE × TESTER ANALYSIS IN UPLAND COTTON


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ABSTRACT

Combining ability of the parents was estimated via line x tester analysis so as to determine the ability of parents to combine their favourable alleles/gens during the process of hybridization and transfer those to their progenies. Two types of combining abilities were estimated, the general combining ability (GCA) which is due to additive genes whereas specific combining ability (SCA) is due to dominant and epistatic gene effects. Eight parents (Five lines and three testers) along with their fifteen F1 hybrids were studied in randomized complete block (RCB) Design with four replications during 2006 at Department of Plant Breeding and Genetics, Sindh Agriculture University, Tandojam, Pakistan. The traits studied were; number of bolls per plant, boll weight (g), seed cotton yield per plant (g), ginning outturn percentage and seed index (g). The GCA variances due to lines and testers and SCA due to lines x testers interaction were significant for all the characters studied. However, the magnitude of GCAs from lines (females) and testers (pollinators) were higher than the SCA indicating preponderance of additive genes in the expression of all the traits. Nonetheless, among the lines, CIM-506 whereas in testers, NB-999 by manifesting maximum GCA effects were regarded as the best general combiners for almost all the traits suggesting the presence of more additive genes in these parents, hence may serve as potential parents to be considered for hybridization and selection programmes to improve the characters studied. Among the F1 hybrids, CIM-497 x BH-147, FH-901 x NB-999, CIM-506 x NB-999 were found as the best specific combiners for number of bolls per plant, boll weight and seed cotton yield. While CIM-497 x BH-147, NIBGE-2 x BH-147 and FH-901 x BH-147 were the best specific combiners for G.O.T% and seed index. Therefore, these hybrids may be preferred for hybrid crop development.

Key Words: Combining ability, Line × Tester analysis, Gossypium hirsutum L.


INTRODUCTION

Pakistan is facing a problem of low production per unit area as compared to other advanced cotton growing countries of the world. One of the main reasons of low productivity is inferior cotton genotypes being grown in the country. To cope up with the present level of production, it is imperative to develop new high yielding varieties/hybrids which possess higher yield potential along with early maturity, desirable fibre quality traits and insect pests and disease resistance.

General combining ability (GCA) is defined as an average performance of a line in series of cross combinations while specific combining ability (SCA) connotes those instances where certain hybrids are either better or poorer than would be expected on average performance in hybrid combinations. Thus, SCA is important for hybrid crop development whereas, GCA is useful for hybridization and selection programmes. According to Sprague and Tatum (1942), GCA is due to genes which are largely additive in nature, while SCA is due to the genes with dominance or epistatic in effects. Several researchers have already worked-out the combining ability of inbred lines in cotton but most of the times the results remained discordant. Since the development of new varieties through hybridization is a time consuming and continuous process, therefore information on the potentiality of new inbreds through combining ability analysis becomes an important objective of cotton breeders. Rokaya et al. (2005) and Soomro (2007) found the significance of GCA and SCA variances, suggesting the importance of additive as well as dominant genes, nevertheless in their studies, ratio of GCA/SCA was greater than unity further indicating the preponderance of additive genes in the inheritance of seed cotton yield, bolls per plant, boll weight, seed index and lint %. Contrary to above findings, Desphande and Baig (2003), Khan et al. (2005) and Panhwar (2007) noted that though GCA and SCA variances were important yet the magnitude of SCA was higher than GCA implying the preponderance of dominant genes controlling number of bolls, seed cotton yield, ginning outturn% and seed index.
From these findings, it appears that controversial results were obtained which may primarily be due to mating designs used, material tested and the environment in which material was evaluated.

In view of the importance of knowing the combining ability of the parents, thereby determining the types of gene action involved in the expression of various plant characters in cotton, the line × tester analysis was carried-out so as to help cotton breeders to decide for efficient breeding strategies to improve the valuable characters.

