Day Length & Temperature Affect Initiation & Flowering of Snapdragons

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In the past few years reports have been published (N.Y.S.F.G. Bul. 145) on how factors such as light and temperature can be used to hasten the maturity of snapdragons. These reports gave an indication of a period or stage in the growth of a snapdragon that was most responsive to treatment with little or no effect on the final flower quality. However, these reports did not consider the combined effects of daylength and temperature; nor was there any significant uniformity in observations or collection of data that would allow a possible identification of the period or periods most responsive to these treatments. Because of this an experiment was designed to observe the effect of both daylength and temperature on the various stages of flowering. The stages considered were flower bud initiation (observed microscopically), first visible bud, first floret opening and harvest.

The following procedure was used in this experiment. Seeds of the variety Jackpot were sown at about 2 week intervals (January 5, 1959, January 15, 1959, February 2, 1959, February 13, 1959 and February 27, 1959) for 5 sowings and germinated under mist at 60° F nights. When the seeds had germinated (cotyledons just starting to unfold) the seed pans were placed in greenhouse compartments at constant temperatures of 40, 50, 60 and 70° F and under daylengths of 9 (short day) and 18 hour (long day). The 9 hour day was obtained with 9 hours of natural light and 15 hours under black cloth. The 18 hour day was obtained by 9 hours of natural light plus 9 hours of artificial light (incandescent at 10-25 f.c.). When the seedlings reached the 4-6 leaf stage they were pricked into 3″ plastic pots and on reaching approximately the 8 leaf stage stem tips were taken every 5 days to determine flower bud initiation using a microscopic technique. In addition to the four stages mentioned above observations were made on stem length, spike length, number of florets, weight and leaf number.

This work showed that flower bud initiation responds to photoperiod. There was an indication that the subsequent stages of flowering (first visible bud, first floret opening and harvest) did not respond to photoperiod but further work must be done to substandate this point. In Table 1 it may be seen that the number of days from germination to harvest was greater at the 9 hour daylength than the 18 hour daylength. In this same table it

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Table 1—The effect of daylength and temperature on the average* number of days from germination to harvest, number of leaves, stem length, spike length, number of florets and weight on the snapdragon variety Jackpot.

Temperature	Number of Days from germination to harvest		Number of Leaves		Stem Length (Inches)		Spike Length (Inches)		Number of Florets		Weight (oz.)	
°F	9 hr.	18 hr.	9 hr.	18 hr.	9 hr.	18 hr.	9 hr.	18 hr.	9 hr.	18 hr.	9 hr.	18 hr.
70	105	78	18	40	27.8	17.7	7.7	4.0	24.9	8.8	1.3	.4
60	124	96	17	37	29.4	24.9	7.5	8.1	24.1	14.5	1.5	.8
50	134	112	17	33	32.7	33.3	8.0	12.8	24.2	22.2	1.6	1.4
40	143	124	19	37	32.1	32.2	6.1	10.4	19.6	20.2	1.2	.9

*Average of the first 3 sowings (Jan. 5, Jan. 19, and Feb. 2).

may be seen that when the temperature was increased from 40 to 70° F the number of days from germination to harvest decreases.

The number of leaves formed prior to flower buds was observed to respond to photoperiod. Temperature had little or no effect on leaf number over the range from 40 to 70° F as may be seen in Table 1. Decreasing the daylength from 18 to 9 hours approximately doubled the number of leaves formed.

Visual effects of the two daylengths and the four temperatures were discernible shortly after the treatment began. As would be expected, the seedlings at the warmest temperature developed fastest. Those at the 18 hour daylength were larger than those at 9 hour daylength and in general had developed one more pair of leaves at any given seedling observation. These features may be seen in figure 1 which shows the differences at 60° F just before pricking and the over all contrast between treatments may be seen in figures 2 and 3. This series of plants shows the differences when the 70° long day (18 hours) treatment was ready to harvest.

