

Differential Induction of Glutathione Transferases and Glucosyltransferases in Wheat, Maize and *Arabidopsis thaliana* by Herbicide Safeners

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By learning lessons from weed science we have adopted three approaches to make plants more effective in phytoremediation:

1. The application of functional genomics to identify key components involved in the detoxification of, or tolerance to, xenobiotics for use in subsequent genetic engineering/breeding programmes.
2. The rational metabolic engineering of plants through the use of forced evolution of protective enzymes, or alternatively transgenesis of detoxification pathways.
3. The use of chemical treatments which protect plants from herbicide injury.

In this paper we examine the regulation of the xenome by herbicide safeners, which are chemicals widely used in crop protection due to their ability to enhance herbicide selectivity in cereals. We demonstrate that these chemicals act to enhance two major groups of phase 2 detoxification enzymes, notably the glutathione transferases and glucosyltransferases, in both cereals and the model plant *Arabidopsis thaliana*, with the safeners acting in a chemical- and species-specific manner. Our results demonstrate that by choosing the right combination of safener and plant it should be possible to enhance the tolerance of diverse plants to a wide range of xenobiotics including pollutants.

Key words: Herbicide Safeners, Phase 2 Detoxification, Phytoremediation