Development of Genotype-Independent and Efficient Regeneration Procedure for Flax (*Linum usitatissimum* L.)

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ABSTRACT

A genotype-independent and efficient regeneration procedure for flax (Linum usitatissimum L.) was developed. Egyptian and Canadian flax explants (hypocotyls from 5-days-old seedling) rapidly proliferated to provide easy-to-root shoots within a few days on MS basal medium with Gamborg's vitamins and supplemented by 1.0 ppm kinetin and maintained in a controlled growth cabinet for a 16-h photoperiod at 20 0.5°C with a light intensity of about 2000 lux provided by cool white fluorescent tubes. The formation of complete plants was then possible by transferring the shoot tips to hormone-free nutrient agar medium for rooting. This procedure was consistently the best for the four studied Egyptian cultivars and one Canadian cultivar. Besides rapid, genotype-independent and efficient regeneration frequency, the present procedure has another advantage of avoiding callus formation, thereby reducing the incidence of somaclonal variation. This direct regeneration can be used for the vegetative propagation or cloning of a particular line of flax and for genetic transformation of flax.

Key words: *Biotechnology, Flax, Linum usitatissimum, Regeneration.*

INTRODUCTION

Modern biotechnology techniques offer useful tools to assist conventional breeding programs. At present, genetic transformation and subsequent regeneration have been successfully applied in the practical breeding programs of many agriculturally important crops. Fortunately, *Linum* is relatively simple to culture *in vitro* and has a successful history. The wide range of cultivars used in the various reports suggests that the genus *Linum* is amenable to *in vitro* manipulations (eg. McHughen, 1992; Koronfel, 1994).

A reliable, efficient and preferably genotype-independent regeneration system from cultured tissues is a prerequisite for the success of plant transformation mediated by *Agrobacterium tumefaciens*. Most of the flax tissue culture and genetic transformation work has been reported for oilseed type cultivars from Canada or Europe (McHughen, 1992). Unfortunately, tissue culture and gene transformation have not yet been attempted for the improvement of Egyptian flax cultivars. The objective of this investigation was to