Climbing beans in Rwanda: sharing the success, challenges and implications in enhancing food and nutritional security for small-holder farmers

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Why beans?

- Beans are rich in:
  - Proteins (22%)
  - Carbohydrates (32%)
  - Fibres (56%)
  - Micro-nutrients (Fe: 70 ppm); Zn (30 ppm); vitamins A and B
  - They are regarded as a “near-complete” food

Nutritional importance

Beans are a High Value Crop contributing:
- 65% dietary proteins and thus considered:
  - Vegetable “meat” for the poor and the rich in Rwanda
  - At 60 kg per capita (17 kg average for Africa) bean consumption in Rwanda is the highest in the world.

Guiding Policies

- Rwanda Vision 2020
- MDGS
- EDPRS
- PSTA
- CP
Why Climbing beans in Rwanda?

- High population density
- Increased Productivity per unit area: Climbing beans “save” land
- Intensify production
- Low disease incidence on pods far removed from soil surface
- Yield 3-5 tons per ha

Percentage of households cultivating different crops

Bean Research

- The goal of beans research is to contribute to sustainable improved food security, quality nutrition and income earning through improved productivity and commercialization of common beans.
Specific Objectives

1. To develop high yielding varieties that are: tolerant to multiple production constraints (diseases, pests, poor soils, drought) nutritionally superior with high market demand
2. To develop good agronomic management innovation (IDPM, IFSM)
3. To forge strategic partnerships to disseminate and promote utilization of research innovations

Major successes: Variety released 1962 - 2012

• About 54 released climbing bean varieties documented

Major agronomic traits

- High yields of 3.5 – 5.0 Ton per ha
- Resistant or tolerant to major pests and diseases
- Tolerant to heat and drought

Major economic attributes

A. Varieties in diverse market classes for food security and better nutrition
B. Navy beans for domestic and export markets
C. Snap bean for domestic and export markets (and source of vit. A)
D. Sugar and large white beans for domestic, regional and international markets
VARIETY DEVELOPMENT, SELECTION AND RELEASE

Climbing beans encourage integrated systems approach

Increasing soil fertility benefits of climbing beans and associated agro forestry interventions under smallholder production systems

Leafy canopy and biomass could play big role in CO2 sequestration?

Nodulation and N-fixation estimated at 40 kg N/ha

INTEGRATED SOIL FERTILITY MANAGEMENT

Conserve environment by massive leafy canopy providing soil cover most of the year

Variety accounts for 40% while good husbandry practices contribute 60% of the yield
Although the low and mid altitude varieties were officially released in Jan 2010, the farmers had acquired and planted the varieties through participatory variety selection.

Percentage of households selling more than half of their harvest, for various crops in 2011: level of crop commercialization

Source: EICV3, NISR 2012

Informal Trade Balance of Key Staples (Imports vs. Exports in May/June 2011)

Source: BNR July 2011
Some high yielding, drought and/or heat tolerant, nutritionally superior and market preferred bean varieties

Informal Export Primary Destinations
Key Staples (May/June 2011)

- Beans, Dried
- Potatoes, Irish
- Maize Flour
- Peas, Dried
- Maize
- Rice, Husked

Source: BNR July 2011

Staking challenges

Application of staking innovation
Participatory evaluation of staking innovations

<table>
<thead>
<tr>
<th>Option</th>
<th>Yield (kg/ha)</th>
<th>Group</th>
<th>Farmer preference (%)</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>50,000 (no trellises)</td>
<td>3,180</td>
<td>A</td>
<td>25.0</td>
<td>5</td>
</tr>
<tr>
<td>16,700 (+ trellises)</td>
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<tr>
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<tr>
<td>15,000 (+ trellises)</td>
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<td>A</td>
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<td>3</td>
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<tr>
<td>No stakes at all</td>
<td>1,727</td>
<td>B</td>
<td>8.3</td>
<td>6</td>
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</tbody>
</table>

SEED CHALLENGES

- Challenges include:
  - Quality and quantity
  - Distribution and access mechanisms

CURRENT BEAN SEED STATUS

<table>
<thead>
<tr>
<th>Seed system</th>
<th>Type of seed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal (3 %)</td>
<td>Breeder</td>
</tr>
<tr>
<td></td>
<td>Basic</td>
</tr>
<tr>
<td></td>
<td>Commercial</td>
</tr>
<tr>
<td>Informal (97 %)</td>
<td>Commercial?</td>
</tr>
</tbody>
</table>

Challenges that diminish sustained productivity

- Diseases and pests
- Soil nutrients
- Climatic related and socio-economic factors
Concluding Remarks

• Climbing beans have contributed positively to the food security and nutrition in Rwanda and beyond
• More research and resources are needed to find innovative solutions for the challenges that have been highlighted and others that may develop including climate change

Acknowledgements

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Thank you for your kind attention