

Tanawat Bamrungsetthapong 2010: Cloning and Molecular Characterization of *MeAMT2*, *MeNRT2*, *MePT1* and *MeZIP* Transporter Genes in Thai Cassava under Tissue Culture Conditions. Doctor of Philosophy (Agricultural Biotechnology), Major Field: Agricultural Biotechnology, Interdisciplinary Graduate Program. Thesis Advisor: Mr. Sutkhet Nakasathien, Ph.D. 119 pages.

Under tissue culture conditions, cassava (*Manihot esculenta* Crantz var. HB80) *MeAMT2*, *MeNRT2*, *MePT1* and *MeZIP* cDNAs' encoding for ammonium transporter (*AMT*), nitrate transporter (*NRT*), inorganic phosphate transporter (*PT*) and zinc transporter (*ZIP*) were isolated from developing fibrous roots. The cDNAs comprised 1,578 1,710 1,743 and 723 bp for *MeAMT2*, *MeNRT2*, *MePT1* and *MeZIP*, and the proteins were highly homologous with those from other plant species, respectively. DNA blot analysis indicated that at least three copies of *MePT1* and at least two copies of *MeAMT2*, *MeNRT2* and *MeZIP* are present in the cassava genome. For steady-state transcript accumulation of these transporter genes and some growth and development parameters under tissue culture conditions, 3 Thai cassava varieties, Huaybong 80 (HB80), Kasetsart 50 (KU50) and Rayong 1 (R1) were used for evaluation. It was found that at 8 weeks after cultured in MS media, total dry weight (TDW) was highest in +1E treatment in all three varieties and HB80 showed higher TDW than those of KU50 and R1 by 23.71% and 12.89%, respectively. In +1E treatment of all varieties, leaf, petiole, stem and fibrous root lengths were greater than those obtained from other treatments. In different plant parts and under different tissue culture mediums, levels of differential expression of *MeAMT2*, *MeNRT2*, *MePT1* and *MeZIP* genes was highest in stems, fibrous roots, stems and leaf, respectively. The result also showed that the expression levels of *MeAMT2*, *MeNRT2* and *MeZIP* genes were greater in +1E treatment when compared with others, reflecting the highest fresh weight, dry weight, leaf number, fibrous root number, leaf length, stem length, petiole length and fibrous root length, respectively. However, the *MePT1* gene showed decreasing expression trend when compared with control. Overall, levels of expression of these genes were most pronounced between 5-6 weeks after cultured which can be explained that the nutrients were highly utilized for starting growth and development during this period. When compared among the varieties, it was found that the expression levels of these genes in R1 were greater than those of KU50 and HB80, reflecting the highest total fresh weight in this observation.

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Student's signature

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Thesis Advisor's signature