

Callus induction and plant regeneration of five Egyptian rice genotypes as affected by medium constituents

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ABSTRACT

Callus induction and plant regeneration efficiency of five selected Egyptian rice cultivars, Giza 177, Sakha 101, Sakha 102, Sakha 103, and Sakha 104, were studied using mature embryos as explants. Both plant genotype and medium composition influenced the rate of callus formation. Mature embryo explants of the genotype Sakha 104 grown on N6 medium supplemented with 2 mg l⁻¹ 2,4-D and 8.5 mg l⁻¹ silver nitrate gave the highest callus induction frequency (95%). Among the five genotypes tested, Giza 177, Sakha 104, and Sakha 103 showed the highest frequency of embryogenic callus formation (48.3%, 48%, and 47.3%, respectively), on N6 medium supplemented with 2 mg l⁻¹ dicamba. The highest shoot regeneration efficiency of 75.3 and 70.7%, was observed for Sakha 101 and Sakha 104, respectively, on MS medium supplemented with 1 mg l⁻¹ NAA and 2 mg l⁻¹ kinetin.

Keywords: *Oryza sativa*, Somatic embryogenesis, Shoot organogenesis, Silver nitrate, Dicamba.

INTRODUCTION

Rice (*Oryza sativa* L.) is one of the most important cereal crops, which supplies food for more than half of the world's population (Tyagi *et al.*, 2004). Despite the success made in the last decades, traditional breeding efforts alone cannot meet the increasing demand of rice consumers in the 21st century. As the world's population continues to grow towards an estimated 10 billion people by 2050, demand for rice will grow faster than that for other crops, because population growth is greatest in the rice-consuming and rice-producing regions of Asia, Africa and the Americas (Dawe, 2007). In recent years, rice stocks have fallen dramatically, such that in 2008 the stock-to-

use ratio of rice was at the lowest level in 30 years (FAO, 2008 and Sage and Sage, 2009).

One procedure to increase rice productivity is the introduction of useful traits by genetic transformation methods. Genetic transformation of rice has been an important area of research in the past few years. A number of methods including PEG, electroporation, microprojectile bombardment, and *Agrobacterium* have been used to mediate the actual gene transfer (Ignacimuthu *et al.*, 2000). Whatever transformation system was employed, efficient systems for embryogenic callus induction and shoot regeneration were always critical for obtaining adequate numbers of fertile transgenic rice lines. In rice, four different callus types (type I, II, III and IV) can be induced (Visarada *et al.*, 2002). In general, immature embryos and meristematic