

Title Morphological characterisation and agronomic evaluation of transgenic broccoli (*Brassica oleracea* L. var. *italica*) containing an antisense ACC oxidase gene

Author Maria X. Henzi, Mary C. Christey and David L. McNeil

Citation Euphytica 113 (1): 9-18. 2000.

Keywords 1-aminocyclopropane-1-carboxylic acid (ACC); ACC oxidase; antisense gene; *Brassica oleracea*; ethylene

Abstract

Morphological characterisation and agronomic evaluation was conducted on 12 transgenic broccolilines containing a tomato antisense 1-aminocyclopropane-1-carboxylic acid (ACC) oxidase gene. Plants of three cultivars: Shogun (Sh), Green Beauty (Gy) and Dominator (D), were regenerated from hairy root cultures after co-cultivation with *Agrobacterium rhizogenes* strain A4T harbouring the binary vector pLN35. The T-DNA of pLN35 contains genes encoding a tomato antisense ACC oxidase gene (35S-ACC-5'7') and a neomycin phosphotransferase II gene (NOS-NPTII-NOS) for kanamycin resistance. The transgenic plants were transferred to a greenhouse and fertile plants obtained. Integration of the foreign DNA into the broccoli genome was confirmed by the polymerase chain reaction and Southern analyses. Transgenic plants showed evidence of hairy root (HR)-induced morphological changes to varying degrees. Of the 12 characterised transgenic lines, three lines (Gy/7, D/1 and D/2) performed within the limits of acceptability for all head quality parameters analysed (size, density, colour, shape and leafiness). The ethylene production from stalks of four field-grown transgenic lines of Green Beauty broccoli showed significant reductions in activity relative to the control 98 h after harvest. The Dominator transgenic lines D/1 and D/2 showed significant improvements in head colour relative to the control from 48 h after harvest. These results are consistent with the ethylene production patterns determined previously for these lines. The head colour results are consistent with previous results suggesting that two enzyme systems may be involved in broccoli senescence, giving two bursts of ethylene production, with only the second burst inhibited by the antisense ACC oxidase gene used.