CALLUS INDUCTION IN *AMARANTHUS TRICOLOR* AND *AMARANTHUS SPINOSUS*

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ABSTRACT

Amaranths are an agriculturally valuable crop, but tissue culture techniques for these species remain limited. A study was conducted at the Plant Tissue Culture Laboratory, Institute of Crop Science, College of Agriculture and Food Science from October to December 2009. This study sought to identify a combination of plant growth regulators (PGRs) to induce callus formation on hypocotyl segments of *Amaranthus tricolor* and *Amaranthus spinosus*. *Amaranthus* spp. calli were yellow to deep yellow with a few cultures exhibiting red pigmentation depending on the PGRs applied in the induction medium. PGRs also influenced the number of days before callus outgrowths became visible. Callus formation in both species was faster with a combination of 6-benzylaminopurine (BAP) and 2,4-dichlorophenoxyacetic acid (2,4-D) than with α-naphthaleneacetic acid (NAA). *A. spinosus* calli were induced in 10 days with Murashige and Skoog medium (MS) + 0.5 mg L^{-1} BAP + 0.5-1 mg L^{-1} 2,4-D; callus induction took 12.5 days in MS + 1.0 mg L^{-1} BAP + 0.5 mg L^{-1} 2,4-D in *A. tricolor*. In both species, BAP treatments caused profuse callus growth, but *A. tricolor* favored NAA, while *A. spinosus* was more responsive to 2,4-D. The *A. tricolor* calli scored with profuse growth also had the greatest mass. For *A. spinosus*, the calli with the greatest mass formed in MS + 0.5 mg L^{-1} BAP + 5.0 mg L^{-1} NAA, but the larger calli formed in BAP + 2,4-D-containing media.

Key words: callus culture, hypocotyl, 2,4-dichlorophenoxyacetic acid

INTRODUCTION

Amaranth (*Amaranthus* spp.), a.k.a "kulitis", Chinese tampala or pigweed, is a member of the Amaranthaceae family (Tisbe and Cadiz, 1967) and an herbaceous and agriculturally important annual plant in Mexico, Central and South America, India and Africa. The genus *Amaranthus* includes over 60 species found across many parts of the world (Willis, 1973). Amaranths are commonly consumed as vegetables or grain crops and have high nutritional value due to the presence of lysine and calcium (Coimbra and Salema, 1994; Pant, 1983) and high amounts of riboflavin, ascorbic acid and vitamin E. Amaranths also produce secondary metabolites, particularly compounds like betalain and anthocyanin (Wink, 2000). Betalain, a natural pigment derived from tyrosine (Leathers et al., 1992), and anthocyanin, a flavonoid (Mazza and Miniati, 1993), are natural food colorants that exhibit antiradical and antioxidant effects. Anthocyanin also possesses anti-inflammatory, antibacterial/antiviral,