フードセキュリティーリサーチユニット
筑波大学遺伝子実験センター
形質転換植物デザイン研究拠点

PTraD initiative

研究セミナー

“Incorporating desirable quality traits in fruit crops via biotechnology interventions : Spermidine and spermine, a regulator of plant longevity”

日時：2013 年 7 月 25 日　14：００～
場所：筑波大学総合 A 棟 110 室
講師：Dr. Avtar Krishan Handa
米国 Purdue 大学教授
ポストハーベストを主として果実品質についての研究を行っている

講演要旨：

My research program is focused on understanding the mechanisms that regulate fruit quality including postharvest shelf life and cellular levels of the desirable nutraceuticals. The main objectives of research are: (1) The roles of in plant growth and development and controlling crop attributes; (2). regulation and role(s) of cell wall hydrolases in fruit quality; and (3) how heat shock protein chaperon alter growth phenotype of plants under increasing temperature stress? In my seminar I will discuss some of the results in these three topics. We have genetically engineered polyamine pathway in tomato to alter levels of spermidine (Spd) and spermine (Spm) in tomato by over-expressing of SAM decarboxylase or spermidine synthase genes. Higher Spd and Spm enhanced levels of health promoting lycopene, extend longevity of ripened fruit, and delays whole plant senescence. The increased spermidine levels activated a wide array of genes regulating transcription, translation, signal transduction, chaperone activity, stress proteins, amino acid biosynthesis, ethylene biosynthesis and action, polyamine biosynthesis, isoprenoid pathway, and flavonoid biosynthesis. Based on our results, we have proposed a model implicating biogenic amines in reprograming somatic cells and restoring and enhancing metabolic memory in ripening fruit. Higher spermidine and spermine also altered fruit architecture as transgenic fruit become more oval shaped than WT fruits. Whereas the levels of transcripts SUN and OVATE, two fruit architecture genes, were up and down regulated, respectively, higher Spd and Spm influence expression of both cell division and expansion genes. We have previously identified a novel heat shock protein, designated *viscosity1* (*vis1*) whose overexpression in tomato enhanced biomass accumulation under heat stress, increased fruit juice viscosity and shelf life and improved membrane integrity at high temperatures. Overexpression of *vis1* also altered the architecture of flower cluster and increased flowers and fruit set in tomato.

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