

Working Group:	Medicinal and Aromatic Plants
Project Coordinator: (Name/Institution/Partner)	Dea Baricevic, University of Ljubljana, Biotechnical Faculty - Slovenia

I. Description of the Project activities

Project title (Short and descriptive of the project goal)	
Conservation and characterization of oregano (<i>Origanum vulgare L.</i>) wild populations in Europe	
Project duration: Starting and ending dates (maximum three years)	1st of April 2009 to 31th of March 2012
Participants: ECPGR MAP WG members - interested (Names/institutions/partners)	

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Austria: Johannes Novak, Institute for Applied Botany and Pharmacognosy, University of Veterinary Medicine Veterinaerplatz 1 A-1210 Wien, **responsible for genetic analyses of Oregano samples**

Czech Republic: Karel Dušek, Genebank Olomouc, Crop Research Institute (CRI), Šlechtitelu 11
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Bulgaria: Kana Bojcheva Varbanova, Institute of Plant Genetic Resources (IPGR), 4122 Sadovo, Plovdiv; **agreed to participate in the project when national funds available and when costs for chemical analyses and genetic analysis could be covered by ECPGR budget**

Finland: Bertalan Galambosi, Agrifood Research Finland – Mikkeli, Environmental Research, Karilantie 2A
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Italy: Carla Vender, Unità di ricerca per il Monitoraggio e la Pianificazione forestale Consiglio per la Ricerca e la Sperimentazione in Agricoltura (CRA), Piazza Nicolini 6, 38100 Villazzano-Trento

Agreed to participate in the project when national funds available and when costs for chemical analyses and genetic analysis could be covered by ECPGR budget

Israel: Eli Putievsky, Newe Ya'ar Research Center, PO Box 1021, 30095 Ramat Yishai; **agreed to participate in the project**

Latvia: Ieva Zukauska, University of Agriculture, Faculty of Agriculture, Institute of Agrobiotechnology

Macedonia (only year 2009): Gjoshe Stefkov,

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Background

(State of the art, relevance for the ECPGR programme, and linkage to the WG strategy and priorities)

Within the *Origanum* biotypes exists a wide variability that influences some uncertain definitions at both the species and botanical levels. This is the reason why the *Origanum* genus with 49 taxa (most of them are characterized by a high morphological and chemical diversity) was divided into 10 sections, including the section *Origanum* (Iestwaart, 1980). Even this section, consisting of a single species – *Origanum vulgare* L. – has been characterized by a high morphological and chemical variability. More than 300 scientific names have been given, during the last 150 years, to not more than 70 presently recognized *Origanum* species, subspecies, varieties and hybrids (Skoula and Harborne, 2002). The number of different names reflects the extent of morphological variation the genus exhibits in nature. It has been reported (Kokkini, 1997) that the pattern of variation follows the geographical distribution. *Origanum vulgare* L. has a very large distribution area, stretching not only across the Mediterranean, but in many areas falling within the Euro-Siberian and Irano-Turanian region (Spada and Perrino, 1996). Based on differences in *indumentum*, number of sessile glands on leaves, bracts and calyces, size and colour of bracts and flowers as well as on differences in essential oil contents and composition, 6 subspecies have been documented within *Origanum vulgare* L. species (Iestwaart, 1980; Kokkini, 1997). Also, the contents of phenolic metabolites in oregano, responsible for the interestingly high antioxidant activity of the plant, are highly variable due to the genetic heterogeneity that has been found to be influenced by natural cross-pollination (Eguchi et al., 1996).

