

## THE STUDY OF THE SEED GERMINATION IN SOME *ARNICA MONTANA* L. DESCENTS

Vârban Dan Ioan\*, Rodica Vârban, Odagiu Antonia

\*University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Faculty of Agriculture, 3-5 Manastur Street, 400372, Cluj-Napoca, Romania, email: [dan\\_varban@yahoo.com](mailto:dan_varban@yahoo.com)

### Abstract

Both germinative energy and germinative faculty record the biggest values at five and eighth months from harvesting, in *Arnica Montana* L. seeds from Germany. From all four studied soil variants, the best was variant VI (50% peat, 25% terra rosa, 25% sand) with 86.67 % sprang plants.

**Key words:** seeds, germination, soil mixtures

### INTRODUCTION

The plant is well known since Antiquity. The Dacs used it for medicinal aims. Maybe since that ages dated the habitude of placing fresh leaves on cuttings and wounds.

It is for the first time mentioned in the XII<sup>th</sup> century, by Saint Hildegarde de Bingen, who underlines the arnica capacity to heal the cricks. In the same period, arnica was also used in religious rituals, but beginning with 1600 it was used in therapeutic practice, being used in asthma crisis and gallstone. In the XV<sup>th</sup> century, *Arnica montana* was also named "the remedy of break-ups"! Arnica is part of the plants that influenced Christian Friedrich Samuel Hahnemann, the doctor who invented the homeopathy in 1796.

Its popularity was much increased during the XIX<sup>th</sup> the century, its use in homeopathic forms taking the place of the phytotherapeutic products. The greatest Goethe adored this plant, because it saved his life when a respiratory infection, with strong fever, did not ceased with other remedies.

*Arnica montana* L. is spread in Europe, Asia, and North America. In our country, it grows in Apuseni Mountains, and Northern Moldavia, especially, with predominance in the counties of Alba, Bistrița-Năsăud, Hunedoara, Cluj, Suceava.

From arnica the inflorescences (*Arnicae flos*) are used. the flowers contain volatile oil in share of 0.05 – 0.15 % and 0.04 – 3.80 %, triterpenic alcohols, yellow pigments, polyines, bitter principles.

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

## MATERIAL AND METHOD

The experiments were developed within the Laboratory and Green house of the Unit of Phytotechnics from the University of Agricultural Sciences and Veterinary Medicine Cluj -Napoca.

### 1. Study concerning the influence of the seed age upon the energy and germinative faculty in *Arnica montana* L. specie.

In order to perform the study of the germination, we used three seed populations harvested in July 2011 in Germany and Romania – Gârda de Sus village, culture seeds and pastures).

The germination was determined using the STAS, in 4 repetitions of 100 seeds each, with seeds belonging to each population. The determination of the energy and germinative faculty was performed on Linhardt dishes, at 20° C temperature, 70% humidity and permanent light. the seeds were used for germination after 6 and 9 months from harvesting (January and April 2012). The results were recorded at 7 days interval (germinative energy) and 14 days (germinative faculty) from the beginning of the germination.

In experiment we used three variants:

V<sub>1</sub> - Germany;

V<sub>2</sub> – Romania - Gârda de sus village – culture seeds (Control, C);

V<sub>3</sub> - Romania - Gârda de sus village – pasture seeds.

### 2. Study concerning the influence of the soil mixtures upon plant emergence in *Arnica montana* L. specie

In this experience we used four variants of soil mixtures:

V <sub>1</sub>	50% peat
	25% terra rosa
	25% sand
V <sub>2</sub>	40% terra rosa
	20% sand
	20% peat
	20% manure
V <sub>3</sub>	50% terra rosa
	25% peat
	25% sand
V <sub>4</sub>	100 % peat

We took into consideration a variant made up of 3 repetitions of 100 seeds each, with each soil mixture. We used only seeds from Germany, because they had the biggest degree of germination.

The experiment was founded in 14.03.2012 (fig.: 1, 2, 3).

Fig. 1 – Soil mixture



Fig. 3 - Seed seeding



Fig. 2 - Preparation of trays

The field maintaining consists in daily irrigation and weeding (fig. 4). The monitoring of plant emergence was performed weekly (fig. 5).



Fig. 4 - The seedling irrigation



Fig. 5 - The monitoring of plants emergence

## RESULTS AND DISCUSSION

### **1. Study concerning the influence of the seed age upon the energy and germinative faculty in *Arnica montana* L. specie.**

#### **1.1 Study concerning the influence of the seed age upon the germinative energy:**

Table 1 shows that the germinative energy recorded positive very significant differences (63%) for the seeds from Germany and negative significant differences (4%) for seeds from pastures, compared to control (13%) in seeds resulted from cultures.

