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CARNATION PINCHING REVISITED

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It is now nearly 20 years since Holley and Baker published the textbook on carnation production, summarizing pinching and timing. The original work by Wagner, Hill and Taylor was conducted in the early 1950's when the majority of greenhouses were still glass covered, cooling systems were just being introduced, and CO₂ injection and lighting were still to come. In the present carnation market, failure to hit the peak price periods can spell the difference between modest profit for Colorado growers and closing the front door. It seems remiss not to have continued some work on pinching and timing, particularly in light of new temperature control systems, improved nutrition and other factors that may have changed the way a carnation should be handled. In today's market, the grower must have *both* good timing as well as maximum yield and quality. Even though many growers can run their own tests for their operation, a few guidelines were felt necessary to see how the earlier work related to present conditions and to provide a baseline for possible future studies on carnation timing.

Methods

Elliott's White was benched at 2.8 plants per square foot on June 3 and July 3, 1981. There were two plots per treatment, 60 plants per plot, with buffer rows at the end of the benches. The growing medium was soil, watered by Chapin double wall, with automatic fertilizer injection (CGGA Bul. 384). CO₂ was injected. The greenhouse had been recovered the previous year with Tedlar coated FRP. The treatments were, for both planting dates:

1. Single pinch July 18 and July 25.
2. One and a quarter pinch, staggered.
3. One and a half pinch, staggered.
4. One and three-quarter pinches, staggered.
5. Two complete pinches, staggered.

By "staggered" is meant that pinching occurred when the breaks resulting from the single pinch had visibly elongated, so that actual pinching occurred over a period of two to three weeks. When the four top breaks from the single pinch had been pinched, the plant was considered to have had two complete pinches. The first crop flowers were cut to leave at least three breaks, which resulted in an average

grade between 3.00 and 4.00 on a scale of 2 to 5 with 5 equal to fancy grade. The second crop was cut hard, particularly in December and January when there were few breaks on the stems. According to Holley, blind shoots should be cut deep or undercut, and only 6 to 8 inch breaks left on during those months. The primary criterion was to obtain a fancy stem length on all flowers during the second crop.

Results and Discussion

In Fig. 1, the weekly production of each treatment (120 plants) and planting has been plotted using a smoothing procedure which involves a moving average of three weeks for each point. The first and last weeks of records are not plotted. There are some general comments:

1. The effect of successive one-quarter pinches on timing was not the same for the June and July plantings.
2. Each successive one-quarter pinch increasingly delayed start of production by one to four weeks in the June planting, but not for the July planting. For July benching, production started on nearly the same date for all pinches except a second pinch.
3. In comparison to a single pinch, each successive one-quarter pinch increasingly reduced the maximum production of the first peak, with only a 1 to 3 week delay of the first peak of production.
4. A complete second pinch completely eliminated what would have been the peak for a single through 1 $\frac{3}{4}$ pinches.

The greatest effect of pinching treatment was on the second flowering period for the June planting:

1. Each successive one-quarter pinch increasingly reduced the maximum production of the second peak in comparison to a single pinch.
2. Each successive one-quarter pinch increasingly advanced heavy production starting around the 23 week from planting (end of October), until, with a second pinch, heaviest production occurred during the 24th to 25th weeks from planting or in November.

