

Marginal Lighting for Identifying Chrysanthemum Stunt

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You can now separate chrysanthemum stock plants which are throwing "stunted" cuttings from those not producing stunt, by giving the proper daylength.

When the days are suddenly shortened sufficiently for flowering the stunt affected plants bloom at nearly the same time as the normals. When the days are the proper length to permit some budding of the normal plants, those showing stunt bud and bloom but normal plants cannot develop flower buds even though some buds form.

This is one of the characteristics of the stunt trouble of chrysanthemums (cause unknown). Other symptoms were described by Dimock (New York State Flower Growers Bulletin 26). This character appears to lend itself very well as a means of sorting stunted stock plants and for a quick indexing system of the stock. In order to determine which plants are stunted it has been thought necessary to allow them to complete their normal flowering cycle. The present method allows sorting

easily within six to eight weeks.

Developing the Method

A series of experiments to determine the minimum possible artificial light to prevent flower bud formation during the winter showed these great differences in flowering response of apparently stunted and apparently normal plants. Rooted cuttings of five varieties had been given sufficient light to prevent budding. They were planted September 15. Some were given normal daylength which permitted budding and flowering immediately. Some plants showed characteristics of stunt and other plants appeared normal. (Figure 1) Nevada showed a high percentage of plants stunted, yet the budding and flowering time was not much different on all plants even though some were smaller and showed other characteristics of stunt. When plants of Nevada were given 30 minutes of artificial light each night - 15 minutes at 9 p.m. and 15 minutes at 2 a.m., normal plants formed crown buds, followed by crown buds. (Figure 2)



Figure 1. No additional light. Left - normal; right - stunt.

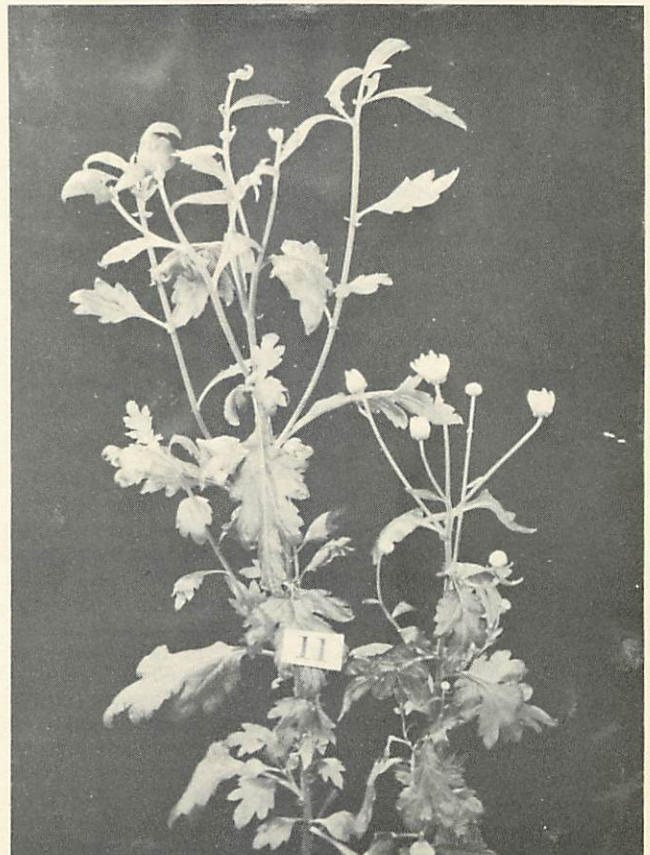


Figure 2. Fifteen minutes of light at 9 p.m. and at 2 a.m. Left - normal; right - stunt.



Figure 3. Thirty minutes of light at 9 p.m. and at 2 a.m. Left - normal; right - stunted.



Figure 4. One hour of light from 11:30 p.m. to 12:30 a.m. Left - normal; right - stunted.

None of these buds developed to flowering under these conditions. Apparently stunted plants formed a terminal cluster and developed the buds somewhat slower than those plants given no additional light supplementing day light. These buds opened.

When given one hour of supplementary artificial light in two 30 minute exposures at 9 P.M. and 2 A.M., the apparently normal plants formed crown buds followed by crown buds (Figure 3). Stunted plants formed a normal spray of terminal buds. These buds were slower to mature than the buds in normal season.

Non-stunted plants given one hour of light from 11:30 to 12:30 produced crown buds followed by vegetative growth which eventually formed a second crown. (Figure 4). It is doubtful if any of these buds would develop if the treatment were continued. Plants which were apparently stunted produced a terminal bud which continued to develop and doubtless would have flowered. The rate of development of the buds was slower than with no artificial light.

