Final report
for project ref LOA 13/032
Collecting the Crop Wild Relatives of the Albania’s Umbellifer Crops
Sokrat JANI

Agricultural Technology Transfer Center (ATTC), Lushnja-Albania

Although a small country, Albania is distinguished for its rich biological diversity. The variation of geomorphology, climate and terrain create favorable conditions for a number of endemic and sub-endemic species with 27 endemic and 160 subendemic vascular plants present in the country. The total number of plants is over 3250 species, approximately 30% of the entire flora species found in Europe. The main elements of the Albanian flora are Mediterranean (24%), Balkan (22%), European (18%) and Eurasian (14%) (MoEFWA, 2011).

The preservation of biodiversity and natural variation within species has become a global concern. Natural variation is essential to the evolutionary process and the long-term survival of species. Land conversion resulting in the habitat loss, fragmentation, and degradation is the most significant factor responsible for the endangerment of species in Albania. Lands have been, and continue to be, converted for commercial, touristic and residential purposes.

Old landraces and obsolete cultivars represent a national heritage that must be conserved for future generations. On the other hand, wild species, which are related to ancestral forms of cultivated crops (crop wild relatives, CWR), are a valuable gene pool for plant breeding, or for direct introduction as a new crop (Guarino et al. 1995). In the early 1970s, a programmed collection of vegetables’ landraces and old cultivars was initiated by the ex-Institute of Vegetable and Potato in Tirana. Important attempts to gather landraces in the Albanian territory were made in the 1993 and 1994 with German-Italian-Polish – Albanian collections, led by Hammer, Gladis, Pistrick, Laghetti, Perrino, Pignone, Podyma and Xhuveli(Hammer et al. 1994; Gladis et al. 1995), and an earlier ones (1941/42) of H. Stubbe (Stubbe. 1982). The highest priority of the missions mentioned above was given to the collection of Albanian landraces but, when the opportunity arose, also wild relatives of cultivated species were gathered.

Among the CWR, most species are common; however, there are many species which are of limited occurrence, endangered, or critically endangered (MoEFWA, 2011). New projects for collecting extant fragments of CWR and landraces have been started in the last 5-6 years. One among them is this project for the collection of CWR of Umbellifer crops.

Materials and methods
The motivation for this collection mission was the interest in genetically diverse material from wild relatives of cultivated Umbellifers and their landraces. Wild plants (CWR), useful for man and agriculture, were preferably collected from primary sites that were not subjected to intensive agriculture. Among the wild plants and landraces, the
following species of the family Apiaceae (Umbelliferae) were targeted during collecting: dill \textit{(Anethum)}, carrot \textit{(Daucus)}, fennel \textit{(Foeniculum)}, parsley \textit{(Petroselinum)}, coriander \textit{(Coriandrum)}, celery \textit{(Apium)}, caraway \textit{(Carum)}, parsnip \textit{(Pastinaca)} and chervil \textit{(Chaerophyllum)}. The field collections were directed toward the botanically rich regions, such as the coastal and western lowland territory, but also covering various climatic and geographic regions of the country. The principal method was the gathering of bulk samples from many plants (at least 30, if possible). All sites were located using GPS. Ecological conditions were noted, together with geographical data, and then recorded into the collection database.

Information from specimen labels of the Museum of Natural Sciences’ Herbarium was used to determine locations of wild carrot species. Information on other Umbellifer’ wild relatives (CWR) that may have potential for cultivation and utilization was also gathered.

Seeds were collected as many mature heads and plants as possible, and information on site habitat, plant morphology, and phenology recorded. Digital photographs were taken at all sites.

Seeds were processed and inventoried by personnel at the Albanian GenBank, and information was sent for entered into the National Plant Germplasm System.

\textbf{Results and discussion}

The present collecting mission was conducted as a joint project between the Bioversity International and Agricultural Technology Transfer Center (ATTC)-Lushnje, Albania. Local expertise for Albania was provided by botanists from the Faculty of Natural Sciences in Tirana University.

\textbf{Preparatory phase}

The main activity was the preparatory phase to make sure “all the homework”. This included having very clear collecting objectives. Another major preparatory activity was the gathering as much information as possible about the target germplasm and area where the collecting would take place (Demiri, 1982). Much available information has been taken through internet, specific books, but also very worthwhile visiting herbaria with material of the target species to accumulate data that might not been available on the internet. The contact with local specialist in the target area in advance facilitated the collecting mission.

