**INTRODUCTION**

Bean crop is grown in all agro-ecological zones of Burundi by smallholder farmers. However, insufficient organic manure, unavailability and high cost of inorganic fertilizers have led to declining bean productivity.

According to Onasanya et al. (2009), beans require adequate supply of nutrients particularly phosphorus and potassium for high production.

Organic residues, green manure and farmyard manure have potential to improve crop production due to their plant nutrients supply and soil properties improvement.

Green biomass of tithonia has been recognized as an effective source of nutrients for many crops. Green leaf biomass of tithonia is high in nutrients, averaging about 3.5% N, 0.37% P, 4.1% K, 2.6% Ca and 0.41% Mg on a dry matter basis (Jama et al, 2000).

The study has been conducted in Moso region where *Tithonia diversifolia* is abundant and invasive.

The objective of the study was to assess the effect of green biomass of *Tithonia diversifolia* on grain bean yield.

**METHODS**

An on farm experiment was conducted to assess the effect of *Tithonia diversifolia* on bean yield in Moso agro-ecological zone of Burundi during 2010B, 2012B, 2013A and 2013B cropping seasons.

Four treatments were tested (1) Tithonia fresh biomass (22.2 t ha⁻¹) + DAP (100 kg ha⁻¹), (2) DAP (100 kg ha⁻¹) alone, (3) Fresh biomass of *Tithonia diversifolia* alone (22.2 t ha⁻¹), and (4) control (no fertilizer application).

Fresh biomass of *Tithonia diversifolia* was applied in furrows one to two weeks before sowing while DAP was applied at the sowing time.

The experimental design was a Complete Randomized Block Design (CRBD) with 6 replicates. IO2021245 “Inamunhire”, ISABU released bush bean variety was used in this study.

Data collected on grain yield were subjected to an analysis of variance using GenStat 14th Edition.

**RESULTS**

All treatments increased significantly ($p < 0.05$) bean yield than the control. Bean grain yield followed almost the same trend throughout the four cropping seasons (Table 1). Use of *Tithonia diversifolia*, mineral fertilizer (DAP) alone and combined (DAP + Tithonia) induced high yield compared to the control. Combining fresh biomass of Tithonia and DAP gave high yield compared to other treatments (Figure 1).

![Figure 1: Visualization of treatments effect during vegetative growth of beans](image)

Fresh green biomass of *Tithonia diversifolia* increased bean yield as the same as application of DAP at an estimated rate of 100 kg ha⁻¹. This demonstrates the high potential of *Tithonia diversifolia* in nutrient supply and soil properties improvement.

The fresh young green biomass of *Tithonia diversifolia* is an alternative solution to mineral fertilizers.

**Table 1: Mean bean grain yield by cropping season (kg/ha-1)**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>2010B</th>
<th>2012B</th>
<th>2013A</th>
<th>2013B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tithonia</td>
<td>1570 a</td>
<td>1417 a</td>
<td>567 a</td>
<td>1181 a</td>
</tr>
<tr>
<td>DAP</td>
<td>1525 a</td>
<td>1333 a</td>
<td>583 a</td>
<td>1014 a</td>
</tr>
<tr>
<td>Tithonia+DAP</td>
<td>1833 a</td>
<td>1550 a</td>
<td>700 a</td>
<td>972 a</td>
</tr>
<tr>
<td>Control</td>
<td>944 b</td>
<td>583 b</td>
<td>283 b</td>
<td>389 b</td>
</tr>
</tbody>
</table>

![Figure 2: Average bean yield per treatment](image)

**CONCLUSION**

From the study, most of the treatments performed well than the control. The application of fresh biomass of *Tithonia diversifolia* produced comparable bean yield to the sole application of inorganic fertilizers (DAP). The young biomass of Tithonia, has great potential to improve soil fertility by providing the amount of nutrients required by bean crop. Therefore, the green manure as *Tithonia diversifolia* could constitute an alternative solution to mineral fertilizers generally highly expensive and unaffordable for poor farmers.

**ACKNOWLEDGEMENT**

The financial and implementation facilities provided by CIAT/PABRA, Government Extension Services, and farmer’s organizations are gratefully acknowledged.

**REFERENCES**
