NYSFG New York State Flower Growers
INCORPORATED

BULLETIN 280 Secretary, Charles Wilton, Prattsburg, Steuben Co., N. Y. 14873 MARCH 1969

Importance of Light in Carnation Growth

Ralph Freeman, Arthur Bing and R. W. Langhans
Cooperative Extension, and Dept. of Floriculture
Cornell University

Introduction

The effects of light and temperature on the growth and flowering of carnations have been studied for several years at Cornell University. Throughout this period we have noted crop quality was excellent at one time of the year yet at other times the crop was of lower quality.

Crops were grown at many day and night temperatures and combinations of temperatures from 40° to 80°F. Also, plants were grown under many different conditions of light intensity and photoperiod. Observations made on these crops when grown under controlled conditions indicated light intensity and duration were among the most important factors regulating speed of flowering, plant and flower quality.

In this paper we will discuss some of the observations made on the effect of light on carnations and how a grower can best take advantage of this information.

Materials and Methods

Rooted cuttings of the cultivars 'Apollo', 'Iroquois', 'Improved Sidney Littlefield', 'White Littlefield', 'Coquette', 'S. Arthur Sim', 'Scania', 'Atlas', 'Peace River', 'Orchid Beauty' and 'Silvanus' were planted in steam pasteurized soil on August 10, 1967 in raised benches at the Cornell Ornamentals Research Laboratory, Farmingdale, L.I. and also at the Floriculture Research Greenhouses in Ithaca, N. Y. The plants were pinched once two weeks after planting and grown under 18-hour photoperiods. In the greenhouses night temperatures were 52°F and day temperatures 60-65°F when controllable. Complete details of materials and methods can be found in New York State Flower Growers Bulletin 278 (1) and 273 (2).

Results

Days to flower. The number of days for the Farmingdale and Ithaca crops to reach their flowering peaks are shown in Table 1. The number of days varied from 104 (Apollo) up to 184 (Silvanus) for the Farmingdale-grown plants. All varieties growing in Ithaca flowered after those grown in Farmingdale. The delay in flowering varied from 16 to 54 days (Table 1).

Stem quality. Observations on stem quality are shown in Table 2. Seven of the eleven varieties grow at Farmingdale had commercially acceptable stems whereas five of the eleven varieties grown at Ithaca were commercially acceptable. Some varieties responded better at Farmingdale than at Ithaca (Orchid Beauty, S. Arthur Sim, Peace River, White Littlefield) and vice versa (Scania and Apollo).

Table 1. Date of flowering peak, number of days from planting to peak flowering for eleven varieties grown at Farmingdale and Ithaca, N. Y. Cuttings were planted on August 10, 1967 and grown under similar conditions at both localities.

Variety	Long Island Date	Long Island No Days	Ithaca Date	Ithaca No Days	Delay in flowering
Apollo	Nov 22	104	Jan 15	158	54
Iroquois	Nov 25	107	Jan 3	146	39
Imp Sid Littlefield	Dec 7	119	Jan 29	172	53
White Littlefield	Dec 8	120	Jan 29	172	52
Coquette	Dec 8	120	Jan 10	153	33
S. Arthur Sim	Dec 10	122	Jan 10	153	31
Scania	Dec 12	124	Jan 24	167	43
Atlas	Dec 25	137	Jan 22	165	28
Peace River	Jan 1	144	Feb 5	179	35
Orchid Beauty	Feb 1	175	Mar 1	203	28
Silvanus	Feb 10	184	Feb 26	200	16

(continued on page 2)

Short Course Split Sessions

The following are summaries of the various crop work shops held during the 1968 Florist Conference. The participants were very pleased with these sessions as they were all full and all ran longer than the allotted time. The summaries although brief do indicate some of the subjects discussed.

Easter Lilies

D. C. Kiplinger, Professor of Horticulture at Ohio State University, divided the causes of forcing problems into factors in bulb production, cooling and bulb forcing. He was of the opinion that most forcing problems could be attributed to forcing "foul-up." He listed several types of problems. Problems from bulb production errors were of two types: 1) no stem growth—caused by rotting after damage from stem pulling or 2) leaves emerging from the soil but no stem growth—caused by breaking-off of scales during stem pulling and the production of bulblets on these scales.

Problems from improper cooling could be seen as 1) a long forcing time—caused by too little cooling or 2) undesirable plant quality—caused by too-long cooling or by poor environmental conditions during cooling.

