

## **Dissertation Abstract**

Earth is surrounded by a stratospheric ozone layer, which completely blocks out deleterious UV-C radiation and partially absorbs damaging UV-B radiation. Due to the release of man-made chlorofluorocarbons and other ozone-depleting chemicals, the ozone layer has become thinner and thus has led to increased amounts of UV-B radiation reaching the surface of the earth. The effect of UV-B radiation on plants varies from effects on ecosystems to changes in plant growth and morphology and changes at the molecular level inside the plant cell, such as DNA damage, synthesis of antioxidants and protective pigments, and alterations in gene expression.

Most studies on genes differentially regulated by UV-B have focused on photosynthetic genes and genes encoding enzymes involved in biosynthesis of protective pigments. The search for novel genes not previously identified as UV-B-regulated may lead to the discovery of novel protective responses and may help in elucidating signalling pathways. By utilising three different methods: differential display, suppression subtractive hybridisation and DNA microarrays, several novel UV-B-regulated genes have been identified.

These include genes encoding chloroplast-localised proteins which were all down-regulated and several genes encoding putative signalling proteins. Several of the genes found in this study were novel when first sequenced and consequently there is not yet any known function for the corresponding proteins. The large number of genes identified as UV-B regulated shows that UV-B alters many more cellular processes in plants than previously anticipated including protein translation and protein degradation, processes that can directly influence the levels of proteins in the cell.

**Keywords:** UV-B radiation, differential display, suppression subtractive hybridisation, pea, *Arabidopsis thaliana*

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