9. USES OF WILD PLANTS

Local herbalists looking for medicinal plants in the Turkestan Range, Kyrgyzstan.

Photo: L. Pawera
9. USES OF WILD PLANTS

9.1 COLLECTION OF DATA ON THE USE OF WILD PLANTS

Wild plants continue to be an important part of the human diet, and have cultural, medicinal and economic values for local communities. Many wild species are actively managed to a greater or lesser extent. The use of wild plants is studied using ethnobotanical approaches – a combination of anthropological, ethnographic, botanical and ecological approaches (Martin 2004, Albuquerque and Alves 2016). Such studies can help to:

- Describe culturally important species and their uses
- Assess the sustainability of harvesting
- Identify species that could be domesticated or included in breeding programmes
- Identify underutilized species, or those with the potential to contribute to nutrition, climate-change resilience and other aspects of community well-being
- Determine changes and dynamics of traditional knowledge over time
- Enable intracultural and cross-cultural comparison of traditional knowledge.

Information about the use of wild plants is most commonly collected through interviews with local people, but may also be collected through focus group discussions or household surveys. Because not everyone has the same knowledge of wild plants, their uses, locations and harvesting, it is important to identify key informants – those with knowledge of local wild plant resources and their uses. Interviewing key informants is the best approach when the objective of the study is to document as much knowledge as possible in a short time or to document rapidly disappearing traditional knowledge.

Often, certain knowledge is held by specialist ‘custodians of knowledge’. For example, this is the case with medicinal plant knowledge, which is commonly maintained by herbalists, traditional healers or shamans. In this case, the method employed for selection of informants will be purposive (targeted) sampling or snowball (chain-referral) sampling (Tongco 2007; see also ‘Non-probability sampling’ in Section 2). One of the important decisions for the study will be whether to categorize plant uses according to folk categories (this would be a more emic and culturally-sensitive point of view) or to follow scientific categorization of plant uses, such as the Economic Botany Data Collection Standard (Cook 1995). The latter would be a more etic or scientific approach, and is more widely used in the international context and for comparative purposes. Emic perception is that of the community, while etic perception is an external (scientific) point of view.

FOLK CATEGORIZATION AND FOLK TAXONOMY

Communities often have specific terminologies and ‘folk categories’ for wild food plants, wild vegetables, forest medicines, etc. (see also Local names and classification systems in Section 2). One of the important decisions for the study will be whether to categorize plant uses according to folk categories (this would be a more emic and culturally-sensitive point of view) or to follow scientific categorization of plant uses, such as the Economic Botany Data Collection Standard (Cook 1995). The latter would be a more etic or scientific approach, and is more widely used in the international context and for comparative purposes. Emic perception is that of the community, while etic perception is an external (scientific) point of view.

FREELISTING

In freelisting, informants are asked to list, for example, all wild food plants that people in their community use and their answers are noted in the order in which they are given. It is a simple and effective method for capturing a large amount of traditional knowledge, and for quantifying plants’ cultural importance (Quinlan 2005). The ease of freelist interviewing makes it ideal for collecting ethnobotanical data from a large sample.

The assumptions of the freelisting method:

- More commonly used items are cited by more people (frequency of citation)
- Informants tend to cite more important items earlier in the list (position in the list)
- A more knowledgeable person will give a longer list than a less knowledgeable person (number of listed plants)

Thus, freelisting will indicate:

- What items belong to a particular domain (folk categorization)
- What items are the most important in that domain (cultural importance)
- Who is most knowledgeable about the topic (number of items an individual informant lists).
Freelisting is conducted with the minimum of 30 informants, but gives better results with 50 or more informants. Individual informants are asked to list all plants they know (or use) in a particular category (e.g. wild food plants used, fruits consumed, medical plants used for gastrointestinal disorders).

For wild food plants, the interviewer asks:

- What wild food plants do you know?  

The freelist for one informant may look like this:

- Kangkung air
- Bayam liar
- Daun kelor
- Rimbang
- Keladi
- Mangga hutan
- Kapunduang

Depending on study objectives, this would then be followed up with separate questions for other use categories, e.g.:

- What medicinal plants do you know?
- What wild fodder plants do you know?
- What wild plants do you know that can be used for firewood?
- What wild plants do you know that can be used for construction?

**ETHNOBOTANICAL QUESTIONS**

The freelisting method results in lists of plants known to or used by the community for different purposes. Additional questions are needed to find out about the different aspects of local knowledge and use.

