LIGHT-INDUCED CHANGES IN STEM CIRCUMNUTATIONS AND ELECTRICAL POTENTIAL IN HELIANTHUS ANNUUS L.

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Plant organ movements arise as a result of irreversible (growth) or reversible (turgor) cell volume changes. To generate stem nutations – autonomic growth movement – ultradian oscillator and electrical changes are required. An important environmental factor – light – affects growth as well as the biological clock and electrical potential changes.

We investigated the effects of a 16/8h light/dark period on stem circumnutations and electrical activity in three-week-old sunflowers. Extracellular measurements of electrical activity (recorded by Ag/AgCl electrodes) and time-lapse images from a top view camera were registered and analyzed. The plant apex position relative to geographic directions and solar time were taken into consideration, so that an objective method for the calculation of circumnutation parameters (length, shape, angle and direction) could be used. In the laboratory, the light was turned on at 4 a.m. and off at 8 p.m.. Both circumnutation parameters and electrical potential showed diurnal rhythm. “Light-off” initiated a new circumnutation or an increase in the length of a circumnutation which had already existed and simultaneously induced transient electrical depolarization. “Light-on” evoked a transient electrical hyperpolarization and a decrease in circumnutation length. It often altered the direction of circumnutations, and their angle and shape.

This results suggest that a light perception mechanism accompanied by electrical potential changes is involved in circumnutation mechanism.

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