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Original Articles

# Ultrasound irradiation effect on photosynthesis and transpiration of aquatic lirium plants

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## **Abstract**

# **Purpose**

To find possible causes of the photobaric response decrease in photoacoustic measurements on Aquatic Lirium plants after ultrasonic irradiations reported elsewhere contributing to understanding the effect of ultrasonic irradiation on them and searching for environmentally friendly methodologies to control this weed.

## **Materials and Methods**

The plants were extracted from their natural habitat in Xochimilco water canals, Mexico City. The irradiations on the plants were carried out to 2 hours exposure time, 17 kHz frequency, and 30 W x 4 output power. We used the photoacoustic spectroscopy technique at room temperature in the range of 400–750 nm to analyze the optical absorption response of photosynthetic pigments before and after ultrasonic irradiations. To monitor the leave transpiration rate, we used an LI-COR 6400XT portable system, expressed in units of mols  $H_2O$  per second per unit area of the leaf surface.

# **Results**

We obtained a significant decrease of the chlorophylls bands amplitude in the photoacoustic spectroscopy spectra and a drastic reduction in the leaves

transpiration rate of irradiated plants that depends on the time elapsed after irradiation. Remarkable physical changes in the leaves and petioles of the irradiated plants were observed with the naked eye.

# **Conclusions**

A significantly decreasing photosynthesis and transpiration in the leaves of the irradiated lirium plants were obtained. Together with the observed physical changes in the leaves and petioles, these results suggest an alteration in the water transport and the overall gas exchange mechanisms affecting the irradiated leaves' transpiration and photosynthesis processes that agree with the photobaric response decrease reported elsewhere. Due to the fundamental role of stomata in these mechanisms, it is suggested, as a possible cause, that the ultrasonic-induced disruption of stomata's mechanical operation by guard cells prevents them from performing their function normally. A hypothesis to be confirmed in future studies, for which a line of action is proposed.

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## Disclosure statement

<sup>\*</sup> Local tax will be added as applicable

The authors declare that there is no conflict of interest.

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