*Table 1*

**The germinative energy (observation at 7 days) in studied de *Arnica montana* L seed at five months after harvesting (Cluj-Napoca, 2012)**

Variant	Seed age	Germinative energy		± Difference	Significance
		Germinated seeds %	%		
V2 (C)	January 2012	13	100.00	0	-
V1	January 2012	63	484.60	50	xxx
V3	January 2012	4	30.80	- 9	0

LSD 5%= 6.00                      LSD 1%= 9.09                      LSD 0.1%= 14.60

After 8 months after harvesting, we record a great difference between the variant from Germany and those from Romania (table 2). In variant V<sub>1</sub> (with seeds from Germany) the germination was superior to those of variant V<sub>2</sub> from Romania (with seeds from culture) positive very and differences were positive in advantage of first variant compared to control. In V<sub>3</sub> (with seeds from pastures) we recorded negative very significant differences compared to control (seeds from culture).

*Table 2*

**The germinative energy (observation at 7 days) in studied de *Arnica montana* L seed at eight months after harvesting (Cluj-Napoca, 2012)**

Variant	Seed age	Germinative energy		± Difference	Significance
		Germinated seeds %	%		
V2 (C)	April 2012	37.50	100.00	0	-
V1	April 2012	63.25	168.70	25.75	xxx
V3	April 2012	22.75	60.70	-14.74	000

LSD 5%= 2.40                      LSD 1%= 3.63                      LSD 0.1%= 5.83

### 1.2 The influence of the seed age on germinative faculty:

After five months from harvesting, the germinative faculty (table 3) recorded positive very significant differences for the seeds from Germany (86.00%) compared to control (56.50%) seeds harvested from culture. The third variant (50.25%) - seeds obtained from pastures - had no significant differences compared to control (56.50%) - seeds harvested from culture.

Table 3

The germinative faculty (recorded at 14 days) in *Arnica montana* L. studied seeds, at five months after harvesting (Cluj-Napoca, 2012)

Variant	Seed age	Germinative energy		± Difference	Significance
		Germinated seeds %	%		
V2 (C)	January 2012	56.50	100	0	-
V1	January 2012	86.00	152.20	29.50	xxx
V3	January 2012	50.25	88.90	- 6.25	-

LSD 5%= 10.22

LSD 1%= 15.48

LSD 0.1%= 24.86

Concerning the germinative faculty, at 8 months after harvesting, the values from the variants with seeds from Romania (V<sub>2</sub> - culture and V<sub>3</sub> - pastures) are almost equal, but in variant with seeds from Germany (V<sub>1</sub>) the germinative faculty recorded a positive very significant difference compared to variant V<sub>2</sub> (seeds from culture - Gârda village), considered control (table 4).

Table 4

The germinative faculty (recorded at 14 days) in *Arnica montana* L. studied seeds, at eight months after harvesting (Cluj-Napoca, 2012)

Variant	Seed age	Germinative energy		± Difference	Significance
		Germinated seeds %	%		
V2 (C)	April 2012	56.75	100	0	-
V1	April 2012	86.50	152.40	29.75	xxx
V3	April 2012	54.50	96.00	-2.25	-

LSD 5%= 3.04

LSD 1%= 4.61

LSD 0.1%= 7.40

## 2. Study concerning the influence of the soil mixtures upon plant emergence in *Arnica montana* L. specie

From table 5 results that the highest share of emerged plants was recorded in variants V1 (86.67%) and V2 (73.33 %). These variants had positive distinct significant differences (V1 - 50% peat, 25% terra rosa, 25% sand) and positive and significant (V2 - 40% terra rosa, 20% sand, 20% peat, 20% manure) compared to control V3 variant. The V4 (27.67% - peat 100%) recorded negative distinct significant differences compared to control (V3 - 57.67%).

Table 5

**The influence of the soil mixtures on emergence of *Arnica montana* L. plants, resulted from seeds from Germany (Cluj-Napoca, 2012)**

Variant	Seed germination		± Difference	Significance
	Emerged plants %	%		
V3 (C)	57.67	100	0	-
V1	86.67	150.3	29	xx
V2	76.33	132.4	18.67	x
V4	27.67	48	- 30	00

LSD 5%= 14.56

LSD 1%= 22.05

LSD 0.1%= 35.43

### CONCLUSIONS AND RECOMMENDATIONS

**1. Conclusions concerning the I<sup>st</sup> objective (the influence of the seed age on germinative energy and faculty in *Arnica montana* L. specie):**

Both germinative energy and germinative faculty recorded the biggest values after five and eight months after harvesting, in *Arnica Montana* L. seeds from Germany (fig. 6).

**2. Conclusions concerning the II<sup>nd</sup> objective (the influence of the soil mixtures on the emergence of the *Arnica montana* L. specie plants):**

From all four studied soil mixture variants, the best were variant V1 (50% peat, 25% terra rosa, 25% sand) - fig. 7 - and variant V2 (40% terra rosa, 20% sand, 20% peat, 20% manure) - fig. 8 - on which we recorded the better emergence of the *Arnica Montana* L. plants.

In order to produce the *Arnica montana* L. seedlings we recommend the following mixtures: V1 (50% peat, 25% terra rosa, 25% sand) and variant V2 (40% terra rosa, 20% sand, 20% peat, 20% manure).

3. The weak germination of the seeds produced in Romania may be the consequence of the incognizance of the best harvesting moment.

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