Forcing problems could be from incorrect planting depth (the nose 2" below the surface is optimum), poor

(continued on page 3)

(continued from page 1)

Table 2. Effect of 18-hour photoperiods on eleven varieties on the stem quality of carnations when grown at Farmingdale, L.I. and Ithaca, N. Y.

Variety	Stem Quality	
	Farmingdale	Ithaca
Silvanus	excellent	good
Orchid Beauty	"	brittle
S. Arthur Sim	"	weak
Peace River	"	excellent (brittle)
Imp Sidney Littlefield	"	good
White Littlefield	"	very weak
Atlas	good	good
Iroquois	very weak	weak
Scania	"	good
Apollo	brittle	excellent
Coquette	very brittle	weak

Discussion

Carnations grown on Long Island not only flowered sooner (Table 1) but were generally better in quality particularly with respect to stem diameter and stem strength. Bloom quality was approximately the same in both locations. More varieties at Farmingdale were commercially acceptable than those grown in Ithaca (Table 3). The authors feel part of the reason may be due to the difference in light intensity between the two areas.

Table 3. Varieties which appeared to show promise* for being grown under 18-hour photoperiods at Farmingdale and Ithaca, N. Y.

Farmingdale	Ithaca
S. Arthur Sim	Apollo
Imp Sidney Littlefield	Imp Sidney Littlefield
White Littlefield	Atlas
	Scania

* Based on days to flower, response to 18-hour photoperiods, and general crop quality.

Other studies indicated similar results. In one study (3) similar plantings of variety CSU White Pikes Peak were grown in Farmingdale and Ithaca. The plants on Long Island flowered 3 to 4 weeks earlier and had higher grades than the Ithaca plantings. The rooted cuttings were the same for both areas, i.e. grown and propagated in Ithaca. Likewise, all cultural conditions were similar.

U.S. Weather Bureau Records indicate Long Island receives more sunlight than Ithaca. There is a good reason for this: Farmingdale (40° 44′ north latitude) is located 120 miles south (in latitude) of Ithaca (42° 29′ north latitude). This accounts for higher light intensity and the longer daylength at Farmingdale. In addition, Ithaca due to location and terrain is situated in the path of great cloud cover. This situation is caused by air going over the Great Lakes, picking up moisture and forming clouds which reduces the total quantity of light. Therefore, not only the daylength but also the intensity is less at Ithaca especially during the period of September through March—the critical growing months of the year. This difference undoubtly accounts for the differences seen between the two areas.

Growth chamber studies (to be reported later) in which carnations were grown at various light intensities indicated those receiving more light intensity yielded larger, more vigorous plants with quicker flowering than when grown at the lower light intensities. Likewise, similar results occurred when plants were grown in a greenhouse in full sunlight, and under 1, 2, or 3 layers of cheesecloth. These studies showed light is important and definitely has an effect on plant growth. Observations indicated leaf width, leaf length, stem diameter, stem strength and overall quality was better on the plants grown at Farmingdale. It is without question earlier flowering, flowers of higher grade and better quality flowers are obtained from plants grown in an area with higher light intensity.

Conclusion

These observations indicate the importance of light in the growth of carnations.

The period between October and March is always a difficult growing period. This is primarily due to the shorter daylength and lower light intensity as compared to the April through September period.

It would appear every effort should be made by growers to improve the light situation in every greenhouse. First choice is to select an area of high light intensity and long days with weather cool enough to give optimum conditions for growing. In any area to improve winter production the glass must be clean and all sash bars and structural members painted white and kept clean to reflect maximum light. Supports for holding plants erect should be minimum in number (yet enough to do the job) and also painted white. Greenhouse sidewalls should either be painted white or aluminum foil suspended behind the heating pipes to reflect light and heat. Anything a grower can do to improve the light situation will make a difference, a big difference in a marginal situation.

A grower must not overlook new or different varieties in his cultural program. The varieties grown 10 or 20 years ago were probably the best at that time. The question should be asked "are they the best growers and producers today"? Perhap other varieties can do a more suitable job and make more money for you today.

Summary

This paper discussed some of the effects and importance of light on carnations. It would appear no matter where a grower is located he would make every effort to improve the light situation in each of his greenhouses. One factor in the growing environment necessary for the production of quality carnations is maximum light. Could your greenhouse be brighter? Could quality be improved? Why not take advantage of some of the suggestions outlined above?

