Finding niches for drought tolerant, short-season lablabs in semi-arid farming systems of Eastern Africa

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1. Introduction

Benefits of the multi-purpose legume - *Lablab purpureus*

- Ability to fix atmospheric N [green manure, short-term fallow, ...]
- Protein rich grains and healthy vegetable leaf and pod products
- High quality animal forage
- High agro-morphological and physiological diversity

BUT: Lack of adequate characterization data for short-season lablab varieties

2. Objectives

To collect key agronomic information, including photoperiod sensitivity estimates for potential short-season lablab varieties. New knowledge to be captured in crop-soil models (APSIM).

Model assisted scenario analysis used to devise low risk cropping strategies for drought prone farming regions.

3. Materials and methods

a. Lablab field evaluation – Limpopo Province South Africa

- Three field evaluations from 2002 to 2008 in Limpopo Province
- Germplasm: 33 lablab accessions
- Objective to select early flowering grain types
- Measurements: aboveground biomass production as DM, days to flowering, physiological maturity, seed and pod yield

b. Lablab photoperiod sensitivity evaluation - Germany

- Growth chamber pot experiment to determine day length x variety interactions [7 accessions x 4 day lengths x 3 replicates]
- Germplasm: Q6880, CPI52513, CPI52535, CPI52554, CPI81364, CPI60795, Highworth
- Day length durations: 10, 12, 14, 16 h @ 28°C
- Measurements: time to flowering, dry matter (DM) per pot at flowering

4. Results

4.1. Field evaluation

Table 1: Highest yielding and shortest season accessions from 3 evaluations [time to flowering and physiological maturity in days after planting (DAP), aboveground biomass production as DM, seed yield and pod number].

<table>
<thead>
<tr>
<th>Accession</th>
<th>Flowering (DAP)</th>
<th>Maturity (DAP)</th>
<th>DM (kg ha⁻¹)</th>
<th>Seed yield (kg ha⁻¹)</th>
<th>No. of pods/plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>CQ 3620</td>
<td>63-68</td>
<td>84-99</td>
<td>4734</td>
<td>574819</td>
<td>18.60</td>
</tr>
<tr>
<td>Q 6880</td>
<td>43-65</td>
<td>65-102</td>
<td>1359</td>
<td>532933</td>
<td>12.90</td>
</tr>
<tr>
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<td>52-73</td>
<td>91-99</td>
<td>610</td>
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</tr>
</tbody>
</table>

From 33 accessions evaluated, ten were found to be consistently early flowering (43 – 70 days after planting), maturing (65 – 102 DAP) and high yielding (seed yield: 331 – 1900 kg ha⁻¹) [Table 1; Whitbread et al., 2011].

4.2. Photoperiod sensitivity

Fig. 1: Time till flowering in day after planting evaluated for seven lablab accessions at different day lengths (10, 12, 14, 16 h) * indeterminate

The photoperiod response is highly variable among the evaluated lablab germplasm accessions. Whereas Q 6880B and CPI 81364 were consistently early flowering, others flowered under short day conditions but were indeterminate under long day conditions (Fig. 1).

5. Conclusions and future perspectives

- Providing new crop options to farmers in vulnerable areas of Eastern Africa is a food security priority.
- Lablab offers a diverse range of consistently early flowering and high yielding varieties; these are known to be more drought tolerant than the commonly used grain legumes such as beans and cowpeas.
- On farm testing, consumer acceptance and the development of agronomic packages and crop models will help to identify niches for short season accessions.