Norikuni OHTAKE, Dr. Agr.

Associate Professor
Program: Life and Food Sciences
Area: Applied Life and Food Sciences
Undergraduate: Dept. of Applied Biological Chemistry

Professional Expertise

My professional Expertise encompasses plant nutrition, especially regulation of soybean storage protein accumulation, nutritional diagnosis using hydroponic culture.

Research Fields of Interest

Regulation of accumulation of soybean storage protein

We found that the β-subunit of β-conglycinin was absent in the seeds of four non-nodulating soybean lines grown in the field, whereas the seeds of their nodulating isogenic lines all accumulated the β-subunit. Further investigation revealed that the lack of β-subunit in seeds was not due to the non-nodulating trait per se, but to the nitrogen deficiency caused by the lack of nodulation.

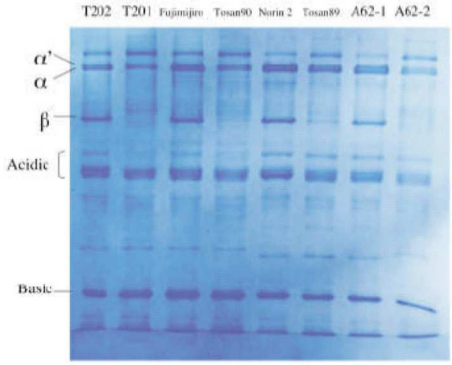

Figure1 Seed storage protein profile of nodulationg and non-nodulation soybeans.

How to regulate the accumulation

Different response supplied amino acid Asparaganine and Glutamin were major form of nitrogen in exude solution from soybean seed coat, only glutamine could induce β-subunit mRNA accumulation during 12 hour. From our experiments revealed that β-subunit accumulation level by nitrogen statue in the soybean plants.

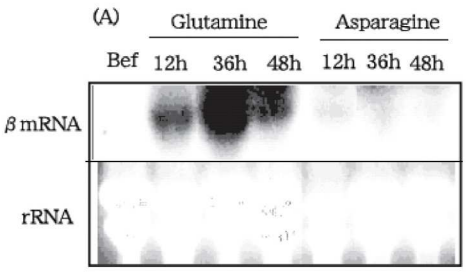

Figure 2 Expression of bsubunit mRNA in *in vitro* soybean cotyledons treated with glutamine and asparagine as a nitrogen souse.

Evaluation of plant nutritional diagnosis by leaf color imaging

Especially vegetables cultivation, nutrient deficiency or excess in the early growth stage significantly effect on the quality of harvest. The method is required to determine the nutritional status of plants before symptoms become obvious. We investigate that the methods to estimate plant nutrient statue enrichment or deficiency, the color value such as hue, saturation and lightness/luminosity

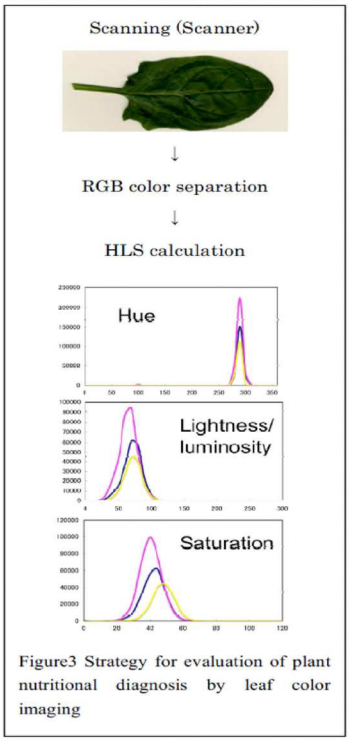

Figure3 Strategy for evaluation of plant nutritional diagnosis by leaf color imaging

Major Publications

Papers

[1] Ohtake N., Takano A., Yamazaki A., Fujitake H., Sueyoshi K., and Ohyama T., *Quantitative and isotopic analysis of amino acids, allantoin, and allantoic acid in soybean by LC-MS using the atmospheric pressure chemical ionization method.* Soil Sci. Plant Nutr., 50, 241-248, 2004

[2] Ohtake N., Kawachi T., Okuyama I., Fujitake H., Sueyoshi K., Ohyama T., *Effect of Short-Term Application of Nitrogen on the Accumulation of β -Subunit of β-Conglycinin in Nitrogen-Starved Soybean (Glycine max L.) Developing Seeds.* Soil Sci. Plant Nutr. 48 31-41, 2002

[3] Ohtake N, Sato T., Fujitake H., Sueyoshi K., Ishioka N-S., Watanabe S., Osa A., Sekine T., Matsuhashi S., Ito T., Mizuniwa C., Kume T., Hashimoto S., Uchida H., and Tsuji A., *Rapid N transport to pods and seeds in N-deficient soybean plants.* J. Exp. Bot 52, 277-283, 2001

[4] Ohtake N., Kawachi T., Okuyama I., Fujitake H., Sueyoshi K., and Ohyama T., *Temporary application of nitrate to nitrogen-deficient soybean plants at the mid- to late-stages of seed development increased the accumulation of the β-Subunit of β-Conglycinin, a major seed storage protein.* Soil Sci. Plant Nutr. 47, 195-203, 2001