Literature Cited

1. Freeman, R. N. and A. Bing. 1969. Timing eleven carnation varieties. New York State Flower Growers Bul. 278:1-2, 4.
2. Langhans, R. W. 1968. Photoperiod, temperature and light intensity effect "one crop" carnations. New York State Flower Growers Bul. 273:1-2, 4.

Short Course

(continued from page 1)

soil mix (a desirable mix is well drained and with no more than 25% organic matter), improper watering, inadequate fertilization program (200 ppm each of N and K at every watering is good), poor light conditions (clean glass is essential), undesirable temperatures (60° NT—70° DT is best), or poor spacing (3-6" pots of 7-8" grade bulbs per 1 square foot (6x8 spacing) is sufficient).

During the discussion a question was asked whether bulbs in the center of the case were cooled less than those on the case-edge. Dr. Kiplinger felt that the seriousness of this factor was not known and Dr. A. DeHertogh added that dry peatmoss would probably tend to insulate, and accentuate the problem; while, in moister peatmoss, cooling would be more uniform throughout the case. Dr. Kiplinger was asked the reason for nonuniform growth on the bench. He stated that he thought much of the problem could be attributed to the forcer (e.g. uneven planting depth or uneven watering) but the nonuniform conditions during the cooling treatment might also be influential.

Dr. N. Stuart commented on lighting of shoots just after they emerge from the soil. As a recommendation for trial he suggested applying "chrysanthemum" lighting for the first 3 weeks after shoot emergence to insure rapid forcing.

Tom Weiler

Bulbous Crops

A. DeHertogh, Professor of Horticulture at Michigan State University, reviewed the culture of bulbous crops—especially Dutch bulbs. He stated that several stages during production affected the final product. Field growing conditions, harvesting and post-harvest conditions, shipping conditions, forcing techniques, and marketing were emphasized. Results have shown that bulbs are never dormant, therefore, are constantly influenced by environment.

Dr. DeHertogh recalled his recent work his been directed at working out a schedule for reliably flowering tulips of optimum quality. He defined his requirements for a desirable tulip cultivar as:

Requirements	Pot Plant	Cut Flower
Plant height	10"	greater than 14"
Flower bud length	greater than 2"	greater than 12"
Days to flower at 65°	less than 21	less than 15

Using these requirements and dividing the flowering season into 5 periods between January 21 and May 14 (Jan. 1-16, Jan. 17-Feb. 14, Feb. 15-March 14, March 15-April 20 and April 20-May 14), he is searching for cultivars and optimum cooling treatments for flower production during each of the 5 periods.

He gave general "tips" for forcing bulbous crops, stressing the importance of properly handling and storing the bulbs, using a well drained soil mix, using good watering practices, checking root development periodically, and shipping flowers and potted plants in bud, not as open flowers.

In the question and answer period, Dr. DeHertogh said several soil mixes could be used for forcing. He commonly used a 1 soil, 1 sand, 1 peatmoss mix, but artificial media as the Cornell mix also worked well. He emphasized tulip bulbs should never be stored above 63°F. Higher temperatures reduce height. In answer to a question on tulip "topple" he said the malady depended on cultivar, storage at temperatures above 63°F, and forcing above 70°F. In response to other questions he stated 5°C (41°F) dry storage for tulips was too experimental to be recommended and he found "Termil" to be effective in controlling *Botrytis*.

Tom Weiler

POINSETTIAS

Jim Mikkelsen of Mikkelsen and Son Greenhouses began the informal session on poinsettias with a brief discussion on the new culture or new poinsettia varieties. He discussed methods which result in shorter production times and better quality with the new varieties. The handling of cuttings, nutrition, temperature control of bud initiation and bract size, and disease control were all discussed as factors important in improving quality in the new varieties.

The discussion included cutting and pinching timing, pinch size, problems of getting breaks (enough), and temperature and cultural control of quality. Many growers brought up personal problems with the culture of the new varieties (which Jim Mikkelsen analyzed in an excellent manner).

The discussion had an over-flow crowd and many interesting points were brought up and discussed by the moderator and many members of the audience.

Art Spomer

CHRYSANTHEMUMS

Carl Scharfenberg of Yoder Brothers moderated an informal discussion on chrysanthemum production. He began the discussion with a short discussion on what the floriculture industry could expect with chrysanthemums within the next 10 to 20 years. He briefly discussed the ever present necessity for improving marketing practices. This was followed by a discussion of what to expect in the field of quality control. The biggest advance in quality control is expected from breeding work. Breeders hope to produce plants of better size and form and which require shorter crop times. New growth regulators such as growth retardants, pinching agents, and disbudding agents can also be expected in the future along with new methods of photoperiod control and cultural control of product quality.

