



Salicylic acid-induced changes in physiological parameters and genes of the flavonoid biosynthesis pathway in *Artemisia vulgaris* and *Dendranthema nankingense* during aphid feeding

Y. Sun*, X.L. Xia*, J.F. Jiang, S.M. Chen, F.D. Chen and G.S. Lv

College of Horticulture, Nanjing Agricultural University, Weigang, Nanjing, China

*These authors contributed equally to this study.

Corresponding author: F.D. Chen

E-mail: chenfd@njau.edu.cn

Genet. Mol. Res. 15 (1): gmr.15017546

Received August 28, 2015

Accepted November 6, 2015

Published February 19, 2016

DOI <http://dx.doi.org/10.4238/gmr.15017546>

ABSTRACT. Phloem-feeding aphids cause serious damage to plants. The mechanisms of plant-aphid interactions are only partially understood and involve multiple pathways, including phytohormones. In order to investigate whether salicylic acid (SA) is involved and how it plays a part in the defense response to the aphid *Macrosiphoniella sanbourni*, physiological changes and gene expression profiles in response to aphid inoculation with or without SA pretreatment were compared between the aphid-resistant *Artemisia vulgaris* 'Variegata' and the susceptible chrysanthemum, *Dendranthema nankingense*. Changes in levels of reactive oxygen species, malondialdehyde (MDA), and flavonoids, and in the expression of genes involved in flavonoid biosynthesis, including *PAL* (phenylalanine ammonia-lyase), *CHS* (chalcone synthase), *CHI* (chalcone isomerase), *F3H* (flavanone 3-hydroxylase), *F3'H* (flavanone

3'-hydroxylase), and *DFR* (dihydroflavonol reductase), were investigated. Levels of hydrogen peroxide, superoxide anions, MDA, and flavonoids, and their related gene expression, increased after aphid infestation and SA pretreatment followed by aphid infestation; the aphid-resistant *A. vulgaris* exhibited a more rapid response than the aphid-susceptible *D. nankingense* to SA treatment and aphid infestation. Taken together, our results suggest that SA could be used to increase aphid resistance in the chrysanthemum.

Key words: Aphid; Chrysanthemum; Flavonoid; Physiology; Salicylic acid