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Effect of temperature and sucrose concentration on hydroquinone toxicity in leafy spurge suspension culture cells

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Hydroquinone, a simple phenol identified in the low-growing forb, *Antennaria microphylla*, has been established to be phytotoxic to leafy spurge in a number of *in vitro* bioassays. Both leafy spurge and *Antennaria microphylla* have the capacity to enzymatically detoxify hydroquinone via glucosylation, however the glucosylating enzyme is substrate-induced in leafy spurge and was found to be six-fold less efficient than the same enzyme constitutively expressed in *Antennaria*. Detoxification of hydroquinone requires a readily available carbohydrate pool. Reports that leafy spurge roots accumulate unusually high amounts of free sucrose at the end of the growing season have promoted tissue culture assays to determine if sucrose accumulation enhanced the glucosylation of hydroquinone. Such an enhancement could provide seasonal amelioration of the allelochemical effects of hydroquinone on leafy spurge. Preliminary research results indicate that cold temperatures and exogenous hydroquinone represent a dual stress on the cells which can be only partially ameliorated by metabolism of exogenous sucrose. This chronic susceptibility of leafy spurge suggests the possibility of using hydroquinone-producing forage plants as natural competitors.