The general, informal discussion which followed Carl Scharfenberg's introduction covered the topics of chemical pinching, breeding, post harvest physiology, production costs, and the use of "water-wetters" in chrysanthemum production.

Art Spomer

(continued on page 4)

Short Course

(continued from page 3)

GERANIUMS

"Is "Carefree" part of your vocabulary? Paul Randolph of Pan American Seed Company seems to think that it should be and if it isn't; he says that it will be.

In a most interesting presentation, Paul said geraniums from seed are now possible for the greenhouse and bedding plant grower. Why then are the seed still so expensive? The breeder gets only five seed per pollination. It has not been possible to store the pollen, and each seed requires cleaning and scarification.

Among the most important cultural points were: 1) soil temperature of 70-75°F during germination, 2) drench with Dexon and Terraclor immediately after transplanting, 3) plants should be grown at 62°F night temperature (may be finished at 45-50°F), 4) Cycocel drench at 3000 ppm three weeks after transplanting is a must for good plants. It was also pointed out that five varieties of "Carefree" geraniums can now be flowered in four inch pots for Memorial Day. Variety and seeding date are important, thus schedules must be followed.

Paul finished the talk with a slide and tape presentation, "Mission PROBABLE."

Allen Hammer

BEDDING PLANTS

An excellent look into the future of the bedding plant industry was presented by Dr. Marlin Rogers of the University of Missouri. Dr. Rogers spent the first few minutes reviewing some of the latest advances which have been introduced into the industry during the last decade. He then gave his own personal views of the future of the bedding plant industry.

Dr. Rogers stated that the product in the future would be a more simplified product, that it would be mass produced, require less labor to produce it, and that simplified methods would be used in its production. He further discussed the advantages of the individual container over that of using flats.

More attention should be paid to the plants in the seedling stage and at this point in his discussion, Dr. Rogers talked about the Role of the Computer in the Bedding Plant Industry. Computers in conjunction with growth could produce the "perfect" plant although the cost would be very high.

Dr. Rogers stated that the biggest bottleneck in the bedding plant industry today is the transplanting of the seedling. Because of the time, labor, and other headaches involved with this process, it will have to be replaced by a better method if the industry is going to continue to grow. The possibilities of a "Seed Wafer" which would be placed on the soil, watered and allowed to grow might be the answer to this question said Dr. Rogers.

Although some of these ideas might seem unreal to us today, it should be remembered that the addition of CO_2 to the greenhouse air ten years ago seemed unreal at that time.

Bob Kaltaler

Ralph Wright Curtis Memorial Fund

Professor Emeritus, Ralph W. Curtis died November 13, 1968 at the age of 89 after a long illness. He is survived by his wife Allison Curtis.

Ralph Curtis graduated from Cornell in 1901 and completed his Masters degree in 1906 under Liberty Hyde Bailey. The next six years were spent at the Arnold Arboretum at Jamaica Plains, Massachusetts. In 1913, Liberty Hyde Bailey appointed R. W. Curtis, Assistant Professor in the School of Landscape Art. In 1922 he joined the Department of Floriculture and Ornamental Horticulture as Assistant Professor of Ornamental Horticulture to teach the good use of woody ornamental plants.

Professor Curtis' teaching career began in a gray two-story wooden building overlooking Beebe Lake near the present north door of Warren Hall. A planting of woody ornamentals was soon developed nearby and was later moved during the 1920's to the slopes of Fall Creek Valley first as the "Arboretum" and later at Dr. L. H. Bailey's suggestion was called the Cornell Plantations now pleasantly familiar to many Cornellians.

Fortunately native trees abound on hillside land through the Cornell Plantations. However new selections or varieties of maple, oak and other trees have not been added recently. It is proposed that a Ralph Curtis Memorial Fund be set up to expand the representation of shade tree species and varieties at Cornell University for teaching, extension, and research purposes.

Persons wishing to contribute should make checks payable to Cornell University and send them to the Ralph Curtis Memorial Tree Planting Fund, 439 Day Hall, Cornell University, Ithaca, N. Y. 14850.

In This Issue

Bul. 280, March '69

YOUR EDITOR,

Bob Langhans