Original Article

Use of homeopathic Arnica montana for the issuance of roots of Rosmarinus officinalis L. and Lippia alba (Mill) N.E.Br.

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ABSTRACT

This study sought to evaluate the influence of dilutions of the homeopathic preparation Arnica montana on the rooting of rosemary (Rosmarinus officinalis) and white Lippia (Lippia alba). Cuttings of R. officinalis and Lippia alba were place for rooting in trays of commercial substrate "plantmax"-like and soon after, subjected to daily applications of Arnica montana 3cH, 6cH, 9cH and 12cH and two controls – distilled water and ethanol 70%. Statistical design was entirely casualized delineation, with 6 treatments and 4 repetitions, each experimental unit was composed by 10 stakes. Applications were made via pulverization, 10 drops of the treatment in 400 ml of water. 45 days later the number of roots, the number of shoots, the length of the largest root, the percentage of sets and the quality of stakes were assessed. Data were analyzed through variance analysis, mean were compared by Tukey's test at 5% level of statistical significance. Arnica montana 3cH, 6cH and 12cH had a stimulatory effect on all variables regarding the issuance of roots in both species studied, showing the similarity of this homeopathic preparation to the physiological picture arising from the process of cutting, promoting an increase in the percentage and quality of roots.

Keywords: Homeopathy; rooting; cutting; Arnica Montana

Introduction

The commercial production of medicinal plants in Brazil has not yet been fully exploited; most species are still illegally acquired in the forests, lowland, Cerrado and fields [1], resulting, thus, in the exhaustion of vegetal raw materials. Actions such as management and cultivation of medicinal plants are needed in order to check the effects of this predatory extractivism.

Rosemary *(Rosmarinus officinalis* L.) and white Lippia, "colic mint" *(Lippia alba* Mill), traditionally used in health programs, are important to poor populations, as their pharmacological actions are effective and safe.

Nevertheless, cultivation of medicinal plants requires the knowledge of their ways of propagation, adaption to environment, growth, development and aging [2].

Studies regarding the vegetative propagation of medicinal species, efficiently addressing social, economic and ecologic features are still relatively unknown, making organic production of vegetal matter difficult.

The use of alternative agriculture techniques, protecting the environment and resulting in high quality products at the same time, is the main challenge for those caring for quality of life.

In this context, the study of diluted and agitated solutions (homeopathy) may be relevant [3]. Tests of the use of homeopathy in plants are being conducted worldwide [4], showing positive results regarding the increase of the resistance to plagues and diseases [5], tolerance to improper conditions, blossoming, breaking of the of the seeds latency and production of healthy seedlings [6].

Arnica montana is homeopathically indicated to organisms exhibiting defensive behavior and hypersensitiveness in traumatic conditions or situations [7]. It is indicated in adaptation instances, adaptation impact, including physical and mechanical, old, inherited impacts, physical stress, sensitiveness to external factors, injuries, healing of tissues internally or externally damaged, [8] all these similar to the processes applied to plants in the process of cutting, i.e. physical stress due to cuts in stakes (injury). *Arnica montana* would act directly on the rooting of vegetal species [9]. Thus, it is paramount to test the mode of use and the efficacy of homeopathic preparations on the rooting of medicinal species, allowing for a characterization of the homeopathic potential of *Arnica montana* in different dilutions in this context.

The present study aimed to evaluate the influence of different dilutions of *Arnica montana* on the rooting of rosemary and white Lippia.

Materials and Methods

Two trials were conducted at the Center of Agrarian Sciences of the Federal University of Minas Gerais at Montes Claros, Minas Gerais, Brazil (NCA/UFMG), in a greenhouse; a same methodology was adopted in both cases, difference concerned the species under study: rosemary – from April 15th to May 30th, 2007, and white Lippia – from September 1st to October, 15th, 2007.

Stakes of rosemary and white Lippia were collected at the Medicinal Botanic Garden of NCA/UFMG, from the apical part of branches of uniform matrix plants. Stakes were placed to root in trays of a commercial substrate "plantmax"-like and were immediately subjected to daily applications of *Arnica montana* 3cH, 6cH, 9cH and 12cH, and 2 controls, no agitated distilled water and ethanol 70% - these were the treatments in this study.