MATERIALS AND METHODS
A trial was conducted on the experimental field of the Department of Plant Breeding and Genetics, Sindh Agriculture University, Tandojam, Pakistan during 2006, so as to estimate the GCA and SCA of inbred parents through line × tester analysis. The experimental material consisted of F₁ crosses and their parents of upland cotton. The seed was sown in a randomized complete block (RCB) Design with four replications. There were eight parents, out of which 5 were used as lines/females (CIM-506, FH-901, CIM-497, CIM-499 and NIBGE-2) and three as testers/pollinators (NB-999, NB-111/S and BH-147) hence 15 F₁ hybrids were developed. Thus a total of 23 genotypes were evaluated for number of bolls per pant, boll weight (g), seed cotton yield per plant (g), ginning outturn% (G.O.T. %) and seed index.

For recording the observations, ten plants from each genotype per replication were randomly tagged. The distance between plant to plant was kept at 30 cm whereas row to row distance was 75 cm. All the recommended agronomic and cultural practices were carried-out properly. At crop maturity, the data for different characters were recorded and the analysis of variance to determine the differences among the genotypes (Parents and F₁’s) was carried out according to Gomez and Gomez (1984). The mean squares from line x tester design and GCA and SCA effects were calculated by following the statistical procedures as adopted by Singh and Choudhry (1979).

RESULTS AND DISCUSSION
For the improvement of any character, plant breeders heavily rely on the availability of genetic variability that could be acquired from different mating designs. Cotton breeders are also well aware of the phenomenon that in hybridization programme certain crosses pass-on more favourable genes in the progeny than the others. Thus, some cross combinations may provide transgressive segregants to improve economic traits in cotton breeding. The present research therefore was designed to estimate the GCA, SCA variances and their effects for different quantitative traits in a set of line x tester crosses. The results obtained are discussed character-wise as under.

Bolls per Plant
In cotton plant, as the number of bolls per plant is increased, the yield is correspondingly increased. Thus, there is a close and positive association between these parameters. The analysis of variance (Table I) revealed significant differences among the genotypes. On an average, maximum number of bolls per plant (47.75) were set by the cross CIM-506 x NB-999 followed by CIM-506 x NB-111/S (44.62) as per se hybrid performance. Among the parental lines, CIM-506 set highest bolls per plant (36.90) whereas in testers, NB-999 gave maximum (36.60) bolls per plant (Table II). The variances due to GCA and SCA were highly significant suggesting that additive and non-additive types of gene actions were involved in the expression of this trait. Line CIM-506 gave maximum (7.28) GCA effects whereas among the testers, NB-999 manifested maximum (4.320) GCA effects indicating that both the parents retain more additive genes, thus may be utilized in hybridization programmes for the improved number of bolls per plant in segregating population. The results further revealed that crosses CIM-497 x BH-147 and FH-901 x NB-111/S which gave maximum SCA effects of 4.400 and 2.000, respectively may be suitable crosses for hybrid crop development. Present findings are in conformity with those of Khan (2003), Chhabra et al. (2005), Rokaya et al. (2005) and Saini et al. (2005) who also reported significant GCA and SCA variances and effects for number of bolls per plant.

Boll Weight
In fact, as boll weight increases the yield equally increases if bolls per plant are to be kept constant. Regarding average performance, tester NB-999 and line CIM-506 weighed maximum boll weight of 3.35 g and 3.30 g respectively. Among the F₁ hybrids per se, CIM-506 x NB-999 gave highest (4.25 g) boll weight while cross CIM-506 x NB-111/S produced next (3.97 g) heavier bolls (Table II). The GCA and SCA variances were highly significant indicating that both additive and non-additive genes control boll weight. Regarding GCA effects, line CIM-506 and tester NB-999 revealed maximum effects of 0.754 and 0.434, respectively (Table III). These higher GCA scoring parents may be suitable for crossing and selection programmes. Among the crosses, FH-901 x NB-111/S manifested highest (0.150) SCA effects and next maximum SCA (0.140) was scored by other two hybrids i.e.
CIM-506 x NB-111/S and CIM-497 x BH-147. The crosses showing higher SCA effects may be considered for hybrid crop development. Present findings are also in consonance with those of Zhang et al. (2003) Nimbalkar et al. (2004), Khan et al. (2005), Saini et al. (2005) and Rokays et al. (2005) who also reported significant GCA and SCA effects for boll weight.

