# Effect of Benzylaminopurine (BAP) on Clonal Propagation Rate of *Curcuma longa* L.

A.F. Mogor and G. Mogor
Plant Production Department
Agronomic Science College
São Paulo State University (UNESP),
Botucatu, São Paulo, Brazil
cep 18.603-970.

E.O. Ono and J.D. Rodrigues
Botany Department
Bioscience Institute
São Paulo Estate University (UNESP),
Botucatu, São Paulo, Brazil
cep 18.603-970.

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**Abstract**

***Curcuma longa* L. is used in many countries for its flavor, and medicinal and cosmetic attributes, as well as for its peculiar starch characteristics. These factors have driven an interest in the in vitro propagation of this species, looking for germplasm bank maintenance, production of disease free plants, genetic variability induction from callus, and as a tool for starch research. However, there are few reports concerning the micropropagation of *Curcuma longa*. The in vitro propagation rate of this species, cultured under two benzylaminopurine (BAP) concentrations, was the aim of this research.**

## INTRODUCTION

*Curcuma longa* L., called in Brazil açafrão, belongs to the Zingiberaceae family. India is its region of origin. Curcumin, its pigment, has many applications in the food industry, and the essential oil of this species is widely used in the cosmetic industry (Mangalakumari et al., 1986); these uses denote the economic importance of açafrão. The agronomic problems characterizing açafrão are those related to agricultural sustainability in developing tropical and subtropical countries. This cultivation takes a very important place in the support of small growers surviving on their properties. A good way to sustainability is the identification of new applications of well-known cultures. In this way, research concerning açafrão starch may well lead to new profits for growers.

For decades, plant tissue culture has been utilized as a good tool for agronomic research, providing appreciable advances in yield worldwide. The aim of this work is the establishment of the best clonal propagation rate of açafrão to support research in the economic utilization of the starch. For this, we have evaluated two benzylaminopurine (BAP) concentrations in the culture medium and their effect on açafrão shoot emission and bud number.

## MATERIALS AND METHODS

The experiment was carried out in the micropropagation laboratory of the Plant Production Department of the Agronomic Science College of UNESP in 2000, and started from *in vitro* established plants, cultured from axillary buds of rhizomes, which formed callus and developed after polyamine induced organogenesis, in Murashige and Skoog medium (Murashige and Skoog, 1962), with complete macronutrients, and supplemented with exogenous polyamines (Viu, 2000). Each plant was replaced monthly into MS/62 culture medium. The experimental culture medium consisted of MS/62 with complete macronutrients supplemented with 100 mg $L^{-1}$ inositol, 1g $L^{-1}$ thiamine HCl, 6 g $L^{-1}$ agar and 30 g $L^{-1}$ sucrose (Krajewska et al., 1987, Balvanyos et al., 2000). The treatments were established with the addition of 1 mg $L^{-1}$ benzylaminopurine (BAP) (treatment A), 2 mg $L^{-1}$ BAP (treatment B) and culture medium without growth regulators (treatment C). There were 80 plants per treatment with 4 replications in a completely randomized block design. The cultures were incubated in growth chambers with 16 h photoperiod (1000 Lux) and a constant temperature of $26 \pm 2$°C. Cultures were transferred to fresh medium

every 30 days. Plants were evaluated for the mean number of buds and axillary shoots per cluster at the end of the second month after the beginning of the experiment.

## RESULTS AND DISCUSSION

There are no significant differences between the treatments for the evaluated characteristics. In Table 1 we can verify the number of buds and shoot emission averages 30 days after the second subculture.

The low propagation rate of açafrão is very clear, and the expected effect of BAP addition to the culture medium to induce shoot emission (Thorpe, 1980; Krikorian, 1988; Teixeira, 1994), did not occur. Therefore, addition of benzylaminopurine (BAP) to culture medium in the same concentrations as used in this experiment, and under the described conditions, is not justified. Winnaar (1989) described a successful açafrão clonal propagation starting from field growth plant buds using the same concentration as that in treatment B, suggesting different responses to BAP addition between cultures started from field growth plant buds and plants derived from callus, as in this work. However, Balachandran (1989) started his work from field growth plant buds also and submitted these to different BAP concentrations (0 mg/L to 5 mg/L) and obtained an average number of shoots per explant very closely obtained in this work. Although, the aim proposed for this research was not reached, all the data will be collated for future research.

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## Tables

Table 1. *Curcuma longa* L. shoot emission at second month after the beginning of the experiment.

| Treatments | Buds | Axillary shoots |
|---|---|---|
| A | 2,1 a | 2,4 a |
| B | 2,0 a | 2,3 a |
| C | 2,1 a | 2,3 a |

Means within a column followed by same letters are not significant differences according to Tukey ($p<0,05$).

## Figures

Fig.1. *Curcuma longa* L. plant two weeks after second subculture.