Callus Induction and Shoot Regeneration from Mature Seed of Rice Tainung 67 (Oryza sativa L.)

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Summary

The production of transgenic plants has a great potential for crop improvement however a reliable and efficient regeneration system is a prerequisite for gene transformation. The objectives of this study were to investigate the effects of salt formulation, carbon source, proline, water stress and callus aging on plant regeneration from mature seed-derived callus culture of cultivar Tainung 67 (TNG 67), a popular rice variety in Taiwan. Callus was initiated from mature seeds of three cultivars Taipei 309 (TP309), Taichung native 1 (T(N)1) and TNG67 on two salt formulations (N6 and MS) with an average callus formation frequency of 94.6%, 80.5% and 50.8% for each variety, respectively. Although it was found that callus formation better on N6 medium than MS medium for TNG67, no difference was observed on callus formation of T(N)1 and TP309 on both salt formulations. A significant effect of proline on enhancement of embryogenic callus regeneration was observed. A 100% regeneration frequency was obtained from embryogenic calli grown on proline treatment (1.15 g/l) however only 66.7% for the control (without proline). The water stress treatments including the use of 1% agarose, 0.5% phytage and 1.6% bacto-agar were found with 41%, 14.5% and 0% frequency of regeneration, respectively. The decreasing regeneration frequency was observed along with increasing of long-term cultures. A 87.5% frequency of regeneration was obtained from the 18-day-old embryogenic callus and only 40% remained for the 42-day-old embryogenic callus on a regeneration medium containing sucrose. Meanwhile, a higher regeneration frequency (95%) was obtained for the 42-day-old embryogenic callus grown on a regeneration medium containing maltose. Medium of N6 and MS salt formulation with kinetin and BA respectively were tested for shoot elongation however no significant difference was found.

Key words: Oryza sativa L., Callus induction, Regeneration.