

Original Article

Testing Germination Capacity on Seeds of *Arnica Montana* L. Specie

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Abstract

The mountain arnica ethimology originates from the Greek word *ptarmica* (la Discorides), which became from the verb *ptario* = to sneeze, because the roots and the stems of the plant produce sneeze. As vegetal product flowers from mountain arnica are used (*Arnicae flos*). In mountain arnica there are found: flavonoids, di- and triterpenes, helenalin, dihydrohelenalin. The pharmaceutical preparates based on mountain arnica flowers have action: antiseptic, anti-inflammatory, bacteriostatic, fungicide, choleric, cholagog, anti-sclerotic. In *Arnica Montana* L. seeds from Germany and from Gheţari, the germinative faculty records the biggest values one year and four months after harvesting, and after two years and four months there is a sharp decrease of values. Among four variants of soil mixtures taken into study, the best were variant V₃ (50% terra rosa, 25% peat, 25% sand) and variant V₄ (germinative pills) on which the best *Arnica Montana* L. rising. According to our research, the following results were obtained: for the sample harvested from Poiana Horii area, a content of 0.039 g% flavonoids was recorded and for those harvested from Scărişoara cave a content of 0.4949 g% flavonoids.

Keywords: germinative faculty, mixtures, active principles

1.Introduction

The mountain arnica ethimology originates from the Greek word *ptarmica* (la Discorides), which became from the verb *ptario* = to sneeze, because the roots and the flowers of the plant produce sneeze. In the XVIIth century, as result of the distortion of the word *ptarmica* appeared mountain arnica (montanus = of mountain) and this shows the plant origin place.

The plant was appreciated by Goethe who, each evening, drunk mountain arnica tea. German writer and botanist, Goethe claimed that mountain arnica saved his life.

Studies concerning the bio-ecology and valuation of this specie were performed in our country by F. Păcurar and I. Rotar, 2004; M. Tămaş et al., 2006, B. Michler et al., 2006, etc. [3].

From mountain arnica inflorescences are used (*Arnicae flos*).

They contain volatile oil in share of 0.05 - 0.15% (Grigorescu E. et al., 2001) and 0.04-3.8% (Crăciun F. et al., 1977), function of biological material and vegetation conditions, as well as triterpenic alcohols, (helenalin), yellow pigments, bitter principles [2, 1].

In mountain arnica from the area of Apuseni Mountains, Tămaş M. et al., 2006, reported a content of 0.74 - 1.08% sesquiterpenic lactones, helenaline [4].

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The active principles from mountain arnica have a complex action: antiseptic, anti-inflammatory, bacteriostatic, fungicide, choleric, diuretic, hypotensive.

2. Material and Method

The researches, which are the subject of this study were carried on during 2008 - 2010 with the aim of contributing to the thoroughing of the knowledge concerning the seeds germination.

The objectives of our study were:

1. to identify the influence of the seeds age on the germinative faculty in *Arnica montana* L. According to the SR 1634/99 standard, for determination of germination, we used four repetitions of 100 seeds/each variant, that were introduced in germinating device at constant: temperature - 20° C, humidity - 70%, and permanent light. We used two types of seeds harvested in 2008: Rieger Hofmann GmbH – Germany and Ghețari – village of Gârda de Sus (county of Alba) - Romania. The practical importance of determining the germinative faculty aims to seeds crops destined for sowing. Function of obtained values, the quantity of seed needed for sowing by area unity is settled, in order to supply an appropriate emergence and an optimal plant density. Three variants were taken into study were: (Control) - 4 months from harvesting (nov 2008), **V₂** - 1 year and 4 months from harvesting (nov 2009), **V₃** - 2 years 4 months from harvesting (nov 2010).
2. to establish the influence of soil mixtures on emerging of *Arnica montana* L. plants. We used in the experiments: terra rosa (soil from Apuseni Mountains – Gârda village), peat, sand and germinative pills (pills that increase their volume by watering). We used seeds from Ghețari – village of Gârda – Romania. We took into study four mixture

variants. With each mixture, an experience was put into practice, in three repetitions with 100 seeds each. The maintaining conditions consisted of daily irrigation, and weekly monitoring of emergence degree in plants. The following variants of mixtures were used: **V₁**, 50% peat, 25% terra rosa, and 25% sand, **V₂**, 40% terra rosa, 20% sand, 20% manure, and 20% peat, **V₃**, 50% terra rosa, 25% peat, 25% sand, **V₄**, germinative pills

3. to identify the identification of the flavonoid content in *Arnica montana* L. specie. The qualitative phytochemical study, of the flavonoids from *Arnica montana* L. specie was performed using thin layer chromatography at the Faculty of Pharmacy from Cluj - Napoca, at the Unit of Pharmacognosie.