### Table I. Mean squares analysis of variance, GCA and SCA in a line x tester analysis for various characters in upland cotton

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Degrees of freedom</th>
<th>No. of bolls per plant</th>
<th>Boll weight</th>
<th>Seed cotton yield per plant</th>
<th>G.O.T.%</th>
<th>Seed index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replications</td>
<td>3</td>
<td>0.245</td>
<td>0.240</td>
<td>18.410</td>
<td>0.440</td>
<td>1.030</td>
</tr>
<tr>
<td>Crosses</td>
<td>14</td>
<td>120.531**</td>
<td>1.500**</td>
<td>1174.090**</td>
<td>31.860**</td>
<td>1.890**</td>
</tr>
<tr>
<td>Lines (GCA)</td>
<td>4</td>
<td>218.561**</td>
<td>2.970**</td>
<td>3306.050**</td>
<td>83.760**</td>
<td>1.920**</td>
</tr>
<tr>
<td>Testers (GCA)</td>
<td>2</td>
<td>336.720**</td>
<td>3.960**</td>
<td>1455.110**</td>
<td>42.330**</td>
<td>2.000**</td>
</tr>
<tr>
<td>Lines x tester (SCA)</td>
<td>8</td>
<td>17.469**</td>
<td>0.150**</td>
<td>37.860**</td>
<td>3.300**</td>
<td>0.880**</td>
</tr>
<tr>
<td>Error</td>
<td>42</td>
<td>0.715</td>
<td>0.050</td>
<td>6.840</td>
<td>0.310</td>
<td>0.068</td>
</tr>
</tbody>
</table>

** = significant at 1 % probability level.

### Table II. Mean performance of parents and their $F_1$ hybrids for various characters in upland cotton

<table>
<thead>
<tr>
<th>$F_1$ Hybrids/parents</th>
<th>Bolls/plant</th>
<th>Boll weight (g)</th>
<th>Seed cotton yield/plant (g)</th>
<th>G.O.T. (%)</th>
<th>Seed index (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIM-506 x NB-999</td>
<td>47.75</td>
<td>4.25</td>
<td>184.25</td>
<td>37.57</td>
<td>8.05</td>
</tr>
<tr>
<td>CIM-506 x NB-111/S</td>
<td>44.62</td>
<td>3.97</td>
<td>175.37</td>
<td>37.05</td>
<td>7.97</td>
</tr>
<tr>
<td>CIM-506 x BH-147</td>
<td>43.25</td>
<td>3.17</td>
<td>164.75</td>
<td>36.30</td>
<td>7.32</td>
</tr>
<tr>
<td>FH-901 x NB-999</td>
<td>42.70</td>
<td>3.80</td>
<td>147.37</td>
<td>35.50</td>
<td>7.37</td>
</tr>
<tr>
<td>FH-901 x NB-111/S</td>
<td>38.47</td>
<td>3.35</td>
<td>140.0</td>
<td>35.00</td>
<td>7.20</td>
</tr>
<tr>
<td>FH-901 x BH-147</td>
<td>29.12</td>
<td>2.50</td>
<td>132.75</td>
<td>34.87</td>
<td>7.42</td>
</tr>
<tr>
<td>CIM-497 x NB-999</td>
<td>41.0</td>
<td>3.20</td>
<td>146.0</td>
<td>35.92</td>
<td>7.55</td>
</tr>
<tr>
<td>CIM-497 x NB-111/S</td>
<td>37.25</td>
<td>2.67</td>
<td>137.75</td>
<td>35.57</td>
<td>7.50</td>
</tr>
<tr>
<td>CIM-497 x BH-147</td>
<td>35.12</td>
<td>2.47</td>
<td>131.25</td>
<td>32.75</td>
<td>7.52</td>
</tr>
<tr>
<td>CIM-499 x NB-999</td>
<td>40.50</td>
<td>3.25</td>
<td>156.75</td>
<td>33.75</td>
<td>7.80</td>
</tr>
<tr>
<td>CIM-499 x NB-111/S</td>
<td>34.12</td>
<td>3.05</td>
<td>139.50</td>
<td>33.90</td>
<td>7.42</td>
</tr>
<tr>
<td>CIM-499 x BH-147</td>
<td>31.37</td>
<td>2.55</td>
<td>131.25</td>
<td>34.87</td>
<td>6.40</td>
</tr>
<tr>
<td>NIBGE-2 x NB-999</td>
<td>39.25</td>
<td>2.90</td>
<td>138.50</td>
<td>33.00</td>
<td>7.82</td>
</tr>
<tr>
<td>NIBGE-2 x NB-111/S</td>
<td>32.75</td>
<td>2.30</td>
<td>133.0</td>
<td>34.00</td>
<td>7.52</td>
</tr>
<tr>
<td>NIBGE-2 x BH-147</td>
<td>31.50</td>
<td>2.25</td>
<td>127.75</td>
<td>34.25</td>
<td>7.30</td>
</tr>
<tr>
<td>Parents</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CIM-506</td>
<td>36.90</td>
<td>3.30</td>
<td>132.50</td>
<td>34.97</td>
<td>6.80</td>
</tr>
<tr>
<td>FH-901</td>
<td>30.45</td>
<td>2.65</td>
<td>126.85</td>
<td>32.70</td>
<td>5.82</td>
</tr>
<tr>
<td>CIM-497</td>
<td>35.17</td>
<td>2.95</td>
<td>129.25</td>
<td>33.77</td>
<td>5.60</td>
</tr>
<tr>
<td>CIM-999</td>
<td>28.55</td>
<td>2.60</td>
<td>122.50</td>
<td>30.25</td>
<td>4.60</td>
</tr>
<tr>
<td>NIBGE-2</td>
<td>24.95</td>
<td>2.47</td>
<td>119.00</td>
<td>28.37</td>
<td>4.25</td>
</tr>
<tr>
<td>NB-999</td>
<td>36.60</td>
<td>3.35</td>
<td>131.75</td>
<td>35.00</td>
<td>6.50</td>
</tr>
<tr>
<td>NB-111/S</td>
<td>32.65</td>
<td>2.77</td>
<td>127.00</td>
<td>33.75</td>
<td>6.12</td>
</tr>
<tr>
<td>BH-147</td>
<td>28.85</td>
<td>2.57</td>
<td>123.25</td>
<td>30.25</td>
<td>5.35</td>
</tr>
<tr>
<td>LSD(5%)</td>
<td>1.208</td>
<td>0.319</td>
<td>3.736</td>
<td>0.794</td>
<td>0.371</td>
</tr>
</tbody>
</table>

