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Anther culture of some Lotus species

The possibility of producing haploid plants through anther culture was tested for the following Lotus species: L. alpinus Schleich. (2x and 4x), L. caucasicus Kupr., L. corniculatus L., L. cruentus Court., L. divaricatus Boiss., L. hispidus Desf., L. japonicus (Regel) Larsen (2x and 4x), L. krylovii Schischk. et Serg., L. pedunculatus Cav. (2x and 4x), L. sulphureus Boiss., and L. tenuis Waldst. et Kit. (2x and 4x). Seventeen sources of L. corniculatus (2n = 24) germplasm were tested including the cultivars: Empire, Macdonald College Strain H., Maitland, and Viking. In addition, the following three interspecific hybrids were tested in anther cultures: the amphidiploid of L. japonicus X L. alpinus, crossed with L. corniculatus, the amphidiploid of L. japonicus X L. alpinus, and the amphidiploid of L. krylovii X L. tenuis.

Anthers from the various species were cultured on agar - solidified Gamborg's (1970) basal medium supplemented with 1.0 mg/l NAA, 1.0 mg/l kinetin, and 30 g/l sucrose. Cultures were maintained at 25°C in the light with an intensity of 5000 lux.

There was no consistent relationship between the frequency of callus formed from anthers and the stage of pollen development, whether pollen mother cells, uninucleate pollen, or binucleate pollen. Similarly, there was no consistent relationship between the frequency of callus formed and the ploidy of the germplasm source, whether diploid, tetraploid, or amphidiploid.

No pollen divisions were observed in culture. Callus which formed from anthers was of somatic origin. Plants which regenerated from anther cultures of L. japonicus (4x) and L. corniculatus cultivars Empire and Viking, showed somatic chromosome numbers equivalent to those of the germplasm sources.

Various techniques utilizing Ethrel (2-chloroethylphosphonic acid), parafluorophenylalanine, elevated sucrose levels, cold pretreatment, and tobacco nurse cultures, all failed to induce pollen divisions in anther cultures of L. corniculatus cultivars Empire and Viking. Possibly, endogenous hormone levels in cultured Lotus anthers prevent pollen divisions in culture, as suggested by Niizeki and Kita (1974).

References

GAMBORG, O. L. 1970. Plant Physiol. 45: 372-375.

NIIZEKI, M. and F. KITA. 1974. J. Fac. Agr., Hokkaido Univ. 57: 293-300.