

## CHAPTER 14

### CONSERVATION OF EASTERN-EUROPEAN MEDICINAL PLANTS

*Arnica montana in Romania*

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**Abstract.** Today, Southeast Europe is by far the most important European source region of medicinal plants collected from the wild. Bulgaria and Albania in particular, but also Romania, FYROM and other countries provide the European market with considerable amounts of raw material. The destruction or conversion of habitats and an increasing demand for raw material, however, endanger medicinal-plant resources in the region. To develop a model for the sustainable management of medicinal plants collected from the wild, WWF-UK, WWF-DCP (Danube-Carpathian Programme) and the University of Agricultural Science and Veterinary Medicine (USAMV) in Cluj-Napoca have initiated the project 'Conservation of Eastern-European Medicinal Plants: *Arnica montana* in Romania', funded by the Darwin Initiative, UK.

The main goal of the project is to develop a model for the sustainable production of and trade in *Arnica montana* in Gârda-de-Sus resulting in benefits to both biodiversity and livelihoods. As one of the key elements of the project, a Resource Management and Trade Association (RMTA) is planned to be established at community level. The mechanisms and procedures to set up the RMTA will be developed by the local stakeholders (farmers, collectors, people with key functions in the community), in cooperation with the project team from Cluj and WWF-DCP Romania. The sustainable sourcing of arnica and other non-timber forest products (NTFPs) is also hoped to be included in the management system of the Apuseni Natural Park.

Key components for successful project implementation are (a) training and capacity building, (b) development of local arnica management and marketing structures, (c) development and construction of arnica drying facilities, (d) research on arnica ecology (including resource inventorying / monitoring), trade-chain analysis, socioeconomic context (including research on community attitudes) and drying methods. All project components will be implemented in parallel as they are interdependent. Regular evaluation of successes, threats, challenges and lessons learnt will enhance targeted and effective project development and implementation.

**Keywords:** *Arnica*; Apuseni; Gârda-de-Sus; sustainable use; wild-collection; mountain meadow; natural park; WWF-UK; WWF DCP; USAMV

## BACKGROUND

Today, Southeast Europe is by far the most important European source region of medicinal plants collected from the wild. Two countries alone – Bulgaria (about 10,000 tonnes annually) and Albania (about 7,600 tonnes annually) – provide more than 50 % of the medicinal plant material exported from this region (Lange 2003). Other countries, such as Romania, export less to the European market, but they have specialized in certain species as for example *Arnica*, of which large quantities are collected from the wild (Kathe et al. 2003).

Until a few decades ago, arnica (*Arnica montana*) was a common plant in Europe. It could be found throughout the continent, mostly on acidic soils in mountain pastures up to 2,850 metres a.s.l. (Bown 2001). Like in many other plant species, however, arnica populations gradually diminished or fully disappeared from parts of the species' former range. The reasons for this decline are manifold: overharvesting of the resources, intensification of agriculture (including the use of nitrogen fertilizers), high cattle density in arnica habitats and land-conversion.

*Arnica montana* is a traditional medicinal plant in Europe and has been used for many centuries. By some it is regarded as a 'miracle medicine' applied to heal bruises and wounds quickly. It is also used as a gargle for mouth infections and as a shock remedy. The popularity of arnica oil and tinctures as well as ointments has not suffered with the advance of synthetically produced medicines. Arnica products are still widely used in Europe, North America and beyond.

Most of the arnica raw material (mainly the flower heads) is sourced from the wild. Arnica populations have long been depleted in the main consumer countries such as Germany, Switzerland and the UK. Meanwhile, the species is strictly protected in France, Germany and other countries and has been listed in Annex D of the EU Council Regulation No. 338/97 and in Annex V(b) of the EU Habitats Directive (92/43/EC – Directive on the Conservation of Natural Habitats and Wild Fauna and Flora). Today, most of the arnica material is imported from South and Southeast Europe, in particular from Spain and Romania (Lange 1998). The cultivation of Arnica has proved to be possible, but it is not easy and rather costly. In 1990, U. Bomme (LFL) produced the first cultivar of *Arnica montana*, named 'Arbo' (Bomme 1993), which became commercially available a few years later. Although cultivated material entered the market some years ago and most companies would prefer such material, they are still hesitating to buy large amounts because of the high price of cultivated arnica (B. Galambosi, pers. comm.).