In order to quantitative determination of flavonoids two samples were taken into study:

- from Poiana Horii area, Apuseni Mountains – sample 1
- area of the Scărișoara cave, county of Alba – sample 2

3. Results and Discussions

Figure 1 shows an increase of the germinative faculty from november 2008 (four months after harvesting - 45%) up to 2009 (at one year and four months from harvesting - 73%) and then it strongly decreases in November 2010 (at two years and four months from harvesting - 34%).

It explains the fact that after four months from harvesting the seeds are in sowing pause and as consequence the seeds germination is lower.

The Variant **V₂** (at one year and four months from harvesting – 73%) recorded very significant positive differences compared to control variant (at four months from harvesting – 45%), and variant **V₃** (at two years and four months from harvesting – 34%) recorded very significant negative differences compared to control variant **V₁**.

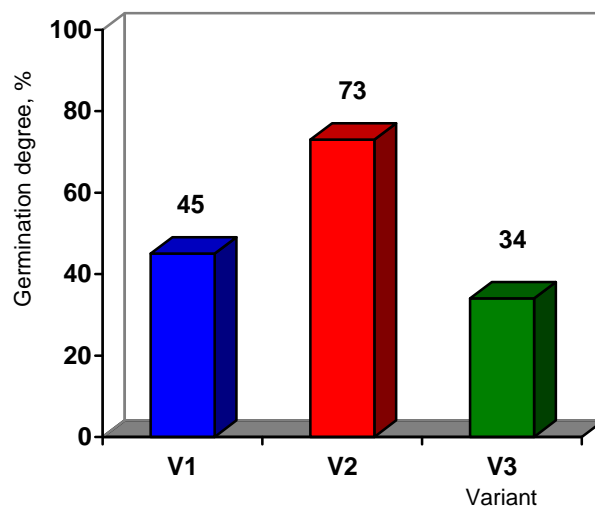


Figure 1. The germinative faculty in *Arnica* seeds from Germany, function of seeds age (Cluj-Napoca, 2011)

The figure 2 shows an increase of the germinative faculty from November 2008 (at four months from harvesting – 38%) up to 2009 (at one year and four months from harvesting - 83), then it

suddenly decreases in November 2010 (at two years and four months from harvesting - 28). In this case, too, we can say that the mountain arnica seeds are in seminal repose in the first four months from harvesting.

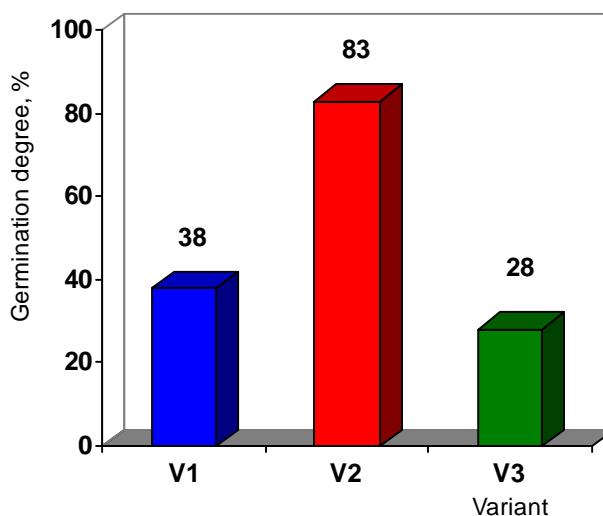


Figure 2. The germinative faculty in *Arnica montana* L. seeds from Ghețari, function of seeds age

This explains the low germination percent in this period.

The variant V_2 (at one year and four months from harvesting – 83%) recorded differences very significant positive compared to control variant (at

four months from harvesting – 38%), and variant V_3 (at two years and four months from harvesting – 28%), recorded negative distinct significant differences compared to control sample V_1 .

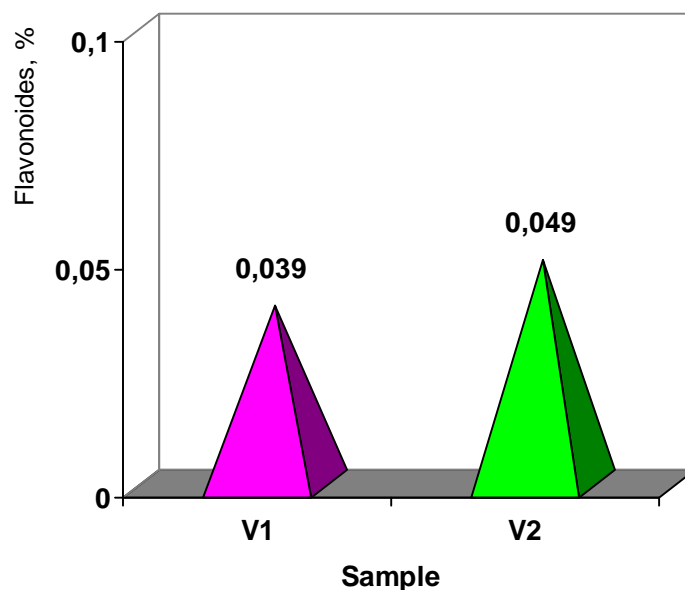


Figure 3. The quantitative content of flavonoids from both harvested samples

The figure 3 shows that in sample 2 (from the area of Scărișoara cave, county of Alba) the flavonoid content is bigger compared to sample 1 (from the Poiana Horii area, Apuseni Mountains).

