

**Armenia as a producer of medicinal plants:  
Possibilities and perspectives  
Yerevan 2004**

*Harvesting and cultivation of medicinal and aromatic plants could become one of the main items of export for Armenia, a good tool for poverty reduction and employment opportunity for rural communities. The brochure contains specific data on some selected medicinal and aromatic plants that can be collected on natural ecosystems or cultivated in organic farms. It comprises also information on existing environmental organizations, stakeholders interested in collection, cultivation and export of vegetative raw material. Development of present brochure is aimed at supporting a seminar to discuss the practical issues on potential of Armenia as producer of medicinal plants.*

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## General Information on Armenia



**Geographical coordinates:** 38<sup>o</sup>50'-41<sup>o</sup>18' E, 43<sup>o</sup>27'-46<sup>o</sup>37' N

**Territory:** 29,800 sq. km: 1,400 sq. km of water surface and 28,400 sq. km of land. Urban area - 4.6 %, industrial area - 5,5 %, forests - 9,8 %, specially protected areas - 10 %, 0.93 ha area per capita

**Land boundaries:** from the East – Azerbaijan - 566 km, from the North – Georgia - 164 km, from the South – Iran - 35 km, and from the West – Turkey - 268 km

**Climate:** varies from subtropical to continental. Temperature varies from -41<sup>o</sup> C to +42<sup>o</sup> C, annual precipitation: approximately 500 mm

**Relief:** mountainous landscapes with minor forests and fast flowing rivers. Elevation extremes: the lowest point – River Debed - 400 m and the highest point – Mount Aragats 4,090 m

**Population:** 3.000.000

**Capital:** Yerevan

**Spatial separations:** 11 provinces (marzes)- Aragatsotn, Ararat, Armavir, Gegharkunik, Kotayk, Lori, Shirak, Syunik, Tavush, Vayots Dzor, Yerevan

**GDP:** USD 2.4 billion, with an annual growth rate of 12.9%. GDP by sector: agriculture - 23.1%, industry - 20.5 %, services - 56.4 %

**Population below poverty line:** 52 %

**Labour force:** 1.4 million

**Unemployment rate:** 127.3 thousand

**Agricultural products:** fruits (especially grapes), vegetables and livestock

**National currency:** Armenian Dram (AMD), 1 USD = 560 AMD

**Inflation rate:** 1.1 %

**Railway system:** 852 km in common carrier service, with few passenger trains per week to Tbilisi, the capital of Georgia.

**Highways:** 11,300 km – country roads. The main possible way for export from Armenia is through Georgia to Black Sea ports. Second way for export is through Iran.

\* Economic data of 2002

Armenia is a small mountainous country on the Armenian Plateau in the South of the Caucasus between the Black and Caspian Seas. Phyto-geographically, Armenia is situated at the junction of two floristic provinces - Caucasian and Armeno-Iranian<sup>1</sup>. The peculiarity of each, enhanced by other conditions, led to rich variety of the country's vascular flora and vegetation. The mountainous nature of Armenia results in a series of highly diverse landscapes - seven distinct landscape types are described in Armenia - from deserts to alpine lands. The great diversity of ecosystems and vegetation types is correlated with the variety of landscapes, ranging from sand deserts and semi-deserts situated at 400 m above sea level to alpine meadows and turfs at 3000 m, from xeric mountain formations to wetland vegetation, and from mesophilous forests to feather grass steppes.

Flora of Armenia includes about 3500 species of vascular plants<sup>2</sup> and is very unique. Armenia is a center of species diversity for many genera (including a great number of medicinal plants) such as cornflower, pear, and astragal. The local endemic flora comprises

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<sup>1</sup> Takhtajyan A. L. 1986: *Floristic regions of the world*. — University of California Press.

<sup>2</sup> Takhtajan, A. L. (ed.) 1954-2001: *Flora Armenii*, 1-10. — Erevan.

more than 120 species. N.I.Vavilov<sup>3</sup> identified Armenia as one of the centers of biodiversity for wild relatives of cultivated plants and as one of the Asia Minor centers of origin of cultivated plants.