In some parts of Romania, arnica populations are still relatively large, but the destruction or conversion of habitats and collection pressure endanger the arnica and other medicinal-plant resources in the country. For this reason, WWF-UK, WWF-DCP (Danube-Carpathian Programme) and the University of Agricultural Science and Veterinary Medicine (USAMV) in Cluj-Napoca have initiated the project 'Conservation of Eastern-European Medicinal Plants: *Arnica montana* in Romania'.

## THE PROJECT AND ITS GOALS

The project is funded by the Darwin Initiative, UK and carried out by WWF-UK, WWF-DCP (Vienna and Bucharest) and USAMV (Cluj) between April 2004 and March 2007. WWF-UK provides the project lead and technical expertise, WWF-DCP's responsibilities are project management, administration and national and international communications and promotion, and USAMV carries out the local project coordination and local and regional communications and provides office space and technical expertise. In addition, young professional building is an important element of the project. Therefore, several PhD, diploma and master students from USAMV and Babeş-Bolyai University (Cluj) are members of the project team and carry out important research work, in particular on arnica ecology and trade-chain analysis. Naturally, not all expertise required can be covered by the project team. Therefore, additional external experts from the Museul Etnografic, Cluj-Napoca, the community of Gârda de Sus, the University of Medicine and Pharmacy (Cluj), the Institute of Biological Research – ICB (Cluj), the German Organization for Technical Cooperation (GTZ), the University of Freiburg, Germany and the Apuseni Natural Park cooperate with the project team. Many links and local contacts in Cluj and in the community of Gârda-de-Sus were already established during the previous project 'Proiect Apuseni', carried out by the University of Freiburg and numerous partners.

Gârda-de-Sus is located in the central part of the Apuseni Mountains in Transylvania, about 70 kilometres (linear distance) southwest of Cluj-Napoca and northwest of Alba Iulia. The village consists of a central valley settlement (in the Arieş Valley) and a number of scattered hamlets, most of which are located in the mountain ranges above the Arieş River. The high-altitude hamlets, such as Ocoale and Gheţari (Plateau of Gheţari), where the project centre is located, are mostly inhabited by mountain farmers. During Proiect Apuseni (Ruşdea et al. 2005), studies on the history of these mountain settlements were carried out (Goia 2003). A survey of the household structure and the role of agriculture in the economic development process was provided by Heidelbach (2002). Agriculture is, besides small home gardens, usually restricted to low-intensity livestock farming and, often illegal, lumbering, which provides a considerable portion of the family income for many households. Arnica and other natural resources such as edible boletus (*Boletus edulis*) are usually collected by women and children; revenues from these activities constitute an important additional income to some landowners and poorer families. The Arieş Valley is one of the richest 'arnica areas' in Romania: about 25 % of the open grassland are arnica meadows (Michler, pers. comm.). It is estimated that about 12 tonnes of fresh arnica flower-heads are collected in this area every year (Michler 2005), which would be about 10-20 % of the annual Romanian arnica trade (cf. Kathe et al. 2003). The high biodiversity of the area around Gheţari has been demonstrated by a recent study; Michler (2005) found 242 taxa of medicinal plants in this area.