Go back to the list of plants, and ask the following questions about each plant:

- Does the plant have other local names? If so, note down all plant names.
- What part(s) of the plant do you use (bark, root, flower, leaves...)?
- What is the mode of preparation or administration (infusion, decoction, raw, cooked...)?
- Where do you gather it (e.g. near to river, in forest, on fallow land, in home garden, in rice field)?
- How available is this plant (i.e. use a scale from 1 to 5, where 1 is rare and 5 is highly abundant)?
- Does the plant have some other uses beside the main use (medicine, spiritual use, technical material, and others)?

Additional questions can provide information on a plant’s economic value, seasonal availability, time or distance to collection place, source of knowledge, quantity collected or frequency of use. The answers can be tabulated as in Table 9.1.

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*2 The list of plants given will depend on the exact question asked. For example, if informant is asked “Which wild food plants do you use?”, the list of used plants will be shorter than if we ask for known plants.*
9.2 DATA ANALYSIS

DIVERSITY OF USED WILD PLANTS

Information about wild plants is usually organized by species, indicating their uses and the number of informants who mentioned them. Basic analysis includes the organization of data into the botanical families, genera, and species they belong to, and some of the following calculations:

- The total number of useful species
- The number of species per botanical family
- The number of species per use category
- The most commonly used wild species based either on the number of times a species is cited in freelist or on the percentage of informants who cited the species.

The data can be further analyzed to calculate quantitative ethnobotanical indices, such as use reports, salience index, use value or cultural importance index (see below). These indices show the importance of particular species in the community.

STATUS AND DISTRIBUTION OF PLANT KNOWLEDGE IN THE COMMUNITY

To understand the distribution of knowledge in the community and traditional knowledge richness, calculate:

- The average number of species mentioned per informant
- The average number of species mentioned in particular use categories per informant

USE REPORT

The most basic step towards quantification of ethnobotanical information is to convert the collected data on plant uses into use reports. Generally, one use report is when one informant mentions the use of one species in one use category. For example, in a study of wild food plants in the White Carpathians in the Czech Republic (Pawera et al. 2017), the first informant stated that they used elderberry (*Sambucus nigra*) as follows:

- Mature fruits for jams, preserves or marmalade (category ‘Fruits’)
- Flower for tea (category ‘Recreational beverages’)
- Flowers coated in batter and fried consumed as a snack (category ‘Others’).

This informant thus gave the species three use reports. In the whole study, which involved 65 informants, *Sambucus nigra* was referred to as being used in five different food categories and obtained a total of 71 use reports. The number and percentage of use reports for particular use categories or for botanical families indicate the importance of that use category or plant family. For instance, in the White Carpathians study, the highest share of use reports (31%) was recorded for the category ‘Fruits’.

SALIENCE INDEX

The salience index is a value expressing the cultural significance of freelist items. The salience index (of one item) is calculated using the following formula:

\[
\text{Salience Index} = \frac{\text{inverted rank}}{\text{number of all items in the list}}
\]

where rank is the position/order of the plant in the freelist.

The composite salience for all informants can be calculated by summing the individuals’ salience scores and dividing the result by the number of informants (Table 9.5).


Table 9.2 Analysis of freelist from one informant

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Rank (order in the list)</th>
<th>Inverted rank/no. of all items</th>
<th>Salience index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kangkung air</td>
<td>1</td>
<td>5/5</td>
<td>1</td>
</tr>
<tr>
<td>Bayam liar</td>
<td>2</td>
<td>4/5</td>
<td>0.8</td>
</tr>
<tr>
<td>Daun kelor</td>
<td>3</td>
<td>3/5</td>
<td>0.6</td>
</tr>
<tr>
<td>Rimbang</td>
<td>4</td>
<td>2/5</td>
<td>0.4</td>
</tr>
<tr>
<td>Keladi</td>
<td>5</td>
<td>1/5</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Table 9.3 Analysis of freelists from two informants

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Informant 1</th>
<th>Informant 2</th>
<th>Total Salience</th>
<th>Composite Salience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kangkung air</td>
<td>1</td>
<td>0.2</td>
<td>12</td>
<td>0.6</td>
</tr>
<tr>
<td>Bayam liar</td>
<td>0.8</td>
<td>0.6</td>
<td>12</td>
<td>0.6</td>
</tr>
<tr>
<td>Daun kelor</td>
<td>0.6</td>
<td>0.4</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Rimbang</td>
<td>0.4</td>
<td>1</td>
<td>14</td>
<td>0.7</td>
</tr>
<tr>
<td>Keladi</td>
<td>0.2</td>
<td>0.8</td>
<td>1.0</td>
<td>0.5</td>
</tr>
</tbody>
</table>
### Table 9.4 Example of final ethnobotanical table with wild food plants used traditionally in the White Carpathians, Czech Republic.

