

**Abstract:**

The purpose of this investigation was to provide growers of sunflowers, *Helianthus annuus*, with clarifying information about the photoperiodic control of flowering in two varieties (Double Dandy and Elf). Sunflowers are important crops, for both flower production and for their seeds, which are used for agricultural purposes. Research into circadian rhythms and flowering in this species is not clear. Plants have been reported to be long-day (short night), short-day (long night), or day neutral, and agreement does not exist among researchers. In order to explore this mechanism, we grew replicates of these two varieties at two controlled photoperiods (8 hr light and 16 hr light) in plant growth chambers. A third set of replicates was grown in a greenhouse, under typical summer conditions. Plants were measured weekly for about nine weeks. Each plant was assessed for stem height and diameter, leaf color and number, and the timing and number of flower buds and flowers. Results indicate that plants of both varieties grown in the greenhouse were taller with larger stem diameters, and appeared to be very healthy compared to those plants exposed to photoperiodic control in growth chambers. The two varieties differ in photoperiod control of flowering, with Elf displaying long-day (short night)/day neutral characteristics, while Double Dandy flowered only when exposed to a photoperiod that was shorter than 12-13 hours, indicating that it is a short-day (long night) variety.