The project's direct and most prominent aim is to develop a model for the sustainable production of and trade in *Arnica montana* in the community of Gârda-de-Sus. Both the biodiversity of arnica habitats and local livelihoods should benefit from the model. A key element is to find an effective and locally accepted way to

increase the benefits for the local collectors from the sale of medicinal plants. Arnica is particularly interesting as it is not only one of the rare flagship species in the realm of medicinal plants, but also of high economic value: its dried flower-heads rank among high-price drugs. According to data from 2002, collectors in Gârda-de-Sus received about 0.5 €(euro) per kilogramme fresh arnica flower-heads (= ca. 1 - 3 €per kilogramme dry weight; the fresh- / dry-weight ratio is still not entirely clear and may vary considerably; calculations range from 1:2 (Michler 2005) to 1:4 - 1:6 (D. Lange, pers. comm.)). In the same year, 1 kilogramme dried arnica flowers in tea-bags was sold at about 45 €in Cluj-Napoca; the wholesale price for one kilogramme dried arnica flower-heads in Germany was between 53 and 79 €(Michler 2005). The annual fluctuation of the market price is considerable. In 2004, the first year of the project, prices paid to collectors were lower than in 2002 (0.22 - 0.45 € per kilogramme fresh weight; Klemens and Michler, pers. comm.).

To support the local livelihoods it is planned to establish effective local arnica management structures. A potential option is founding a Resource Management and Trade Association (RMTA) at community level. The project team from Cluj and WWF-DCP Romania is planning, together with all relevant stakeholders within the community of Gârda-de-Sus (land-owners, collectors, people with key functions in the village) and supported by expertise from GTZ, to develop a mechanism to set up an RMTA, while considering the legal requirements for such an enterprise. A working association would not only be able to negotiate better prices to be paid to their arnica collectors, but could also institutionalize arnica monitoring and the development of annual collection plans, which would be an important step towards developing and implementing a sustainable arnica-sourcing scheme in the area. The management and sustainable use of natural resources in the community are not independent of the Apuseni Natural Park, which covers the community area north of the Arieş Valley and possibly, in future, may extend south of the river. Although communication between the Apuseni Natural Park and the community of Gârda-de-Sus has been difficult in the past, efforts are made to develop a cooperation between the park, the local community and the project in order to integrate the arnica management into the management plan of the natural park.

The conservation of arnica and its habitats depends, to a large degree, on the management system of the land on which the species grows. Arnica requires low-intensity mountain-meadow farming to flourish, a traditional system of farming once common in almost all mountainous areas in Europe inhabited by humans, but meanwhile frequently abandoned in favour of intensified meadow management systems in most parts of Europe. Arnica requires low nitrogen levels (i.e. continuous absence of nitrogen fertilization, Ellenberger 1999) and regular cutting of the meadows after the flowering season. In the project area, this management system is still practised, although first signs of intensification clearly show. Overgrazing has already reduced the arnica population in some parts of its former habitat.

## KEY COMPONENTS OF THE PROJECT

The project is made up of several interacting project components, which are implemented in parallel. Key components are:

*a. Training and capacity building*

Training and capacity building comprises two elements: young professionals training, and training in arnica collection and processing techniques. Arnica is mainly collected by elderly women and by children, and is – in this area – only regarded as semi-traditional, as the local population originally worked in forestry and did not collect many medicinal plants, neither for primary health-care purposes nor for sale. Some species are locally known, but the local knowledge of their medicinal properties and application is limited (Michler 2005). Until recently it was common practice to collect as many arnica flowers as possible, almost regardless of the quality, collection time and method, material of transport containers and storage practice. Quality experts in the project team are regularly training the collectors in appropriate collection and storage techniques. Women are reached through a ‘train a trainer’ approach, whereas children are playfully introduced into both arnica monitoring and collection techniques. Community celebrations such as fairs and church holidays are good occasions to organize such ‘training events’. The project field team is supported by many local authorities such as the mayor of the community, the local priest, school director, doctor and others, who provide platforms to project members to explain the aims of the project and to carry out training units.