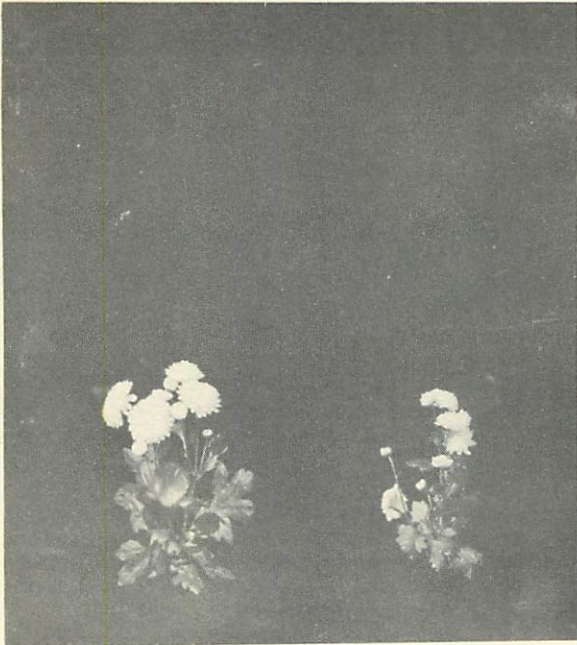
Daylength for Indexing

It is obvious from these preliminary trials that stunted plants can be detected in less than two months if they are given a daylength suitable for budding but not short

enough for flowering.

To index stock plants, four or more cuttings could be taken from each plant. The cuttings could be given "marginal" lighting in the rooting media. By some fertilization in the rooting media, the plants could be grown for the necessary time to determine those apparently stunted. Referring back to the plants from which these cuttings were taken the stock which produced cuttings which budded early could be detected and eliminated. These are the stock plants producing stunted cuttings. Apparently stunted free cuttings could be produced from these stock plants in less than 8 weeks from the time the cuttings are made for indexing.

Another method of obtaining stunt free stock would consist of rooting the cuttings and using them for stock. These cuttings are marginal lighted until those which develop the buds can be identified. The apparently stunted plants are removed. The apparently normal plants are cut back to remove the buds which have formed, and the day is lengthened above 14 1/2 hours by giving three hours of light each night. This causes the remaining plants to immediately produce vegetative shoots which can be used for cuttings. By this method one could produce a crop of cuttings about 4 weeks after the tops are removed or about 12 weeks after the original rooted cuttings were planted in the bench.



Arcadia flowers immediately if given short days as soon as the rooted cuttings are planted. Left apparently normal. Right-probably stunted.



Arcadia given two hours of artificial light (7 to 9 p.m.) December and January. Apparently normal plants (left) bud continuously but the buds fail to develop while apparently stunted plants (right) bud and flower.

PROPOSED MARGINAL LIGHTING ARRANGEMENT

During the short day period (September to March inclusive) many variations of marginal lighting are effective in sorting the stunted plants. Any small amount of additional artificial light has an effect of delaying the development of the buds which have formed on normal plants. Two hours or less of additional light per night has little or no effect on the rate of development of the buds on stunted plants. In later trials, one hour of light in the middle of the night or two hours from 7 to 9 P.M. gave great differences between apparently stunted and apparently normal plants.

Late varieties require a shorter light period than do early varieties to exaggerate growth differences.

During the long day period (April to August) the marginal lighting treatment will have to be provided by reducing the light period rather than lengthening it. A cover which is absolutely opaque, such as rubberized cloth, canvas or sisalkraft paper should be used. A lighting arrangement under the cloth would be necessary since most operators could not be present to cover plants at the proper time. Two methods of manipulation under the cloth can be followed to give similar results.

1) Cover the plants at 5 P.M. and remove the cover at 7 A.M. The time will have to be quite accurate. Light the plants under the cloth from 7 to 9 P.M. During hot weather the treatment could be from 3 to 5 A.M., 60 watt Mazda bulbs at 6 foot intervals and 3 feet above the plants or, better yet, if fluorescent bulbs were used to give a minimum of 5 foot candles.

2) cover the plants in late afternoon and turn on the lights immediately. Set the time switch to turn off the lights at 7 P.M. and to turn them on again at 5 A.M. The lights are turned off when the cloth is removed in the morning.

Both treatments give a 10 hour dark period of sufficient length to permit buds to form on all varieties but prevents them from developing on apparently normal plants. It will probably permit buds to develop to flowering on the apparently stunted plants. Treatment (2) is probably most satisfactory because it will permit a greater variation in the time of day the plants are covered. Probably no more than 15 minutes difference from the time set, in the time of covering or removing the cloth should be allowed if treatment (1) is followed. 60 degrees F. temperature must be maintained.

PROPAGATE MUMS LATE

You have time to clean stunt from your stock before you have to propagate for normal season bloom. There is no need to take cuttings for normal season before May 15.

Are you calculating your production program from the date you are to flower them?

Pinch pompoms 25 to 30 days before you start short days. Plant rooted cuttings 15 to 20 days before you pinch and make cuttings 15 to 20 days before you bench them.