The majority of species of the genus *Origanum* have been used as spice (oregano) for thousands of years. Based on scientific proofs on oregano's biological activities (antibacterial, fungicidal, antiviral, nematicidal, antioxidant, antimutagenic, spasmolytic), the traditional use of oregano in phytotherapy has received a sound scientific fundament (Bernath, 1997, Baricevic and Bartol, 2002). The genetic improvement/breeding of oregano accessions has to consider the yield, growth habit, ramification, leaf/stem ratio, better aromatic as well as other chemical characteristics in order to meet the quality of plant raw material. In order to introduce oregano into future breeding programs, conservation of native populations and characterization of their morphological, genetic and chemical characteristics is needed. The explained mutual relationships between geographic distribution in West and South-Eastern European Countries, environment and characterized (morphologically, genetically, chemically) natural populations would enable the understanding of inheritance patterns of morphological and chemical characters, the determination of genetic variability as well as the biogenesis of active secondary metabolites within and among oregano native populations. These relationships have not been clearly defined in scientific literature due to well-known interactions between genotype and environment that typically occurs in medicinal and aromatic plants.

In **Slovenia** only *Origanum vulgare* L. ssp. *vulgare* could be found in nature. *Origanum vulgare* L. ssp. *hirtum* is, because of its high essential oil content, cultivated in gardens and used as a spice. *Origanum vulgare* L. is used also as medicinal plant, even its activity has not been officially recognized. In plant protection it is used against parasites, insects, nematodes and snails. Neither in Slovenia or in other European countries (partners on the project), oregano wild populations have not been studied for their distribution, variability or the extent of biodiversity loss. Because oregano populations were found to be a very interesting raw material both as a herb and as medicinal plant in all MAP WG members, the project proposal offers an opportunity to partners to find out the distribution pattern together with belonging morphological, genetic and chemical characters of populations over a wide area of Western and Eastern Europe.

Portugal has adequate ecogeographical conditions for the occurrence of oregano in spontaneous growth over many places throughout the country, it is commonly found in ruderal habitats, fallow lands and abandoned cultivated fields. The Genus is present only by two subspecies of the *Origanum vulgare* in the flora of Portugal (mainland and islands of Azores and Madeira).

Origanum vulgare L. subsp. *vulgare* only exists in the Northern part of the country.

Origanum vulgare L. subsp. *virens* (Hoffmannsegg & Link) Iestwaart is widely distributed in Portugal, including also Azores and Madeira.

Oregano, in Portugal is widely used as a spice and in Portuguese cuisine and also for medicinal and pharmaceutical purposes.

Recent carried out surveys and systematic collecting missions for seed and vegetative propagating material, showed a large distribution of *O. vulgare* in Portugal.

Based upon the analysis of the characterisation data it can be said that the accessions present a broad genetic base which is an asset for the utilisation in the genetic improvement of the species according to Franz and Novak (1997).

The genus *Origanum* (tribe Mentheae, Labiate family) is characterized by a large morphological and chemical diversity in **Albania**. Due to unsustainable harvesting *Origanum* in Albania became endangered species. *Origanum vulgare* is included in the National Red Data Book of Albania and the threatened status by IUCN: EN Endangered species (Vangjeli et al. 1995). *Origanum vulgare* subsp. *vulgare* and *O. vulgare* subsp. *hirtum* are the most important *Origanum* species in Albania, in relation to their utilization.

The ecogeographical characteristics of Albania, particularly its soil and climate, represent ideal conditions for the spontaneous growth of oregano in many places throughout the country, especially in *Lauretum-Castanetum* vegetation, though it may also be found growing up to the *Fagetum* area. Recent germplasm-collecting missions (Hammer et al. 1994) have pointed out that oregano is more widespread in the southern part of the country, in poor red soil, through rocks, particularly in the mountainous districts of Sarande, Tepelene, Gjirokaster, Fier, Vlore, Berat, Kolonje, Skrapar, Permet, Gramsh, Elbasan, Tirane, Shkoder, Puke, Kukes and Peshkopi. (Ricciardi L., 2005.)

