

Gamma radiation LD 50 determination in *Heliconia bihai* (Heliconiaceae) explants

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SUMMARY

The high economic importance of ornamental plants represents a stimulus for breeders in the research for new cultivars. Among the several employed techniques, gamma radiation induced mutation can bring promising results in *Heliconia* species. The 50 % lethal dose (LD 50) determination, in *in vitro Heliconia bihai* cultivation, is the initial step for utilization of that breeding method. The doses: 0; 10; 20; 30; 40 and 50 Gy gamma ray in 25 shoot apices were tested. The results indicated that LD 50, for this *in vitro* culture, ranges between 30 and 40 Gy.

Key-words: ornamental plants, *Heliconia*, explants, radiation lethal dose.

RESUMO

Determinação da DL 50 em explantes de *Heliconia bihai* (Heliconiaceae), empregando radiação gama

A elevada importância econômica das plantas ornamentais representa um estímulo para os melhoristas na obtenção de novos cultivares. Dentre as diversas técnicas empregadas, a indução de mutações utilizando radiação gama pode apresentar resultados promissores em *Heliconia*. A determinação da dose letal 50% (DL 50) no cultivo *in vitro* de *H. bihai* é o passo inicial para utilização desse método. Foram testadas as doses de 0, 10, 20, 30, 40 e 50 Gy de raios-gama em 25 ápices

caulinares por tratamento. Os resultados indicam que a DL 50, para essa cultura *in vitro*, está entre as doses de 30 e 40 Gy.

Palavras-chave: plantas ornamentais, *Heliconia*, ápices caulinares, dose letal de radiação.

1. INTRODUCTION

Ornamentals perform a large number of plant species with high economic importance and contribute with a great percentage of the economic value in agricultural and horticultural products. The increasingly demand for tropical plants, among them *Heliconia*, represents a new and promising investment area of this agro-business segment in Brazil. Having the ornamental plants economic importance in sight, breeders have been working with different methods for cultivars development and releasing, among them, induced mutations as a technique to increase genetic variability. On the overall, from the 1,790 direct or indirectly released mutant cultivars, about 484 (27.0 %) were obtained in ornamentals, what demonstrate the importance of this technique (MALUSZYNSKI et al., 1995). Breeding methods application in flower production crops has resulted in mutants for flower coloration, modifications in leaf color, increasing in the flower size, compact and or erect growth habit and early bloom. The induced mutation using gamma radiation presented promising results in *Chrysanthemum*, *Dahlia variabilis*, *Gladiolus*, *Lilium* and foliage plants as

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Stromanthe and *Calathea* (BROERTJES & VAN HARTEN, 1988; LATADO et al., 1996; LATADO & TULMANN NETO, 1996) and could also be applied in *Heliconia*. The identification of the endophytic bacteria *Pseudomonas solanacearum* accomplished by ATEHORTUA (1997) and DIAS & RODRIGUES (2001) and its control recommended by DIAS (2002), using the combination of two antibiotics for different *in vitro* explants of *H. bihai* (Lobster Claw I), have contributed to the improvement of tissue culture. The initial planning for this breeding method utilization comprises the dose selection that causes plant height or survival reduction from 30 to 50 %. The present research work goal was to determine, in *H. bihai in vitro* cultivation, the 50 % lethal dose (LD 50), using gamma radiation.

2. MATERIAL AND METHODS

H. bihai (Lobster Claw I) shoot apices inoculated in MS solid medium (MURASHIGE & SKOOG, 1962) containing 6.0 g L⁻¹ of Agar, Morel vitamin (MOREL & WETMORE, 1951), 30.0 g L⁻¹ of sucrose, 3.5 mg L⁻¹ of 6-benziladenine (6-BA) and pH adjusted to 5.8. Each treatment consisted of 25 shoot apices submitted

to the following gamma radiation doses: 0; 10; 20; 30; 40; and 50 Gy from the ⁶⁰Co radioisotope source of the Plant Breeding Laboratory, at CENA/USP. The irradiated apices went to *in vitro* cultivation with transplanting every 28 days, until reach the V₄M₁ stage with monthly evaluations, being observed apices survival and bud production in each generation.

3. RESULTS AND DISCUSSION

The results demonstrated that 50 Gy was lethal for 100 % of explants, as well as the 40 Gy that presented only one viable explants up to the V₄M₁ stage. The 20 Gy dose presented an explants survival superior to the control, what suggests the influence of this dosage in the super budding. The 10 and 30 Gy doses presented explants number similar to control. The results indicate that DL 50, for this *in vitro* culture ranges between 30 and 40 Gy (Table 1).

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Table 1. *Heliconia bihai* explants number and percentage up to the fourth cultivation cycle after exposure to gamma ray radiation

Treatments	V ₀ M ₁	V ₁ M ₁	V ₂ M ₁	V ₃ M ₁	V ₄ M ₁	Explants (%)
0 Gy(control)	25	36	51	68	117	100
10 Gy	25	26	37	48	108	92.3
20 Gy	25	38	113	196	275	235.04
30 Gy	25	29	40	52	94	80.34
40 Gy	25	26	1	1	1	0.85
50 Gy	25	25	0	0	0	0

* VM - Number of *in vitro* subcultures after mutagenic treatment.

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