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Plant growth promoting rhizobacteria influence potato tuberization through enhancing lipoxygenase activity

Nookaraju Akula[1], Chandrama P. Upadhyaya[1], Doo Hwan Kim[1], Se Chul Chun[1] and Se Won Park[1]*

[1]Dept. of Molecular Biotechnology, Konkuk University, Seoul-143 701, Korea

*Corresponding author. Park Se Won(Professor), Tel: +82-2-450-3739, E-mail: sewpark@konkuk.ac.kr

Molecular insights on the role of plant growth promoting rhizobacteria (PGPR) in potato tuberization are reported in the present study. The PGPRwere isolated from the soil collected from potato fields of Highland Agricultural Research Centre, Pyeongchang, Korea and they were identified to the genus level based on the 16S rRNA sequence analysis. These PGPR were heat-killed, filtered and the filtrates were addedindividually at a concentration of 10^7 cfu mL^{-1} in MS (Murashige and Skoog's) medium supplemented with 7% (w/v) sucrose to study their influence on *in vitro* potato tuberization. Tuber initiation occurred early in untreated control, while tuber growth was pronounced in case of PGPR treatments. The control explants showed tuber formation as a result of sub-apical swelling of stolons while several sessile tubers formed directly in the axils of nodal cuttings in case of PGPR treatments, which is an indication of strong induction for tuberization. Theexplants cultured on MS medium supplemented with bacterial isolate 6 (*Bacillus firmus* strain 40) showed highest average tuber yield (Ca. 12.56 g per treatment) after 30 days of culture, which was 3 folds increase over the untreated control. A significant increase in *lipoxygenase* (*LOX1*) mRNA expression and activity of LOX enzyme were also detected in the tubers induced on PGPR treatments as compared to untreated control. This LOX expression level correlated with increased tuber growth and tuber yield. Further studies focused on the role of bacteria cell wall components, growth regulators and signal molecules released by PGPR are under investigation to elicit clues for PGPR-mediated signal pathway controlling potato tuberization.