Normally, flowering takes place in July–September for the 'red type' (*Origanum vulgare* subsp. *vulgare*) and in May–July for the 'white type' (*O. vulgare* subsp. *hirtum*). Oregano is widely used as a spice in Albanian cuisine: to make tea, as a medicinal and pharmaceutical plant, for dyeing, as well as a good melliferous plant. (Asllani U., 2004)

Because of its known ability to establish itself in poor soils and dry areas, oregano is a symbol of poverty and stoicism for Albanian people, representing a very popular element in their culture. (Xhuveli L., 1994) Oregano annual production in Albania (dried leaves with 13% moisture content) ranges from 550 to 600 t, of which about 500 t are exported, mainly to Greece, Germany and Italy (MoAF, 2001).

The rest of the production is used for national consumption. Harvest, processing and trading of oregano follow official standards set out by National Authorities.

In the **Czech Republic** *Origanum vulgare* L. and *Origanum vulgare* subsp. *vulgare* are found in the natura. The genus *Origanum* spreads in light forest and shrubbery forest steppe country, rocky hillside, glade and fallow land (Dostál, 1989). The ample amount of *Origanum* spreads in warmer area of the Czech Republic. Oregano is used in traditionary and official medicine for very long time. The drug quality - *Origani herba* is defined in the Czech formulary (Pharmacopoeia Bohemica, 2002). Oregano is widely used as a spice and partially as the substitution on behalf of hops in the brewery.

In **Latvia** only *Origanum vulgare* L. ssp. *vulgare* could be found in nature. In Latvia, oregano is a common plant in certain areas but the plant density is quite low. It is found in dry and middle humid meadows, at field borders and on dry hills. The wide use of oregano is one of the reasons why the populations are severely depleted. The majority of the populations are concentrated into three regions: Vidzeme, Latgale and Kurzeme. In the central area, Zemgale, oregano is only found in a few places. The main chemical components of oregano are carvacrol, thymol, terpinene, cymene and borneol. The total content of essential oil differs (Pakalns, 1992). In European oregano the essential oil is mainly composed of the two phenols carvacrol and thymol. The variation may be wide and many chemotypes are available. It also contains variable amounts of other phenols, monoterpene hydrocarbons (linonene, terpinene, ocimene, caryophyllene, β-bisabolene, *p*-cymene) and monoterpene alcohols (linalool, 4-terpineol). Investigations furthermore show that oregano leaves and young shoots contain very high ascorbic acid amounts at the budding stage and at the start of flowering (Rubine, 1977). Fresh or dry flowering plant tops and leaves can be used as spices. The dried herb is also used in many processed foods such as meat and meat products, condiments and relishes, snacks and milk products and alcoholic beverages. Historically the latvians used oregano as an ingredient in production of sausages.

Oregano is one of the species, which could be used in the development of a sustainable agro system. Thus, it might be grown in multiple-component mixtures with the aim to reconstruct over-cropped land and give rise to a natural plant reproduction (Zukauska, 2001). The aim of the project partner from Latvia is to find and test suitable genotypes of *O. vulgare* from wild growing plants from different sites of the countries in order to study morphological differences, agro-botanical properties suitable for cultivation, further selection and conservation. The main aims of the nearly future work is: studying individual variability of oregano plants within selected population by using sets of visually determined or measured morphological features and chemical characters; comparing the results to find correlation between the different approaches; taking into consideration the possibility of chemotype selection. *O. vulgare* is cross-pollinated species and seeds from best accessions for gene banks must produced in isolation. An alternative method for conservation and storage are the *in vitro* collections. Future actions connected with micropropagation of *O. vulgare*. The best accessions will be used for micropropagation experiments.

The genus *Origanum* (tribe Mentheae, Labiate family) is present only by two subspecies of the *Origanum vulgare* in the flora of **Macedonia**. *Origanum vulgare* subsp. *vulgare* and *O. vulgare* subsp. *hirtum* are the most important *Origanum* species in Macedonia, in relation to their utilization.