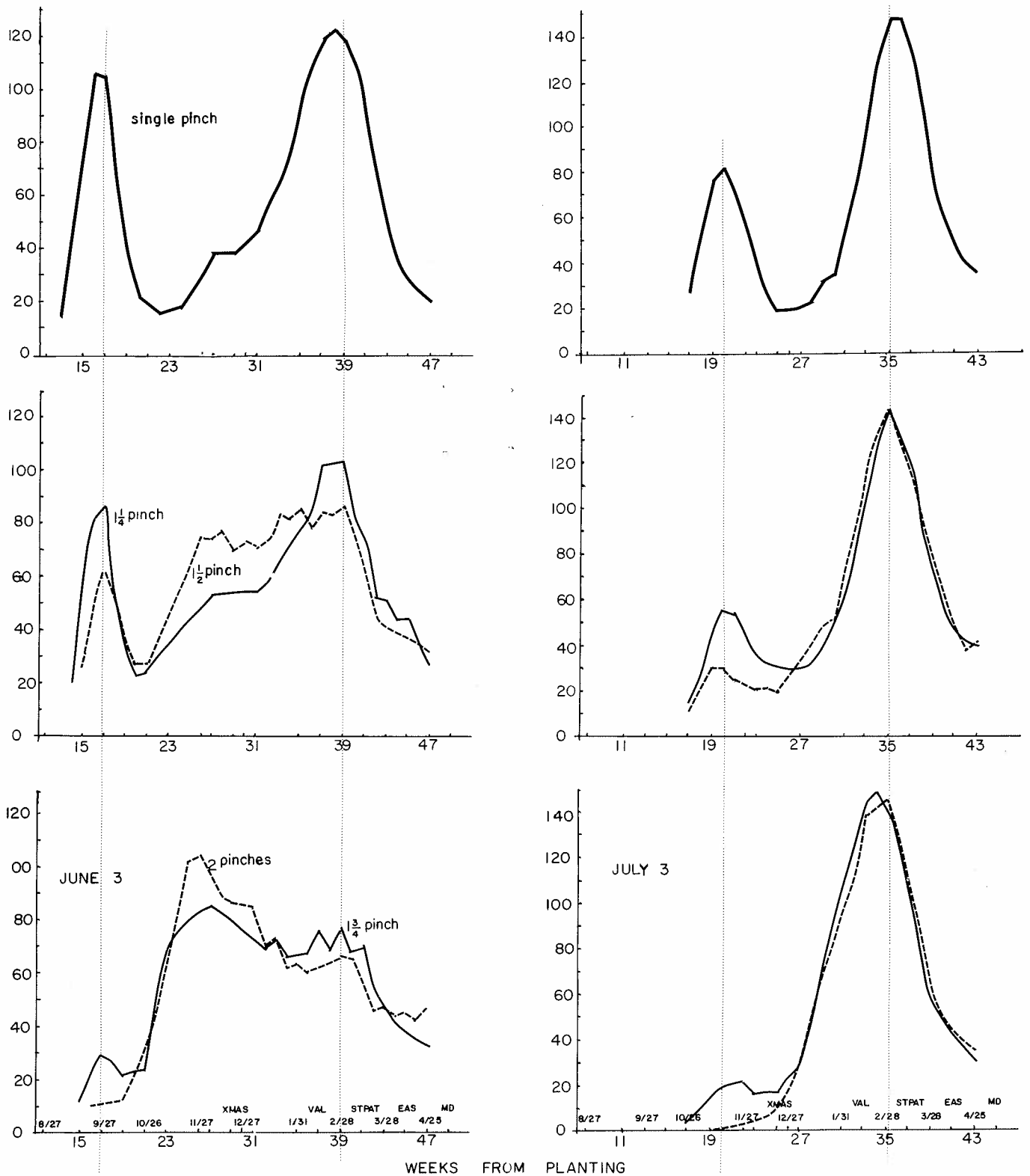


Fig. 1: Three week, moving mean curves of standard carnation production, planted June 3 (left) and July 3 (right), and given single, $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$ and 2 complete pinches. Yield on the vertical axes is average total per treatment per week for 120 plants, Elliott's White.

3. A $1\frac{1}{2}$ and $1\frac{3}{4}$ pinch resulted in fairly constant heavy production from November through February. Production from a second pinch gradually declined from November into April, and was beginning to return from Easter (records terminated May 3).

For the July planting, each successive one-quarter pinch had relatively little effect on moving production for the second period ahead in comparison to a single pinch. All treatments had maximum flower production around the 35th week from planting, or the end of February. Additional

pinching tended to advance heaviest cutting by one to three weeks.

The cutting method resulted in a production decline for all treatments in March and April, so that minimum production was during Easter to Mother's Day. It is likely that if the plants had remained in the bench, heavy July production would have occurred.

There was very little effect of 1, 1¼ and 1½ pinches on yield of the June 3 planting (45.3 to 46.5 flowers per sq.ft.) (Table 1). A 1¾ and 2 pinch treatment resulted in 44.3 and 44.1 flowers per sq.ft. for the 11 month period the June planting was in the bench. However, for the July 3 planting, each successive one-quarter pinch increasingly reduced total flower yield (10 months in the bench). A single pinch produced 41.8 per sq.ft., whereas a complete second pinch produced only 34.1 flowers (Table 1). The additional growing period of one month, provided by the June 3 benching date, is extremely important in regard to total yield and timing in the first year.

Previous work indicated that a single pinch in mid-July will result in peak production in November-December and in March-April. The first pinch on the June 3 planting was delayed in this experiment to July 18. But, maximum produc-

tion occurred in September and in February. Holley indicated December-January and April-May peaks from a single pinch on July 30. The results here were November and February-March for a single pinch on July 25, with successive pinches having relatively slight effect on delaying later production. It would appear that cultural improvements over the years have tended to advance the second flowering peak especially, and to sharpen carnation response. The point should be made that any practice which tends to delay, or reduce growth, such as withholding water, reduced nutrition, poor coverings, high salinity, or disease, will tend to delay response to pinching and broaden the response by reducing the sharpness of maximum production peaks.

One interesting facet comes to mind from this work. It appears that no combined work of pinching with lighting has been done on standard carnations at CSU. Nearly all lighting work in the first production year has dealt with single pinching, with most of the lighting work focused on second year production. Of course, early work has shown that lighting the first crop is not desirable since the procedure prevents side breaks for the second crop. However, there may be some desirable timing combinations with 1½ or 2 complete pinches for the second production period in the first year.

Table 1: Yield from 120 plants per treatment of Elliott's White planted June 3 and July 3 and given 1, 1¼, 1½, 1¾ and 2 complete pinches. Records terminated May 3, 1982 (months total in bed for June 3 planting = 11, 10 for July 3 planting).

	Pinch				
	1	1¼	1½	1¾	2
June 3 planting					
Total flowers per treatment	1994	1942	1974	1899	1892
Flowers per square foot	46.5	45.3	46.0	44.3	44.1
July 3 planting					
Total flowers per treatment	1793	1687	1603	1611	1461
Flowers per square foot	41.8	39.3	37.4	37.6	34.1