**Source:** Pawera et al. (2017)

<table>
<thead>
<tr>
<th>Family, Species</th>
<th>Local Name</th>
<th>Habitat</th>
<th>Food Category</th>
<th>Parts Used And Mode Of Use</th>
<th>Use Report</th>
<th>Use Value</th>
<th>Actual Use</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alliaceae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allium vineale</td>
<td>Planá pažitka</td>
<td>AN</td>
<td>VEG</td>
<td>Leaves eaten raw on the bread, added to soups, scrambled eggs</td>
<td>5</td>
<td>0.08</td>
<td>++</td>
</tr>
<tr>
<td>Allium scorodoprasum</td>
<td>Planý/divoký česnek</td>
<td>ME/AN</td>
<td>SEA</td>
<td>Bulbs as garlic substitution</td>
<td>2</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Allium ursinum</td>
<td>Medveděl česnek, Hadi česnek, Česnečica</td>
<td>FO, SEA</td>
<td>VEG</td>
<td>Leaves eaten raw, added to salads</td>
<td>27</td>
<td></td>
<td>+++</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SEA</td>
<td>Fresh/dried leaves added to sauces and soups</td>
<td>4</td>
<td>0.54</td>
<td>+++</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ALC</td>
<td>Fresh leaves with honey and wine for preparation of liqueur</td>
<td>1</td>
<td></td>
<td>+</td>
</tr>
<tr>
<td><strong>Apoaceae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aegopodium podagraria</td>
<td>Bršlice</td>
<td>AN</td>
<td>VEG</td>
<td>Leaves stir-fried a few minutes as a spinach</td>
<td>2</td>
<td>0.03</td>
<td>-</td>
</tr>
<tr>
<td>Carum carvi</td>
<td>(Planý-) Kmin, Kmínek</td>
<td>ME</td>
<td>SEA</td>
<td>Seeds for seasoning dishes, soups and added to homemade saveloys</td>
<td>17</td>
<td>0.28</td>
<td>++</td>
</tr>
<tr>
<td><strong>Asteraceae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bellis perennis</td>
<td>Sedmikráška, Chudobka</td>
<td>AN</td>
<td>VEG</td>
<td>Flowers and leaves eaten raw, on the bread or added to soups/salads</td>
<td>23</td>
<td>0.42</td>
<td>+++</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>REC</td>
<td>Flowers for recreational tea</td>
<td>2</td>
<td>0.32</td>
<td>-</td>
</tr>
<tr>
<td>Carlina acaulis</td>
<td>Myslivecký chlěb, Pupava, Bodláchek</td>
<td>ME</td>
<td>VEG</td>
<td>Receptacles eaten raw</td>
<td>11</td>
<td>0.18</td>
<td>+</td>
</tr>
<tr>
<td>Cichorium intybus</td>
<td>Čekanka</td>
<td>AN</td>
<td>REC</td>
<td>Dried ground roots as a coffee substitution</td>
<td>6</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>VEG</td>
<td>Flower buds loaded in oil</td>
<td>1</td>
<td>0.12</td>
<td>-</td>
</tr>
<tr>
<td>Matricaria discoidea</td>
<td>Heřmánek</td>
<td>AN</td>
<td>REC</td>
<td>Flowers for digestive herbal tea</td>
<td>3</td>
<td>0.05</td>
<td>+</td>
</tr>
<tr>
<td>Taraxacum sect. Ruderalia Kirschner, H.Øllg. &amp; Štěpánek</td>
<td>Pampeliška, Půpava, Pléška</td>
<td>AN/ME</td>
<td>VEG</td>
<td>Flowers boiled with sugar to prepare honey</td>
<td>21</td>
<td>0.70</td>
<td>+++</td>
</tr>
<tr>
<td>Taraxacum sect. Ruderalia Kirschner, H.Øllg. &amp; Štěpánek</td>
<td>Pampeliška, Půpava, Pléška</td>
<td>AN/ME</td>
<td>VEG</td>
<td>Leaves added to salads/eaten directly</td>
<td>18</td>
<td>0.27</td>
<td>+++</td>
</tr>
<tr>
<td>Taraxacum sect. Ruderalia Kirschner, H.Øllg. &amp; Štěpánek</td>
<td>Pampeliška, Půpava, Pléška</td>
<td>AN/ME</td>
<td>VEG</td>
<td>Dried ground roots as a coffee substitution, flowers for tea</td>
<td>3</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td>Tragopogon orientalis</td>
<td>Koží brada</td>
<td>ME</td>
<td>CHS</td>
<td>Stem sucked/eaten for sweet sap</td>
<td>7</td>
<td>0.13</td>
<td>-</td>
</tr>
<tr>
<td>Tussilago farfara</td>
<td>Podběl, Pupava</td>
<td>AN/AQ</td>
<td>REC</td>
<td>Roots eaten boiled</td>
<td>1</td>
<td></td>
<td>-</td>
</tr>
<tr>
<td><strong>Balsaminaceae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impatiens parviflora</td>
<td>Oříšky</td>
<td>AN/FO</td>
<td>FRU</td>
<td>Seeds eaten raw</td>
<td>2</td>
<td>0.03</td>
<td>+</td>
</tr>
<tr>
<td><strong>Boraginaceae</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulmonaria officinalis</td>
<td>Medunica, Bedrnica, Medrnica</td>
<td>FO</td>
<td>CHS</td>
<td>Flowers sucked</td>
<td>2</td>
<td>0.05</td>
<td>-</td>
</tr>
<tr>
<td>Symphytum officinale</td>
<td>Medunica</td>
<td>AN/MEA/AQ</td>
<td>CHS</td>
<td>Flowers sucked</td>
<td>2</td>
<td>0.03</td>
<td>-</td>
</tr>
</tbody>
</table>

