Applying APSIM for evaluating intercropping under rainfed conditions: A preliminary assessment

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Introduction

Current systems

Adaptable and resilient

WATER SCARCITY

CLIMATE CHANGE AND VARIABILITY

LOW AGRICULTURAL PRODUCTIVITY

FOOD INSECURITY

FOOD SECURITY

HIGH AGRICULTURAL PRODUCTIVITY
The objective: apply a well-calibrated model of APSIM for a sorghum–cowpea intercrop in assessing different management scenarios for best management practices.
Agronomic factors considered

• Planting dates-
  – Trigger method [Rainfall vs Evapotranspiration]
  – Fixed date 15th Sep, Oct, Nov, Dec, Jan [early to late]
  – Model generated [Soil water content approach]

• Fertiliser (72 kg N/ha to achieve 2t/ha)
  – 0
  – 50%
  – 100% of recommended

• Irrigation
  – Deficit irrigation
  – Weekly irrigation based of rainfall
Results

Sorghum yield (kg ha\(^{-1}\))

Cowpea yield (kg ha\(^{-1}\))

Water use efficiency (kg mm\(^{-1}\) ha\(^{-1}\))

Planting dates

28 - 30 Oct. 2015, Vic falls Zimbabwe
Results....

**Fertilizer application**

<table>
<thead>
<tr>
<th>N kg/ha</th>
<th>Sorghum</th>
<th>Cowpea</th>
</tr>
</thead>
<tbody>
<tr>
<td>72</td>
<td>1919.26</td>
<td>246.61</td>
</tr>
<tr>
<td>36</td>
<td>1924.73</td>
<td>246.7</td>
</tr>
<tr>
<td>0</td>
<td>1825.82</td>
<td>246.93</td>
</tr>
</tbody>
</table>

**Yield (kg/ha)**

- 1600
- 1800
- 2000
- 2200

**Irrigation**

<table>
<thead>
<tr>
<th>Rainfed</th>
<th>Weekly</th>
<th>Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1916.38</td>
<td>1938.02</td>
<td>1941.85</td>
</tr>
<tr>
<td>246.63</td>
<td>309.27</td>
<td>312.13</td>
</tr>
</tbody>
</table>

**Water Use efficiency (kg/mm/ha)**

- Rainfed
- Weekly
- Deficit

0 36 72
Conclusions/Recommendations

- Under optimum management options intercropping can improve productivity in semi-arid and arid agro-ecologies.
- Best management practices are crucial for increased resilience against climate uncertainties.
- Optimum planting dates should always be considered for improved yield and WUE – site specific.
- Promote the development of efficient irrigation systems for improved yield and WUE, especially for areas under economic water scarcity.

28 - 30 Oct. 2015, Vic Falls, Zimbabwe