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Year Around Snapdragon Culture for Colorado

W. D. Holley

The snapdragon was presented as a potentially profitable crop for Colorado in CFGA Bulletin 184. At the time this article was prepared, it was realized that the preparation of a year-round flowering schedule for snapdragon in Colorado involved far too much guesswork as to timing and acceptable varieties.

Almost all cultural and timing information available on year-round snapdragon culture has been obtained in the northern latitudes (Midwest), or in the Deep South. Timing and variety performance is strongly influenced by light intensity, daylength and temperature. This paper reports a systematic study to obtain timing and performance data for a climate characterized by relatively high winter sunshine and low relative humidity; inducive to good evaporative pad cooling during periods of excessive temperatures. The CO_2 concentration when ventilation was off during fall, winter and spring was 800 to 1200 ppm.

Beginning in late July 1965, the best estimate of a year-round schedule was planned (Table 1). Six equal areas are needed to achieve nearly equal continuous production of snapdragons. Since only four areas were available, there were gaps in the flowering schedule. Each area was planted three successive times to produce flowers from December 1965 to August 1966. Plot size varied slightly with the first four plantings. Thereafter all plots consisted of 12 rows 4" apart.

All seeds were germinated under intermittent mist in a steamed, well drained medium of equal parts sand, peat and soil. No difficulties were encountered in germination or in growing suitable transplants.

Table 1. Schedule of snapdragon plantings 1965-66 with estimated and actual flowering dates.

Sowing date	Transpl. date		Variety	Est. flw. date	Actual flw. date	Bench time in days
7-30	8-19	1	Treasure Chest	11-20	12-3	107
8-17	9-11	2	P.A. White	12-10	12-16	97
8-25	9-21	3	Ohio	1-20	1-4	106
9-5	10-2	4	Doubloon	2-1	1-18	109
11-13	12-18	5	Ranier	4-3	4-12	116
12-4	1-5	6	Debutante	4-15	4-15	101
1-5	2-4	7	Snowman	5-15	4-26	82
1-22	3-1	8	Virginia	6-1	5-21	82
3-26	4-23	9	Texas	7-9	8-2	71
4-10	5-12	10	Florida	7-29	8-2	81
5-11	6-7	11	Kentucky	8-22	8-4	59
5-26	6-20	12	P.A. Sum. Pink	9-4	8-15	57

The time required for growing transplants from sowing was 20 days in late spring to a maximum of 35 days for January sowings. This time could be reduced by growth rooms and/or fluorescent light. Occasional benches were not cleared when transplants were ready. Flats of transplants were stored satisfactorily at 33F in the dark for as long as 10 days to hold them for transplanting.

The purpose of these flowering trials was to obtain economic as well as cultural information, hence planting densities were varied. Originally, the plan was to allow 12, 16 and 20 square inches per plant throughout the year. After flowering several winter crops it became evident that 20 square inches was possibly too much space. With proper selection of varieties this spacing could produce too high a percentage of top grade flowers and insufficient numbers

in the middle grades. Plantings from February to May allowed 10, 12, and 16 square inches per plant. All plants were grown single stemmed. A brief resume of the schedule and bench time required is shown in Table 1.

As crops were cut the flowers were graded by the SAF 5-grade system using weight, length and number of open florets as grading criteria. A mean grade for each spacing treatment was calculated for ease of quick comparison.

Results

The yield and grade of the first 10 crops is shown by planting density in Table 2. The mean percent in each grade for each planting density is also shown. This percentage can be improved upon by better variety selection. Crops 2, 3 and 6 were inferior varieties for this climate. Crops 7, 11 and 12 were good varieties flowered at the wrong season. Additional observations on varieties (not shown) were made by including a different buffer variety between plots for each planting.

The grade of flowers was easily controlled by planting density. The grade required by a market, and the grade that market will pay for, should determine the planting density. A producer should also keep in mind the amount of light available to his crop. These crops were grown in a high light situation with minimum shadow from superstructure.

Table 3 summarizes the effect of planting density on the percent flowers in each grade and gives the average yield for each planting density. As planting density increased more flowers were produced and the average grade decreased gradually. While this table cannot be adapted to another environment, it can serve as a guide in making estimations and predictions.

Table 2. Effects of planting density on yield and grade of snapdragon.

Spacing	Crop	Yield	Grade					
			Utility	First	Extra	Fancy	Spec.	Mean
4 x 5"	1	73	--	1	7	25	40	4.42
	2	80	1	5	10	38	26	4.04
	3	89	2	2	9	37	39	4.22
	4	78	--	4	8	13	53	4.47
	5	92	--	--	5	21	66	4.66
	6	95	--	9	6	33	47	4.24
Total		507	3	21	45	167	271	
Mean % by grade				4	9	33	53	
4 x 4"	1	91	--	3	8	38	42	4.31
	2	106	--	16	22	45	23	3.71
	3	102	--	7	17	58	20	3.89
	4	81	--	5	1	26	49	4.47
	5	108	--	2	7	37	62	4.47
	6	120	1	7	23	55	34	3.95
	8	108	--	3	11	60	34	4.36
	9	81	--	4	1	5	71	4.76
	10	123	--	1	14	48	60	4.36
Total		920	1	48	104	372	395	
Mean % by grade				5	11	40	43	
4 x 3"	1	112	--	11	15	45	41	4.04
	2	104	5	16	26	39	18	3.47
	3	126	2	17	30	63	14	3.58
	4	103	--	9	20	46	28	3.90
	5	127	--	7	18	57	45	4.10
	6	140	3	23	30	59	25	3.57
	8	133	--	9	16	71	37	4.02
	9	117	--	2	6	18	91	4.69
	10	130	--	12	24	47	47	3.99
Total		1092	10	106	185	445	346	
Mean % by grade			1	10	17	41	31	
4 x 2 1/2"	8	144	2	18	25	57	42	3.83
	10	136	2	5	17	62	50	4.12
Total		280	4	23	42	119	92	
Mean % by grade			2	8	15	42	33	