### Seed Cotton Yield per Plant

Seed cotton yield per plant occupies a unique place among many plant characters because it plays an important role in strengthening the economy of the growers and ultimately the country. Regarding mean performance per se, hybrid CIM-506 x NB-999 by producing highest yield (184.25 g) ranked first whereas cross CIM-506 x NB-111/S was next scorer (175.37 g) in seed cotton yield per plant (Table II). In parents, line CIM-506 (132.50 g) and from testers, NB-999 gave maximum seed cotton yield (131.75 g). The GCA and SCA mean squares were significant for seed cotton yield per plant indicating that both additive and non-additive genes were governing
the seed cotton yield in cotton. However, the highest GCA effects of 29.040 and 8.825 were manifested by the line CIM-506 and tester NB-999, respectively (Table III) implying that both the parents were good general combiners hence may be utilized in hybridization and selection programmes to improve the cotton yield. For SCA effects, maximum (5.400) SCA was recorded by the cross CIM-499 x NB-999 while next ranker (2.900) was NIBGE-2 x BH-147 (Table IV). Other researchers like Randhawa and Hami (2004), Baloch et al. (2005), Chhabra et al. (2005) and Khan et al. (2005) also reported higher GCA and SCA variances and their effects for seed cotton yield per plant.

**Table III. General combining ability (GCA) effects of lines and testers for various characters in upland cotton**

<table>
<thead>
<tr>
<th>Parents</th>
<th>Bolls/plant</th>
<th>Boll weight</th>
<th>Seed cotton yield/plant</th>
<th>G.O.T (%)</th>
<th>Seed Index</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lines (females)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CIM-506</td>
<td>7.288</td>
<td>0.754</td>
<td>29.040</td>
<td>1.215</td>
<td>0.240</td>
</tr>
<tr>
<td>FH-901</td>
<td>-1.170</td>
<td>0.170</td>
<td>-5.708</td>
<td>-0.110</td>
<td>-0.210</td>
</tr>
<tr>
<td>CIM-497</td>
<td>-0.128</td>
<td>-0.262</td>
<td>-7.416</td>
<td>0.290</td>
<td>-0.002</td>
</tr>
<tr>
<td>CIM-999</td>
<td>-2.586</td>
<td>-0.095</td>
<td>-3.250</td>
<td>-0.560</td>
<td>0.000</td>
</tr>
<tr>
<td>NIBGE-2</td>
<td>-3.420</td>
<td>-0.562</td>
<td>-12.666</td>
<td>-0.860</td>
<td>0.010</td>
</tr>
<tr>
<td>S.E.(gl.)</td>
<td>0.244</td>
<td>0.06</td>
<td>0.754</td>
<td>0.160</td>
<td>0.075</td>
</tr>
<tr>
<td><strong>Testers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NB-999</td>
<td>4.320</td>
<td>0.434</td>
<td>8.825</td>
<td>0.265</td>