The statistical design was entirely casualized delineation, with 6 treatments and 4 repetitions, each experimental unit consisted of 10 stakes. Applications were made via pulverization, 10 drops in 400 ml of water. The study was double-blind, symbols were employed to name each treatment in order to avoid possible interferences.

The homeopathic preparations were prepared at the Homeopathic Laboratory of the Phytotechnics Department of the Federal University of Viçosa, Minas Gerais, Brazil, according with the official national prescription [10]: 1 drop of mother tincture of *Arnica montana* was dissolved in 99 drops of alcohol 70%, following the centesimal Hahnemannian scale (cH).

45 days later, the number of roots (NROOT), shoots, length of the largest root (LROOT) in mm, percentage of rooted stakes (PROOT), quality of the stakes (QUALY) and number of shoots of White Lippia (NSH) were evaluated. Quality of stakes was assessed by grading (0 to 5) by two independent raters. Data were interpreted through variance analysis and the means were compared through Tukey's test at 5% level of statistical significance.

Results and Discussion

I. Rosemary

The treatments promoted significant differences in the variables LROOT, QUALY, PROOT, with the exception of NROOT. (Table 1)

Controls – distilled water and ethanol 70% - did not show difference between them in all assessed variables, but did different from the homeopathic treatments in some of them (LROOT, QUALY and PROOT), which allows to infer that the observed effects were exclusively due to *Arnica montana.* NROOT did not show significant difference (Table 2), although *Arnica montana* 6cH and 12cH showed a tendency to higher mean values.

Regarding LROOT, the pathogenetic effect of *Arnica montana* 9cH may only be visually observed, with a mean lower than the other treatments and similar to the controls and *Arnica montana* 12cH (Table 2).

A similar result was observed [3] when the fresh mass of the air part of lemongrass (*Cymbopogon citratus*) of plants treated with dilutions of *Sulphur* was evaluated: lower mean values were recorded with dilution 30cH, verifying, this, the pathogenetic effect of the variable fresh mass.

The differential action of *Arnica montana* 9cH could be observed in QUALY and PROOT, where the treatment does not differ from the control, showing lower mean values than the other dilutions.

Table 1. Variance analysis of variables: number of roots (NROOT), length of root (LROOT), quality of rooting (QUALY) and percentage of rooting (PROOT) in rosemary plants subjected to different solutions of *Arnica Montana.*

Sources of variation	Degress off Freedon	Mean squares			
		NROOT(1)	LROOT	QUALY	PROOT(2)
Treatment	5	2,84	461,6**	1,35**	0,37**
Residue	18	0,74	26,2	0,18	0,059
Total	23				
Coeffcient of Variation (%)		39,8	43,1	47,7	18,0

** and *- α Significant at 1 and 5%. (1) Data transformed to $\sqrt{X+0,5}$. (2) data transformed to *arccos* $\sqrt{X/100}$.

Table 2. Mean values of variables number of roots (NROOT), length of root (LROOT), quality of rooting (QUALY) and percentage of rooting (PROOT) in rosemary plants subjected to different dilutions of *Arnica montana.*

Treatments	NROOT	LROOT	QUALY	PROOT
Alcohol 70 %	1,54 **a**	3,48 **b**	0,25 **d**	0,34 **c**
Distilled water	1,29 **a**	5,37 **b**	0,49 **bcd**	0,59 **bc**
Arnica montana 3cH	2,69 **a**	26,12 **a**	1,23 **abc**	1,00 **ab**
Arnica montana 6cH	3,02 **a**	24,20 **a**	1,61 **a**	1,15 **a**
Arnica montana 9cH	1,38 **a**	1,57 **b**	0,41 **cd**	0,59 **bc**
Arnica montana 12cH	3,04 **a**	10,40 **b**	1,39 **ab**	0,91 **ab**

Mean values followed for at least a same low case letter, in a column, do not differ significantly in Tukey's test a*t 5*% level of statistical significance.

