



Table 1. Effect of gamma rays on growth of calli and initiation of somatic embryogenesis in four varieties of carrot

Dose	Intensity of callogenesis (a)				Intensity of somatic embryogenesis (b)			
	Scarla	Tantal	De Chant.	Boltex	Scarla	Tantal	De Chant.	Boltex
0 Gy	++	++	++	++	++	++	++	++
5 Gy	+++	+++	+++	+++	++	++	+	++
10 Gy	+++	+++	++	+++	++	+++	++	+++
50 Gy	++++	++++	++++	++++	0	0	0	0

a: Intensity of callogenesis based on the fresh weight of calli after 4 weeks of culture on LN1 medium  
 ++:<300 mg +++:300-500 mg ++++:>500 mg

b: Number of developed somatic embryos obtained on calli after 4 weeks of culture on LN medium  
 0:Nul +:<10 ++:10-25 +++:>25

Table 2: Carotene contents in taproots of plants derived from irradiated somatic embryos in 3 varieties of carrots

Varieties	Sources of samples	Carotenes <sup>(1)</sup> (mg/g dry mater)
Scarla	Somatic Emb. (SC <sub>1</sub> )	56.1 ± 0.99
	Irrad <sup>1</sup> (SC <sub>11</sub> )	142.8 ± 1.3
	Irrad <sup>2</sup> (SC <sub>12</sub> )	55.9 ± 1.20
Boltex	Somatic Emb. (B01)	383.0 ± 2.31
	Somatic Emb. (B02)	198.9 ± 1.20
	Irrad <sup>1</sup> (B0 <sub>11</sub> )	118.2 ± 1.49
	Irrad <sup>2</sup> (B0 <sub>12</sub> )	117.0 ± 1.20
Tantal	Somatic Emb. (TA)	534.7 ± 1.03
	Irrad <sup>1</sup> (TA <sub>11</sub> )	488.7 ± 1.49
	Irrad <sup>2</sup> (TA <sub>12</sub> )	489.9 ± 1.20

<sup>(1)</sup>Average of 10 replicates for each taproot. ± standard deviation. For the non-irradiated Boltex, 2 taproots of 2 plants were analysed.

## REFERENCES

Pawlicki, N., R.S. Sangwan, and B.S. Sangwan-Norreel, 1993. Somaclonal variation in caroten content of carrot (*Daucus carota* L.) Acta bot. Gallica. 140: 17-20.

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## DEVELOPMENT OF NEW VARIETIES OF CHRYSANTHEMUM BY MUTAGENESIS *IN VITRO*

At present, the industry of flower cultivation in Mexico has been demanding new varieties produced locally. There are 6,000 hectares dedicated to the cultivation of flowers for domestic use, however the export is very low. The main production area is located in Villa

Guerrero, a small town near Mexico City, where 80% of the total national production is grown. In addition, approximately 10 hectares of greenhouses are dedicated to the production of flowers for export, mainly in the Peninsula de Baja California and the Altiplano Central (Central Plateau). Unfortunately, the production of flowers in Mexico has been affected by two factors: the first, stock plants must be imported from Holland, France and the United States; and the second, there are some government restrictions on their import. Due to these factors, producers are behind in recent innovations related to new varieties. An alternative to solve this problem would be meristem *in vitro* culture. Plantlets from two varieties 'Polaris Yellow' pom-pom type and 'Dramatic' margarita type, were obtained through the meristems tip culture in the MS culture medium, to which kinetin 1.0 mg/l and NAA 0.05 mg/l were added.

In preliminary studies, the plant material was irradiated with doses between 10 to 60 Gy and it was possible to determine that doses higher than 35 Gy were lethal for both varieties. In this experiment, plantlets were irradiated with seven doses (7.5, 10, 15, 17.5, 20, 22.5 Gy) of <sup>60</sup>Co gamma rays. They were then subcultured using three types of explants: bud, leaf and internode.

The best variety for production of direct organogenesis was Polaris Yellow in a range of doses between 7.5 and 15 Gy, the buds being the best explant, while the internodes and leaves were not so suitable. In contrary, the leaf was considered to be the best explant for the induction of indirect organogenesis in the variety Dramatic, in a range of doses between 10 and 20 Gy. It was possible to obtain some mutants for color, size and shape of flowers from these materials and it is expected that in the near future they will rise to new varieties.

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