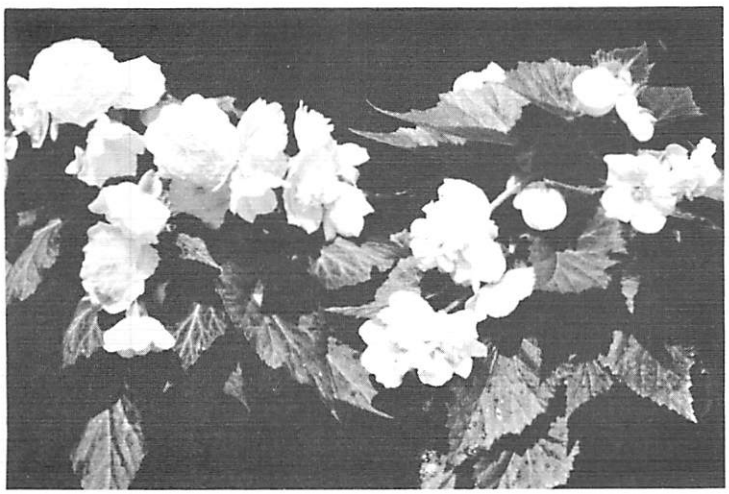
North Carolina Flower Growers Bulletin

VOL. 27 NO. 3
JUNE 1983

OFFICIAL PUBLICATION OF THE N. C. COMMERCIAL FLOWER GROWERS' ASSOCIATION



Flowering Control for Non Stop Tuberous Begonias

William C. Fonteno and
Roy A. Larson

Tuberous begonias are attractive garden plants in regions where high temperatures do not persist for extended periods. Commercial flower growers have grown tuberous begonias as flowering pot plants for spring sales but with varying degrees of success, largely dependent on season and locality. Large, colorful, attractive flowers in an assortment of colors have appealed to customers when high quality plants were produced.

Recently the Non Stop tuberous begonias have attracted attention and interest, as they seem more adaptable to warm temperatures than traditional tuberous begonias. In 1980, Non Stop tuberous begonias were forced successfully in commercial and university greenhouses in North Carolina with little apparent difficulty. In 1981, several of the same greenhouses reported poor growth and sporadic flowering. Reasons for these failures were unknown.

Photoperiodic response and temperature interact to control vegetative and reproductive phases of most begonia species, but the situation is more complex with tuberous begonias. Tuber formation must also be considered. It has been reported that vegetative growth must be at a proper stage of development, or neither tubers or flowers would be formed. Also, tubers have been shown to form under natural short days (10- to 12-hour daylengths) while plants subjected to more than 12-hour photoperiods did not produce tubers. Vegetative growth ceased when plants were moved from long to short days but resumed again when plants were returned to long days. Plants also

(continued on page 2)

Non Stop Tuberous Begonias—*(continued from page 1)*

flowered when moved to long days (18-hour daylength). Other researchers found that a 9-hour photoperiod promoted tuber formation and reduced top growth and flowering in Non Stop yellow tuberous begonias. Pinching delayed flowering but did not alter tuber development.

Cultural information on Non Stop tuberous begonias has been provided to commercial growers by Earl J. Small Growers, Inc., suppliers of these plants. Their instructions state that to promote early flowering, plants must be grown under long days from November to March. They advised that before darkness and extended until approximately 10 p.m.

A study was conducted at North Carolina State University to determine what effects photoperiod and day temperatures might have on flowering of Non Stop begonias. Two cultivars, Double Red and Double Orange, were obtained from Earl J. Small Growers, Inc. and grown in 6½ inch azalea plastic pots in a mix of 3 parts pine bark:1 part peat moss:1 part sand (by volume). The study was conducted in the controlled environment greenhouses of the Southeastern Plant Environment Laboratories (Phytotron). Plants received 9 hours of 50% natural daylight. Long days were provided, either as a 7-hour addition to the natural sunlight (16 hours total) or as a 3-hour night interruption (2300 to 0200 hours). Two temperature regimes were used, 79°/65°F or 72°/65°F (day/night). Plants were watered and fertilized daily with a modified Hoagland's solution, in routine Phytotron care.

After 60 days plants were cut at the soil line and top fresh weight and leaf number were recorded. Tubers were removed and fresh weight and size recorded.

Long days repressed tuber formation and increased leaf number and top fresh weight over short days with both cultivars (Table 1). Both the night interruption and the extended photoperiods resulted in similar shoot and tuber values. The short day treatments promoted tuber formation (Fig. 1). Flowering was indirectly affected by photoperiod. Longer photoperiods promoted larger plants which, in turn, enhanced flowering of both cultivars. However, plants under short days, while exhibiting less vegetative growth, did produce a few flowers. Number of flowers was related to plant size as plants produce axillary flowers while growing points remain vegetative.

Lower day temperatures had greater effects on 'Double Red' both in vegetative growth and tuber formation than on 'Double Orange' (Table 2). Leaf number, top fresh weight, tuber fresh weight, and tuber size increased at 72°F in 'Double Red' while only plant fresh weight of 'Double Orange' increased compared with plants at 79°F. Flowering was not affected directly by temperatures; more flowers were present on the larger plants. The lower temperature seemed to produce more flowers as a result of producing larger plants. Larger tubers were formed at the lower day temperature.

