

**EXPRESSION DETERMINATION OF ETHYLENE SIGNAL
TRANSDUCTION GENES IN KHAW DOK MALI 105 (KDML105) RICE
DURING RICE TUNGRO BACILLIFORM VIRUS (RTBV) INFECTION**

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Ethylene responsive sensor 1 (Os-ERS1) and ethylene responsive sensor 2 (Os-ERS2) were isolated from Khaw Dok Mali 105 (KDML105) rice. The Os-ERS1 and Os-ERS2 cDNA sequences were 2,072 and 2,950 nucleotides in length which encoded 636 and 635 amino acids, respectively. Southern analysis indicated that only one copy of both Os-ERS1 and Os-ERS2 was found on chromosome 3 and 5, respectively. Analysis of amino acid sequence revealed that Os-ERS1 and Os-ERS2 putative proteins show the highest level of 98.6% and 99.4% identity comparing *Oryza sativa* japonica variety from Genbank database. Three domains including transmembrane, GAF and histidine kinase domain were found in both Os-ERS1 and Os-ERS2 putative proteins. In order to understand the signaling system of ethylene during Rice Tungro Bacilliform Virus (RTBV) infection, we monitored the dynamics of four ethylene receptors and four ethylene responsive factor genes using Northern analysis technique. Results indicated that transcription levels of five out of eight genes (Os-ERS2, Os-ETR1, Os-ETR2, Os-ERFG1 and Os-ERFG2) were detected at low level or none at all before inoculation. After RTBV inoculation, the level of expression of those genes was elevated with significant difference in their patterns. Os-ERS1, Os-ETR2, Os-ERFG3 and Os-ERFG4 shown to be rhythmic pattern that highest level at 2-4 hr after RTBV infection. Interestingly, four isoforms of Os-ERFG1 gene is presented while the other ethylene responsive factor genes are shown only single isoform. Effect of Agroinoculation technique was observed at low level in all of those genes excepted on Os-ERFG2 which shown to up-regulate by *Agrobacterium* inoculation. The result suggesting the possible association of ethylene signaling with RTBV infection.

Student' signature

Thesis Advisor's signature

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LIST OF ABBREVIATIONS (Cont'd)

| | | |
|-------|---|---|
| SSC | = | Standard saline citrate |
| TAE | = | Tris acetate EDTA |
| TCS | = | Two-component regulatory system |
| UV | = | Ultraviolet |
| Vol | = | Volume |
| X-gal | = | 5-bromo-4-chloro-3-indolyl-beta-D-galactopyranoside |

LIST OF ABBREVIATIONS

| | | |
|-------------------|---|--|
| ACC | = | 1-Aminocyclopropane-1-carboxylic acid |
| bp | = | Base pair |
| CTR | = | Constitutive triple response |
| dH ₂ O | = | Distilled water |
| DEPC | = | Diethylpyrocarbonate |
| DIG-11-UTP | = | Digoxigenin-11-uridine-5'-triphosphate |
| DNA | = | Deoxyribonucleic acid |
| EDTA | = | Ethylenediaminetetraacetic acid |
| EIN | = | Ethylene insensitive |
| ETR | = | Ethylene triple response |
| ERS | = | Ethylene responsive sensor |
| ERF | = | Ethylene responsive factor |
| g | = | Gram |
| h | = | Hour |
| IPTG | = | isopropyl-beta-D-thiogalactopyranoside |
| JA | = | Jasmonic acid |
| LB | = | Luria bertani broth |
| LBA | = | Luria bertani agar |
| mg | = | Milligram |
| ml | = | Millilitre |
| MAPK | = | Mitogen activated protein kinase |
| nt | = | Nucleotide (s) |
| OD | = | Optical density |
| PCR | = | Polymerase chain reaction |
| RNA | = | Ribonucleic acid |
| rpm | = | Revolutions per minute |
| RT | = | Room temperature |
| SA | = | Salicylic acid |
| SDS | = | Sodium dodecyl sulphate |