In the same variable (LROOT) it is possible to verify the differential effect of each dilution: *Arnica montana* 3cH and 6cH resulted in mean values 16.6 and 15.4 times, respectively, than 9cH, which shows the non linearity of responses as a function of dilution. Significant increases were seen [11] in the height of plants of *Justicia pectoralis* when subjected to treatment with *Arnica montana* 3cH.

In our study, treatment with Arnica montana 6cH also exhibited statistically significant higher mean values regarding controls in variables QUALY and PROOT (Table 2).

This treatment showed stimulatory effects in all variables regarding the issuance of roots in rosemary, thus it may be effectively used in the propagation of the species, as it resulted in higher quality roots.

II. White Lippia

Treatments promoted significant differences in variables NSH, LROOT, QUALY and PROOT, with the exception of NROOT (Table 3).

Table 3. Variance analysis of variables: number of roots (NROOT), number of shoots (NSH), length of root (LROOT), quality of rooting (QUALY) and percentage of rooting (PROOT) in white Lippia plants subjected to different dilutions of the homeopathic preparation *Arnica montana.*

Variations sources	Degress off Freedon	Mean Squares				
		NROOT(1)	NSH(1)	LROOT	QUALY	PROOT(2)
Treatment	5	2,79	0,54**	10184**	4,07**	0,224*
Residue	18	0,44	0,013	827.2	0,30	0,042
Total	23					
Coeffcient of Variation (%)		26,96	9,67	28.87	26,93	20,68

** and *- α Significant at 1 and 5%. (1) Data transformed to $\sqrt{X+0,5}$. (2) data transformed to *arccos* $\sqrt{X/100}$.

Table 4. Mean values of variables number of roots (NROOT), number of shoots (NSH), length of root (LROOT), quality of rooting (QUALY) and percentage of rooting (PROOT) in white Lippia plants subjected to different dilutions of the homeopathic preparation *Arnica montana.*

Treatments	NROOT	SNH	LROOT	QUALY	PROOT
Alcohol 70 %	3,00 **a**	1,02 **b**	45,63 **c**	1,07 **c**	0,78 **b**
Distilled water	3,38 **a**	0,79 **b**	46,09 **c**	1,05 **c**	0,82 **b**
Arnica montana 3cH	4,64 **a**	1,40 **a**	136,92 **ab**	2,75 **a**	1,08 **ab**
Arnica montana 6cH	4,94 **a**	1,57 **a**	171,91 **a**	3,55 **a**	1,40 **a**
Arnica montana 9cH	3,01 **a**	0,77 **b**	85,66 **bc**	1,50 **bc**	0,84 **b**
Arnica montana 12cH	3,95 **a**	1,54 **a**	111,36 **b**	2,35 **ab**	1,05 **ab**

Mean values followed for at least a same low case letter, in a column, do not differ significantly in Tukey's test a*t 5*% level of statistical significance.

Controls distilled water and ethanol 70% are statistically similar to each other in all variables studied; this allows inferring that the vehicle does not interfere in the manipulation of homeopathic preparations. Alterations in observations, thus, would be exclusively due to the homeopathic preparation *Arnica montana*. Variable NROOT showed no significant difference. (Table 4)

The effect of several dilutions of *Arnica montana* on several factors related to the growth and development of feverfew (*Tanacetum parthenium)* showed higher heights with decimal dilutions 1x and 5x and significant increase in fresh mass with dilutions 1x, 2x, 4x and 5x [12].

The effect of *Arnica montana* 9cH was not different from the controls' in any of the variables under study, showing lower mean values on variable NSH, which represents an inhibitory effect, and characterizes a pathogenetic effect. A similar result was obtained when beet (*Beta vulgaris* L.) was subjected to treatment with *Phosphorus* 1cH, 2cH, 3cH, 4cH, 5cH and 6cH: lower values were observed in all variables related to the root by comparison to control [3].

Arnica montana 3cH, 6cH and 12cH have homeopathic effect regarding the issuance of roots, optimizing rooting in the species under study (white Lippia) and increasing the quality of the roots in the stakes.

Conclusions

Arnica montana in dilutions 3cH, 6cH and 12cH showed stimulatory effect in all variable related to issuance of roots in the species under study (rosemary and white Lippia), showing its similarity to the pathologic picture arising from the process of cutting, promoting an increase in the percentage and quality of roots.

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