

(05-1-51)

Molecular Characterization of the Gibberellin 3 β -hydroxylases Gene from Potato (*Solanum tuberosum*)

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Objectives

1. Cloning and characterization of distinct potato gene encoding GA 3 -hydroxylase related to potato tuberization.
2. Molecular breeding of high quality potato having early tuberizing characteristic.

Materials and Methods

1. Material - Potato (*S. tuberosum* cv. Superior)
2. Methods
 - Cloning of the genes : PCR-based cloning of potato GA 3 -hydroxylase and sequencing
 - Check the expression level of the GA 3 -hydroxylase genes was performed by northern blot analysis

Results and Discussion

Gibberellin (GA) 3 -hydroxylase is one of the key regulatory enzyme in the GA biosynthetic pathway. We identified two distinct potato (*Solanum tuberosum*) genes encoding GA 3 -hydroxylase, correspond to previous report of two genes in tomato seedling. The genes, designated to St3bOH-1 and St3bOH-2, have high similarity in sequence with tomato genes Le3OH-1 and Le3OH-2, respectively. This GA 3 -hydroxylase gene family regulate the conversion of GA₂₀ to active GA₁. Tuberization in potato is promoted by short photoperiod, low temperature, and nitrogen deficiency, but is inhibited by endogenous GA₁. Using northern blot analysis, the different patterns of tissue-specific mRNA transcripts that corresponding to those genes were detected. The expression of two genes was shown different patterns during the growth and tuberization stages. The St3bOH-1 transcripts showed stable expression level in leaf and stolon tissue during the growth and tuberization stage. But the St3bOH-2 mRNA drastically decreased in stolon and leaf of potato plant at the early tuber-inducing stage. This observation suggests that GA 3 -hydroxylase encoded by St3bOH-2 may play a major role in the control of tuberization by regulating the active GA biosynthesis. For *the in vivo* confirmation of the association with tuberization and expression of St3bOH-2, we have been made the transgenic potato plants and performed the field trial in long day condition. And some transgenic potato lines that showed short tuberization period than non-transgenic potato were selected. It seems to be needed that the comparing the GA levels in the transgenic potato with non-transgenic potato during the tuber formation.