Origanum vulgare subsp. *vulgare* is widely spreaded but for *O. vulgare* subsp. *hirtum* there is only one known locality. The ecogeographical characteristics of Macedonia, particularly its soil and climate, represent ideal conditions for the spontaneous growth of oregano in many places throughout the country and can be pointed out that oregano is widespread through out of the country. Normally, flowering takes place in July–September for the 'red type' (*Origanum vulgare* subsp. *vulgare*) and in May–July for the 'white type' (*O. vulgare* subsp. *hirtum*). Oregano is widely used as a herbal tea and as a spice in Macedonian traditional medicine and cuisine as well as a medicinal and pharmaceutical plant, for dyeing, as well as a good melliferous plant. There is no cultivation on any oregano species and all needed amounts are wild harvested which results with great antropogenic pressure on these plants.

In **Norway** wild growing *Origanum vulgare* L. is distributed in all parts of the country up north to the county of Nordland. The plant is most common in the eastern part of the country, and it is quite rare in coastal areas in the west. Some collections have been carried out recent years and some evaluation of the collected accessions from different part of the country has been conducted. The aim of this work has been to identify genotypes with properties suitable for commercial production of oregano for the spice market.

Around 75% of *Origanum* species were distributed in East Mediterranean region (Spada and Perrino, 1997). **Turkey** is a country bearing 22 species of 42 identified *Origanum* species. The number of *Origanum* taxa and hybrids present in Turkey is 32 and 21 of them are endemic to this country (Sari and Oguz, 2002). Four subspecies from *Origanum* section are distributed in Turkey (Ietswaart, 1982).

Origanum vulgare subsp. *gracile* is distributed in Eastern Anatolia around Gumushane, Kahramanmaraş, Malatya, Tunceli, Sivas, Bitlis, Van and Hakkari provinces. This subspecies is an Irano-Turanian element and encountered at high altitudes, more than 1000m above sea level.

Origanum vulgare subsp. *hirtum* is distributed mainly at the Western Anatolia provinces such as Edirne, İstanbul, Çanakkale, Balıkesir, İzmir, Samsun, Muğla and the islands in the Aegean Sea. It is also found at the some parts of Southern and Central Anatolia. It has large distribution from 50m to 1500m above sea level.

Origanum vulgare subsp. *viride* is distributed mainly at the Northern Anatolia and rare at the Central and Southwestern Anatolia. It is distributed in İstanbul, Bursa, Sakarya, Zonguldak, Sinop, Amasya, Giresun, Artvin, Kutahya, Konya and Isparta province of Turkey from 90m to 1300m above sea level.

Origanum vulgare subsp. *vulgare* is also distributed at the Northern parts of Turkey in İstanbul, Tekirdağ, Bolu, Zonguldak, Kastamonu, Çankırı, Sinop, Rize and Kars provinces. This subspecies is Euro-Siberian element and found at the high altitudes.

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Project goal

(Clearly defined goal in 2-3 sentences)

The main objectives of the project are to inventarize and to survey for native populations of wild oregano (*Origanum vulgare* L.), to characterize their morphological, genetic and chemical characteristics and to find out the distribution pattern of taxonomically defined populations in South - Eastern European countries. Environmental data of *Origanum vulgare* natural habitats are planned to be characterized. Also, one of important goals is to collect the seed material from taxonomically defined wild populations of oregano as well as medium- and long-term storage of collected seed material that could be used in future in breeding programs.

Multiplication of seed material (using screenhouse – isolation technique) in the second year of the project has been anticipated by all partners. Collected seed material from different parts of the region will be very important for future cultivation in several countries - WG members.

The data on characterization of plant material and all resulted data will be documented in a databases of the genebanks and will be available for exchange within all partners. This project aims at establishment of regional collection(s) of *Origanum vulgare* L. in the area of Europe.

