EARLY EVALUATION OF SINGLE CROSSES FOR YIELD IMPROVEMENT IN COTTON : RESULTS.

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Introduction

In Benin, to face the cotton production stagnation, yield improvement has become a priority for cotton research as a whole, including plant breeding.

Since 1997, an early evaluation trial (EET) has then been included in the cotton breeding program (Lançon et al., 2000). In two years, 1998 and 1999, 16 and 10 crosses respectively have been evaluated and the best lines selected.

Aside of \textit{ss st} selection which is the main objective of the EET, other useful results for the breeder could be obtained, such as heritability estimates of new traits and cross x density interaction.

Heritability of plant mapping traits.

The genetic study concluded that only four plant mapping traits exhibited sufficient heritability (table 1 and table 2) to be used for efficient lines selection. Among these, the number of vegetative branches and the number of fruiting branches bearing at least one boll were easier to evaluate than the percentage of fruit retention on the whole plant or on the early sites. Nevertheless, this level of heritability is considered to be a little too low for efficient mass selection.

### Table 1.- Branches and sites

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Number of Branches</th>
<th>Number of sites</th>
<th>Percent sites</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Végétative</td>
<td>Fructing</td>
<td>FBB</td>
</tr>
<tr>
<td>( h_N )</td>
<td>0,26</td>
<td>0,17</td>
<td>0,29</td>
</tr>
<tr>
<td>( CV_A )</td>
<td>0,11</td>
<td>0,04</td>
<td>0,09</td>
</tr>
</tbody>
</table>

\( h_N \): narrow heritability  \( CV_A \): additive variance (square root) as a percentage of the mean; FFB: fruiting branches bearing mature bolls;

### Table 2.- Number of bolls and bolls retention

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Number of bolls</th>
<th>Boll retention</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>On Fruit. Branches</td>
<td>P1%</td>
</tr>
<tr>
<td>( h_N )</td>
<td>0,12</td>
<td>0,04</td>
</tr>
<tr>
<td>( CV_A )</td>
<td>0,07</td>
<td>0,03</td>
</tr>
</tbody>
</table>

\( P1\% \): percentage of total bolls represented by the P1 positions; \( 10P1\% \): percentage of total bolls represented by the first 10 P1 positions; \( CBV\% \): percentage of total bolls born by the végétative branches.

Many other traits showed a low level of heritability (about 0,1) : the number of bolls borne by the fruiting branches or their concentration on the early sites, the estimated \textit{cut out} or the percentage of fruit retention on the late sites. They could be used for characterising and, eventually, selecting related groups of lines or varieties.
Cross x density interactions.

All the lines were classified according to their realised stand in the trial. Within a cross, each class could be characterised by the mean of all the included lines and on this basis, a cross x density study could be conducted.

Four different behaviours were identified. At both extremes, productive and reactive crosses were opposed to less productive and less reactive ones (fig. 1). Superior production generally matched with more important vegetative growth.

Interactions happened only with intermediate types, either relatively productive but not very responsive to increased stands ones or less productive but more responsive.

Graph 1. F3 lines yield and stand (Okpara 1998 and 1999).

Conclusion

The main purpose of EET is to evaluate crosses and lines at the F3 stage. However, these two results show that the design is powerful and accurate enough to get extra information: it can also provide a better understanding of the traits studied and a wider knowledge of the genetic material in comparison.

References