

ADVANCES ON THE RADIOINDUCED MUTATION BREEDING PROGRAMME ON
HASS AVOCADO

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Abstract

Evaluation of plant development of 82 individuals (18 months old) subjected to gamma irradiation at doses from 0 to 25 Gy is presented. Variables evaluated were height, scion and rootstock circumference, internodal length, stomata] density and percentage of individuals with low vigour and flowering.

The results indicate that the maximum mean for the first three variables corresponds to 10 Gy, while internodal length and stomatal density have such value at 20 and 10 Gy respectively. The maximum variability, estimated by the variation coefficient, corresponds to 15 Gy for the first five variables, whereas for height and internode length this value corresponds to 0 and 20 Gy respectively. Highest percentage of individuals with low vigour and flowering was detected on the doses of 20 and 10 Gy respectively.

1. Introduction

Fruit breeding by radioinduced mutagenesis requires the continuous evaluation of vegetative and reproductive development of the treated plants. Changes in growth rate, internodal length and number, size, form and or color of leaves and fruits can lead to identification of a possible mutant.

This continuous evaluation also permits to compare treated with untreated populations regarding to the degree of variation of study characters and in consequence to determine the dose which favors the maximum variability, taking in account that high doses generate deleterious effects whereas low doses produce no genetic changes (Broertjes, 1969).

Among the mutants that can be relatively easy to obtain are those with compact growth or dwarf (Donini, 1992), because they can be selected in early stages of vegetative development according to characteristics such as short internodes, low vigour, and thicker shoots. In avocado the stomatal density can be used as a selection index for compact growth (Barrientos, 1986)

This paper presents the evaluation of the vegetative development of 82 Hass avocado treated with "Co gamma rays.

2. Material and methods

Hass avocado budwood were subjected to gamma irradiation at doses from 0 to 45 Gy and grafted on Mexican seedlings rootstocks on June 1993. The surviving material was planted six months after in "La Labor" Experimental Station at Temascaltepec, *México*.

Monthly evaluations regarding to height, scion and rootstock diameter, and internode length were performed, evaluating also stomata] and flowering density.

The obtained information was statistically analyzed regarding to medium range and variation coefficient.

3. Results

Table I shows the statistics related to vegetative growth.

The mean of the three characters evaluated has a maximum at 10 Gy with gradual reduction as doses increases or decreases (table 1). The maximum interval is at 0, 15 and 10 Gy for height, rootstock and scion circumference respectively.

Highest variability was found at 15 Gy, except for height in which the control exhibited more variation.

Internode length presents its maximum mean and variation coefficient at 20 Gy; stomatal density has its maximum mean at 10 Gy and its maximum variability at 15 Gy, the percentage of individuals with low vigour is highest at 20 Gy attributed this to severe physiological effects of radiation (Donini, 1992).

The maximum variability of the evaluated characters is found at 15 Gy (Except for height) (Figure 1), so this dose is recommended for further radioinduced mutation breeding programmes.

References

- Barrientos, P.A. 1986. Densidad estornatal y su relación con el hábito de crecimiento en aguacate. En:Memoria de actividades CICTAMEX, Coatepec Harinas, Méx. pp.64-65.
- Broertjes, C., 1969. Mutation breeding of vegetatively propagated crops. In: G.C. Chisci and G. Haussman (Editors), Proc. 5th Eucarpia Congr., Milan, 1968. Genet Agrar.: 139-165.
- Donini,B. 1992. Mutagenesis applied for the improvement of vegetatively propagated plants. Curso corto sobre el uso de técnicas nucleares en fitomejoramiento. O.I.E.A.- I.N.I.N-E.A.Z. Univ. Aut. de Guanajuato. 18p.

Table 1. Statistics related to vegetative growth of Hass avocado tress subjected to gamma irradiation.

Dosis (Gy)	N	Height (cm)			Rootstock circumference (cm)			Scion circumference (cm)		
		\bar{X}	R	VC	\bar{X}	R	VC	\bar{X}	R	VC
0	18	72	108	43	6.6	5.1	24	6.2	4.5	22
5	17	81	78	24	7.1	4.2	19	6.6	4.5	21
10	18	83	86	29	7.9	5.6	21	6.8	5.8	23
15	16	66	78	40	6.5	5.8	28	6.0	5.4	34
20	10	65	59	33	6.5	5.0	26	5.6	3.8	23
25	3	77	17	20	7.4	0.7	7	7.1	0.3	24

N.-Number of trees. R.-Range. \bar{X} .-Mean. VC.-Variation coeficient.

Table 2. Statistics of characters related to vegetative and productive development of Hass trees subjected to gamma irradiation.

Dose	Internode length (cm)			Stomatal density ¹			Low vigour (%)	Flowering (%)
	\bar{X}	R	VC	\bar{X}	R	VC		
0	4.1	2.1	14	46	9	7.2	22	5.5
5	4.1	2.3	16	48	5	4.3	12	0
10	4.3	2.7	17	50	4	4.1	5	24.4
15	4.9	3.5	19	42	23	17	19	20
20	5.4	5.0	27	45	6	5.2	30	0
25	3.6	0.4	6	42	3	3.6	0	0

I/. Number of stomata per field (12.5 x 40X) R.-Range
 VC. Variation coefficient. \bar{X} .-Mean

