1-21. Characterization of Pathogenesis and Plant Defence-related Genes Against *Potato virus X* infection empolying *Potato X virus* expresssin vector

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Differential display (DD) of mRNA is a technique in which mRNA species expressed by a cell population are reverse transcribed and then amplified by many separate polymerase chain reactions (PCR). Using DD-RT-PCR we obtained many genes that expressed differentially in healthy and PVX-infected *Nicotiana benthamiana*, using total RNAs extracted from healthy and PVX-infected *N. benthamiana* plants. Three hundred and twenty-five DNA fragments isolated from DD-RT-PCR were cloned and sequenced for further characterization. Several host genes including SKP1-like protein, heat shock transcription factor and Avr9/Cf-9 rapidly elicited protein were selected to obtain full-length open reading frame and to characterize their potential involvement in virus disease development and/or host's defense against virus infection employing PVX-based expression vector. Transcrips from wild-type and clones containing each selected gene were inoculated onto *N. benthamiana*. Levels of virus replication were confirmedby RT-PCR and RNA blot analysis. Expression profiles and potential role(s) of selected genes upon PVX infection will be discussed.

1-22. Altered Invertase expression induced by BCTV on Arabidopsis

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Arabidopsis infected with beet curly top virus (BCTV) has the systemic symptoms like stunting of plant growth, curling of leaves and shoot tips, and callus induction. The regulation of sucrose metabolism by BCTV infection is essential for obtaining the energy source in the process of virus replication and symptom development. Sucrose metabolism-associated gene expression and biochemical enzyme activity were analyzed with the rossette leaves and inflorescencestems of BCTV infected Arabidopsis by the time course of 1, 7, 14, 21 day postinoculation. The expression of invertase and sucrose synthase genes (encoding sucrose-cleaving enzymes)was increased and reversely the level of *Atkin10a* (sucrose non-fermenting gene) was decreased, resulting by semi-quantitative reverse transcription polymerase chain reaction. The biochemical analysis of invertase and sucrose synthase activity was performed. The activity of neutral invertase in the inflorescence stems was elevated remarkably. The photosynthetic response in the source of sucrose metabolism was consistent with the down-regulation of ribulose 1,5 bisphosphate carboxylase gene, and lower activity than mock-inoculated plants. The levels of genes pertaining to the cell cycle, hormone, and biotic stress-related pathway showed an increase or a decrease dependent on viral symptoms. Therefore, sucrose sensing by BCTV infection can regulate the expression of sucrose metabolism-related key enzymes such as invertase and *Atkin10a*, and these gene products might influence to symptom development.