Research Application Summary

Evaluating the level of adoption of improved agrosilvopastoral technologies, factors affecting adoption and establishing the species and systems adopted among small holder farmers of Buhera and Mutasa Districts of Manicaland Province, Zimbabwe

Chihota B.P., Mupanda K., Mrema M., Tagwira F. & Ajayi O.C.

Background
Two thirds of the rural populations in most countries of Sub-Saharan Africa subsist on less than US$1 a day. The farmers’ economies have weak linkages to the markets and they have little or no access to external inputs. The increasing cost of inputs and high transport costs make external inputs unaffordable for the smallholder farmer (Spencer, 2002). Inorganic fertilizer use has declined to 8kg/ha (NEPAD, 2006). Smallholder farmers cannot afford stock feeds for supplementing limited and poor quality pasture during the dry and cold season. Land degradation and siltation are an environmental concern that also reduces yields (Rattso, 1996). Crop and livestock yields are low and declining. Countries like Zimbabwe, Malawi, Zambia, Mozambique and Botswana are affected and as a result, food insecure (Bohringer, 2002).

Some agroforestry technologies have been shown to improve the soil and animal fodder availability (Dzowela, 1994; Govere, 2003). Agroforestry can improve crop and livestock production by providing relatively less costly, more affordable and locally available inputs for fodder and soil amendments to the smallholder farmer. Government departments and non-governmental organizations (NGOs) like World Agroforestry Centre (WAC) are scaling up agroforestry through training and distributing germplasm to the smallholder farmers in the region. Not much has been done on assessment of adoption and factors that affect adoption of agroforestry in different geographical areas and agricultural sectors in Zimbabwe. Improved agroforestry was introduced by WAC to Buhera district in 2002 and in Mutasa district, since 2005. Assessment of adoption of agroforestry in these districts has not been done. The objectives of this study are, therefore, to establish (1) the level of adoption of the technologies among trained and non trained small holder farmers in the two districts, (2) the factors that affect adoption of the technologies and (3) the species and systems that are adopted in various agrosilvopastoral systems in the two districts.

Methodology
Key informant interviews were conducted among organizations including WAC, Agriculture Research and Extension (AREX), Natural Resources Board (NRB), and PLAN that are involved in research, training and extension in agroforestry. A formal survey was then conducted in December 2006 among small holder farmers in Manicaland. The province was stratified into agroecological zones. Buhera and Mutasa districts were chosen from the three districts to which agroforestry had been implemented by WAC. Buhera in agroecological zone IV receives annual rainfall of 450-650mm. Mutasa in agroecological zone II receives 750-1000mm per annum. From Buhera, 100 farmers from one ward, Nerutanga, and 200 farmers from 2 wards, Sadziwa and Madwaramaredza in Mutasa, were interviewed. The difference in sample size and number of wards selected for the survey is because Buhera and Mutasa have a total household number of 12,550 and 39,847 respectively. From Sadziwa ward 75 trained and 25 untrained, and in Madwaramaredza, 74 trained and 26 untrained farmers were purposefully selected and interviewed. All ten farmers trained as trainers in Nerutanga were interviewed. Snow ball sampling was used to identify the farmers trained by farmer trainers in Nerutanga ward. A total of 42 farmer trained and 48 untrained farmers were also interviewed. Untrained farmers were interviewed to assess farmer awareness.

Results
Of the farmers interviewed from each ward, 33% from Nerutanga ward of Buhera district, 82% from Sadziwa and 50% from Madwaramaredza ward of Mutasa district are testing agroforestry as shown in Figure 1. Testing of agroforestry was significantly higher among trained farmers.
(P<0.001). In Nerutanga, 44.8% of the trained farmers and only 8.3% of the untrained are testing agroforestry. In Sadziwa 88.1% of the trained and 50% of the untrained farmers, and 66.2% trained and only 3.8% of the untrained in Madwaramaredza were testing the technology. Testing of agroforestry among untrained farmers was relatively high in Sadziwa, probably because species grown in home gardens are successful. Home gardens are protected from livestock and frequently watered as the area receives high rainfall, making them successful such that other farmers appreciate the technology and benefits. The non trained farmers sometimes request training and planting material for testing from practising farmers.