<td>0.180</td>
</tr>
<tr>
<td>NB-111/S</td>
<td>-0.475</td>
<td>0.024</td>
<td>-0.625</td>
<td>0.130</td>
<td>-0.020</td>
</tr>
<tr>
<td>BH-147</td>
<td>-3.845</td>
<td>-0.456</td>
<td>-8.200</td>
<td>-0.370</td>
<td>-0.15</td>
</tr>
<tr>
<td>S.E. (gl.)</td>
<td>0.189</td>
<td>0.05</td>
<td>0.584</td>
<td>0.124</td>
<td>0.058</td>
</tr>
</tbody>
</table>

**Table IV. Specific combining ability (SCA) estimates from line x tester analysis for various characters in upland cotton**

<table>
<thead>
<tr>
<th>F1 Hybrids</th>
<th>Bolls/plant</th>
<th>Boll weight</th>
<th>Seed cotton yield/plant</th>
<th>G.O.T %</th>
<th>Seed index</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIM-506 x NB-999</td>
<td>-1.800</td>
<td>-0.010</td>
<td>0.700</td>
<td>0.340</td>
<td>0.090</td>
</tr>
<tr>
<td>CIM-506 x NB-111/S</td>
<td>-0.100</td>
<td>0.140</td>
<td>1.200</td>
<td>0.050</td>
<td>0.210</td>
</tr>
<tr>
<td>CIM-506 x BH-147</td>
<td>1.900</td>
<td>-0.180</td>
<td>-1.800</td>
<td>-0.270</td>
<td>-0.270</td>
</tr>
<tr>
<td>FH-901 x NB-999</td>
<td>1.700</td>
<td>0.150</td>
<td>-1.500</td>
<td>0.290</td>
<td>-0.140</td>
</tr>
<tr>
<td>FH-901 x NB-111/S</td>
<td>2.200</td>
<td>0.110</td>
<td>0.600</td>
<td>-0.030</td>
<td>-0.110</td>
</tr>
<tr>
<td>FH-901 x BH-147</td>
<td>-3.700</td>
<td>0.260</td>
<td>-0.900</td>
<td>0.350</td>
<td>0.240</td>
</tr>
<tr>
<td>CIM-497 x NB-999</td>
<td>-3.00</td>
<td>-0.020</td>
<td>-1.100</td>
<td>1.600</td>
<td>-0.150</td>
</tr>
<tr>
<td>CIM-497 x NB-111/S</td>
<td>-1.800</td>
<td>-0.140</td>
<td>-1.010</td>
<td>1.280</td>
<td>0.001</td>
</tr>
<tr>
<td>CIM-497 x BH-147</td>
<td>4.400</td>
<td>0.140</td>
<td>1.100</td>
<td>0.090</td>
<td>0.150</td>
</tr>
<tr>
<td>CIM-499 x NB-999</td>
<td>0.900</td>
<td>-0.140</td>
<td>5.400</td>
<td>0.680</td>
<td>0.080</td>
</tr>
<tr>
<td>CIM-499 x NB-111/S</td>
<td>-0.700</td>
<td>0.070</td>
<td>-2.400</td>
<td>0.560</td>
<td>-0.100</td>
</tr>
<tr>
<td>CIM-499 x BH-147</td>
<td>0.100</td>
<td>0.50</td>
<td>-3.100</td>
<td>1.760</td>
<td>0.010</td>
</tr>
<tr>
<td>NIBGE-2 x NB-999</td>
<td>0.400</td>
<td>-0.020</td>
<td>-3.300</td>
<td>-0.310</td>
<td>0.090</td>
</tr>
<tr>
<td>NIBGE-2 x NB-111/S</td>
<td>-1.300</td>
<td>-0.210</td>
<td>0.600</td>
<td>0.540</td>
<td>-0.010</td>
</tr>
<tr>
<td>NIBGE-2 x BH-147</td>
<td>0.900</td>
<td>0.220</td>
<td>2.900</td>
<td>0.070</td>
<td>-0.100</td>
</tr>
<tr>
<td>S.E. (si.)</td>
<td>0.422</td>
<td>0.111</td>
<td>1.307</td>
<td>0.278</td>
<td>0.130</td>
</tr>
</tbody>
</table>