*b. Development and construction of arnica-drying facilities*

The quality of dried arnica flower-heads depends on both the quality of the collected material and the processing methods. Drying is one of the most essential processing steps and it can, with relatively little effort, be established locally. The main advantages of local drying are 1) a potentially high quality of the drug, because freshly collected material immediately enters a controlled drying process, and 2) local value-adding, as dried arnica can be sold at higher prices than fresh flower-heads.

Drying conditions and appropriate drying protocols may vary from place to place. Temperature, humidity and other factors can influence the drying process. In order to find out the optimum drying conditions at the project site in Ghețari, an experimental drying house was built and tested during summer 2004.

*c. Development of local arnica management and trade structures*

A crucial element and link between locally collected arnica flower-heads and the market is the organization of trade. Traditionally, arnica collectors brought their material to collection points in one of the hamlets or the village. Intermediate traders showed up at these collection points and transported the material to trading companies, which in turn sold the material either to another trading company (e.g. a company with an export license) or to a pharmaceutical company in Romania. The local collectors were totally dependent on an intermediate trader to show up, which did not happen every year. In this case, both the time and energy of the collectors and

the arnica harvest were wasted.

The project aims at organizing the trade more effectively to make it suit a new product: high-quality dried arnica flower-heads from sustainable, controlled collection. To achieve this aim, an effective mechanism must be established, which allows to

- a) 'point-collect' the fresh material close to where it is sourced;
- b) perform immediate quality control;
- c) start immediate, controlled drying of the material; and
- d) sell the final product collectively to the market, either to a Romanian export company or directly to pharmaceutical companies (both abroad and in Romania) that seek to purchase such a high-quality product collected in a sustainable way.

The planned RMTA would both regularly control the arnica meadows (including arnica monitoring), issue collection quotas if necessary, control the quality of the collected material, supervise the drying and organize storage, marketing and sale of the final product. It is planned to include all local stakeholders in this association, collectors, farmers / land owners, local traders and village authorities, because the RMTA will only work if confidence building has been successful (Kathe 2005) and the majority of potential members see the economic advantages of associating over any single-handed enterprise in local arnica collection.

Besides providing dried arnica flower-heads as raw material for further processing, the production of arnica oil and tincture is an alternative; these may be produced locally and either used domestically or sold to tourists or on local markets. A study currently carried out by a local consultant analyses the legal framework for the local production of arnica medicine in Romania.

Once drying is established in the village, methods and facilities need not be used to dry arnica flower-heads exclusively. Additional value-adding is possible if other medicinal plants and resources such as mushrooms are dried with the help of these facilities as well. Technically, this should be possible, as the arnica season is limited to only a few weeks during the summer and other plants and mushrooms appear before or after the arnica season, with only little or no overlap.

#### *d. Research*

Broad and in-depth research is an important basis to manage arnica and other natural resources in an effective and sustainable way. Not only research into arnica distribution, habitats and ecology is important, but also into drying methods, arnica trade and the socioeconomic context of the community of Gârda-de-Sus (Kathe 2005). A great advantage of the project during its start-up phase was that many research items did not have to be newly initiated but could build on work that had already been carried out by 'Proiect Apuseni' (Ruşdea et al. 2005), although most of the publications were available in German language only.

Research into arnica and its ecology is of particular significance because an effective resource management depends on accurate data. For this purpose, the project field team started to complete arnica inventorying in the project area already during the first summer (2004) (for methods see Michler and Reif 2003; Michler 2005). A complete inventory is the basis for continuous monitoring of the arnica population

and subsequent quota setting and management.

Work on arnica–insect interaction and a market analysis of the Romanian arnica market (including consumer behaviour) is carried out by two diploma / masters students who are part of the project team, in cooperation with Babeş-Bolyai University, the University of Medicine and Pharmacy and the Institute of Biological Research – ICB, all located in Cluj (Kathe 2005). As an analysis of the European arnica import market is a valuable tool in establishing direct market links to import companies, it is planned to commission a study of the European arnica market to a researcher in Germany or in the UK.

