Increasing farmers’ dependency on fertilizers, herbicides and pesticides will decrease fossil energy consumption (SDG13), reduce farmer poverty (SDG2) and develop decent work (SDG8) in sub-Saharan Africa.

**Objectives**

- To identify “win-win” options among farmers’ cropping strategies as a basis for promoting sustainable agriculture.

**Methods**

- **Sites** - Two Beninese villages; Zonmon in the south and Pelebina in the north-west.
- **Statistical analyses** - Redundancy analyses to investigate the relationship between farm performances (measured as food production, income and labour productivity), farm resource endowment (cash available for purchasing chemical inputs and production, income and labour assets), and farmers’ cropping strategies.

**Results**

- Farmers’ cropping strategies accounted for 43% and 62% of variation in farm performances and resource endowment in Zonmon (axes RDA1 and 2 in Figure 1) and Pelebina (axes RDA1, 2 and 3 in Figure 1), respectively.
- In Zonmon, large areas under maize (e.g., in farm 65) were associated with high farm performance and low chemical inputs cost but with high labour use and large area owned in uplands (Table 1 and Figure 1). Large areas under rice (e.g., in farm 10) were associated with high farm income and food production but also with low labour productivity, high chemical inputs cost, high seeds and planting materials cost, high labour use, and large area owned in uplands.
- In Pelebina, large areas under assina yam (e.g., in farm 44) were associated with high farm performance and low chemical inputs cost but also with high seeds and planting materials cost (Table 1 and Figure 1). Large areas under cotton (e.g., in farm 66) were associated with high farm income but also with low food production, low labour productivity, high chemical inputs cost, high labour use, and large area owned in uplands.

**Conclusion**

- Cropping strategies supported by credits (rice in Zonmon; cotton in Pelebina) were not among the win-win options.
- The identified win-win options (Figure 2) were not viable for farms with low levels of resource endowment (land and labour assets).

**Hypotheses**

- “Win-win” options exist among current farmers’ cropping strategies: substantial farm food production, income and labour productivity with limited chemical inputs.

- These options are not feasible for low-resource endowed farms.

**Background**

- Increases in farm food production, income and labour productivity are needed to meet the growing food demand (SDG1), reduce farmer poverty (SDG2) and develop decent work (SDG8) in sub-Saharan Africa.
- Decreasing farmers’ dependency on fertilizers, herbicides and pesticides will decrease fossil energy consumption (SDG13), preserve human health (SDG3) and life in water and on land (SDG14 and 15).

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**Table 1.** Regression coefficients from RDA analyses and adjusted R squares from partial RDAs.

<table>
<thead>
<tr>
<th>Objective RDA response variables</th>
<th>Zonmon Intercept (mean)</th>
<th>Rice</th>
<th>Maize</th>
<th>Pelebina Intercept (mean)</th>
<th>Cotton</th>
<th>Assina yam</th>
<th>Cassava</th>
<th>Noudosse yam</th>
<th>Sorghum + cowpea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Food production (kcal)</td>
<td>2,164,836</td>
<td>528,773</td>
<td>864,871</td>
<td>10,252,665</td>
<td>-157,045</td>
<td>1,693,844</td>
<td>833,535</td>
<td>537,532</td>
<td>2,637,201</td>
</tr>
<tr>
<td>Income (FCFA)</td>
<td>135,879</td>
<td>183,234</td>
<td>50,847</td>
<td>1,359,350</td>
<td>14,547</td>
<td>207,600</td>
<td>39,269</td>
<td>-119,460</td>
<td>18,329</td>
</tr>
<tr>
<td>Labour productivity (FCFA person-day)</td>
<td>1875</td>
<td>878</td>
<td>104</td>
<td>6575</td>
<td>-266</td>
<td>1085</td>
<td>-371</td>
<td>1138</td>
<td>-1597</td>
</tr>
<tr>
<td>Min Chemical inputs (FCFA)</td>
<td>9594</td>
<td>32,704</td>
<td>-1118</td>
<td>69,004</td>
<td>7496</td>
<td>-7334</td>
<td>7544</td>
<td>6191</td>
<td>6430</td>
</tr>
<tr>
<td>Seeds and planting materials (FCFA)</td>
<td>18,718</td>
<td>46,830</td>
<td>-1320</td>
<td>185,060</td>
<td>-1551</td>
<td>42,503</td>
<td>6152</td>
<td>45,870</td>
<td>-11,494</td>
</tr>
<tr>
<td>Labour use (person-days)</td>
<td>119</td>
<td>245</td>
<td>23</td>
<td>304</td>
<td>25</td>
<td>-9</td>
<td>23</td>
<td>44</td>
<td>-1</td>
</tr>
<tr>
<td>Area owned in uplands (ha)</td>
<td>2.00</td>
<td>0.85</td>
<td>0.13</td>
<td>10.01</td>
<td>0.32</td>
<td>-0.03</td>
<td>0.45</td>
<td>0.48</td>
<td>0.52</td>
</tr>
<tr>
<td>Area owned in wetlands (ha)</td>
<td>0.18</td>
<td>0.04</td>
<td>0.01</td>
<td>0.79</td>
<td>0.03</td>
<td>0.02</td>
<td>0.11</td>
<td>-0.04</td>
<td>0.35</td>
</tr>
</tbody>
</table>

**Figure 1.** RDA triplots. A. Zonmon (axes RDA1 and 2). B. Pelebina (axes RDA1 and 2). C. Pelebina (axes RDA1, 2, and 3). Performance and resource endowment variables are symbolised by red diamonds. Cropping strategy variables are symbolised by blue arrows. Farm scores are symbolised by black points and/or farm identification numbers.