All natural ecosystems have been under anthropogenic influence for millennia. Because of this fact great territories of natural ecosystems are currently destroyed or damaged. Energy and ecological crisis have influenced negatively on ecosystems as well. Owing to anthropogenic influence the sources of some medicinal plants (especially growing on disturbed lands - *Tussilago farfara*, *Urtica dioica*, and *Artemisia absinthium*) have recently increased in Armenia. Decrease of grazing pressure has essentially improved of condition sub alpine and alpine meadows, restoration of their biodiversity and enlarging the sources of *Hypericum perforatum*, *Ephedra procera*, *Origanum vulgare* as one of the consequences. Forest cutting led to enlarging territories covered by secondary vegetation including a number of medicinal plants (*Crataegus*, *Betula*, *Cotoneaster*, etc.). As a result of economic crisis and high prices for fertilisers and pesticides has decreased their use in agriculture and forestry (and in many cases completely

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<sup>3</sup> Vavilov, N. I. 1992: *Origin and geography of cultivated plants*. — Cambridge University Press.

stopped). As a result the major part of medicinal plants populations growing in natural ecosystems is ecologically

clean. Meantime, a sharp decrease in industrial sector resulted to improvement of atmospheric and water basins.

### **Legal aspects**

#### *Main laws regulating the natural resources protection*

The state policy on conservation, use and reproduction of natural plant resources is regulated by the RA Law on Flora (adopted in 1999). According to the Law, the use of flora species for industrial purposes can be realized only by a permit issued by the Bioresources Management Agency under the RA Ministry of Nature Protection. The Agency is the state authorized body for conservation, protection, use and reproduction of flora in Armenia. When a permit for using flora species is provided to a consumer, the latter should contract the landowner (or land user) for collection (harvesting) of medicinal and other plant species.

According to the RA “Forest Code” (adopted in 1994), the collection of wild medicinal plant species from the state-owned lands, as secondary forest use, is realized by detaching the forested territories into areas for short-term (up to 5 years) and long-term (up to 10 years) use through issuing special documentation (“Agreement on Forest Use” and “Forest Ticket”).

According to the RA Law on Specially Protected Areas (adopted in 1991), the collection of medicinal plants, as one of the forms of economic activity, is

permitted in economic and buffer zones of national parks and in state sanctuaries.

The use of flora objects, including medicinal and aromatic plants, for industrial purposes is chargeable according to the Governmental Decree on Rates of Nature Use Fees. The rates for the use of such medicinal plants, as immortelle reddish, common valerian, liquorice, cephalaria, hulwort, St. John’s worth, motherwort, colt’s foot, wormwood, elder tree, mountain-ash, bryony, are estimated as 75 Armenian drams for collection of 1 kg of upper-ground parts and 250 drams for collection of 1 kg underground parts. The rates for the rest of medicinal plants are set up to 50 drams for collection of 1 kg of upper-ground parts, and 150 drams for underground ones.

The import and export of wild plants into/from the territory of Armenia is regulated by the RA Governmental Decree on “Regulation of Import and Export of Botanical Collections and Plant Samples from or into Armenia”. The import/export permits are issued by the Bioresources Management Agency under the RA Ministry of Nature Protection. To acquire the permit for import, the importer should submit a document confirming the legitimacy

for collecting and/or purchasing the given medicinal plant.

The basic international document declaring the concepts of biodiversity conservation and sustainable use of bioresources is the UN “Convention on Biological Diversity” ratified by Armenia in 1993.

Thus, the issues of collection (harvesting), use, import and export of medicinal and other useful plants in Armenia are subject to legislative regulation. However, the Bioresources Management Agency, under RA MNP takes the scientific data on inventory of flora species and quotas of their use as a basis to grant permits for collection of wild plant species. The data has not been updated during the last 15 years because of the lack of financial resources. In this regard, a serious obstacle occurs for conducting a precise assessment of natural stock of wild medicinal plants in different regions of the Republic and this considerably holds up the issuance of permission for their collection. In order to regulate the collection of medicinal plants in natural habitats, it is necessary to carry out a short-term investigation of the stocks and to identify the

quota for their use in every distinct case and at every distinct territory.

