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In vitro response of different *Salvia hispanica* L. (*Lamiaceae*) explants

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ABSTRACT

The *Salvia* (*Lamiaceae*) genus includes more than 900 species used in human diet and for therapeutic and decorative purposes. The *Salvia hispanica* L. ("chia") "seeds" represent the highest natural source of omega-6 and omega-3 fatty acids that are important in human nutrition. It is possible to obtain a rapid propagation of a large number of uniform plants through tissue culture. Although some *Salvia* species have been micropropagated, no results on "chia" were reported. The objective was to evaluate the *in vitro* behaviour of different *S. hispanica* explants. The explants used were: young leaves, cotyledons and uninodal segments with 2 axillary buds. The explants were inoculated on Murashige and Skoog (1962) (MS) culture medium, with 0,1 µM of naphthalene acetic acid (NAA); 0,1 µM of gibberellic acid (GA_3) and 0; 0,5; 0,75 or 1 µM of 6-bencyladenin (BA). Both the leaves and the cotyledons did not succeed. The highest percentage of nodal segments with shoots was of 78%. A better survival of shoots and a higher proliferation of leaves/plantlet were observed with 0,75 and 1 µM of BA, with a result of up to 6,63 shoots per bud. There were different responses according to the explant and the growth regulator concentrations used. Higher concentrations of BA increased the shoots formation.

Keywords: *Salvia hispanica*

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Introduction

The *Salvia* (*Lamiaceae*) genus consists of more than 900 annual or perennial species that are used for nutritional, therapeutical or decorative purposes. *Salvia hispanica* L. ("chia") is an annual herbaceous plant. Its "seeds" represent the highest natural source of omega-6 and omega-3 fatty acids that are important in human nutrition because they reduce the risks of cardiovascular diseases (Ayerza, 1995; Yaniv, et al. 1999). By means of the tissue culture it is possible to obtain a rapid propagation of an important number of uniform plants. Although some *Salvia* species have been micropropagated (Arikat et al., 2003; Gostin, 2008), there were no results reported on "chia". The aim of this study was to evaluate the response of different *S. hispanica* L explants.

METHODOLOGY

The explants (young leaves, cotyledons and uninodal segments with 2 axillary buds), were inoculated on Murashige and Skoog (1962) medium, with the addition of 0,1 µM of naphthalene acetic acid (NAA); 0,1 µM of gibberellic acid (GA_3) and 0; 0,5; 0,75 or 1 µM of 6-bencyladenine (BA). They were incubated at 23 ± 2° C, 16 h daylight, and 60 $\mu mol.m^{-2}.s^{-1}$ of light intensity. The data was analyzed using ANOVA and the means were compared with Tuckey.

Results and discussion

The leaves and cotyledons did not succeed. The highest percentage of nodal segments with shoots was of 78%. Even though there were no significant differences between the treatments, a higher survival of shoots and a higher proliferation of leaves/plantlet was observed with 0,75 and 1 µM of BA. The highest rate of proliferation in a month was of 6,63 with 1 µM of BA. Gostin (2008) proved the necessity of BA in the culture medium for shoots development and confirmed that the optimum level to be added to the culture medium depends on the endogenous concentration of cytokinins. This author obtained in *S. officinalis* a satisfactory growth rate on MS medium with 2,22 µM of BA. The plants showed their usual appearance and the number of leaves, shoots and the leaves length were higher if compared to the varieties with greater or lower concentrations of BA.

Arikat et al. (2004) reported a high rooting percentage in *S. fruticosa* cultured on MS medium with 2,7 µM of indol-3-butyric acid (IBA). For this study, the direct rhizogenesis of the shoots was induced in the same culture medium. According to Gostin (2008), the supply of both, kinetin and NAA also stimulated the direct rooting of the shoots in *S. officinalis*. The results obtained in this research represent the first mention of the *in vitro* culture of *S. hispanica* L. ("chia").

Conclusions

The *in vitro* response varied depending on the explant and the growth regulator concentrations used. Higher concentrations of BA increased the shoots formation.

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Note: Part of this study was presented at the 'II Reunión de Biotecnología aplicada a plantas medicinales y aromáticas' (Second Biotechnology Meeting on Medicinal and Aromatic Plants), Córdoba, Argentina, 2009.

References

-Ayerza, R.; Coates, W. (2005). Chía. Rediscovering a Forgotten Crop of the Aztecs, 1st ed. The University of Arizona Press, Tucson, Arizona. p. 197.

-Arikat, N. A.; Jawad, F- M.; Daram, N. S.; Shibli, R. A. 2004. Micropropagation and accumulation of essential oils in wild sage (*Salvia fruticosa* Mill). Scientia Hortic. 100: 193-202.

-Gostin, I. 2008. Effects of different plant hormones on *S. officinalis* cultivated *in vitro*. International Journal of Botany 4(4): 430-436.

-Murashige, T.; Skoog, F. (1962) A revised medium for rapid growth and bioassays with tobacco tissue cultures. *Physiol. Plant.*, 15, 473-497.

-Yaniv, Z.; Schafferman, D.; Shamir, I.; Madar, Z. (1999). Cholesterol and triglyceride reduction in rats fed *Matthiola incana* seed oil-rich in (n-3) fatty acids. *J. Agric. Food Chem.* 47: 637-642.