

## DIFFERENTIALLY EXPRESSED GENES IN GRAPEVINE LEAVES EXPOSED TO SUB-DOSES OF 2,4-D

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**Destaque:** Sub-doses of 2,4-D in grapevine induce the expression of genes involved hormone transport, chemical homeostasis and regulation of signal transduction.

**Resumo:** Grapevine injury caused by off-target movement of the synthetic auxin herbicide 2,4-dichlorophenoxyacetic acid (2,4-D) has been a concern for grape growers in southern Brazil. Grapevines are highly sensitive to 2,4-D, however, the ability to assess and prevent damage by 2,4-D drift in vineyards remains limited to visual symptoms, making it problematic to identify the drift source and to avoid future incidents. In this work, RNA-Seq was used to identify differentially expressed genes (DGEs) in grapevine leaves within 24 h of exposure to sub-doses of 2,4-D. One year-old potted 'Cabernet Sauvignon' plants were arranged on a randomized complete block design in the field, and three months after planting the sub-doses were applied (0.05, 0.5, and 5% of the recommended use doses of 2,4-D dimethylamine salt) in three replicates. Leaf tissue was sampled at five and 24 h after treatment (HAT). The abundance of DGEs increased in a dose-dependent manner for both sampling times: After five HAT, the number of DGEs were 15, 137, and 1252, and after 24 HAT it changed to 8, 349, and 4113. Further analysis revealed that the up-regulation of some genes clearly increased in a dose-response manner: (1) one gene from cytochrome P450 734A1 subfamily with monooxygenase activity, involved in the regulation of hormone levels, lipid homeostasis, and phytosterol metabolic process; (2) an auxin-responsive protein IAA17; and (3) an auxin efflux carrier component 1, which is involved in the hormone transport, hormone-mediated signaling pathway, chemical homeostasis, and regulation of signal transduction. This suggests that the response of grapevines to sub-doses of 2,4-D is strongly related to hormone levels and signal transduction pathway. This study provides novel insights into the molecular response of grapevines to sub-doses of 2,4-D, which will be valuable for the next steps of our project on finding a molecular marker for the presence of 2,4-D in grapevine leaves.

**Palavras-chave:** Grapevine; 2,4-D; Drift; RNAseq

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