Project objectives

(List of specific project objectives)

The specific objectives of this project are:

- ✓ Inventory, survey and characterization of habitats and of native populations of *Origanum vulgare* L. in European Countries, ECPGR members
- ✓ Collecting of herbarium specimens
- ✓ Collecting of seed material
- ✓ Medium- and long- term seed conservation
- ✓ Multiplication of seed material
- ✓ Study of morphologic, genetic and chemical variability of oregano populations
- ✓ Documentation
- ✓ Distribution of collected material and characterization data among partners

Work plan

(Short description of each activity including timetable)

Inventory and mapping of *Origanum vulgare* L. native populations, collecting of seed material, conservation and multiplication of seed material, morphological and chemical characterization of material is planned to be made in all countries - WG members. Genetic characterization of populations by microsatellites (Novak et al., 2008) (15 samples per population, 10 populations per country, i.e. 150 samples/partner country) is planned to be made in one member country (presumably Austria). Documentation of registered characters, obtained during field and laboratory work, as well as promotion of conservation activities has been planned by all project partners.

The following steps of the project have been anticipated:

➤ **Inventory and surveying of *Origanum vulgare* L. populations**

During the field work the identification and mapping of the main areas where wild oregano is distributed will be done. Geographical coordinates (latitude, longitude and altitude) will be recorded and ECPGR proposed environment-site descriptors will be used for characterization of habitats.

Abundance of native populations will be recorded. During the survey the period of seed sampling, based on developmental stage of observed populations, will be decided/planned.

➤ **Collecting of herbarium specimens**

Herbarium specimens will be collected.

➤ **Collecting of seed material**

Seed material from characterized plant populations will be collected in autumn, depending on vegetation developmental stage. Collected seed material will be, after cleaning, dried to 8 % moisture content and to 5 % moisture content for medium-term conservation and for long-term conservation, respectively.

➤ **Medium and long term conservation**

Collected seed material will be stored at +4°C (medium-term conservation – active collection) and at -20°C (long term conservation - base collection) at institutions of project partners.

➤ **Study of morphologic, genetic and chemical variability of oregano populations**

For morphological and chemical characterization ECPGR crop specific descriptors will be used. After DNA isolation, genetic variability within and among *Origanum vulgare* L. populations will be done with micro-satellite technique (Novak et al., 2008). It has been planned that the project partners prepare samples for DNA extraction (15 plants per population, 10 populations per partner). According to the preliminary results of intra- and inter-populations variability studies the number final samples, needed for detailed genetic analysis will be determined.

➤ **Documentation**

All collected accessions and as well as habitats of native populations will be described by passport data (general ECPGR descriptors and crop specific ECPGR descriptors). In Slovenia the compiled national data will be processed by relational database MEDPLANT .

➤ **Distribution of collected material**

All collected material and data will be available for distribution to all project partners.

Expected outcome

(Short description, resulting from the predicted activities)

The main outcome of the project is to achieve the data on distribution and of native populations of taxonomically defined oregano (*Origanum vulgare* L.) in ECPGR MAP WG member countries, partners of the project. The material will be *in situ* and *ex situ* (in 2011) morphologically and chemically characterized. A high genetic variability within oregano populations (higher than among oregano populations) has been anticipated. Collected seed material will be medium- and long-term conserved and multiplied/regenerated. Due to the cross-pollinating nature of oregano, multiplication will have to be done in screenhouses, using pollinating flies. The data on characterization of plant material and of habitats will be documented and distributed among partners. The output of relational database MEDPLANT (Slovenian national data) will be presented to the project partners with the aim of possible future upgrade/internationalization of the database.