Figure 1. Percentage farmers testing agroforestry at ward level in selected wards

Extension methods used in disseminating agroforestry affected adoption in all wards. Adoption was highest where large numbers of farmers were trained. WAC and PLAN trained a total of about 380 farmers in large groups of about 60 at each of 6 workshops conducted in Sadziwa. In Nerutanga ward, only 10 farmers were trained by WAC as farmer trainers, and less than 90 were trained by farmer trainers. In Sadziwa where 27% of the household population was trained, over 80% of the farmers were testing the technologies (Figure 1). In Nerutanga, only 8% of the population was trained and less than 35% was testing the technology. In Nerutanga ward, 90% of the WAC trained farmers compared to 25% of the farmer trained farmers were testing agroforestry. Of the 44 interviewed untrained farmers in Nerutanga, only 9.1% are testing the technology.

Testing of agroforestry was not significantly affected by gender in Nerutanga and Sadziwa wards (Table 1).

Table 1. Percentage of farmers testing agroforestry among trained and untrained farmers in selected wards

<table>
<thead>
<tr>
<th>Ward</th>
<th>Practising %</th>
<th>Non Practising %</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Nerutanga</td>
<td>Trained</td>
<td>63.2</td>
<td>51.5</td>
</tr>
<tr>
<td></td>
<td>Non trained</td>
<td>8.3</td>
<td>8.3</td>
</tr>
<tr>
<td>Sadziwa</td>
<td>Trained</td>
<td>86.4</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>Non trained</td>
<td>60</td>
<td>33.3</td>
</tr>
<tr>
<td>Madwaramaredza</td>
<td>Trained</td>
<td>72.5</td>
<td>52.2</td>
</tr>
<tr>
<td></td>
<td>Non trained</td>
<td>27.5</td>
<td>47.8</td>
</tr>
<tr>
<td>All wards</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*, **, *** Significant at P<0.05, P<0.01 and P<0.001 respectively; NS: Non significant
Testing was significantly influenced by gender in Madwaramaredza ward, where 72.5% of the female and 52.2% of the male farmers are testing agroforestry. None of the male and only 6.3% of the female non trained farmers in this ward are currently testing agroforestry probably because they had not observed the benefits.

Live fencing, alley cropping, contour banding, improved fallows, plantations and intercropping were being tested by the farmers. In all wards agroforestry is successful in home gardens as they were fenced and protected from livestock. Live fencing with mainly Jatropha, sometimes other species, was the most popular, in Nerutanga (17.1%) and Sadziwa (60.6%). Improved fallows were the least popular being practised by 6.1% of the practising farmers in Sadziwa, 3.1% in Nerutanga and none in Madwaramaredza. Small land unit holdings, limited quantities of planting material, death of plants during the dry season, limited water, high labour requirement for watering and destruction by livestock discourage adoption of improved fallows. Seed multiplication in the communities was low because of pest attack on flowers, fruit and seed and mortality of species before reproduction.

Sesbania sesban, Tephrosia vogelli, Cajanus cajan, Leucaena species, Gliricidia sepium, Jatropha carcus, Uapaka kirkiana, Moringa oleifera and Acacia angustissima were grown for soil improvement, livestock feed, fruit, grain, herbs, poles, fuel wood, live fencing, and in some instances for oil and soap making in all wards. Some farmers, who have established and are maintaining the project, are realizing the benefits, particularly in soil improvement.

Conclusion
Testing and adoption of agroforestry in all wards is promising, considering the differences in climate and results in some farmers’ fields. Results in some farmers’ fields have proven that the technology can alleviate the impact of reduced fertilizer application and lack of fallowing. The major limitations to farmers include lack of know how, water shortage and small land holdings. There is potential for more farmers to adopt the technology.

Recommendations
Provenances that can adapt better to the different zones may help reduce failure to establish and dry season losses through death. Establishing the species at the beginning of the rainy season could also reduce loss of plants through drying up during the dry season. Training more farmers in large groups, where possible, may also promote adoption. Better accessibility to planting material may promote adoption of agroforestry. Seed multiplication in protected community garden could ease seed shortage.

References

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