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Comparative effects of ethylene inhibitors in agrobacterium mediated transformation of wild watermelon

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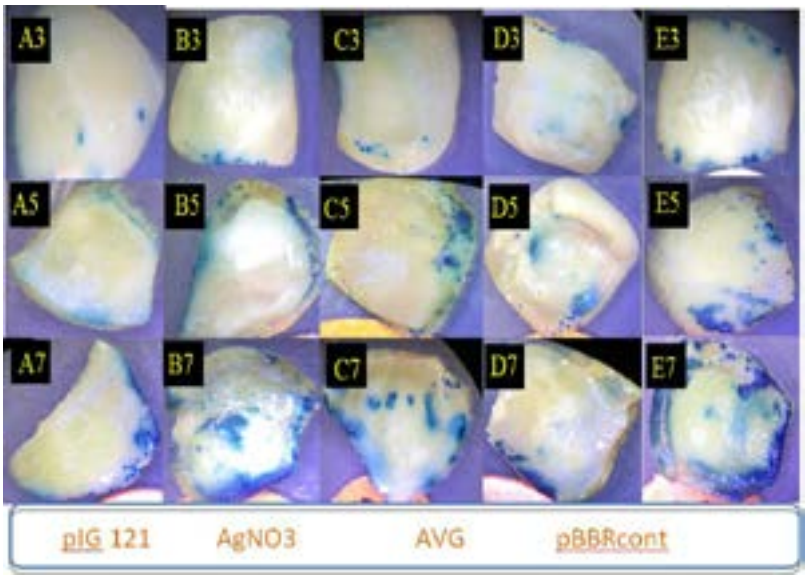
Ethylene (C_2H_4), a phytohormone that is produced in response to both abiotic and biotic stresses, is an important factor in the plant-microbe interaction. It is produced from the freshly cut wounds and has shown to be a major limiting factor in successful Agrobacterium-mediated plant transformation. In this study, experiments were conducted to evaluate the effectiveness of ethylene inhibitors on the genetic transformation in wild watermelon. Two chemical ethylene inhibitors silver nitrate ($AgNO_3$) and aminoethoxyvinylglycine (AVG), and a plasmid pBBRacdS harboring a 1-Aminicyclopropane-carboxylic Acid (ACC) deaminase gene for which cleaves ethylene precursor ACC into α-ketobutyrate and ammonia, were used in the experiment. Evolved ethylene gas from the watermelon explants inoculated with Agrobacterium was quantified using a gas chromatography, and the results shows that explants inoculated with the Agrobacterium harboring pBBRacdS was highly effective in inhibiting ethylene evolution as the amount recorded from 3-7 days after inoculation was lower as compared to the other treatments. The GUS histochemical assay using pIG121-GUSint reporter gene plasmid after 7 days of co-cultivation shows that pBBRacdS was more effective in gene transfer with 46% of the explants been stained blue, followed by AVG (22%) and $AgNO_3$ (13%) treatments in wild watermelon explants. The spectrophotometric GUS enzyme assay results indicates a higher gene transfer in explants harboring plasmid with ACC deaminase gene as shown with a higher rate of nitrophenol production (8.68 nmols min^{-1} g^{-1}) as compared to those with chemical inhibitors AVG and AgNO3 (5.31 and 4.54 nmoles min-1 g-1, respectively). Understanding the effectiveness of different ethylene inhibitors will be beneficial for improving the efficiency of the Agrobacterium-mediated gene transfer in crop plants of interest.



Biography

Malambane Goitseone is a PhD student at Tottori University, Japan. His current research is mainly on drought tolerant genes of a wild watermelon species that grow and strive in the Kalahari Desert under very harsh conditions. Currently, he focuses on the characterization of the genes expressed during the acclimatization of the crop during its exposure to moisture and slight stress.

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