Land privatisation in Armenia was initiated in 1991. At present, the privatised lands cover 457,700 ha or the 66,4 % of agricultural lands. On the basis of former kolkhozes, sovkhoses and other agricultural organizations, about 350,000 small farms and households were organized, which currently cover 447,000 ha agricultural lands (1990). The average privatized land for a farm/household is about 1.4ha, out of which 1.04 ha is arable land, 0.12 ha is perennial and 0.24 ha - hay-field.

Land ownership and land use are regulated by the RA Land Code, adopted in 2001. At present, the state-owned lands include: forest covered areas, specially protected areas, pastures (from agricultural lands), as well as lands of environmental and recreational significance.

Collection and harvesting of medicinal and aromatic plants is mainly realized on forested areas, as well as on privatised territories of various landscape zones (semi-deserts, steppes, meadows).

### **Cultivation and harvesting of medicinal plants**

Richness and variability of the flora and vegetation in Armenia enables

wide use of plant resources by population. Most of biodiversity in Armenia

have been used for economic activity since ancient times. According to historical data, the local population has been using over 2,000 species of plants (or 60% of the flora) for different purposes. According to literature sources, the population used about 500 species of edible plants in the beginning of 20th century. At present the number has decreased and only about 100 species are used, and the 30-40 species are considered more or less widely used. From about 50 wild berry plants the population is using only 14-15. Medicinal plants are the main active agent in folk medicine and are used both independently and in compounds. About 50 species are very widely used (except for 8-10 officinal species which were incorporated in the State Pharmacopoeia of the USSR). Most of these species are collected from nature or are grown on small plantations or on backyards. At present, about 40 medicinal plant species grown and collected in Armenia are being sold in drug stores.

Before independence (1991) under the Soviet central planning system, different state and cooperative organizations harvested and purchased medicinal, edible and other natural products from local population. The Ministry of Agriculture, as well as the "HayAntar" ("Arm-forest"), and "Haycoop" enterprises used to harvest annually about 500 tones of wild fruits and berries

(including more than 300 tones of seabuckthorn's fruits), about 45 tones of walnut, 50 tones of hazelnut, 3,5 tones of Rose hip fruits, about 400 tones of 50 species of medicinal and aromatic plants. After the transition period, these activities were actually stopped, due to the lack of state budget financing, which is also hindering the insurance of state order and provision of payments to producers. At the same time, the private and cooperative enterprises are facing huge difficulties in the market.

The distribution of useful plants is so large in Armenia that it is very difficult to identify the richest territories. For fruit-berry plants and for some edible and medicinal plants, it is forest zone of the country. In neighborhood of every village local population collects their traditional species of useful plants. In non-forest zone the sources of ether-oil and different species of xeric and alpine edible and medicinal plants are very large. Although the species diversity of useful plants in Armenia has been investigated rather well, the intra-specific categories (like chemo or eco races) are not adequately investigated. This is not equal, as the value of vegetation, in particular, is determined by biologically active stuff.

For example, people in Armenia widely use *Thymus kotschyanus* for tea (a hypotensive effect). However,

another species- chemo-race, with lemon odor, is rated as the most valuable.

Theoretically, about 800 species of Armenian flora can be used as medicinal plants. However, actually the natural resources of most of these plants do not allow collecting them from natural ecosystems in industrial or commercial quantities. Below the description of some flora species of Armenia is provided, in requisition to the world market of medicinal plants. Their harvesting will not damage natural ecosystems and biodiversity of Armenia. Collectors have to follow the WHO (World Health Organization) guidelines. It is recommended that

they accept the obligations of “Voluntary confirmation of wild plants origin”. The only way of harvesting for many other species is their growing in artificial conditions.

To be used as medicinal plants on the markets of developed countries, these species have to be cultivated on organic farms and the production has to be certified. If these species are used in pharmacological industry for biologically active stuff extracting, they can be cultivated in hydroponics conditions (In the Institute of Hydroponics of the Armenian National Academy of Sciences methods for growing more than 10 species are worked out).

