Progress in identifying sources of resistance to angular leaf Spot (*Phaeosariopsis griseola*) in Malawi

Rowland Chirwa and Barthlomew Chataika
PABRA – A CONSORTIUM OF AFRICAN BEAN NETWORKS

DONORS:
DFATD, SDC, USAID, BMGF, McKnight, ASARECA, CORAF, KHT, CCARDESA, AGRA, NGO, GO

WECABREN

CIAT

ECABREN

Southern Africa Bean Research Network (SABRN)
ALS is one of the most important diseases. Lemessa et al., 2011 reported yield loss due to ALS of up to 47%
Different market class varieties fetch different prices in local markets.
Approach:
✓ Developing Marketed-led bean varieties that combine grain yield with resistance to important diseases

Aim
✓ to identify the best genotypes as sources of resistance to ALS
Test sites:

✓ Chitedze (Medium altitude):
  Screen for grain yield
✓ Bembeke (high altitude):
  Screening for ALS
Screening genotypes in nurseries over 5 seasons (since 2006):

- 78 entries (72 from Colombia and 6 from other sources) constituted ALS nursery
- Genotypes were planted on single rows at Bembeke (ALS) and Chitedze (yield).
- Selection was used based on ALS score (1-9) at Bembeke, and grain yield at Chitedze
Evaluation of genotypes in replicated trials:

- 33 Genotypes (29 promising genotypes identified from nurseries and four taken from other nurseries) comprised the trials
- Testing was done in replicated trials at Bembeke and Chitedze over 2 seasons 2013 and 2014
- Trial design: RCBD
- Plot size: 4 rows x 4m long x 0.75m apart x 10cm between planting stations, one seed per station.
- Net plot: two middle rows x 2 meters long
- Data analysis: Using Genstat
Yield performance of common bean genotypes at Chitedze and reaction to Angular Leaf Spot at Bembeke in 2012/13 and 2013/14 seasons
Top ranking genotypes based on both reaction to ALS and seed yield (kg/ha)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Genotype</th>
<th>Chitedze Yld Kg/ha</th>
<th>ALS BBK</th>
<th>Seed size</th>
<th>Seed Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>*1</td>
<td>CNF 5558</td>
<td>1592</td>
<td>2.5</td>
<td>21</td>
<td>Carioca</td>
</tr>
<tr>
<td>*2</td>
<td>AFR 735</td>
<td>1564</td>
<td>3.0</td>
<td>38</td>
<td>Calima</td>
</tr>
<tr>
<td>*3</td>
<td>BM 12732-133VEF2000 135</td>
<td>1771</td>
<td>3.2</td>
<td>20</td>
<td>Khakhi</td>
</tr>
<tr>
<td>4</td>
<td>AFR703</td>
<td>1742</td>
<td>3.2</td>
<td>35</td>
<td>Red</td>
</tr>
<tr>
<td>5</td>
<td>AND277</td>
<td>1558</td>
<td>3.4</td>
<td>34</td>
<td>Calima</td>
</tr>
<tr>
<td>*6</td>
<td>BM 12732-57VEF2000 121</td>
<td>2006</td>
<td>3.7</td>
<td>21</td>
<td>Khakhi</td>
</tr>
<tr>
<td>*7</td>
<td>A 791</td>
<td>1762</td>
<td>3.7</td>
<td>20</td>
<td>Khakhi</td>
</tr>
<tr>
<td>8</td>
<td>AND279</td>
<td>1599</td>
<td>3.7</td>
<td>35</td>
<td>Calima</td>
</tr>
<tr>
<td>*9</td>
<td>A 686</td>
<td>1946</td>
<td>3.8</td>
<td>20</td>
<td>Khakhi</td>
</tr>
<tr>
<td>10</td>
<td>CAL143</td>
<td>1628</td>
<td>4.0</td>
<td>35</td>
<td>Calima</td>
</tr>
<tr>
<td>13</td>
<td>G 22267</td>
<td>1131</td>
<td>3.5</td>
<td>46</td>
<td>Red Kidney</td>
</tr>
<tr>
<td>14</td>
<td>RWR 222</td>
<td>1128</td>
<td>3.5</td>
<td>50</td>
<td>Red Kidney</td>
</tr>
<tr>
<td>15</td>
<td>G 22257</td>
<td>1127</td>
<td>3.7</td>
<td>38</td>
<td>Yellow</td>
</tr>
</tbody>
</table>
Some of the identified ALS lines

<table>
<thead>
<tr>
<th>BM 12732-133VEF2000 135</th>
<th>BM 12732-57VEF2000 121</th>
</tr>
</thead>
<tbody>
<tr>
<td>G22257</td>
<td>G7874</td>
</tr>
</tbody>
</table>
Results and Discussion

Yield performance of common bean genotypes at Chitedze and reaction to Flowery leaf spot and Bean common mosaic virus at Bembeke in 2012/13 and 2013/14 seasons
Summary

- Six genotypes identified which combine high yield and disease resistance ((CNF5558, AFR735, BM-12732-133VEF2000-135, BM 12732-57VEF2000-121, A791 and A686))

- SEA21, G5207, G22267, RWR222 and G22257 were also identified to be good sources of resistance to ALS though not competitive in grain yield

- We notice the occurrence of other diseases such as Flowery leaf spot and bean common mosaic virus hence the need to find other sources of resistance.
Countries with no breeding programs— but have released bean varieties. Some varieties are released in more than one country— “Nets that work for all”
Progression of Variety Development

- **Nurseries of different market classes and attributes:** eg. Calima, Sugar, BioFORT, BILFA, ALS and drought resistant
- **On-station bean trials**
- **Participatory variety selection**
- **Demo of potential or release bean varieties**
- **Seed increase initiatives**
Thank you