

Expression of Glucan Water Dikinase in Cassava (*Manihot esculenta* Crantz.)

Oranuch Leelapon¹ and Jarunya Narangajavana²

¹National Center for Genetic Engineering and Biotechnology, 113 Paholyotin Rd.,
Klong 1, Klong Luang, Patumthani 12120, Thailand

²Department of Biotechnology, Faculty of science, Mahidol University, Rama VI Rd.,
Bangkok 10400, Thailand

Abstract

Starch phosphorylation is an integral part of starch biosynthetic pathway and also closely related to amylopectin chain structure. Increasing in the degree of starch phosphorylation affects the physico-chemical properties of starch and prevents crystallization, which is a desirable aspect as materials in both food and non-food industries. A recent breakthrough in the elucidation of enzymatic mechanisms, glucan water dikinase (GWD), a 160 kDa, from potato has been verified as a starch-phosphorylating enzyme. The presence of this protein also found in a wide range of plant species, including the tubers of sweet potato and yam, the seeds of maize and barley, and the fruits of banana. Thus, to gain further knowledge of cassava starch phosphate, *GWD*-like gene was isolated from 6-month cassava, cv. KU50, using degenerate primer derived from potato GWD. A partial cDNA fragment contained 218 putative amino acids. Sequence alignments showed that the GWD-like protein shared a common conserved motif to that of potato, *Citrus reticulata*, and SEX1 from *Arabidopsis* mutant, including other dikinase-type proteins. Phylogenetic analysis of putative conserved regions revealed cassava GWD-like protein is more closely related to the mutant from *Arabidopsis thaliana*, starch excess protein (SEX1), than other GWD-like proteins and dikinase proteins from several species.

This article will be submitted to *Planta*.