An estimate of the effect of planting density on the percent of transplants that can be expected to produce a flower is presented in Table 4. This is a very important economic factor hence each grower should do everything possible to decrease this loss percentage. In the first 6 plantings, 95% or more of the transplants produced a flower at the 4 x 5" spacing. Table 4 shows the average number of transplants and number of flowers cut for three planting densities in the last 6 plantings. As planting density increased the loss percentage also increased. Some of this loss was due to death of plants but most was probably caused by crowding which delayed flowering of some plants. These delayed plants were usually weak and would have produced utility grade flowers had the cutting period been extended. The grouping of transplants in hills of 2 or 3 plants together was tried in several of the plantings and resulted in larger losses. Three plants together do not grow evenly hence at least one of them is likely to become weak, spindly and delayed.

Table 3. Percentage distribution by grades for 4 snapdragon planting densities.

Spacing	No. of crops observed	Mean yield	Grade				
			Utility	First	Extra	Fancy	Special
4 x 5"	6	84.5	--	4	9	33	53
4 x 4"	9	92.0	--	5	11	40	43
4 x 3"	9	109.2	1	10	17	41	31
4 x 2 1/2"	2[a]	140.0	2	8	15	42	33

[a]Not directly comparable since the crops were flowered only in May and August.

Considerable variation in maturity date was observed in some varieties. This variation either extends the bench time required to cut a crop off or decreases the actual number of transplants that produce a flower.

Flowering Good Varieties at the Wrong Time

Three crops were planted with varieties known to be good to excellent at their proper flowering times. In each case these varieties matured too quickly at the times they were flowered and produced low average grade (Table 5). Kentucky and Pan American Summer Pink required 59 and 57 days of bench time contrasting with an estimate of 75 days in the schedule. Snowman cut off 19 days earlier than estimated when flowered in late April. Using the right varieties for each season of the year is most important for maximum profit with snapdragons. Group I varieties must be selected very carefully for Colorado. Even the best of this group tend to require too little growing time. They may be short and light weight. Group I varieties for flowering December 15 to February 1 should require 100 to 110 days of bench time.

Group II varieties should be used for flowering November 15 to December 15 and from February 1 to April 15.

Group III varieties should be selected for flowering in Colorado from April 15 to June 15 and from October 15 through November.

Group IV varieties are possibly the most important for Colorado. Few varieties are available in this class but breeders are concentrating on it. These varieties tolerate strong light, relatively high temperatures and they must have long days. For flowering in Colorado and similar climates from June 15 to October 15, varieties from the Group IV response group should be planted. Among the present acceptable varieties in this group; Texas is excellent, Dark Star is good and the only Group IV yellow at this time. Georgia, Florida, Miami and White Skies are other good varieties to spread the list. Arizona, listed by some as a Group IV variety, is marginal for summer flowering in Colorado. It requires as little as 50 days of bench time and acts more like a Group III variety. While a good variety, Arizona should be flowered in Colorado with Group III.

On the basis of this work, a suggested flowering schedule for Colorado is given in Table 6.

Table 4. Effect of planting density on percent plants producing a flower in last six plantings.

Spacing	No. of flowers cut	No. plants transplanted	Percent maturing by cutoff date
4 x 4"	626	720	87
4 x 3"	769	936	82
4 x 2 1/2"	859	1152	75

Table 5. Effects of flowering good snapdragon varieties out of season on the grade of flowers produced.

Crop	Variety	Flw. group	Flw. date	Grade						Total yield
				Utility	First	Extra	Fancy	Spec.	Mean	
6	Snowman	II	4-26	2	81	130	201	20	3.36	434
11	Kentucky	III	8-4	57	81	120	132	--	2.84	390
12	PA Summer Pink	III	8-15	59	55	112	113	--	2.82	339

Table 6. Suggested timing schedule for snapdragon in Colorado.

For flowering	Benching date	Seeding date	Approx. bench time in days
June 1	March 16	Feb. 13	78
June 15	April 5	Mar. 5	72
July 1	April 25	April 1	68
July 15	May 12	April 20	65
Aug. 1	June 3	May 14	60
Aug. 15	June 15	May 26	62
Sept. 1	June 29	June 8	65
Sept. 15	July 8	June 16	70
Oct. 1	July 19	June 28	75
Oct. 15	July 28	July 5	80
Nov. 1	Aug. 9	July 14	85
Nov. 15	Aug. 18	July 22	90
Dec. 1	Aug. 29	Aug. 1	95
Dec. 15	Sept. 5	Aug. 8	102
Jan. 1	Sept. 17	Aug. 17	107
Jan. 15	Sept. 26	Aug. 26	112
Feb. 1	Oct. 10	Sept. 10	115
Feb. 15	Oct. 19	Sept. 18	120
Mar. 1	Nov. 6	Oct. 5	116
Mar. 15	Nov. 24	Oct. 22	112
Apr. 1	Dec. 18	Nov. 15	105
Apr. 15	Jan. 8	Dec. 5	98
May 1	Feb. 1	Dec. 28	90
May 15	Feb. 21	Jan. 17	84

Your editor,

W D Holley

COLORADO FLOWER GROWERS ASSOCIATION, INC.
OFFICE OF EDITOR
W.D. HOLLEY
Colorado State University
Fort Collins, Colorado

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