**Notes:**
- **Habitat**-gathering environment: AN - Anthropic (villages/homegardens/crofts/orchards/fields/roads); ME - Meadows/pastures; FO - Forests (oak forest/oak-hornbeam/beach forest/spruce forest), AQ - Aquatic (swampy area on the pond/stream bank)
- **Food category:** FRU - Fruits (including fruit kernels and seeds); VEG - Vegetables; SEA - Seasoning plants; REC - Recreational beverages; ALC - Alcoholic beverages; CHS - Children’s snacks; OTH - Others
- **Actual use where:** - expresses only historical use; + rare use; ++ occasional use; +++ common use; ++++ very frequent use
USE VALUE AND CULTURAL IMPORTANCE INDEX

To assess the cultural importance of particular plant species, one can calculate a quantitative ethnobotanical index such as use value (Phillips and Gentry 1993) or cultural importance index (Tardío and Pardo-de-Santayana 2008), which take into account frequency and diversity of species uses.

The use value (for one species) is calculated as:

\[ \text{Use value (UV)} = \frac{U}{N} \]

Where \( U \) is the number of use reports cited by all informants for a given plant species, and \( N \) is the total number of informants interviewed. The plant species with high versatility of uses (use in more categories) and high frequency of citations will have a high use value.

The cultural importance index is calculated as:

\[ CI = \sum_{u=1}^{u_{NC}} \sum_{i=1}^{i_{NC}} \frac{UR}{N} \]

Where \( u \) is use, \( i \) is an informant, \( NC \) is the total number of use categories, \( N \) is the number of informants and \( UR \) is a user report.

**Note:** The difference between the composite salience index and the use value index or cultural importance index is that the first takes into account only listed plants while the other two also reflect the diversity of plant uses.

Table 9.4 gives an example of a table with ethnobotanical information for food plants, which includes the number of use reports (UR) and use value (UV). The table shows 15 species that belong to five families. UV and UR values show that some species, such as dandelion (Taraxacum), are more used than other plants. In total, dandelion obtained 42 UR and it can be considered the most culturally important wild food plant species as demonstrated by the highest UV (0.70).

CROSS-GROUP COMPARISON

Where research aims to compare the diversity of useful plants or the similarity of plant uses across communities or ethnic groups or from different areas or sections of the community, an index such as the Jaccard index can be applied (González-Tejero et al. 2008).

\[ \text{Jaccard Index} = \frac{C}{A + B - C} \times 100 \]

Where \( A \) is the number of species in sample A, \( B \) is the number of species in sample B and \( C \) is the number of species common to A and B. A high Jaccard index value indicates a similarity between the groups compared. Alternatively, a visual illustration of similarity can be made by using a Venn diagram that shows overlaps of plant species among the groups compared (Figure 9.1).
In order to understand in more detail how local people use plants, it is common to assess the proportion of used plant parts (e.g. fruits, seeds, leaves, roots) (Figure 9.2), or by mode of preparation (e.g. use raw, dried, decoction, tincture) (Figure 9.2).

**Figure 9.2** Example of medicinal species proportion according to the mode of preparation in Turkestan Range, Kyrgyzstan. Source: Pawera et al. (2016)

**Figure 9.3** Example of proportion of medicinal plant uses according to the plant parts used in Zacatecas state, Mexico. Source: Reimers et al. (2018)