

POTENTIAL USES OF ANTHOR CULTURE TECHNIQUES IN BREEDING
BRASSICA CAMPESTRIS

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ABSTRACTS

Studies involving anther culture of several Canadian cultivars of summer turnip rape (Brassica campestris L.) were carried out to evaluate the potential of this technique as a breeding tool. The effects of physiological condition of donor plants, developmental stage of anthers, culture medium composition, and culture temperature treatments on embryogenesis in cultured anthers were evaluated. Embryogenesis was induced from uninucleate microspores in anther cultures derived from plants in growth chambers with a 16 hour light (20°C) and 8 hour dark (15°C) cycle. The sucrose concentration of the culture medium influenced the frequency of embryogenesis with as many as 10% of the anthers producing embryos at an optimal sucrose concentration of 10-11%. The presence of auxins in the medium was essential for embryogenesis. Culture temperature treatments dramatically affected embryogenesis with a maximal embryo yield of more than 150 embryos per 1000 cultured anthers obtained after initial culture at 35°C for 1-3 days followed by culture at 25°C.

Regeneration of plants from anther-derived embryos could be obtained directly by embryo culture or indirectly by induction of shoot and root organogenesis in hypocotyl explants. In preliminary studies, in which the anthers were cultured at 25°C, only diploids and polyploids were detected in a population of more than 70 regenerated plants. Homozygosity and, therefore, microspore origin of these plants could be demonstrated on the basis of inheritance of morphological traits by their progeny. In recent studies, large numbers of haploids have been identified amongst plants derived from anthers which had received high culture temperature treatments.

Culture of anthers from F₁ hybrids (intermediate level of erucic acid, brown seed coat) produced by crossing the cultivars Torch (zero erucic acid, brown seed coat) and R500 (high erucic acid, yellow seed coat) permitted the study of segregation for seed characteristics in anther-derived plants. Zero and high erucic types as well as brown and yellow-seeded types were identified in the anther-derived population. Recombinants for both traits were detected. It was concluded that anther culture techniques could be a valuable breeding tool in B. campestris for rapid production of large numbers of homozygous lines from which superior types could be selected and for efficient selection of desirable recombinants from F₁ populations.