

Transcriptomic and physiological responses of *Diplotaxis tenuifolia* under heat stress

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Climate change is going to be one of the biggest challenges for the agricultural sector in the future. One of the most important changes is related to the increase of temperature that could affect crop performance inducing heat stress. This represents a severe condition for the crops, affecting the plant growth and quality. For these reasons, it has been largely investigated.

Plants respond to heat stress in different ways, showing physiological alteration, morphological symptoms, and effects on secondary metabolism. These alterations can be seen also at cellular and molecular levels, as the alteration of cell and organelle and with the regulation of many genes involved in multiple regulatory pathways.

The objective of the work is to deepen the knowledge about *Diplotaxis tenuifolia* response mechanisms to heat stress. Plants were cultivated in a growth chamber under controlled conditions (24 °C), and for the heat stress, the temperature has been increased to 37° C for 4 hours/day, for 4 days. For each condition (stressed vs control), plant material has been sampled for physiological and molecular analyses. Several physiological parameters have been analyzed, including chlorophyll *a* fluorescence and pigments content, nitrate concentration and sugars content. Also, RNA-sequencing has been performed to underline molecular changes induced by high temperature. Chlorophyll fluorescence and physiological assays results confirmed the effect of the heat stress: a reduction of chlorophyll content and leaf functionality were observed. Sugars and nitrate content also show alteration due to heat stress.

The transcriptomic profiling confirmed the heat stress effects on rocket plants, showing the different regulation of the metabolic and physiological pathways in the two conditions (control vs. heat).

These data allowed a deeper understanding of the physiological and transcriptional mechanisms induced by heat stress in rocket and represent a useful basis for further studies.