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Ornamental Gingers as Flowering Potted Plants – Part 3
Photoperiod on Growth and Development

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BACKGROUND

To control the growth, development and flowering of gingers, it is necessary to understand the effects of photoperiod on vegetative and reproductive growth. In general, gingers become dormant in winter in response to short days (#12 hours) and low temperatures. The objectives of this experiment were to study the effects of photoperiod on plant growth and development of *Curcuma alismatifolia* 'Siam Tulip White' , *C. cordata*, *C. petiolata* 'Emperor', *C. thorelii* 'Chiang Mai Dwarf', *Kaempferia* sp. 'Grande', *S. decora*, and *Siphonichilus kirkii*.

MATERIALS & METHODS

Tissue-cultured plants of *C. petiolata* 'Emperor', *C. thorelii* and *K.* sp. 'Grande' *S. decora*, *S. kirkii* and a *C. cordata* were planted one per 6-inch container and placed in a greenhouse with temperature set points of 80°F day/70°F night.. Rhizomes of *Curcuma alismatifolia* 'Siam Tulip White' (rhizomes had no t-roots) were also planted one per container. All plants were fertigated with Peters 24-8-16 Tropical Foliage. Photoperiod treatments were 8, 12, 16, and 20 hours. Plants received 8 hours of natural light from 0900 to 1700. The light source for the extended photoperiod was provided by 100 watt incandescent light bulbs at an irradiance of 11 $\mu mol \bullet m^{-2} \bullet s^{-1}$ (50 fc) at plant height.

RESULTS

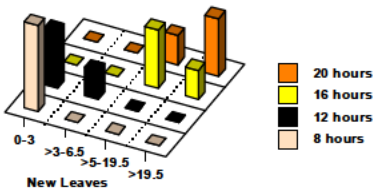
All plants became "dormant" when grown under the 8 hour photoperiod, except *S. decora*. The number of weeks required for plants to become "dormant" under the 8 hour photoperiod was 12 weeks for *C. alismatifolia*, 9 weeks for *C. cordata*, 15 weeks for *C. petiolata* 'Emperor', 11.6 weeks for *C. thorelii*, 12 weeks for *K.* sp. 'Grande', and 15.6 weeks for *S. kirkii*.

After 61 days of treatment plants grown under 20 and 16-hour photoperiods were taller than those grown under 12 or 8-hour photoperiods. Plant height of *C. alismatifolia*, *C. petiolata*, *C. thorelli* and *S. decora* grown at 20 hour was taller than those plants grown at 8 h.

***C. petiolata*. From left to right; 20, 16, 12 and 8 hours of light.**

After 90 days all gingers grown at 20 hour were taller than those grown at 8 hour *K.* sp. 'Grande', *C. cordata* and *C. thorelli* extend "dormancy" under the 8 hour photoperiod.

Photoperiod affected the number of unfolded leaves of all plants, except for *C. thorelii* . Sixteen and 20-hour photoperiods increased the number of leaves unfolded compared to 12 and 8 hour. For example, *C. alismatifolia* grown at 8 and 12-hour photoperiods unfolded 0-2 leaves (84 and 72% of plants grown under each photoperiod respectively) during the 18 week study. Sixty percent of the plants grown at a 16 hour photoperiod unfolded >4-8 leaves; 43% of those grown at 20 hour photoperiod unfolded >4-8 leaves and 48% unfolded more than 8 leaves.



Number of unfolded leaves for *C. petiolata* grown under 8, 16, 12, and 20 hour of light.

The effects of photoperiod on fresh weight of underground storage organs, number of rhizomes, and number of t-roots was dependent upon the ginger species. More t-roots were produced when grown under 8 or 12 hour than 20 or 16-hour photoperiods. There were 1.5 more for *C. alismatifolia* 'Siam Tulip White', 5.9 more for *C. cordata*, 5.7 more for *C. petiolata*, 8.3 more for *K.* sp. 'Grande' and one more for *S. kirkii*. The exception was *C. thorelii*, where more t-roots were produced on the plants growing at 20 or 16-hour photoperiod than the 12 or 8 hour photoperiod. *Siphonichilus decora* did not produce t-roots under the 4 photoperiods used in this study. *Curcuma alismatifolia* 'Siam Tulip White' (1.3 more rhizomes), *C. cordata* (1.1 more rhizomes) and *C. petiolata* (2 more rhizomes) produced more rhizomes under the long day photoperiods (20 and 16 hour) than under 12 and 8 hour photoperiod.

Underground storage organs of *C. petiolata*.

CONCLUSIONS

Vegetative growth of most of the ornamental ginger species used in this study was optimized when plants were grown under 16 and 20-hour photoperiods. An 8-hour photoperiod promoted "dormancy" but increased the number of t-roots for most species. These results are in agreement with studies which reported that vegetative growth of *C. alismatifolia* was maintained by long days and "dormancy" was induced by short days. There was some variation in response to photoperiod by species of ginger. E.g., *C. thorelii.* Therefore, the effect of photoperiod on vegetative shoot growth and development of underground storage organs is not the same for all ginger species.

IMPACT TO THE INDUSTRY

1. All genera and species of ginger in this study became "dormant" under the 8-hour photoperiod.
2. Vegetative growth was maintained under a 16 and 20-hour photoperiods.
3. Both above ground and below ground plant growth varied according to genera and species of the ginger used.

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