### **Medicinal plants that could be harvested from natural ecosystems**

It is strongly recommended estimating possible values of harvesting from nature for every species listed below in different regions of Armenia.

Hawthorn (*Crataegus sp.*) There are 13 species of hawthorn in the flora of Armenia. The wide distributed are *Crataegus orientalis*, *C. meyeri*, *C. caucasica* and *C. pentagyna*. The hawthorn is mostly distributed in forest regions of Armenia - in Tavush region (marz) in the North and in Sjunik region in the South.

Great massifs of this plant can be found in the hills of Ararat valley. Flowers and fruit of hawthorn are used as medicinal raw. Flowers have to be

collected in the beginning of bloom at dry weather and have to be delivered to airing place very fast.

Because of differences in the climate conditions in the North, Central and



South Armenia (especially in the number of fair days without precipitation in May-June) it is more convenient to collect hawthorn's flowers in central and south regions of Armenia. Hawthorn's fruit have to be harvested in mature condition and have to be dried in bakers or in warm places. So, there is no special demand to weather conditions and they may be harvested in all regions where are rather big massifs of this plants. The raw material includes only flowers, fruits and leaves, and right harvest of hawthorn cannot seriously damage natural populations.

Mallow (*Malva silvestris*) In Armenia this species is growing in Lori, Tavush, Vajots Dzor, Sjunik and Ararat regions. Harvesting in industrial quantities is possible in the North (Lori, Tavush) and in the South (Sjunik). Mallow is collected in rather big

amount by local population for domestic consumption. So it is necessary to



estimate the sources in different regions of Armenia and identify possible harvest quotas. If the need for this species increases, it is also possible to grow it in artificial conditions on plantations.

Nettle (*Urtica dioica*) In Armenia is distributed very widely and is growing in all regions on wet and ruderal places.

Harvesting of this species from natural populations in many cases will not damage natural ecosystems. Strong control on collectors is necessary - it is impossible to collect nettle from typical ruderal places. Young leaves of nettle serve as a raw material. They can be collected in May-July depending on altitude and climate conditions.



Artificial growing of nettle was undertaken in Gegharkunik region of Armenia.

St. John's wort (*Hypericum perforatum*) is growing in Armenia in all regions, on meadows, steppes, forest margins, wetlands. According to preliminary expert assessment harvesting of 20-30 ton per year will not cause any damages for natural ecosystems (preferably in mountainous regions).

The actual sources and harvest quotas in different regions should be estimated. Methodological and perfect harvesting of *Hypericum* should not damage the natural ecosystems. The stems of 30 cm long with flowers (during June-August) are used as raw material. In some regions of Armenia (Sisian, Goris) there are rather dense populations of *Hypericum*, in others the density is sparser. Perfect harvest of the species is rather labor-



intensive process and currently artificial growing of nettle is being tested in Gegharkunik region of Armenia.

Wormwood (*Artemisia absinthium*) is growing in all regions of Armenia on ruderal places and wetlands from semi-desert up to sub-alpine belt. Like in the case with nettle, wormwood's harvesting will not damage natural ecosystems, but the strong control on harvest areas is necessary - it is impossible to collect it from ruderal places. Stems and leaves are being used as raw material; they have to be collected in the beginning of bloom (May-July).

Sea-backthorn (*Hippophae rhamnoides*) Armenia has rather large sources of this species. At present it is harvested by local population for domestic consumption and for selling on inner market. It is possible to collect 300-350 tons of fruits per year

without enlarging the existing plantations.

Immortelle (*Helichrysum plicatum*,  
*Heli-chrysum rubicundum*)

### **Medicinal plants recommended for artificial growing in Armenia**

Because of rather high demand on world market it is recommended to grow the following medicinal plants at organic farms in Armenia.

Chamomile (*Chamomilla recutita*)

Flowers are used as a raw material, capitulae are harvested in the beginning of bloom. Selection grades with high quantity of ether oil do exist (the seed extraction should be organized).



Application of perfect agrotechnology enables growing the species in all regions of Armenia from hills to 2000-2200m above sea level.

According to expert assessment there is possibility to collect no less than 10 tons per year without damaging the natural populations.