II. Work Plan Table (WPT)

Slovenia

Portugal

Albania

The Czech Republic

Finland

Latvia

Macedonia - only year 2009

	Activity		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	Inventory and survey of <i>Origanum vulgare L.</i> (field work – 20 days, 2008, 2009)						*	*	*	*	*			
2	Collecting of herbarium specimens(20 days, 2008, 2009)						*	*	*	*	*			
3	Collecting of seed material (8 days; 2008, 2009)									*	*			
4	Medium and long term conservation (2008, 2009, 2010)											*	*	*
5	<i>In situ</i> characterization of plant material (2008, 2009, 2010)						*	*	*	*	*			
6	Multiplication of collected seed material (2009, 2010)			*	*									
7	Documentation (2008, 2009, 2010)				*	*	*	*	*	*	*	*	*	*
8	Distribution (2010)										*	*	*	*

Norway: Activities 2009 - 2012

- Additional survey of *Origanum vulgare L.* populations, incl. collection of herbarium specimens, collection of plant material for further investigation and characterisation of habitats.
- Description, evaluation and documentation of previously collected and new material according to common project plans and standards.
- Providing material for joint DNA-analysis and material for other purposes at project partners.

Slovakia

III. Detailed Budget Proposal (DBP)

Common costs for Genetic characterization of populations by microsatellites (samples of all project partners)

Option 1: 2000 samples: **17.000 €**

Option 2: 1000 samples: **9.750 €**

Slovenia: Year 2009

	Year 1		
	Number	€	€
Surveys and collecting expeditions			
Accommodation	3 nights x 4 persons	100/day	1200
Daily allowances technical staff	20 days x 4persons	20/day	1600
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation			500
Soil analysis	10 localities	75/sample	750
Morphological characterization of plant material	100 hours	19,5/hour	1950
Chemical characterization of plant material	150 samples		3000
Documentation	70 hours	19,5/hour	1365
Total budget for 2009			11765

Portugal: Year 2009

	Year 1		
	Number	€	€
Surveys and collecting expeditions			
Accommodation	3 nights x 2 persons	100/day	600
Daily allowances technical staff	20 days x 2persons	20/day	800
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation			500
Soil analysis	10 localities	75/sample	750
Morphological characterization of plant material	100 hours	19,5/hour	1950
Chemical characterization of plant material	100 samples		2000
Documentation			
Total budget for 2009			8000

Albania: Year 2009

	Year 1		
	Number	€	€
Surveys and collecting expeditions			
Accommodation	3 nights x 4 persons	100/day	1200
Experts daily allowances	10 nights x 4 persons	60/day	2400
Daily allowances technical staff	20 days x 4persons	20/day	1600
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation			500
Soil analysis	10 localities	75/sample	750
Morphological characterization of plant material	100 hours	19,5/hour	1950
Chemical characterization of plant material	150 samples		3000
Documentation	70 hours	19,5/hour	1365
Total budget for 2009			14165

The Czech Republic: Year 2009

	Year 1		
	Number	€	€
Surveys and collecting expeditions			
Accommodation	3 nights x 4 persons	100/day	1200
Daily allowances technical staff	20 days x 4persons	20/day	1600
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation			500
Soil analysis	10 localities	75/sample	750
Morphological characterization of plant material	100 hours	19,5/hour	1950
Chemical characterization of plant material	150 samples		3000
Documentation	30 hours	19,5/hour	585
Total budget for 2009			10985

Latvia: Year 2009 - Necessary financial support from project, depending from project financial possibilities

Year 1			
Morphological characterization of plant material *	100 hours	19,5/hour	1950
Chemical characterization of plant material*	150 samples		3000
Documentation*	70 hours	19,5/hour	1365
Total budget for 2009			6315

Macedonia: Year 2009

Year 1			
Surveys and collecting expeditions	Number	€	€
Accommodation	5 nights x 3 persons	100/day	1500
Daily allowances technical staff	20 days x 1persons	20/day	400
Local transportation	7 days x 200 km/day	60/day	420
Office materials			200
Medium and long term conservation			500
Soil analysis	5 localities	75/sample	375
Morphological characterization of plant material	100 hours	19,5/hour	1950
Chemical characterization of plant material	100 samples	20/sample	2000
Documentation	70 hours	19,5/hour	1365
Total budget for 2009			8710

