PEROXIDASE DEFICIENCY AND HEME SYNTHESIS IN A FULLY HABITUATED NONORGANOGENIC SUGARBEET CALLUS (*BETA VULGARIS* L.) OVERPRODUCING POLYAMINES

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Fully habituated (auxin- and cytokinin-independent) and fully heterotrophic nonorganogenic (HNO) sugarbeet callus cells have been shown to exhibit many features of animal tumor and cancer cells. All types of habituated tissues examined in the literature share at least three common biochemical characteristics: a low peroxidase activity, a high polyamine (PA) levels and a low ethylene production. However, results concerning their auxin and cytokinin level are not consistent. Peroxidase synthesis in the achlorophyllous HNO callus appears to arise from aminolevulinic acid (ALA) through the Shemin pathway (Bisbis *et al.*, 1997a; 1998a), commonly used by animals and fungi. This pathway is limited by a disturbed nitrogen metabolism that diverts glutamate, required for ALA synthesis in higher green plants, into PA synthesis (Bisbis *et al.*, 1997b). This is the first evidence to suggest that low ethylene production is caused by an interaction with PA for their common precursor, S-adenosylmethionine (Bisbis *et al.*, 1998b). Interactions between several metabolic pathways, including peroxidase synthesis, nitrogen and sugar metabolisms, ALA synthesis via the Shemin and/or the Beale pathways were investigated. The results showed that the accumulation of polyamines in the HNO callus could explain partly the deficiency in tetrapyrrolic compounds observed in this achlorophyllous callus.

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