Peppermint (*Mentha piperita*) Leaves are used as a raw material. Selection grades with high quantity of ether oil do exist (the seed extraction should be organized). Growing of the species requires rather good irrigation, so we recommend growing it in the North and South regions of Armenia, where water deficit is not very crucial.

Saffron (*Crocus sativus*) Dried stigmas are being used as a raw material. The saffron's growing in Armenia has to be very profitable because of high prices on raw and low transport expenses.



## **Organizations interested in harvesting, cultivation or processing**

Currently a great number of individuals, as well as small and medium size business organizations do exist in Armenia, interested in harvesting, collection and cultivation of medicinal plants. The main obstacles for this activity are the lack of marketing information, absence of cooperation and even linkages to foreign partners and lack of data on current state of me-

dicinal plants populations. Taking into consideration high level of unemployment in rural areas and a large portion of currently non operated agricultural lands, a number of organizations has capacity and interest to expand their activities in the sphere of harvesting and cultivation of medicinal plants.

### **Commercial structures and private organizations, which are specialized on harvest and cultivation**

**“HAM” Ltd.** (Komitas str. 7/3, apt.33, Yerevan. General Manager A. Mehrabyan, [www.armeniantea.com](http://www.armeniantea.com)). The activities include growing, harvesting and processing more than 15 species of medicinal plants. Organization produces and sells on Armenian and foreign markets different herbal teas and tea blends. All stages of production (from growing to realization) are in use and the licenses are being permanently updated. Organization gained a large experience of collaboration with local population.

**“Ghazaros” Ltd. Medicinal Herbs** (Tavush region, Idjevan. Contact person. L. Aslanyan). Has large experience in collection and cultivation of medicinal plants. For realization of production a specialized shop does exist in Yerevan. Company undertakes advisory activities for local population

on cultivation and harvesting of medicinal plants, technologies for processing of homeopathic medicines. The licenses are being permanently. Unfortunately, there is no trend to enlarge the activities.

**“Busabujts-Nana” Ltd.** (Energeticov str. 13, Sevan. Director S. Mnatsakanyan). Since 2002 WWF implements the project “Development of sustainable use of medicinal plant resources in the Caucasian eco-region”. Currently a trial plantation is operational based on the Sevan branch of Yerevan botanical garden aimed at cultivation of 10 species of medicinal plants (*Urtica dioica*, *Hypericum perforatum*, *Hippophae rhamnoides*, *Berberis vulgaris*, *Pinus kochiana*, *Helichrysum rubicundum*, *Rosa canina*, *Salix caprea*, *Sambucus nigra*, *Vaccinium myrtillus*). The mentioned species

should be of demand on the world market.

**“Hayantar” SNCO** (Yerevan, Moskovyan str. 35. Chief forester R. Petrosyan). Has large experience and capacity on harvesting and cultivation of medicinal plants. The SJCS is authorized by-product harvesting in forests, i.e. has access to all medicinal resources, existing on the state forest lands. The same time, the organization is eligible to involve a rather large amount of man power and provides them with land for cultivation of medicinal plants.

**“Chir” SC** (Nalbandyan str.110, Yerevan. Director T. Tsaturyan, Manager M. Nazaryan). The organization produces dried fruits by using solar drier. Up to date the organization has no experience in cultivation and harvesting of medicinal plants, although it is ready to develop activities in this direction. The organization is capable to store and process medicinal plants.



**“Shen” NGO** (Nalbandyan str.110, Yerevan. President H. Minasyan, [www.shen.am](http://www.shen.am)). The mission of or-

ganization is to provide disadvantaged communities with rented land (the profit entirely is owned by producers) and finding distribution markets. The organization has necessary capacities for cultivation of medicinal plants. For 2004 a trial growing of chamomile is envisaged. Harvesting medicinal plants in the natural ecosystems does not lay across the aims of organization and isn't planned in the nearest future. Organization needs technologies for cultivation, harvesting and processing medicinal plants, as well as advisory services.