The effects of the two daylengths and the four temperatures on what may be termed harvest observations are shown in Table 1. Here it may be seen that 9 hour daylength (short day) affect flower quality very little over the range from 50-70° F. Whereas under the 18 hour daylength (long days) increases in the temperature from 50-70° F decreased flower quality. In general the 9 hour day-

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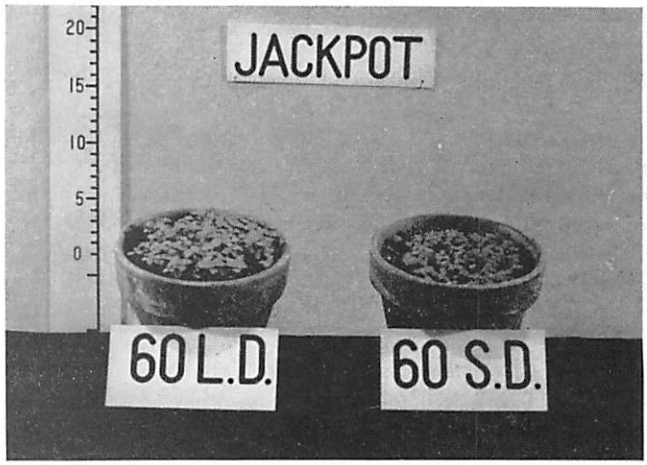

Figure 1. The effect of 18 hours (L.D.) and 9 hours (S.D.) on the growth of snapdragon seedlings variety Jackpot.

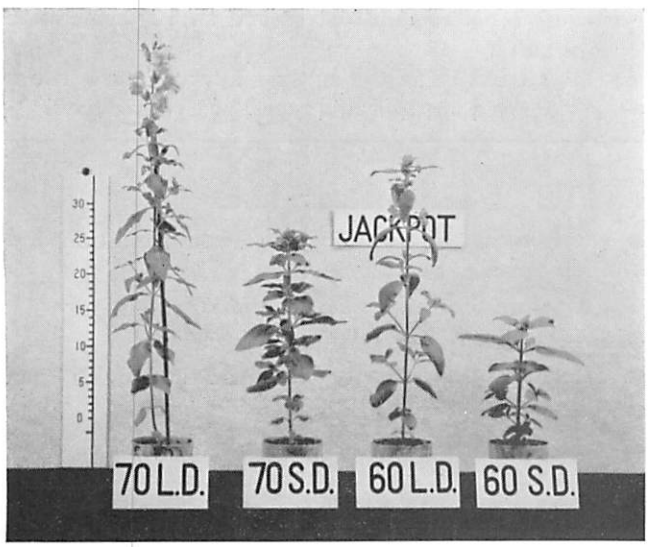

Figure 2. The effect of temperature (70° and 60°) and daylength (L.D. and S.D.) on the growth of the snapdragon variety Jackpot. All plants are from the same sowing.

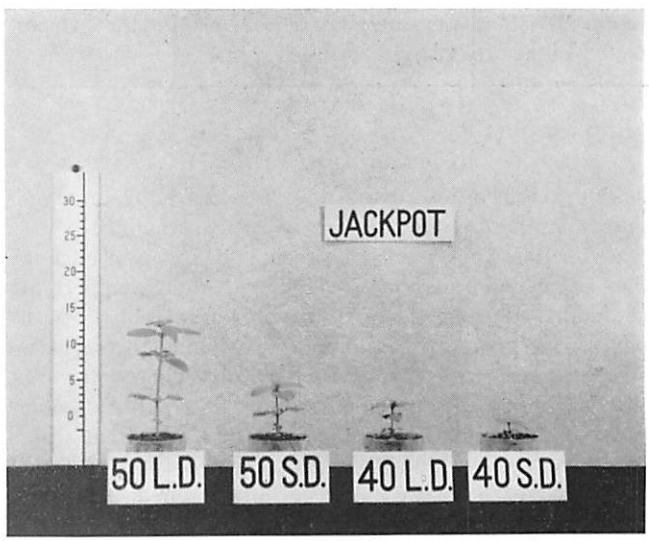

Figure 3. The effect of temperature (50° and 40°) and daylength (L.D. and S.D.) on the growth of the snapdragon variety Jackpot. All plants from the same sowing.

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length produced flowers that were one S.A.F. grade higher than a similar treatment under 18 hour daylength.

From this work it may be seen that a grower through the right combination of daylength and temperature could predetermine the quality of his crop. Thus growers could produce crops that would suit the requirements of specific markets in the shortest possible time. However, the feasibility of any combination of treatments must prove economical. The factor from this work that would tend to show that such treatments could be possible is the indication of a rather short period just prior to flower bud initiation when the plant is sensitive to daylength. More work must be done to obtain information on this period but it would seem reasonable that in the case of a winter flower crop that long days during this period

would hasten flowering with little or no loss in quality.

As yet we are in no position to recommend any commercial daylength or temperature treatment based on this work. But until further work is carried out the results of this work should encourage growers to experiment on a small scale, with daylength and temperature in aiming to improve their snapdragon culture.