The mixture variants V_3 (50% terra rosa, 25% peat, 25% sand – 60.33%) and V_4 (germinative pills – 87.67%), have a large number of emerged plants and recorded positive, as presented in fig. 4.

Very significant differences compared to control sample (40% terra rosa, 20% sand, 20% manure, 20% peat), and variant V_1 (50% peat, 25% terra rosa, 25% sand) were recorded, and also recorded very significant negative differences compared to control variant V_1 .

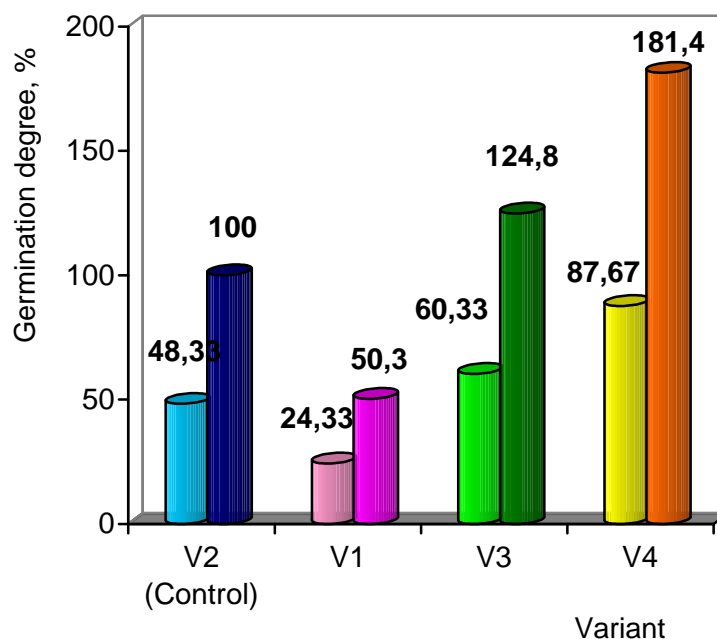


Figure 4. The germinative faculty in *Arnica montana* L. seeds from Ghețari, function of used mixture (Cluj-Napoca, 2011)

For seedlings the following mixture variants of mountain arnica were used: V₃ (50% terra rosa, 25% peat, 25% sand) and V₄ (germinative pills).

The differences between both values resulted from the quantitative analyze, may be put on the

4. Conclusions

1. In *Arnica Montana* seeds from Germany and Ghețari, the germinative faculty recorded the biggest values after one year and four months from harvesting, and after two years and four months from harvesting the values recorded a sharp decrease. For inseminating the *Arnica montana* L. seeding, we recommend their use up to a maximum age of one year and four months, in order to benefit orf a maximum germinative capacity.

2. Of all four mixture studied variants, the best were the variants V₃ (50% terra rosa, 25% peat, 25% sand), and V₄ (germinative pills) on which the beest emerging rate of *Arnica Montana* L. plants was recorded.

3. Our research emphasizes the folowing results: the sample from Poiana Horii area has a content of 0.039 g% flavonoids and the sample from the Scărișoara cave area, 0.4949 g% flavonoids.

factors connected with the harvesting, drying, not appropriate preservation, and age of the medicinal vegetal product.

The differences may be the result of the factors connected to harvesting, drying, not apropiate preservation, or age of the vegetal product.

References

- [1] Crăciun F., O. Bojor, M. Alexan, 1977, Farmacia naturii, vol. II, Ed. Ceres, București, 26 – 27
- [2] Grigorescu E., M.I. Lazar, U. Stănescu, I. Ciulei, 2001, Index fitoterapeutic, Ed. Cautes Iași, 62 – 65
- [3] Muntean L. S., M. Tămaș, S. Muntean, L. Muntean, M.M. Duda, D.I. Vârbă, S. Florian, 2007, Tratat de plante medicinale cultivate și spontane, Ed. Risoprint Cluj-Napoca, 577 – 585
- [4] Tămaș M., L. Vlase, G. Crișan, 2006, Proceeding of the 4th Conference on Medicinal and Aromatic Plants of South-East European Countries, Iași, 569 - 572