DIFFERENTIAL GENE EXPRESSION IN RESPONSE TO
XANTHOMONAS AXONOPODIS PV. GLYCINES IN SOYBEAN
USING OLIGONUCLEOTIDE MACROARRAY

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Abstract

Bacterial leaf pustule (BLP) caused by Xanthomonas axonopodis pv. glycines (Xag) is
one of soybean (Glycine max (L) Merr.) disease commonly occurred in Korea and the southern
United States where hot and humid weather conditions. Typical and early symptoms of the
disease were small yellow-to-brown lesions with a raised pustule and these developed into large
necrotic lesions, leading substantial loss of yield by premature defoliation. A single recessive
gene, Rcp, controlled the BLP resistance and mapped on linkage group (LG) D2 and/or LG H.
Intensity of symptoms responses to Xag could be different depending on the number of
inoculum, growth conditions and genotypes. After PI 96188 was infected by Xag, only pustules
without chlorotic haloes were observed. This novel symptom was one of resistant responses
instead of hypersensitive response. The genes including Rcp or pathway for responses to Xag
infection was not characterized at molecular level. Interaction between plants and pathogen at
transcriptional level is a major step for understanding plant defense responses against pathogen.
To identify differentially expressed genes before and 24 hr after Xag inoculation in PI 96188
showing novel symptom to BLP and BLP-resistant SS2-2, oligonucleotide macroarray was
constructed with 100 genes mainly related to disease resistance and metabolism from soybean
and Arabidopsis. After total RNAs were isolated using TRIZOL reagent with soybean leaves
harvested before and 24 hr after Xag inoculation, oligonucleotide macroarray experiments were
performed with three replicates and dye swamping. 50 and 85 genes showed significant
difference in expression between 0 hr and 24 hr in PI 96188 and SS2-2, respectively.
Quantitative real-time RT-PCR was also performed with selective genes for validating
macroarray results with Tubulin and Jangyeobkong (BLP-susceptible) as a control and 10 genes,
showing up-/down-regulation in PI 96188 and SS2-2 simultaneously, were selected. Generally,
oligonucleotide macroarray data and quantitative real-time RT-PCR were matched, indicating
confidence in oligonucleotide macroarray experiments.

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