### OUTLOOK

The project ‘Conservation of Eastern-European Medicinal Plants: *Arnica montana* in Romania’ is a very challenging initiative. It has a good potential to become a model project but there are also high risks involved. One of the major challenges is the dependence of arnica on low-intensity meadow management. This traditional farming system will only be maintained if it provides sufficient income to the farmers and their families. However, the economy is changing fast in Romania and it can be anticipated that even faster changes will follow Romania’s planned accession to the European Union in 2007. Both intensification of agriculture and increasing environmental requirements may, ironically, endanger the traditional agricultural systems, which are a prerequisite for flourishing arnica populations. Some remote mountainous areas in the Apuseni, where access is difficult and limited, have meanwhile been entirely abandoned. Houses and hamlets decay or are being bought by townspeople, renovated and used as remote holiday homes. The mountain meadows are no longer taken care of, gradually become scrubland and enter a natural succession process. Whereas this process is, from a conservation point of view, not necessarily negative as nature gets back what humans have once taken and converted into farmland, the process endangers arnica and associated habitats, which are usually very rich in species.

While there is still a relatively large human population in and around Ghețari and Ocoale, it is unpredictable how the population will develop in the next couple of years. Children completing primary school need to leave their homes and move to the valley or more distant cities in order to continue their education, and many of them do not return. Economic alternatives elsewhere tend to be more attractive. Tourism may become an increasing source of income locally, but it does not necessarily contribute to maintaining traditional farming systems and therefore conserving arnica habitats.

Another threat is arnica cultivation. In principle, arnica can be cultivated (see above), only the raw material is considerably more expensive than arnica from wild-collection. Low wages in the source countries such as Romania contribute to the competitive price of wild-collected arnica on the international market. The country’s accession to the EU will increase the costs of labour in Romania and within a few years, the country may no longer be a cheap source for arnica. If cultivation techniques are adaptive enough, arnica cultivation could be introduced in Romania;

arnica 'fields' would most likely be located in easily accessible places and not in remote areas, where arnica is collected today. Large volume arnica cultivation in Romania would deprive the local population in and above the Arieş Valley of an important source of income and, at the same time, reduce the farmers' incentive to take care of the arnica meadows, and thus threaten the habitats.

However, there are alternatives. The responsible and innovative management of biosphere reserves or regional nature parks such as the French 'Parcs naturels régionaux' has shown that conservation of nature, maintenance (or reawakening) of the regional cultural heritage and agricultural traditions and improved livelihoods can go together. In most cases, a larger regional concept was developed, in which ecological tourism, the revitalization of typical, local products and production techniques and improved community services were all integral parts of the 'new' regional identity, for which a brand name and marketing structure were developed. Examples are the German biosphere reserve Rhön ([www.biosphaerenreservat-rhoen.de](http://www.biosphaerenreservat-rhoen.de)) or the French Parc régional naturel de Corse (PRNC – [www.parc-naturel-corse.com](http://www.parc-naturel-corse.com)). The French concept of these 'regional nature parks' is almost 40 years old and is a success story of integrating conservation and regional development. Today about 12 % of the French land territory is covered by the 44 Parcs naturels régionaux (Fédération des Parcs Naturels Régionaux de France 2005).

The Apuseni region has a good potential for such an integrated model and regional branding, certainly within Romania, but – with Europe growing together – also abroad. The Apuseni Natural Park is already developing a similar concept (A. Mos, pers. comm.). The sourcing of arnica and the traditional low-intensity farming of mountain meadows in the community of Gârda-de-Sus, the sourcing of arnica and the local production of products based on arnica and other locally available natural resources can be part of this concept. To turn it into a successful programme, communication and collaboration between the Apuseni Natural Park and the communities on and around its territory require a good deal of mutual understanding and the willingness to overcome prejudices and reservations on both sides. Although the large habitats and high population density of wild arnica in the Apuseni are in danger, these habitats can still be saved and arnica collection could continue to contribute to the local economy if carried out in a sustainable way.

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