Original Article

Increase in growth of eucalyptus seedlings with application of homeopathic preparations

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Abstract

The use of less impacting techniques in agricultural systems is the global trend, so the use of homeopathic preparations on these systems has been studied as ecologically sound technology. This study had the object to study the interaction between the homeopathic preparations and the development of *Eucalyptus urophylla* S. T. Blake seedlings and was conducted from May 2007 to July 2007, in the greenhouse of the Department of Plant Science at the Federal University of Viçosa, MG, Brazil. Applications were made in one-day intervals and preparations utilized were Phosphorus, Calcarea carbonica, Kali muriaticum, Magnesia carbonica, all in potencies 3CH and 12CH and the controls were water and alcohol 3CH. Parameters of seedlings quality were measured in different times during the experiment, up to the end. Kali muriaticum 12CH promoted increased root length of approximately 55% compared to the water control. Phosphorus 3CH differed from other treatments considering the total green mass. The homeopathic preparations Phosphorus 3CH and Kali muriaticum 12CH increased the root growth in relation to controls. The responses obtained with the application of Phosphorus 3CH indicate the viability of its agronomic use to increase of the root capacity of absorbing elements, as much as necessary for the plant growth.

Keywords: homeopathy; eucalyptus; agro-homeopathy; seedling growth

Introduction

Currently, Brazil has the second largest area reforested with *Eucalyptus* species of the world, making approximately of three million of hectares, whose wood produced is intended to mainly for production of pulp and charcoal [1]. These data, which are linked to the high productivity of this population in Brazil, encourage new plantings. In search for high productivity in forest stands, the quality of the seedlings produced plays a predominant role [2]. The most critical period of seedling formation extends from seed germination to the initial stages of growth. Low quality seedlings develop at a lesser pace, with lower rates of increase / hectare / year and can cause malformation of the root system, resulting in unevenness in the field and worse quality of stem [3].

The malformation of the root system making difficult the absorption of water and nutrients in enough quantities to meet the needs of the plant, resulting in the typical symptomatology of water and nutritional deficiency because of the imbalance between root and aerial part. This problem is usually associated with the deformation of the root system of seedlings in the vivarium phase or the planting act, or to the lack of adaptation of the species to the region, or to the planting in compacted soils or subject to waterlogging [2]. Also, plants with shallow root system become more vulnerable to the deleterious effects of weed competition and temperature oscillations and demand greater availability of water and nutrients in the soil immediately in the months after the planting [1].

Due to pressure that society exerts on forestry sector, the search for sustainable techniques is increasing. Sustainability is supported in the triangle formed by the socially just, economically viable and environmentally correct, therewith, the importance of working with little aggressive techniques to the environment is clear. Homeopathic preparations are a balanced technology to aid the production, minimizing the residues generation and reducing the costs in a sustainable way. Herein, the homeopathic preparations were obtained following the traditional homeopathic method, to reach their smooth and lasting action [4]. In the choice of homeopathic preparations used in this work was based on the nutrients commonly used in plant fertilization.

The objective was to evaluate the growth changes provided by homeopathic preparations in eucalyptus seedlings, up to the end of the experiment.

Material and methods

The experiment was conducted in a greenhouse, in the Department of Plant Science of UFV, Viçosa, Minas Gerais, from April 30th to July 23th, 2007.

Eucalyptus seedlings

The seedlings of *Eucalyptus urophylla* S. T. Blake we acquired in the seedling nursery of the State Forestry Institute (IEF), located at the Federal University of Viçosa. The 90 days old seedlings were healthy with no symptoms of illness. The planting was in pots of 5 liters with substrate of seedlings (Plantmax™) and worm humus in a ratio of 7:3, respectively. A total of 50 eucalyptus seedlings was used in this work.

Homeopathic preparations

The homeopathic preparations used in this work were: *Phosphorus*, *Calcarea carbonica*, *Kali muriaticum*, *Magnesia carbonica*, all in the potencies 3CH and 12CH. The matrices used are part of the collection of the Laboratory of Homeopathy of the Viçosa Federal University. The potencies used were manipulated following the technical standards, using an automatic dynamizer Denise™, glass amber vials and 70% alcohol as vehicle. The controls were water and 70% alcohol, at the potency 3CH.

Experimental design

A completely randomized design with 10 treatments and 5 replications was adopted, with a total of 50 pots, being each pot with one seedling. The pots were randomly placed, following a draw. All the pots were placed on wooden benches, inside the greenhouse, where they received adequate light.

Treatments

The applications were made from the diluted drug (40 drops / liter) via irrigation water, with 100 mL per pot, three times a week, for three months [5]. The double-blind method was adopted [6].

Morphological parameters tested

The morphological parameters of the seedlings used in the evaluation of the results were: shoot height (H), collection diameter (WC), total dry mass (DMM), dry shoot mass (DSM) and length of the root system (LRS) [7]. All morphological parameters were measured at the end of the experiment.

Statistical analyses

The data were interpreted by means of analysis of variance and the means were compared by the Tukey or Dunnett test with 5% of confidence interval [8].

Results and Discussion

The homeopathic preparations *Kali muriaticum* 12CH and *Phosphorus* 3CH promoted a statistically significant increase in root length, in relation to the controls (Table 1). The roots length is responsible for the growth and productivity of the plants, thus, the increase in root length is an agronomical desirable feature. With a well-formed root system, the plant is more likely to withstand stressful environmental factors, such as droughts, and to explore the environment to obtain the necessary elements for its development, with which there are gains in growth and productivity.

Table 1 - Mean values of pivot root length (CRP), in centimeters, according to the treatments. The groups of statistical significance are shown as a, b, c. The averages followed by the same letter do not differ among themselves by the ANOVA-Tukey test ($p \leq 0.05$).

Treatments	Length of the pivoting root
Kali muriaticum 3CH	33.80 c
Magnesia carbonica 3CH	35.10 c
Water	37.50 c
Magnesia carbonica 12CH	38.20 c
Phosphorus 12CH	40.30 c
Alcohol 3CH	43.30 c b
Calcarea carbonica 3CH	43.30 c b
Calcarea carbonica 12CH	47.20 c b a
Phosphorus 3CH	54.50 b a
Kali muriaticum 12CH	58.00 a

The plants treated with *Phosphorus* 3CH had 32% increase in relation to water (control), regarding to the plant fresh mass (ANOVA-Dunnett, $p \leq 0.05$). However, there was no difference in relation to the dry mass. This discrepancy can be due to the predominance of a turgid feature in plants treated with *Phosphorus* 3CH, at the moment of harvesting.

Combining these data with the root growth, both promoted by *Phosphorus* 3CH, one can infer that these homeopathic preparations promoted a greater use of the local resources by the treated plants, mainly of water. In times of drastic climate changes, this feature is highly desirable under the agronomical point of view and indicate the feasibility of using *Phosphorus* 3CH as a phyto technical resource in *Eucalyptus urophylla* seedling soon after planting.

Conclusion

The homeopathic preparations *Phosphorus* 3CH and *Kali muriaticum* 12CH promoted increased root growth. The responses obtained with the use of *Phosphorus* 3CH indicate the feasibility of agronomic use, due to the increase in root absorption of elements necessary for the development of the plants.

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