THE USE OF LONG DAYS AND INDOLEBUTYRIC ACID TO STIMULATE ROOTING OF CHRYSANTHEMUM CUTTINGS[1]

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Although chrysanthemum cuttings are easily rooted, there is still considerable interest in finding means of speeding the rooting process and increasing the number and length of roots. Rooting hormones such as indolebutyric acid (IBA) are widely used to accomplish these objectives. Little work has been reported, however, to determine the effect of exposure of chrysanthemum cutting to different daylengths on rooting. Cuttings of common bean, which are day neutral as far as flowering is concerned, have been shown to root much better at photoperiods of 12 to 16 hours than at shorter photoperiods or under continuous light (1). Certain junipers, holly, and rhododendrons have also shown differential rooting responses when cuttings were exposed to different photoperiods in the cutting bench (2).

Two hundred 3-inch cuttings of the garden chrysanthemum, variety Wanda, were taken in mid-February to test the effect of photoperiod and IBA on rooting. The stock plants had been dug in the fall, stored in a cold frame for two months, and brought into the greenhouse about six weeks before the cuttings were taken. The bases of half of the cuttings were treated with a talc preparation of 0.3 percent IBA. The other half received no hormone treatment. Cuttings were stuck in sand-rooting medium in flats and exposed to either a 9-hour or 16-hour photoperiod in the greenhouse bench during the rooting period. They were hand watered.

Half of the cuttings exposed to each photoperiod had been hormone treated making a total of four different treatments:

1) Long-day and hormone
2) Long-day only
3) Short-day and hormone
4) Short-day only

There were two replicates for each treatment. The two photoperiod treatments were given as follows:

a) Both the short-day (S.D.) and long-day (L.D.) cuttings received 9 hours of natural light from 8 a.m. to 5 p.m. The S.D. cuttings were shaded the rest of the day.

b) The L.D. cuttings were given an extended day by exposing them to low intensity (25-50 foot-candles) incandescent light from 5 p.m. to 10 p.m. and from 6 a.m. to 8 a.m.

The low intensity of the light used to extend the photoperiod of the L.D. cuttings would give little photosynthetic advantage over the S.D. cuttings. A night temperature of 60-62°F. was maintained. Notes were taken after 10 and 14 days on the percentage of cuttings rooted, the number of roots and the estimated length of roots.

Results:

Table 1 shows that more cuttings were rooted after 10 days in treatments with either L.D. or IBA. After 14 days all of the cuttings were rooted in all treatments.

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Table 1. - Percentage of cuttings rooted after 10 and 14 days

Rooting Time	Long-Day		Short-Day	
	No IBA	IBA	No IBA	IBA
10 days	26	50	16	32
14 days	100	100	100	100

Treatments receiving long days or IBA also produced more roots and longer roots than the short-day, no IBA treatments after 14 days of rooting. This is illustrated in Figures 1 and 2.

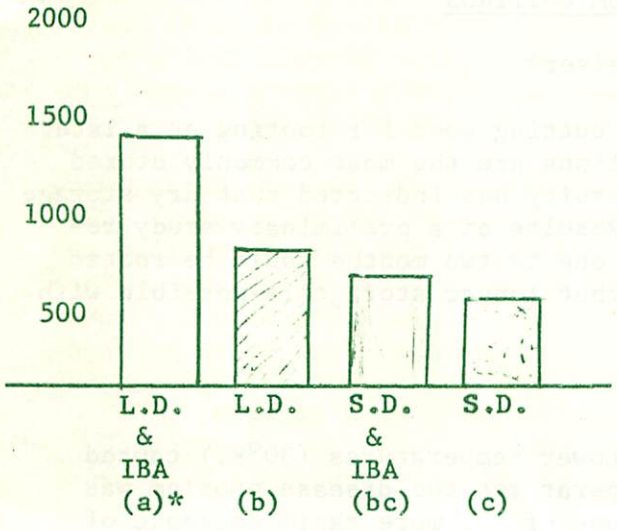

Figure 1. Total root length on 50 cuttings after 14 days.

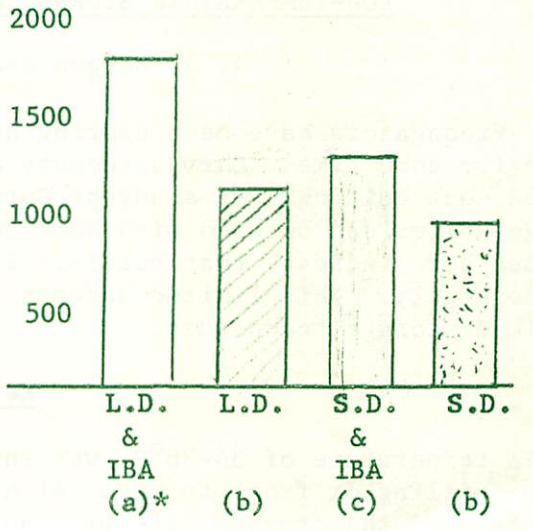

Figure 2. Total number of roots on 50 cuttings after 14 days.

*Letters under each treatment indicate results of the Multiple Range Test at the one percent level of significance. Treatments with letters in common are not significantly different from one another.

In both cases by far the best root development occurred in the treatment receiving both L.D. and IBA and the poorest rooting occurred in the control which has S.D. and no IBA. The combined beneficial effect of L.D. and IBA was greater than the sum of their individual effects.

Conclusion

It can be concluded that long days combined with hormone treatments gave considerably better rooting of Wanda chrysanthemum cuttings than any of the other treatments. Where fast rooting and well developed root systems are desired during the short days of winter, it would be simple and inexpensive to expose cuttings to low intensity light to lengthen the day, in addition to giving them a hormone treatment.

References

1. Fernquist, I. B. and A. C. Leopold. 1959. Light effects on rooting of Phaseolus cuttings. Plant Physiology 34:iv.

2. Lanphear, F.O. and R.P. Meahl. 1961. The effect of various photo-periods on rooting and subsequent growth of selected woody ornamental plants. Proc. ASHA 77:620-633.

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