**Ginning Outturn Percentage (G.O.T. %)**

Lint % is a complex character which is governed by many genes. Primarily, it depends on lint weight, which has direct effect on seed cotton yield. Among the F1 hybrids per se, CIM-506 x NB-999 and CIM-506 x NB-111/S produced top (37.57%) and next maximum (37.05%) ginning outturn. While among the parents, tester NB-999 ginned highest (35.00%) lint % whereas among the females, maximum (34.97%) lint was ginned by the line CIM-506 (Table II). The mean squares due to GCA lines and testers and SCA (lines x tester interaction) (Table I)
indicating that the lint percent was controlled by both additive and non-additive genes. Among the lines, CIM-506 (1.215) and testers NB-999 (0.265) and NB-111/S (0.130) exhibited positive GCA effects. The top three SCA scoring hybrids were CIM-499 x BH-147 (1.760), CIM-497 x NB-999 (1.600) and CIM-497 x NB-111/S (1.280) SCA. Similar results have also been obtained by Rady et al. (1999), Phundan et al. (2003), Nimbalkar et al. (2004) and Baloch et al. (2005). Present results suggested that line CIM-506 and testers NB-999 and NB-111/S being good general combiners may be potential parents for hybridization and selection programmes whereas among the F₁ hybrids CIM-499 x BH-147, CIM-497 x NB-999 and CIM497 x NB-111/S being best specific cross combinations are worth to be exploited for hybrid crop development to improve the lint percent.

Seed Index

Seed index and seed cotton yield are positively correlated that means increase in seed index will simultaneously increase the seed cotton yield. The mean performance of F₁ hybrids per se showed that hybrid CIM-506 x NB-999 manifested highest (8.05 g) seed index while next maximum value (7.79 g) was given by CIM-506 x NB-111/S (Table II). Among the lines, CIM-506 (6.80 g) and testers, NB-999 (6.50 g) recorded maximum seed index (Table II). Mean squares due to GCA and SCA were significant (Table I). Among the parental lines, CIM-506, CIM-499, NIBGE-2 and tester, NB-999 exhibited positive GCA effects. The SCA effects revealed that eight out of fifteen F₁ hybrids exhibited positive effects, yet the maximum SCA effect (0.910) was given by CIM-506 x NB-999 and next ranker was FH-901 x BH-147 (2.240). Rady et al. (1999), Khan (2003), Qasim et al. (2003), Nimbalkar et al. (2004), Saini et al. (2005) and Rokaya et al. (2005) also demonstrated significant GCA and SCA variances and their effects. Based on present results, parents CIM-506, NB-999 and NB-111/S proved to be the best general combiners hence may be useful for hybridization and selection programmes to improve seed index.

CONCLUSION

The GCA and SCA mean squares were significant, however the magnitude of variances due to GCA for both lines (females) and testers (pollinators) was higher than SCA (lines x tester interaction) indicating preponderance of additive genes as compared to non-additive. Among the lines, CIM-506 and in testers, NB-999 were found the best general combiners for all the traits studied and thus can reliably be used in hybridization programmes so as to select the desirable plants from segregating populations. Among the F₁ hybrids, crosses CIM-497 x BH-147, FH-901 x BH-147, CIM-499 x NB-999 and CIM-499 x BH-147 were best specific combiners for number of bolls per plant, boll weight, seed cotton yield and ginning outturn%, respectively. Therefore, these crosses could be promising to be exploited for hybrid crop development for different characters.

REFERENCES


