

Daylength Controls Flowering of Tuberous-Rooted Begonias

Charles A. Lewis
Dept. of Floriculture and Ornamental Horticulture
Cornell University, Ithaca, N. Y.

Tuberous-Rooted Begonia flowers are worth twice as much during the winter as in summer. In the past, production has been only during the spring and summer, but now you can have these plants in bloom any day of the year. For the past ten years in California, the flowers have been used commercially in all types of make-up work. They are so popular that one large retail shop in San Francisco uses 50,000 blooms during the spring and summer.

The plants grow best and the flowers are largest at night temperatures of 55-60°F. In the Eastern United States these temperatures can be maintained only during the winter months. Therefore, Tuberous-Rooted Begonias would be at their best during the winter, but the plants normally go dormant in the fall. These investigations were made to determine what environmental factors control the growth and flowering of these plants.

They Bloom Under Long Days

In November, 1949, cuttings were taken of several Camelliaflora varieties and the Multiflora variety, Bourgemeister Max. These were rooted in sand with 70° bottom heat. The rooted cuttings were potted and grown under long and short day conditions. Plants given long days were provided

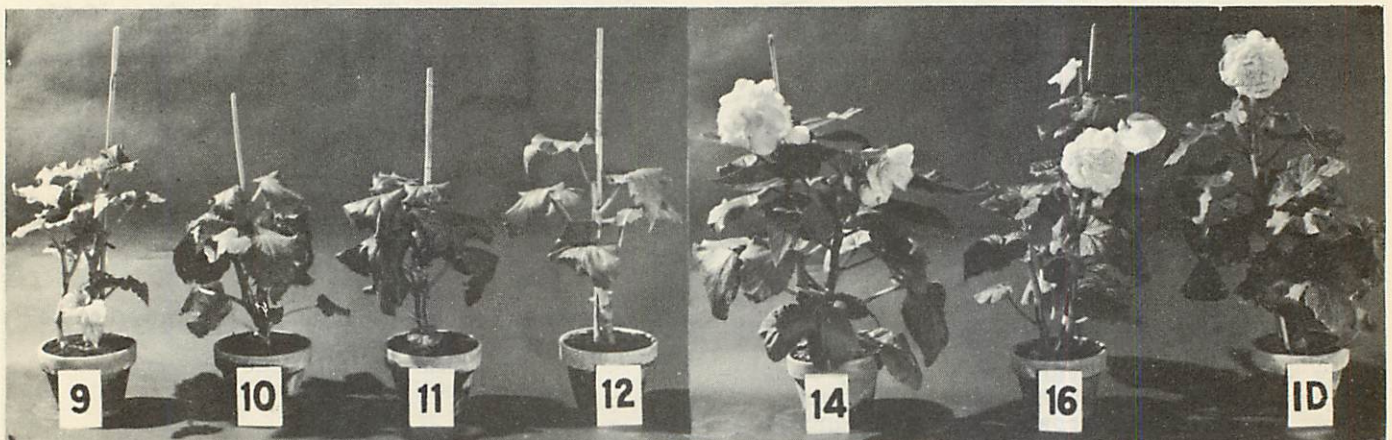
with artificial light from Mazda bulbs to supplement the normal daylength. The supplementary light was given from 4 p.m. to 2 a.m. The short days were provided by normal winter light conditions, which at Ithaca vary from 10 hours of light on December 16 to 12 hours of light on March 1. A third group of rooted cuttings were grown for thirty (30) short days and then given thirty (30) long days.

The plants continued to grow and flower under long days; but under short days they stopped growing, the leaves becoming thick and dark green, and produced no flowers. Plants that had stopped growing under short days started to grow and flower again when placed under long days.

The plants under short days formed tubers while the plants under long days did not form tubers. A few of the Multiflora plants not only formed tubers under the soil during short days but also formed tubers on top of the plant.

This experiment shows that Tuberous-Rooted Begonias grow and bloom under long day conditions, 18 hours in this case, and cease growth and form tubers under short days.

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Daylength treatments left to right; 9, 10, 11, 12, 14, 16 hours of light and interrupted dark. Light periods of 9 through 12 hours not effective in causing growth and flowering. 14, 16 hours of light and interrupted dark results in growth and flowering.

During the summer of 1950 a study was made to determine the effect of high temperature on the daylength response. Multiflora and camelliaflora plants were grown under both long and short days. Again the plants under long days grew and bloomed but did not form tubers. The plants under short days stopped growing and formed tubers. It is evident that high summer temperatures did not affect the daylength response.



