（学位第３号様式）

学　位　論　文　要　旨	
氏名	Huynh Van Kiet（フイン　ヴァン　キエット）
題目	Physiological and metabolic studies of temperature effects on the juvenile growth of the sheath blight-resistant rice genotype 32R （イネ紋枯病抵抗性系統32Rの初期生育における温度反応に関する生理・代謝特性研究）

Rice sheath blight (ShB), caused by *Rhizoctonia solani* Kuhn, is one of the most serious fungal diseases in diminishing rice production. Along with a progress of the climate change, the ShB is expanding in temperate region. The 32R is resistant to ShB and high yield potential, but the juvenile growth of 32R is poor under cold temperature. Using QTL pyramiding to develop new rice genotype with ShB resistance, high yield and cold tolerance is expecting for temperate zone under climate change, 32R is a valuable candidate for future rice breeding.

This study aimed to investigate the effects of temperature on juvenile growth and the metabolic characteristics during juvenile stage of 32R in comparison with ShB-susceptible rice genotypes 29S and Nipponbare (Nb), a standard *Japonica* variety. The 32R and 29S were developed from the crossing of Tetep (*Indica*, ShB resistance) and CN_4-4-2 (progeny of Chugoku 45 and Nb, *Japonica* and ShB sensitivity), but they showed different responses under temperature effects. First, effects of temperature on plant growth and photosynthesis in seedling stage were studied. The results showed that growth of 32R is lower than that of 29S and Nb, because 32R was limited in dry weight, leaf area, RGR, and NAR at low temperature. Furthermore, photosynthetic rate of 32R was lower than 29S and Nb, because its rubisco and chlorophyll content were inhibited at low temperature. These findings indicated that 32R contains some traits of cold-sensitive rice genotypes, thus diminishing photosynthesis causes growth limitation. Second, the changes in root growth, soluble protein and free amino acids (FAAs) of genotypes under cold stress were studied. The results showed that root dry weight and soluble protein were decreased, whereas FAAs increased under cold stress. They were lower in 32R than in 29S. However, the changes in FAAs were not always associated directly with those in soluble protein under cold stress. Third, to further understand the responses of root metabolites to cold stress, metabolic profiles of cationic metabolites were studied by using CE-TOF/MS. The results showed that 81 metabolites including 55.6% amino acids (AAs), 4.9% polyamines, 16.0% nucleotides (Nus) and 23.5% other small molecular compounds were identified. These metabolites participate in many metabolic pathways. Of 81 measured metabolites, several metabolites participate in nitrogen assimilation, osmo-protection and cell membrane-protection were changed under cold stress, and they were lower in 32R than in 29S. These results indicated that cold stress caused variations in many metabolites of root, and the changes were contrasted between 32R and 29S.

These results of this study led to conclusion that 32R contains some traits of cold-sensitive. The contrasting changes in root metabolites caused changes in the physiological functions of roots, thus limiting seedling growth. In addition, these results provided useful information for reconstructing metabolic networks, and expediting the identification of genetic regulators and metabolic engineering strategies in the ShB-resistance for future rice breeding.