

Israelsson, D. and A. Johnsson. 1969. Phase-shift in Geotropic Oscillations a Theoretical and Experimental Study. *Physiologia Plantarum*. 22: 1226-1237.

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The paper studies geotropical induced phase-shifts in circumnutations (turning) of *Helianthus annuus hypocotyls*. Theory based on previous work suggest short gravitational stimulation in different phase positions of an oscillating hypocotyl. Experimental studies are performed to test the theoretical studies.

Abstract: Geotropically induced phase-shifts in circumnutations of *Helianthus annuus hypocotyls* are studied. - Theoretical deductions from a previously developed theory for geotropical movements are made for the case of a short gravitational stimulation in different phase positions of an oscillating hypocotyl. - Experimental studies are performed to test the theoretical results. - The conclusions are drawn, that the theory mentioned can satisfactorily describe geotropically induced phase-shifts. A comparison with phase-shifts in photoperiodic systems is made.

Keywords: circumnutation, plant, turning, delay, differential equation, model, oscillation, first order