\textbf{Collecting activity}

Collecting of Crop Wild Relatives and landraces was developed in two steps: In the first step, an exploratory mission carried out between 20 May and 18 June revealed variation of wild carrot types and other umbellifer species in the Fier, Lushnjë, Kavaja and Durres districts (the western lowland and coastline of Albania), including the Karavasta nature reserve close to the village of Divjaka and the Marinz oil seal area of the Fier district (Fig. 1). Some exploratory trips were made in villages along the Fier-Tirana highway, on both its sides (Mbrostar, Lushnjë, Lekaj, Golem and Maminas). In the Karaburun Peninsula, it was made in the Orikum nature reserve on the coast of the Ionian Sea. In the northern lowlands of western Albania, exploratory trips were made in
residential areas and roads along the Tirana-Shkoder. Another was made in Prespa nature reserve close to the village of Pustec. During these exploration trips were revealed variation of wild carrot types and other umbellifers, such as thin and strong stems, long and short stems, purple colour, flat and convex umbels of carrots. *Anethum graveolens* was found with vigorous plants with long and strong stems, grown in agricultural plots. It is a rare plant, found around the Lushnja and Fieri cities, where it is used as kitchen aromatic herb. *Petroselinum hortense* was found with long and thin stems, small and very aromatic leaves (Lushnje district). *Antrischus sylvestris* and *Foeniculum vulgare* grow on the side of roads, in the green fences and the old walls or near canals in a wide territory, from Tirana to Vlora. *Coriandrum sativum* grows in a wide territory, from Shkoder in the north to Vlore district in south Albania. A landrace of *Pimpinella anisum* grows in south-eastern Albania (Permet district) and is used as kitchen herb. *Ammi visnaga* and *Conium maculatum* grow on roadsides in a wide area, while *Smyrnium olusatrum* is limited around the Bay of Vlora. *Athamanta cretensis* is a rare plant found on mountainous areas on limestone rocks; wet and cool climates (see attached pictures).

In all these exploration trips was estimated size of the population, geographical referencing, mapping of geographic distribution areas, and the selected plants were marked to be harvested for seed, after their maturity.

The second step was seeds collecting mission conducted from July 31 to August 05. Some additional collecting missions were made in Permet, Korça and Dibra regions, respectively 8-10 August, 11-13 and 17-18 September. Collection sites are illustrated in Figure 1 (The map of route traveled and approximate location of collection sites). The full description of districts is given at the table 1. The number of samples of each species collected and their biological status and source of collecting is listed in Table 2 and 3.

All collected samples were recorded into the collection database, where samples are given collection and locality numbers, as well as passport data on the locality; items noted included geography, ecology, and vegetation.

**Site mapping**

All collecting sites (over 40) have been located by GPS and plotted on the Map (Fig 1). In the case of the crop wild relative’s plants, the coordinates were taken roughly in the middle of the plant population. In the case of landraces, the coordinates were taken with precision and family gardens where they were located. It is possible to assume that the western lowland and coastal zones of Albania have been thoroughly covered by collecting activities. Original and unique forms of Umbellifer CWR were found in protected areas and uncultivated territories in the side of the roads, canals, meadows and on surfaces covered with green fences, while landraces were more available in inland regions of the territory of the country.

**Conclusions**

By adopting the programmes on collecting, mapping, and monitoring of crop wild relatives and landraces, the spectrum of Gene Bank activities has moved to a new level.
The share of those materials in the national collections has been significantly increased. Material of Umbellifer CWR from the territory of the Albania is now available for research and breeding, as well as being conserved in perpetuity. It was possible to disclose threats to selected wild plants either currently or potentially useful for agriculture. It was possible to start *in situ* projects as new methods for conservation of agro-biodiversity.

As mentioned above, the project did not imply the protection of the entire spectrum of plants important to agriculture that are threatened by extinction. Otherwise, the project approach was the development of a replicable model of agricultural biodiversity protection for a group of the selected crop wild relatives (Umbelliferae) in one region of Albania, which could be used as a strategy in other regions or for other crops.

Several months of the project have shown that the country’s riches in genetic biodiversity of wild relatives of Umbelliferae plants, requires community support to preserve them *in situ*, through the distribution of knowledge, publicity and cooperation with scientific researchers and governmental structures. Approaches and tools developed by the project will be tested with other crops and in other regions of Albania.

**Recommendations**

On the basis of the main findings of this study, the following recommendations are made.

1. More research is needed to come up with data on variations within Umbellifer species as this was not exhaustively explored.
2. There is also a need to explore further the wild relatives and landraces of Umbellifer vegetables that are said to have disappeared.
3. Farmer’ attitudes toward specific species need further exploration, as this could be useful for making policy recommendations on their promotion.
4. Farmer’ attitudes and their perceptions on traditional umbellifer vegetables need to be studied. This information could be useful in any endeavors or efforts made to promote the production and utilization of Umbelliferae species among the local population.

**Acknowledgements**

I would like to thank the people who have helped in one way or another to make this work possible. First of all, I would like to thank the Bioversity International for providing the funds for this project. In particular I would like to mention the ECPGR Umbellifer Crops Working Group for their support and understanding. My special thanks go to my colleagues Enver Tome and Alban Ibraliu with whom I worked in the field and Alfred Mullaj, botanist in Tirana University, who supplied us with information on the locations of many Umbellifer wild relatives. I also extend my gratitude to the Agricultural Technology Transfer Center (ATTC) of Lushnja for his logistical support and encouragement.
In particular, I would also like to extend my sincere gratitude to all the districts’ agricultural specialists, in all villages, who collaborated very diligently with us during the survey.

To all the other peoples who in one way or the other gave us their support to conduct this project, I also say thank you.

References


Prepared by                                    Certified by
Sokrat JANI                                        Pandeli BOCI
Contact person of the project                     Director of ATTC Lushnjë

Lushnjë, November 07, 2013