Norway: Year 2009

Staff	Travel	Office exp.	Σ
3000 €	2000 €	200 €	5200 €

Slovakia: Year 2009

Year 1			
Surveys and collecting expeditions	Number	€	€
Accommodation	3 nights x 2 persons	100/day	600
Daily allowances technical staff	20 days x 2persons	20/day	800
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation			500
Soil analysis	10 localities	75/sample	750
Morphological characterization of plant material	100 hours	19,5/hour	1950
Chemical characterization of plant material	100 samples		2000
Documentation			
Total budget for 2009			8000

Slovenia: Year 2010

	Year 2		
	Number	€	€
Surveys and collecting expeditions			
Accommodation	2 nights x 4 persons	100/day	800
Daily allowances technical staff	20 days x 4persons	20/day	1600
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation			500
Multiplication of seed material	10 screen houses and pollinating flies		3000
<i>In situ and ex situ morphological characterization of plant material</i>	100 hours	19,5/hour	1950
<i>In situ and ex situ chemical characterization of plant material</i>	150 samples		3000
Documentation	70 hours	19,5/hour	1365
Distribution of seed material			200
Total budget for 2010			13815

Portugal: Year 2010

	Year 2		
	Number	€	€
Surveys and collecting expeditions			
Accommodation	2 nights x 2 persons	100/day	400
Daily allowances technical staff	20 days x 2 persons	20/day	800
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation			500
<i>In situ and ex situ morphological characterization of plant material</i>	100 hours	19,5/hour	1950
<i>In situ and ex situ chemical characterization of plant material</i>	100 samples		2000
Documentation			
Total budget for 2010			7050

Albania: Year 2010

Year 2			
	Number	€	€
Surveys and collecting expeditions			
Accommodation	2 nights x 4 persons	100/day	800
Experts daily allowances	10 nights x 4 persons	60/day	2400
Daily allowances technical staff	20 days x 4persons	20/day	1600
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation			500
Multiplication of seed material	5 screen houses and pollinating flies		1500
<i>In situ and ex situ morphological characterization of plant material</i>	100 hours	19,5/hour	1950
<i>In situ and ex situ chemical characterization of plant material</i>	100 samples		2000
Documentation	70 hours	19,5/hour	1365
Distribution of seed material			200
Total budget for 2010			13715

The Czech Republic: Year 2010

Year 2			
	Number	€	€
Surveys and collecting expeditions			
Accommodation	2 nights x 4 persons	100/day	800
Daily allowances technical staff	20 days x 4persons	20/day	1600
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation			500
Multiplication of seed material	10 screen houses and pollinating flies		3000
<i>In situ and ex situ morphological characterization of plant material</i>	100 hours	19,5/hour	1950
<i>In situ and ex situ chemical characterization of plant material</i>	150 samples		3000
Documentation	30 hours	19,5/hour	585
Distribution of seed material			200
Total budget for 2010			10035

Latvia: Year 2010- Necessary financial support from project, depending from project financial possibilities

Year 1			
Multiplication of seed material*	10 screen houses and pollinating flies		3000
<i>In situ and ex situ morphological characterization of plant material*</i>	100 hours	19,5/hour	1950
<i>In situ and ex situ chemical characterization of plant material*</i>	150 samples		3000
Documentation*	70 hours	19,5/hour	1365
Distribution of seed material*			200
Total budget for 2010			9515

Norway: Year 2010

Staff	Travel	Office exp.	Σ
4000 €	800 €	300 €	5100 €

Slovakia: Year 2010

Year 2			
Surveys and collecting expeditions	Number	€	€
Accommodation	2 nights x 2 persons	100/day	400
Daily allowances technical staff	20 days x 2persons	20/day	800
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation			500
Multiplication of seed material			
<i>In situ and ex situ morphological characterization of plant material</i>	100 hours	19,5/hour	1950
<i>In situ and ex situ chemical characterization of plant material</i>	100 samples		2000
Documentation			
Distribution of seed material			100
Total budget for 2009			7150