AERIAL TUBER FORMATION ON AMI JEAN BARD GROWN IN SHORT DAY

To determine the minimum day length for flowering, camelliaflora plants which had been started from seed in March 1950, and rooted cuttings of Multiflora varieties, Helen Harms and Ami Jean Bard, were used. Artificial light to supplement the normal daylight was used to provide 9, 10, 11, 12, 14, and 16 hour days. One additional treatment consisted of an interrupted dark period, which was provided by giving 9 hours of normal daylight followed by 4 hours of dark, $1\frac{1}{2}$ hours of light, 4 hours of dark, $1\frac{1}{2}$ hours of light, and 4 hours of dark to complete the 24-hour cycle. The plants were grown at a minimum night temperature of 60°F. The supplementary light source was from 60-watt Mazda bulbs placed about $2\frac{1}{2}$ feet above the plants and 4 feet apart giving a light intensity of 6 to 25-foot candles. The supplementary light was given in the morning and the evening to extend the light period at both ends of the day. An automatic time clock controlled the length of day of each treatment.

The camelliafloras stopped growing and flowering when the light period was 12 hours or less, and the leaves became dark green and the stems hardened. When the daylength was 14 or 16 hours, or when the dark period was interrupted, the plants continued to grow and bloom. The interrupted dark period provided a total of 12 hours of light but the plants in this treatment gave the same response as those given 14 or 16 hour days. The multifloras under the 12 hour days produced some growth. Plants under the 14 and 16 hours of light and the interrupted dark treatment produced normal healthy growth and flowered.

Tuberization occurred only on the plants in the 9, 10, 11, and 12 hour light cycles. Some of the plants not only formed tubers in

the soil but also at the ends of the stems. The aerial tubers had been observed in the previous year's experiment. Ami Jean Bard formed these tubers more often than did Helen

Harms. No aerial tubers were formed on the camelliaflora types.

From these experiments it is obvious that Tuberous-Rooted Begonias may be brought into flower any day of the year!

Timing the Production

The plants may be propagated from seeds, tubers, and cuttings. Seeds require approximately six months from sowing to

the first bloom. The tubers and cuttings take about three or four months to produce blooming plants. At present we are trying to determine exactly how long a period is required from cutting to 4-inch pot and from tuber to 4-inch pot. This information will be published in this Bulletin as soon as it is available. The cuttings used are top cuttings which will root in a month in Vermiculite. A more vigorous plant is obtained more quickly by this method than from tubers.

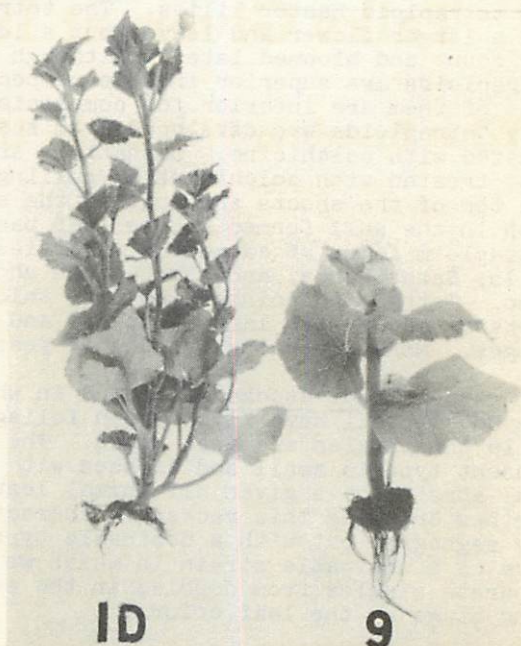
Difficulty has been experienced in the past in having these plants in bloom for Easter. The trouble arises from the fact that when the tubers are started the days are short and growth is slow. Actually, here at Ithaca, the days don't reach 14 hours till April. So, if early plants are desired, it would be best to give the sprouting tubers long days as soon as the first shoots appear.

Whenever off-season production of these plants is desired, the daylength must be at least 14 hours. Short days for Tuberous-Rooted Begonias occur at Ithaca from September 1 to April 8, and any plants grown during this period would have to be given additional daylength. Probably four (4) hours of additional light applied in the middle of the night would be sufficient.

Future Possibilities

The pot plant possibilities of the Tuberous-Rooted Begonia have as yet been largely uninvestigated. The multiflora group, which is relatively unknown in the United States, is similar in size to the Christmas Begonia. The plants are about 1-1 $\frac{1}{2}$ feet tall with many branches from the base, each branch bearing many small flowers. The variety Bourgeois Max is a deep red that would be

particularly appropriate for Christmas. Helen Harms is a lemon yellow that should meet with favor at Easter. The multifloras are hardier than the larger flowered types and would hold up better in the customer's home.



Left to right; Interrupted dark and 9 hours light daily. Growth and no tuberization occurred under interrupted dark while tops did not grow but tubers formed under 9 hour days.

The large camelliaflora types would have to be handled carefully if used as a pot plant. It would be best to grow the plants to three or four stems so that the flowers wouldn't be too large. Shipping a plant with large flowers would be hazardous. It should be remembered that the Tuberous-Rooted Begonia as a pot plant has a double appeal in that after the customer has grown the plant in the home he may plant it outside in the garden for a continued summer bloom.

As a pot plant and a cut flower, the Tuberous-Rooted Begonia has a future. Now that they can be flowered any day of the year the commercial production of these plants is entirely practical.