

TEMPERATURE EFFECTS *SCHLUMBERGERA TRUNCATA* 'MADISTO' FLOWER INITIATION

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Abstract

Schlumbergera truncata 'Madisto' plants were grown under 19 different day/night temperature (DT/NT) environments ranging from 10°C to 30°C with a 9 hour photoperiod. Time from initiation of SD to anthesis varied from 50 days in the 20°C DT/ 25°C NT environment to 99 days in the 10°C DT/ 15°C NT environment. Flower initiation did not occur when plants were grown under the following DT/NT temperature environments, 10°/30°C, 30°/10°C, 25°/25°C, and 30°/30°C. Instead, only phylloclades developed. Plants grown in other environments had only flowers or both flowers and phylloclades. An optimal temperature for flower initiation, based on the ratio of flowers to phylloclades, existed at 20°C. Phylloclade number increased as DT increased and as DT increased relative to NT. Phylloclade number was greatest in the 30°C DT/10°C NT environment.

1. Introduction

Schlumbergera truncata Haw. plants are induced to flower by placing plants under short days (Roberts and Struckmeyer, 1939). Flower initiation is often incomplete, i.e. both flowers and phylloclades develop.

One environmental factor which influences *Schlumbergera truncata* flower initiation is temperature. (Rünger and Führer, 1981). Roberts and Struckmeyer (1939) reported that flower initiation was inhibited under short days (SD) when day and night temperature exceeded 21-24°C, was promoted by SD between 17-18°C, and occurred under SD or long days (LD) at 13°C. Rünger and Führer (1981) reported that the higher the temperature, the shorter the photoperiod necessary to induce flowering. At 30°C, an 8-9 hour photoperiod was required to induce flowering. Yonemura (1979) determined the critical photoperiod for flower induction was 12 hr at 18-20°C.

Incomplete flower initiation, i.e. simultaneous development of phylloclades and flowers, is probably due to nonoptimal photoperiod/temperature conditions for maximal floral induction. The objective of the research presented in this paper was to determine the relationship between temperature and the degree of *Schlumbergera truncata* flower initiation under a 9 hr photoperiod.

2. Materials and Methods

Three *Schlumbergera truncata* Haw. 'Madisto' plants per 10.2 cm plastic pot were grown in a glasshouse with a 20° ±2°C air temperature. Eighty pots were selected for plant uniformity, plants were pinched to 3 phylloclades (leveled), and pots were then moved to glasshouses with temperature setpoints of 10, 15, 20, and 25°C. Plants were moved among glasshouses at 0800 and 1700 hr each day to yield a total of 16 day/night (DT/NT) temperature combinations. In addition to the 16 DT/NT combinations, plants were placed in 10°/10°C, 10°/30°, 30°/10°C, and

30°/30°C DT/NT environments. Each temperature treatment had 5 replicates.

Movement of plants required approximately 15 minutes. An opaque curtain was pulled over the plants after they were moved at 1700 hr and was retracted prior to 0800 hr to provide a 15 hr scotoperiod (9 hr photoperiod) paralleling the NT treatment.

Date of anthesis, flower number, and phylloclade number were collected at anthesis on each pot. Data were statistically analyzed as a 4 x 4 factorial model with DT and NT as the main factors.

3. Results and Discussion

The time from induction (start of SD) to anthesis decreased nonlinearly from 100 to 52 days as the average daily temperature increased from 12°C to 20°C (Figure 1). Increasing ADT above 20°C did not hasten flowering.

Flower initiation did not occur when both DT and NT were warmer than 25°C. These results contrast research by Rüniger and Führer (1981) which showed that flower initiation occurred at 30°C with an 8-9 hr photoperiod. Poole (1973) also showed that flowering could occur at temperatures above 23°C. Differences between this experiment and that of Rüniger and Führer (1981) and Poole (1979) may be due to differences in the sensitivity of different cultivars to temperature and/or photoperiod.

Night temperature (NT) affected the degree of flower initiation. Day temperature (DT) had no significant effect on the degree of flower initiation. The optimal NT range for flower initiation, based on the ratio of flowers to phylloclades, was from 15 to 20°C (Figure 2). As NT increased above 20°C or decreased below 15°C, flower number decreased and/or phylloclade number increased. These data agree with research of Yonemura (1979) who suggested that the optimal temperature for flower initiation was 15-20°C when plants were grown with a 12 hr photoperiod; no distinction between day and night temperature was made. Similarly, Rüniger and Führer (1981) suggested that the optimal temperature for flower initiation was 15°C during the first week then increased to 18°C during the second week of induction.

