

Induced Mutation of Carnation by X-ray

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Irradiation of vegetative carnation cuttings has been shown to speed mutation (2,3). Chan (1) found that chrysanthemum responded best in the dosage range of 1200 to 3000r, whereas rose required at least 7500r to yield appreciable numbers of mutations.

As a preliminary experiment, 5 rooted cuttings of cv. Capri were exposed to X-rays on October 15, 1968. Irradiation was with a GE Maxitron X-ray machine operated at 300 kvp, 20 ma with a 1.27 mm aluminum filter. The distance from the target was 44.5 cm. The cuttings were placed in a circle with tips to the center and the roots covered with a 1/4" lead shield. A single dose of 4485r with a dose rate of 299r per minute was given for 15 minutes.

The irradiated cuttings were potted in individual containers with a nonirradiated cutting as control. The soil mixture was 1/3 each of soil, peat, and sand. Later these irradiated plants were transferred to 10" pots of crushed granite and grown a total of 15 months under observation. The original irradiated plants constituted the C₁ generation.

The 6 plants were flowered without removal of the apical section and showed no color differences from the parent cultivar or the control. Five cuttings were rooted from the first lateral branches of each plant (C₂ generation) and grown in a greenhouse bench for 12 months. During the period of growth any departure from the normal characteristics of the parent cultivar was noted.

RESULTS

Three of the 5 cuttings that were irradiated with 4485r in a 15 minute period produced easily recognizable mutations on lateral branches, whereas none of the apical sections appeared to mutate. The cultivar Capri has a medium pink colored flower. Two color mutants recovered from different irradiated cuttings were a rose pink and a variegated medium and light pink. One irradiated cutting produced one lateral branch without waxy covering on the leaves and stem. Leaf shape was also different from the control; however, flower color was not changed on this shoot.

The X-ray dosage and methods described here are adequate to produce mutations on carnation. Since there was no visible injury to foliage or stems, the irradiation dosage could probably be increased to yield more mutations. The mutants recovered in this experiment probably arose from at least 2 of the 3 histogenic layers of tissue as both flower color and leaf shape were affected. A large C₃ generation is presently under observation since many mutations do not appear on the irradiated plants or the first vegetative generation (C₂).

LITERATURE CITED

1. Chan, A. P. 1966. Chrysanthemum and rose mutations induced by X-rays. Am. Soc. for Hort. Sci. Proc. 88:613-620.
2. Mehlquist, G. A. L. and Yoneo Sagawa. 1959. The effect of gamma radiation on carnations. Proc. IX Int. Bot. Congress 2:285.
3. Sagawa, Y. and G. A. L. Mehlquist. 1957. The mechanism responsible for some X-ray induced changes in flower color of the carnation, *Dianthus caryophyllus*. Amer. J. Bot. 44: 397-403.