



Alpine Botanical Garden of Campo Imperatore (Gran Sasso, Italy): conservation and sustainable use of *Artemisia petrosa* subsp. *eriantha*

Pace L., Pirone G., Pacioni G., Di Martino L.
Alpine Botanical Garden of Campo Imperatore - Italy

c/o Dipartimento di Scienze Ambientali, Facoltà di Scienze MM.FF.NN., Università degli Studi dell'Aquila - Via Vetoio - Loc. Coppito 67100 L'Aquila - Italy
Tel. +39-0862-433226 Prof. G. Pirone (Garden Director) +39-0862-433212 Dott.ssa L. Pace (Assistant) Fax +39-0862-433205 e-mail: loretta.pace@univaq.it



The Alpine Botanical Garden of Campo Imperatore, located in the Gran Sasso massif at 2117 m a.s.l., accommodates the main peculiar species of the regional mountainous flora. It is situated in the Gran Sasso - Monti della Laga National Park. It represents a living museum specialised in biological education and in conservation of regional flora. The Garden is managed by the Department of Environmental Sciences - University of L'Aquila (Prof. G. Pirone) and the Ministero delle Politiche Agricole e Forestali, Ufficio Territoriale per la Biodiversità L'Aquila (Dott. G. Mancini).



Artemisia petrosa subsp. *eriantha* (locally called Genepi) is endemic of central Apennines, and lives in rock crevices above 2200 m a.s.l. The phytotherapeutical properties of the Genepi are comparable with those of other *Artemisia* species, digestive and antispasm; moreover, the aromatic bitterness of this plant is a fundamental component of any fine liqueur. We report *in vitro* propagation of Genepi and the use of *in vitro* regenerated plants for reintroduction of this entity in nature. Such an operation is ecologically acceptable, since Alpine plants, which have a very short reproductive season, easily reproduce asexually.



Artemisia petrosa subsp. *eriantha*

Genepi has a great medical importance and a relevant ecological role. It is protected by an Italian regional law. Plants collected in nature have been multiplied by *in vitro* culture techniques. Medium composition is: MS (Murashige and Skoog), 1% agar, 3% sucrose, CaCO₃ (500 mg/l), 2 mg/l BAP (6-benzylaminopurine) and pH 5.8.

The presence of CaCO₃ influences the rate of propagation which, under optimal conditions, reaches an average of 30-35 shoots/explant. After *in vitro* rooting and transfer to soil, a number of plantlets suitable for reintroduction in nature were produced. Essential oils obtained from cloned plants were characterized by gas-chromatography and mass-spectrometry.



All the oils, particularly rich in *sesquiterpeni*, exhibit a high quantity of *tujoni*, which increases during plant development, but with a minor trend with respect to plants in nature. The drug (*thujone* = 4-methyl-1-(1-methylethyl) bicyclo [3.1.0]-hexan-3-one) is found especially in the flowers from July to September. We remember that towards the end of XIX the century, in France, the liqueur (with the same officinal property) obtained from the *Artemisia absinthium* was the most consumed, especially among artists causing frequently devastating effects.

In table I we report the analyses of essential oils on:

- plants obtained by *in vitro* propagation
- plants transferred in the open air after the propagation *in vitro*
- spontaneous plants, collected on the Gran Sasso during the blooming period (July - August).

All the essential oils show elevated amounts of *tujoni*, while *in vitro* propagated plants have a lower concentration of *tujoni*. Therefore they result being inferior in toxicity and appear more usable for officinal scope.

For the development of the roots the auxin (IBA = 3-indolbutirric acid) added to the medium was necessary. Plants obtained by *in vitro* propagation were transferred on *Quoirin & Lepoivre* medium. Plants were then placed in 50% of peat and 50% of sand, previously sterilized. For two days were left in a germinating chamber, and then placed in climatic chamber for two months. Subsequently were transferred in cold greenhouse, and after some days transplanted on wide pots containing one part of sand and three parts of peat. After a few days in cold greenhouse, the plants were transferred in the open air.

Table I	plants obtained by <i>in vitro</i> propagation	plants transferred in the open air	spontaneous plants
<i>alfa-tujene</i>	tr	tr	tr
<i>alfa-pinene</i>	0,03	0,27	0,35
<i>camfene</i>	0,07	tr	tr
<i>sabinene</i>	0,12	1,64	2,77
<i>beta-pinene</i>	0,13	1,78	0,83
<i>mirreene</i>	0,04	tr	0,27
<i>alfa-terpinene</i>	tr	0,17	0,18
<i>para-cimene</i>	0,10	0,22	0,19
<i>limonene</i>	0,03	tr	0,06
<i>eucaliptolo</i>	0,11	0,38	0,30
<i>gamma-terpinene</i>	0,10	0,35	0,49
<i>terpinolene</i>	tr	tr	0,08
<i>cis-tujone</i>	29,99	42,82	52,22
<i>trans-tujone</i>	13,33	16,82	19,72
<i>camfora</i>	1,83	1,53	0,31
<i>terpinen-4-olo</i>	0,32	0,65	1,02
<i>alfa-terpinedolo</i>	0,11	tr	tr
<i>beta-cariofillene</i>	0,15	0,10	tr
<i>resa in olio (%)</i>	tr	0,21	0,52



Experimental cultivation of plants obtained through the *in vitro* propagation are programmed in the territory of the Gran Sasso - Monti della Laga National Park. The experimental fields are located at about 1000 m a.s.l. In summer the plants are covered with peat and coconut fibres, and irrigated. Plants will develop until to the autumn and will be carried on the second year, in some cases also on the third and on the fourth year.

The cultivation of Genepi turns out useful for the conservation of a rare species, moreover it can be finalized for officinal uses.

References

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