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In-vitro induction of mutations in Chrysanthemum using x- and gamma-radiation

Spontaneous and induced mutations occur frequently in the hexaploid and very heterozygous Chrysanthemum. Alterations in flower colours can thus be obtained for an outstanding cultivar produced by cross-breeding. Whole families of mutants have been reported for cultivars like "Westland", "Indianapolis", "Horim" and "Bravo". The mutation-breeding programme in Poland started in 1986 with the use of in vitro techniques to obtain early cultivars flowering in unheated plastic greenhouses. One of the successful examples was the irradiation of cv. "Richmond". Leaves from plants regenerated through shoot tip culture were treated with 15 Gy x- and gamma-rays. Each treatment comprised 400 leaf explants on MS medium with IAA 2 mg/l and BA 0,6 mg/l. After 6 weeks, regenerated adventitious shoots were transferred to the rooting medium with NAA 0,02 mg/l. Rooted plantlets were used as stock plants for the production of shoot cuttings to be subjected to mutant selection. Many plants with drastically changed flower colours were obtained. The violet-pink colour, which is typical for "Richmond" flowers changed to 13 different colours: white, yellow, golden, pink, salmon, lilac, violet, purple, orange, apricot, amber, bronze and red. Eleven colours occurred as a result of x-ray treatment, eight colours after gamma irradiation. Chimeras were not observed. Among irradiated plants there were also inflorescences with all-ligulate florets scrolled up into tubes.

(M. Jerzy, Department of Horticulture, Academy of Technology and Agriculture, Bernardynska 6, 85-029 Bydgoszcz, Poland)

In-vitro neoformation of woody plants (apple, pear, Weigela)

Adventitious bud neoformation may induce variability in two ways: somaclonal variation, if the explant has undergone undifferentiated growth (callus); induced mutations, if a physical or chemical mutagen has been applied to the explant prior to the regeneration. Three apple scion cultivars ("Gala", "Granny Smith", "Golden Delicious") and four apple rootstock cultivars ("Mark", "Novole", "Lancep", "Cepiland") were grown on basal apple multiplication medium. Leaves, internodes and roots were used for callogenesis and/or regeneration experiments. Scion varieties were more responsive than rootstocks. 1000 "Gala" neoformations will be planted in the field to investigate somaclonal variation. In pear, shoot regeneration was obtained from in-vitro leaves of 3 varieties of Pyrus communis ("Seckel", "Louise Bonne", "Comice") and one variety of Pyrus bretschneideri ("Crystal Pear"). It was observed that regeneration is still possible from leaves irradiated with up to 40 Gy of  $\gamma$  rays, or treated with 5mM ENU for one hour. In Weigela, stem segments (0.5 cm) from rooted in vitro plants of 5 cultivars were used in experiments to induce adventitious buds. On the cultivar "Eva Rathke" the adventitious buds were detected as early as 10 to 15 days after the beginning of the culture. A mutagenic treatment was carried out by immersing explants of "Bristol Ruby" in a suspension of ethyl methane sulfonate (EMS). Among 400 plants regenerated from treated explants, 5 mutants were detected after 5 years of field observation. Two of them seem to be solid mutants. Apparently in Weigela both homogeneous mutants and chimeras are produced by adventitious regeneration from mutagenised explants.

(E. Chevreau, M. Dufour, M. Duron, INRA Station d'Amélioration des Espèces Fruitières et Ornamentales, Beaucouzé 49000, Angers, France)



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