NO-TILLAGE FOR THE DIVERSIFICATION OF RICE-BASED FARMING SYSTEMS IN CAMBODIA

Cambodian agriculture is largely based on the cultivation of rice under conventional tillage systems. Farming systems diversification is one of the goals of the Cambodian National Agricultural Policy, that is being implemented by the Ministry of Agriculture, through the Agricultural Productivity Improvement Project (APIP) financed by the World Bank. Under the structure of APIP, the Farming Systems and Agriculture Economics Subcomponent (FSAE) focus on the promotion of an agro-ecological approach for the development of sustainable farming systems. An Integrated Crop Management Project sponsored by the Norwegian Trust Fund was implemented into the context of the FSAE subcomponent with the purpose of mainstreaming agro-ecological approaches.

Under this institutional context, the FSAE subcomponent is implementing on-farm trials that aims to assess the technical and economical feasibility and social acceptance of some options for the diversification of rice-based farming systems.

Materials and Methods

The technical option being tested is the cultivation of soybeans or mungbeans after harvesting of rice, under no-tillage into the rice residues. Twelve on-farm trials were established in irrigated lowland rice cropping systems located at the districts of Svay Rieng, Pray Veng, Kompong Thom and Kompong Cham. The average size of the farms is 2.1 hectares and the use of external inputs is very low. Pesticides are not used by these farmers.

The FSAE team provided the seeds for the farmers, but other inputs, as well labour, are provided by the farmers themselves. The decision whether to plow or not, whether to apply fertilizers, is made by the farmers. During the crop development, farmers were interviewed in order to get their evaluation of the trials.

Soybeans and mungbeans were sown under No-Tillage by the majority of the farmers (8 out of 12 trials for soybeans and 9 out of 12 trials for mungbeans). The seeds were placed manually into a hole opened by a stick. There was almost no weeds infestation by the planting time, thus no weed management was necessary.

Despite the many options available to be used as cover crops, the team decided to work with species that are already known by farmers and that have additional value other than cover crops. In addition to soybeans and mungbeans, pigeon peas will be introduced in the trials for the next season, as another option to be cultivated after rice. In spite of the fact that this crop is not normally cultivated in the rice areas, pigeon pea is already known and used by some farmers in Svay Rieng and Pray Veng provinces. The team observed that pigeon pea was cultivated in the dikes, and when asked, farmers mentioned the many uses of this plant:

1) young leaves are used as ingredient for a traditional Cambodian soup and for a traditional cake;
2) grains are used as food, and some farmers also use as fodder for pigs;
3) roots and leaves are used as traditional medicine for humans, and roots are also used as medicine for livestock. They also are easy to grow and are drought-resistant.

Results and discussion

The data presented in Table 1 shows positive results for the cropping season 2002-2003. Sowing soybeans and mungbeans after rice, represents an additional income ranging from 1.0 to 1.6 USD/working day. In addition, this proposal fits other farmer’s resources and needs (according to what was discussed with farmers during the interviews), if the following aspects are to be considered:

- It fits into the agrarian system: one particular concern discussed with the farmers was the issue of free condomisation of the conventional system. It is necessary turn over the system is not yet completely turned into No-tillage, because rice is still being cultivated under conventional system. It is necessary to know which could be the incentives to know which could be the incentives to the farmers to change the system of rice cultivation.

Table 1: Economic results of soybeans and mungbeans cultivation under NT into rice residues. Average of 12 on-farm trials in the districts of Svay Rieng, Pray Veng, Kompong Thom and Kompong Cham, Cropping season 2002-2003.

<table>
<thead>
<tr>
<th></th>
<th>Soybeans</th>
<th>Mungbeans</th>
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</thead>
<tbody>
<tr>
<td>Gross margin (USD/ha)</td>
<td>137.0</td>
<td>23.0</td>
</tr>
<tr>
<td>Input costs (USD/ha)</td>
<td>30.0</td>
<td>38.0</td>
</tr>
<tr>
<td>Seeds (USD/ha)</td>
<td>15.0</td>
<td>23.0</td>
</tr>
<tr>
<td>Fertilizer (USD/ha)</td>
<td>15.0</td>
<td>15.0</td>
</tr>
<tr>
<td>Labor requirement (days/ha)</td>
<td>40.3</td>
<td>45.2</td>
</tr>
<tr>
<td>Return to labor (USD/day)</td>
<td>1.6</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Conclusion

The results from the trials showed the technical and economical feasibility, as well as the social acceptance of cultivation on soybeans and mungbeans under no-tillage after rice. The main role of No-tillage was to allow the cultivation of a second crop after rice, thus taking advantage of the residual soil moisture. However, the system is not yet completely turned into No-tillage, because rice is still being cultivated under conventional system. It is necessary to know which could be the incentives for the farmers to change the system of rice cultivation.

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NO-TILLAGE after rice cultivation

NT of soybeans on rice residues at Mr. Sieng Sameth's farm, Svay Rieng District