Best flowering and vegetative growth for both cultivars was 72°F under either the extended day or the night interruption photoperiods. Short days (9 hours) and 72°F day temperature produced the largest tubers, and the poorest flowering.

Essentially, what seems to be happening in Non Stop is the following. Plants will be in either a "growing" phase or a "storing" phase. In the growth phase, plants increase in size and flower Non Stop because the flowers are produced in the leaf axils and not in the growing points. In the storing phase the plant's food sources are directed downward into tubers which increase in size, thereby effectively stopping top growth. This storage phase is a genetic holdover from the ancestors of the Non Stop's. It is a protective mechanism which allowed the plants to overwinter underground in order to survive until spring. This storage phase is triggered by the shortening of the daylength, a sign of an approaching winter. Keeping our greenhouse varieties under long days prevents plants from shifting gears into this storage phase. Cool temperatures seem to enhance either phase but does not trigger the change.

(continued on page 3)

Non Stop Tuberous Begonias—*(continued from page 2)*

Production of Non Stop tuberous begonias would be enhanced by growing plants under long days and 72° day temperatures. For commercial production in winter months, long day treatments can be easily provided with night-interrupted incandescent lighting, such as is standard with "short-day" crops such as chrysanthemum and poinsettia. In North Carolina long-day treatments should be provided from September through April. Care should be taken to provide long days for seedlings before potting so as not to retard their growth in production.

We wish to acknowledge Earl J. Small Growers, Inc., Pinellas Park, FL for the donation of tuberous begonia plants and Coulbourn Lumber Co., Windsor, NC for the donation of media and Dr. Jack Downs, Director, Southeastern Plant Environmental Laboratories for the use of facilities.

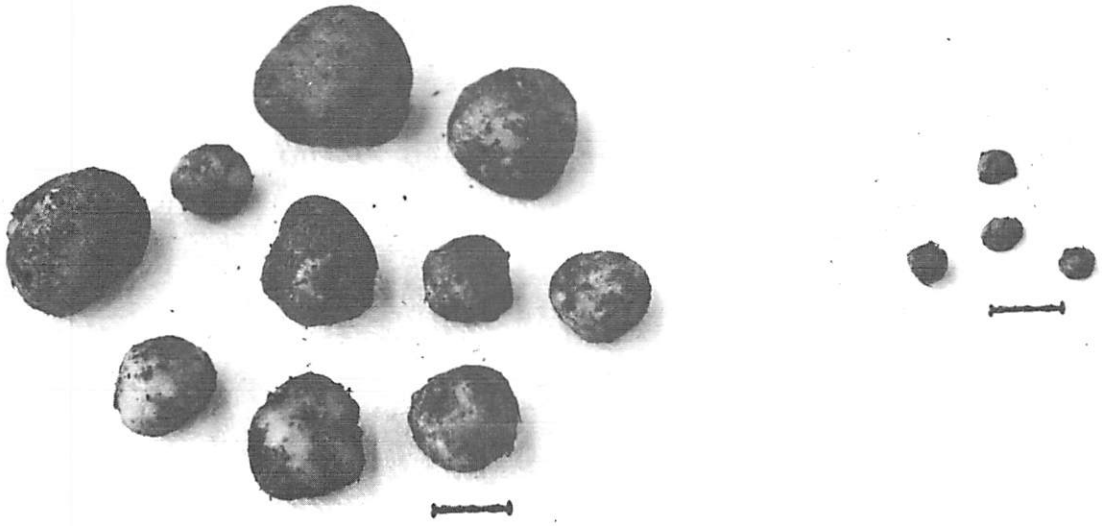


Figure 1. Tubers of Non Stop tuberous begonia, 'Double Red', grown at 79°day/65°F night temperatures under photoperiods of 9 hours (left) and 9 hours + 3 hours interrupted night (right). Scale approximately 0.8 inches.

Table 1. Growth response of Non Stop tuberous begonia cultivars, Double Red and Double Orange, to long day, short day, and interrupted night photoperiods.

Cultivar	Photoperiod (hrs)	Leaf number	Top fresh weight (oz)	Tuber fresh weight (oz)	Tuber Size (in^3)
Double Red	9	11	2.3	0.67	2.00
	9+3	21	7.8	0.03	0.07
	16	24	7.4	0.02	0.07
Double Orange	9	10	1.9	0.64	1.80
	9+3	15	5.7	0.04	0.11
	16	22	5.8	0.05	0.11

Table 2. Growth response of Non Stop tuberous begonia cultivar, Double Red and Double Orange, to different temperatures.

Cultivar	Temperature (day/night) (°F)	Leaf number	Top fresh weight (oz)	Tuber fresh weight (oz)	Tuber Size (in^3)
Double Red	72/65	21	6.9	0.29	0.86
	79/65	16	4.8	0.19	0.54
Double Orange	72/65	16	5.2	0.25	0.71
	79/65	15	3.7	0.23	0.64