

# Low Temperatures Affect Chrysanthemum Flowering

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Serious losses have been reported by many outdoor chrysanthemum growers due to low night temperatures during the first two weeks of short days. The nature of their problems appeared to be delays in the flowering schedule and changes in the types of sprays. Commercially, chrysanthemum growers would like to harvest a crop within a week of its schedule. Therefore, any delay greater than a week may present the grower with a financial loss.

Two experiments were set up in the spring of 1957 and repeated in the fall of the same year to determine the effects of low temperatures, (35° to 60°F at 5 degree intervals) on the bud initiation and the delay in development of the flowers. In the second experiment the types of sprays formed under low temperatures and the delay in their development were studied.

The varieties used in the first experiment were Shasta, Shamrock, Forty Niner and Golden Chord. The durations of the low temperatures were 5, 10 and 15 dark periods; the day temperature was 70°F. Prior to the treatments the plants were under long days until they were well established and after the treatments they were grown under short days until flowering.

In the second experiment the varieties used were Shasta, Gold Coast and Shamrock. All treatments received 10 short days at 60°F night temperature, followed by 10 short days at night temperatures 35, 40, 45, 50 and 60°F; at temperatures 35, 50 and 60°F there were corresponding treatments under long days. The plants were then grown under continuous short days at 60°F night temperatures until flowering. Observations were made on the pedicel lengths to evaluate the sprays formed, as well as the date of flowering to determine the extent of delay.

Prolonged durations (10 to 15 nights) of low night

temperatures (35 to 55°F) during the beginning of short days showed a gradual increase in stem length and number of mature leaves, with the decreasing temperatures. Multiple crowns were formed at 40°F for 15 nights in all varieties studied except Shasta. The average number of flowers developed did not show any appreciable difference with low temperatures. The delay in flower development appeared to be considerable with decreasing temperatures and increasing duration of low temperature (Fig. 1, Table 1). The maximum delay occurred around 40°F. This was consistent with all varieties studied. It may be suggested here that 40°F is a critical temperature in the flowering of chrysanthemums. The delay in flower development of varieties sensitive to low temperatures (e.g. Forty Niner and Golden Chord), was found to be considerably greater than varieties in other temperature response groups. There was evidence that flower initiation did not take place under short days and low temperatures. It is clear that a drop in temperature of 5 degrees F (60 to 55°F) during the first 15 short days may delay the flowering schedule from one to two weeks (Fig. 1). However, it may be possible to decrease the delay by maintaining long day conditions during the low temperature period. As a result of having long days the delay in schedule would be approximately equivalent to the number of long days maintained.

It was also determined that flower initiation is fastest at 60°F among all other temperatures used (60 to 35°F).

When low temperature occurred immediately preceding short days or during the flower development period (after 10 short days), the delay in schedule was not critical. The effect of low temperature during flower development on the spray formation was shown by increased pedicel length and formation of crown sprays.

**Table 1** Effect of temperature during vegetative and photoinductive periods on the time of flower development of two varieties of chrysanthemums. (Average of six plants per treatment).

Variety	Temperature Duration (No. of nights)	Number of Days Delay Night Temperatures (Degrees F.) During								
		Long Photoperiods			Short Photoperiods					
		***60°	50°	35°	***60°	55°	50°	45°	40°	35°
Shasta	5	*71	5	7	74	1	0	2	7	11
	10	74	1	6	74	5	7	11	18	17
	15	73	0	3	74	7	14	23	28	23
Forty Niner	5	80	-2	1	75	10	8	14	15	16
	10	75	5	12	75	16	17	17	29	43
	15	84	-7	10	75	12	22	*28	**	49

\*Number of days from the beginning of photoperiodic induction until salable.

\*\*Plants formed "multiple crowns".

\*\*\*60°F is considered the standard or check.

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Chrysanthemum Flowering (continued from page 2)

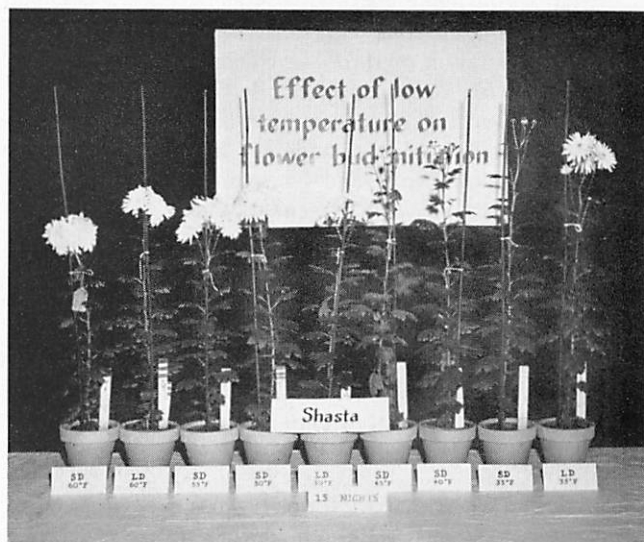
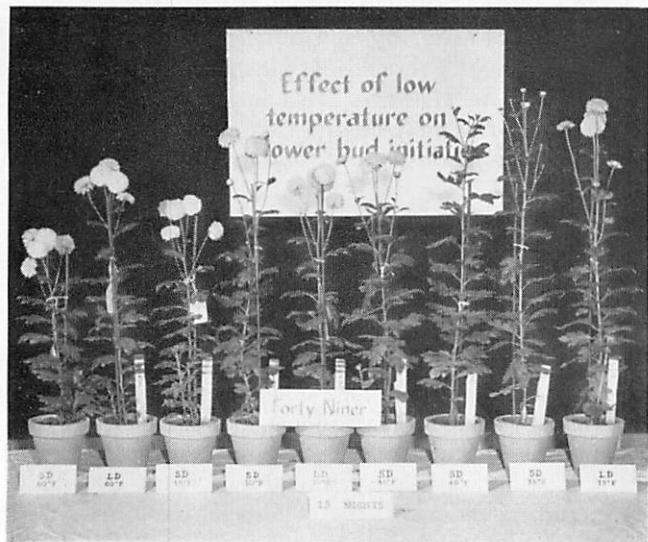


Figure 1. The effect of 15 nights of low temperatures (60° to 35°) given at the start of short days on the flowering of the Chrysanthemum varieties Shasta and Forty Niner. (SD—short days, LD—long days)