Four cell analysis: a participatory method to assess on-farm diversity status

The Four cell analysis is a rapid assessment technique to assess the amount and distribution of crop diversity within farming communities. It takes into account richness and evenness aspects of inter- or intra specific diversity. This participatory tool was used to map out fruit tree diversity in the home gardens and orchards of 36 project communities, but can be applied also on annual crops. It is a method to identify common, unique and rare species or varieties and helps to find reasons for their current status. This tool can help in selecting sites for on-farm and in-situ conservation projects. The tool helps to understand the status of diversity and to decide which type of interventions is needed for the conservation of specific species and varieties. When repeated over time (every three or five years) it can give valuable insight in the rate of loss of diversity in that specific area. The method can be applied also when focusing on wild relatives, i.e. species collected from forests or communal landscapes.

Purpose:
• Measure the abundance and distribution of local crop diversity (richness & evenness)
• Identify common, unique and rare/endangered species or varieties
• Understand and document reasons for the dynamic status of species or varieties within a community and enhance your knowledge to guide transformative interventions.

The method starts with a focus group discussion (FGD) among farmers from a specific village, of preferably mixed gender and often older age groups that are locally known to be knowledgeable about the target species. The exercise can be done to assess the varietal diversity status within one species (intra-specific) or species diversity status within one genus or in general (inter-specific). The species or varieties are categorized into four categories using two indicators abundance and spread. The scientist, who acts as the facilitator, asks the farmers to name and list all the different species or varieties that still thrive within their village boundaries. After completing an initial list, preferably using meta-cards for each specific variety or species, he will ask the group to identify if a certain species or variety is abundant available or rare (cultivated in large area/many trees; cultivated in small area/few trees) and maintained across many households or just few households (many households; few households).
When to use the tool:
- To identify which species or varieties are found in the community and which species or varieties are common, unique and rare.
- It helps to identify the abundance, distribution and spread of these varieties in terms of richness, evenness and divergence at community level.
- It documents the key characteristics and reasons why crop species or varieties are in a certain dynamic stage, regarding their abundance and distribution within the community.
- It further facilitates the identification of potential interventions for the conservation and/or promotion of a crop species or variety within a specific community.

Four Cell analysis (FCA) can be done on the ground preferably with real samples of the varieties/crops, or on a large piece of paper with cards. Draw a cross on the paper sheet; with many trees on the top, few trees on the bottom, few HH on the right and many HH on the left side. Sometimes it might be useful to discuss within the group the cut-off point to define what means many and few trees or households.

Key questions to ask during the exercise
- Can you tell the names of all distinct varieties or species grown/found in your village?
- What are the varieties/species that are grown in large area (many trees) by many households?
- What are the varieties/species that are grown in large area (many trees) by few households?
- What are the varieties/species that are grown in small area (few tree) by many households?
- What are the varieties/species that are grown in small area (few trees) by few households?
- Ask for every variety/species, why it was placed in that specific cell? For example why variety/species A is found only in small number of trees/area and used only by few households? Which traits, uses or reasons are responsible for this current status?
- Which varieties/species are rare or unique and should be prioritized for conservation or promotion? Which potential interventions could be initiated to conserve and/or promote these varieties or species?
- Can you estimate how many trees/acres are found in total in the village for each variety or species? It might help to provide categories; i.e. only 1 or 2 trees/acre, about 10-100 trees/acre, about 100-1,000 trees/acre or more than 1,000 trees/acre. The numbers can help to estimate diversity evenness on community level.
This whole exercise, can be followed or preceded by a transect walk through the village visiting 4-5 farm plots, home gardens or orchards for validation of findings.

Analysis of the results achieved during former exercises showed that there was a common pattern between the diversity status and the type of value associated with crop diversity on farms, see table 1. However, interpretation of diversity status differs for forest or communal lands as compared with private owned land, as shown in table 2.

Table 1: Interpretation of results for crop diversity found on private farms

<table>
<thead>
<tr>
<th>Categories</th>
<th>Many Households</th>
<th>Few Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Area/many trees</td>
<td>Varieties grown for food security or for the market</td>
<td>Varieties that are newly introduced or with specific traits and adaptability to local abiotic context (unique)</td>
</tr>
<tr>
<td></td>
<td>(common)</td>
<td></td>
</tr>
<tr>
<td>Small Area/few trees</td>
<td>Varieties cultivated for home use or related to cultural or religious traditions and rituals (unique)</td>
<td>Varieties with low use value or specific use values to particular families (rare and under threat)</td>
</tr>
</tbody>
</table>

Table 2: Interpretation of results for crop diversity found in forest and communal landscapes

<table>
<thead>
<tr>
<th>Categories</th>
<th>Many Households</th>
<th>Few Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many trees/plants</td>
<td>Varieties or species collected for home use or for the market (common and potentially under threat)</td>
<td>Varieties or species with low use value or specific use values to particular families (common or abundant)</td>
</tr>
<tr>
<td>Few trees/plants</td>
<td>Varieties or species collected for home use or for the market (under threat)</td>
<td>Varieties or species with low use value or specific use values to particular families (rare)</td>
</tr>
</tbody>
</table>