Total break and phylloclade number per pot increased as DT increased (Tables 1 and 2). For instance, phylloclade number increased from 1.8 to 33.0 phylloclades per pot as DT increased from 10 to 30°C with a 10°C NT. Phylloclade number per pot was also greater when the DT was greater than the NT with DT over 25°C. For instance, phylloclade number was lower when plants were grown with a 30°C DT/30°C NT environment (19.4 phylloclades per pot) than when plants were grown with a 30°C DT/10°C NT environment (33.0 phylloclades per pot). The effect of DT on phylloclade number is in agreement with research by Rüniger (1979) which determined that phylloclade number increased with temperature up to 30°C.

4. Acknowledgement

The authors appreciate the technical assistance of Joy Hind, Wendy Cole, Mark Smith, and Martin Stockton. Plants were donated by Post Gardens of Battle Creek, Battle Creek, Michigan.

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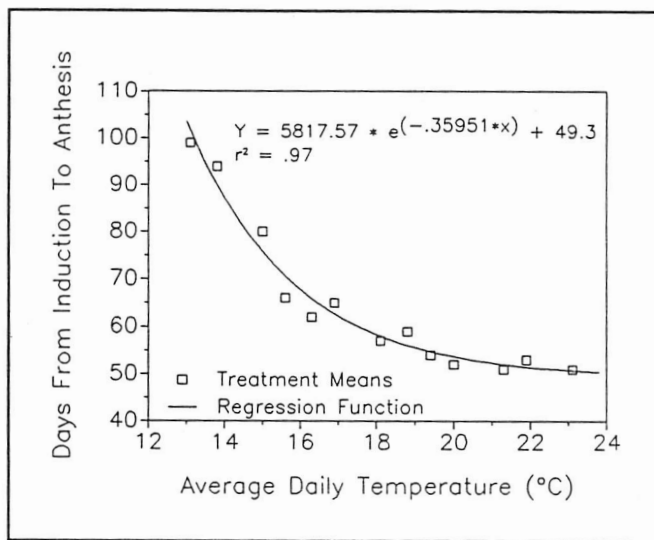


Figure 1. The effect of average daily temperature on the time from flower induction to anthesis on Schlumbergera truncata 'Madisto'.

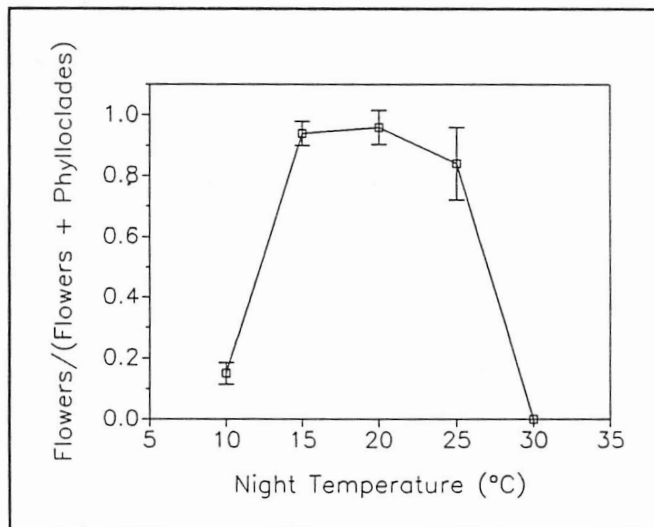


Figure 2. The effect of night temperature on the ratio of flowers to flowers plus phylloclades on Schlumbergera truncata 'Madisto'.

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Table 1. The effect of day and night temperature on total break number per pot of *Schlumbergera truncata* cv 'Madisto'.

Night Temperature (°C)	Day Temperature (°C)				
	10	15	20	25	30
10	2.4 ^z	11.0	18.6	19.4	33.0
15	6.6	8.8	11.5	13.2	-
20	10.2	11.8	13.4	12.4	-
25	9.8	9.6	10.8	19.6	-
30	4.6	-	-	-	19.4

Significance

Day Temperature
 Linear ***^y
 Quadratic n.s.

Night Temperature
 Linear n.s.
 Quadratic n.s.

^z Numerals represent treatment means.

^y Significant at P = 0.001 (***); not significant (n.s.).

Table 2. The effect of day and night temperature on phylloclade number per pot of *Schlumbergera truncata* cv 'Madisto'.

Night Temperature (°C)	Day Temperature (°C)				
	10	15	20	25	30
10	1.8 ^z	11.0	15.2	17.0	33.0
15	0.7	0.8	0.5	0.0	-
20	0.2	0.0	0.0	1.1	-
25	1.0	0.8	3.2	18.2	-
30	4.6	-	-	-	19.4

Significance

Day Temperature
 Linear ***^y
 Quadratic n.s.

Night Temperature
 Linear n.s.
 Quadratic n.s.

^z Numerals represent treatment means.

^y Significant at P = 0.001 (***); not significant (n.s.).