

# Production of Low Glucosinolates Content by Transformed Roots of *Sinapis alba* (White Mustard, *Cruciferae*)

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## ABSTRACT

Transformed hairy roots of *Sinapis alba* (white mustard) were produced following inoculation of sterilized plant stems with wild type *Agrobacterium rhizogenes* (agropine strain LBA9402). Growth studies have shown that these transformed root cultures grow rapidly on hormone-free, half strength GB medium whilst untransformed roots grow only on full strength GB medium supplemented with auxin (0.4 mg/l NAA). The increase in biomass (dry weight) after 30 days of culture was found to be higher under photoperiod conditions (16 fold) than light (10 fold) or dark (8 fold). The phenotypic characteristics of transformed and untransformed cultures have been investigated. The pattern of branching of lateral roots is more intensive in transformed than untransformed roots. Molecular genetic analysis using Southern blotting and PCR techniques confirmed the T-DNA transfer from the *Agrobacterium* into the plant genome. Glucosinolates were produced by transformed roots at low levels (15  $\mu$ mole/g dry weight under dark conditions; compared to the wild type roots 22  $\mu$ mole/g dry weight).

In addition to the previous line of transformed hairy roots, another line was produced following transformation with the same vector but a reporter gene (*gus*) was inserted into the *Agrobacterium* through tri-parental mating. The transformed roots obtained were selected on 1/2GB supplemented with kanamycin (30 mg/l) and subjected to histochemical analysis of GUS and all roots showed a positive blue reaction compared to negative reaction in untransformed roots.

**Key Words:** *Sinapis alba*, *Agrobacterium rhizogenes*, Transformed "hairy" roots, Glucosinolates.

## INTRODUCTION

*Sinapis alba* is known as white mustard and belongs to the family *Cruciferae* (synonym *Brassicaceae*) and called the mustard family. *Cruciferae* consists about 380 genera and about 3000 species. The species of the family are widely distributed throughout the world, mainly in the Mediterranean basin, South - West and

Central Asia. The importance of the mustard family comes from using some species as food crops such as cabbage, oilseed rape, radish, cauliflower and turnip. Other species are used as fodder for animals. *S. alba* is an annual herb, grown wild and used by research groups as a model system in basic science and molecular studies (Heywood, 1985).

Primary metabolites such as proteins are common to all living organisms and