Slovenia: Years 2011 and 2012

	Year 3		
	Number	€	€
Surveys and collecting expeditions			
Accommodation	2 nights x 4 persons	100/day	800
Daily allowances technical staff	20 days x 4persons	20/day	1600
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation (2008, 2009, 2010)			500
Multiplication of seed material			1500
Characterization of plant material	100 hours	19,5/hour	1950
Ex situ chemical characterization of plant material	150 samples		3000
Documentation	70 hours	19,5/hour	1365
Distribution of plant/seed material			200
Preparation of the final report	100 hours	19,5/hour	1950
Total budget for 2011 and 2012			14265

Portugal: Years 2011 and 2012

	Year 3		
	Number	€	€
Surveys and collecting expeditions			
Accommodation	2 nights x 2 persons	100/day	400
Daily allowances technical staff	20 days x 2 persons	20/day	800
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation (2008, 2009, 2010)			500
Characterization of plant material	100 hours	19,5/hour	1950
Ex situ chemical characterization of plant material	100 samples		2000
Documentation			
Preparation of the final report	30 hours	19,5/hour	585
Total budget for 2011 and 2012			7635

Albania: Years 2011 and 2012

Year 3			
	Number	€	€
Surveys and collecting expeditions			
Accommodation	2 nights x 4 persons	100/day	800
Experts daily allowances	10 nights x 4 persons	60/day	2400
Daily allowances technical staff	20 days x 4persons	20/day	1600
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation (2008, 2009, 2010)			500
Multiplication of seed material			1500
Characterization of plant material	100 hours	19,5/hour	1950
Ex situ chemical characterization of plant material	100 samples		2000
Documentation	70 hours	19,5/hour	1365
Distribution of plant/seed material			200
Preparation of the final report	100 hours	19,5/hour	1950
Total budget for 2011 and 2012			15665

The Czech Republic: Years 2011 and 2012

Year 3			
	Number	€	€
Surveys and collecting expeditions			
Accommodation	2 nights x 4 persons	100/day	800
Daily allowances technical staff	20 days x 4persons	20/day	1600
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation (2008, 2009, 2010)			500
Multiplication of seed material			1500
Characterization of plant material	100 hours	19,5/hour	1950
Ex situ chemical characterization of plant material	150 samples		3000
Documentation	30 hours	19,5/hour	585
Distribution of plant/seed material			200
Preparation of the final report	50 hours	19,5/hour	975
Total budget for 2011 and 2012			12510

Latvia: Years 2011 and 2012 - Necessary financial support from project, depending from project financial possibilities

Year 3			
Characterization of plant material*	100 hours	19,5/hour	1950
Ex situ chemical characterization of plant material*	150 samples		3000
Documentation*	70 hours	19,5/hour	1365
Distribution of plant/seed material *			200
Preparation of the final report*	100 hours	19,5/hour	1950
Total budget for 2011 and 2012			8465

Norway: Year 2011

Staff	Travel	Office exp.	Σ
3000 €	500 €	300 €	3800 €

Norway: Year 2012

Staff	Travel	Office exp.	Σ
500 €	-	100 €	600 €

Slovakia: Years 2011 and 2012

Year 3			
Surveys and collecting expeditions	Number	€	€
Accommodation	2 nights x 2 persons	100/day	400
Daily allowances technical staff	20 days x 2persons	20/day	800
Local transportation	20 days x 200 km/day	60/day	1200
Office materials			200
Medium and long term conservation (2008, 2009, 2010)			500
Multiplication of seed material			
Characterization of plant material	100 hours	19,5/hour	1950
Ex situ chemical characterization of plant material	100 samples		2000
Documentation			
Distribution of plant/seed material			100
Preparation of the final report	20 hours	19,5/hour	390
Total budget for 2011 and 2012			7540