

Efficient callus induction and plant regeneration of Malaysian indica rice MR219 using anther culture

ABSTRACT

Rice plant regeneration via anther culture possess several difficulties, these included early anther necrosis and high albinism frequency. In the present study, several biotic and abiotic factors were studied to develop an efficient protocol for the regeneration of Malaysian indica rice MR 219 variety. Callus initiation of anther cultures was evaluated using different N6 media supplemented with 2,4-D in combination with 1-naphthaleneacetic acid (NAA), kinetin (Kin) or 6-benzylaminopurine (BAP). The present study revealed that incorporation of 1.0 mg/L of 2,4-dichlorophenoxyacetic acid (2,4-D) with 3.0 mg/L of NAA significantly elevated callus induction rate with 8.45%. Callus development was further enhanced with the application of 1.0 mg/L of 2,4-D in combination with 1.0 mg/L of BAP, which resulted in 80.83% of globular callus formation rate. Formation of rooty callus (70.83%) was initiated by 0.5 mg/L of 2,4-D in conjunction with 0.5 mg/L of BAP treatment. The highest somatic embryogenesis rate (25.83%) and regeneration frequency (10.92%) was achieved under 4 °C during 7th day, together with the formation of 2.17 green rice plantlets. Nevertheless, culture browning frequency increased over time and reached the highest (100.00%) at 29th day for both 4 and 8 °C treatments. The highest number of albino plantlets was recorded at 18.17 for in vitro cultures maintained under 8 °C at 14th day. The study herein developed an efficient protocol which enhanced callus development as well as the regeneration of green indica rice plantlets while minimizing albinism.

Keyword: Albino plantlets; Globular callus; Regeneration; Rooty callus; Somatic embryogenesis