**“National Union of Farmers” OSC** (Sebastia str. 3a, Yerevan. President V.Soghomonyan, executive director D.Karapetyan). The OSC has a potential for land resources and men power. Many farmers, members of the union, are experienced in cultivation and processing of medicinal plants and are ready to continue their activities in this sphere. The union needs modern technologies for cultivation, harvesting and processing of medicinal plants, as well as advisory services.

**“Republican Association of Potato Producers”** (Kamo str.6, Akhuryan city. President S.Torosyan). Many members of this organization have experience in cultivation and harvesting of medicinal plants (Rose hips, sea-backthorn, and peppermint). They are ready to cultivate, harvest and

process medicinal plants. The members of the association are owners of a big storage; they are appropriately equipped for processing medicinal plants. The association has a big professional capacity and experience.

**“Agrinko” Ltd.** (Moskovyan str.31, Yerevan. Executive director N.Tumanyan). The organization has rented large territories of arable land on which organic production is cultivated. The “Agrinko” Ltd. considers the cultivation of medicinal plants as one of the perspective ways for organization’s development.

**“Bizon-1” Ltd.** (Gjurdzhyan str.14, Yerevan. Director S.Harutynyan). The organization produces oil from medicinal plants (Rose hips, sea-backthorn, Rose). It is also able to enlarge its production (produce oil from apricots’ seeds, pumpkin seeds,

ether oil from peppermint, fennel, taragon, *Thymus*, *Nepeta*). The production of the organization matches RA standards is registered in the RA Ministry of Health and is being realized in drug stores.

**“Eco-Glob” Ltd.** (Mkhitar Geratsi str. 18/3, Yerevan. General Director N.Darbinyan). The organization is involved in inspection and certification of environmentally sound agricultural production. Currently the organization is in the process of accreditation and is interested at expanding contacts with related producers. Harvesting and cultivation of medicinal plants require especially ecologically sound technologies, thus ecological inspection and certification are required. Obtaining the certificate of consistency for ecologically sound product, the producers will get wider access to the markets.

### **Scientific and specialized organizations**

There are institutions in Armenia that can provide high quality material of harvested and cultivated plants, establish relevant correlation between harvesting conditions and nature protection requirements, ensure the relevant information exchange on practical questions.

**Institute of Botany of National Academy of Sciences of RA** (Director A.Charchoglyan). The Plant Re-

sources Department of the Institute has initiated activities on inventory and estimation of possibilities for using different applicable plants since 1944. There are highly qualified specialists in the Institute, who can help and organize consultations and training courses on methods and rules for harvesting and collection of medicinal plants. Moreover, taxonomy specialists can help avoiding any negative

consequences; mycologists can estimate quality of raw material, its contamination by fungi or bacteria. Phyto-sociologists can choose the right places and possible quotas for medicinal plants harvesting without causing any damage to biodiversity. All these activities are necessary, especially in regard to WHO data on improper taxonomic identification of raw material and contamination by pathogen fungi in the world market of medicinal plants. These facts are alarming for producers, as well as for consumers and officials. Moreover, the excessive harvesting of medicinal plants in many developing countries led to distraction of their natural populations. Public and nature protection organizations (mainly IUCN) pay rather serious attention to these facts.

**“Agrogitaspyur”** (Teryan str.74, Yerevan. Armenian Agricultural Academy. Director L.Gjulkhasyan, specialists A.Melikyan, N.Saruhanyan). The organization is focused on public awareness raising on contemporary achievements in agricultural science and promotion of introduction of scientific achieve-

ments into production systems. The organization provides advisory services and is involved in scientific activities as well. It possesses certain technologies on medicinal plants cultivation that can be presented to producers.

**“Natural Resources Management and Poverty Reduction”** project funded by WB and GEF has good perspectives for developing activities in harvesting and cultivation of medicinal plants in Tavush and Gegharkunik regions. The implementation of the project is envisaged to start in 2004. Activities on using medicinal plants in frames of this project have to be implemented on forested territories and in buffer and economic zones of Sevan and Dilijan national parks.

All listed organizations are ready to partake in workshops and discuss the possible frames for their participation in harvesting, cultivating, processing of medicinal plants and supplying the products to the world market.

