DWARFING CARNATIONS WITH CCC FOR POT PLANT SALES

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Potted carnations in dwarfing tests with CCC—left to right: A, 1½ oz. CCC per 3 quarts of water; B, 1 oz. per 3 quarts; C, ½ oz. per 3 quarts; D, only water (control). Two ozs. of the above solutions were applied on August 25 and again on Sept. 14, 1961. Photograph taken Nov, 2, 1961.

Use of the growth retardant chemical CCC offers floriculturists the possibility of producing dwarfed carnations for potted plant sales along with the now-popular chrysanthemum and poinsettia plants. However, several problems remain to be solved before it can become a commercial practice. Plants treated either by soaking a rooted cutting or by soaking the soil vary greatly in height and flowering time. This means that until further research is conducted, plants should only be grown and treated in small containers where selections for sale can be made near the time of flowering.

THREE EXPERIMENTAL methods for application of the CCC were tried: soil soaking, soaking rooted cuttings and potting rooted cuttings. Soaking the roots of cuttings in a solution of CCC for a period of time did not prove practical because of the danger of spreading disease, and because high concentrations cause brittleness. Plants so treated with low concentrations soon "outgrew" the effect of the chemical and grew normally. It also did not appear possible to pot or plant cuttings directly as is done with chrysanthemums because of the extreme variability in both height and flowering of carnations.

In a test of the soil-soak method, one commercial grower near San Francisco who propagates his cuttings directly in 3-inch plastic pots containing U.C. soil mix, tried various concentrations of CCC applied directly to the soil after the cuttings were well rooted and established. Concentrations suggested by the manufacturer for use with poinsettia were used: 1½, 1, or ½ fluid ounces of CCC per 3 quarts of water. Two ounces of these solutions were applied per pot on August 25 and again on September 14, 1961. The CCC product used was a 50 per cent material. The formulation that is now available contains 11.8 per cent active CCC. Plain water was used as a control. These appear as treatments A, B, C and D, in the table and the photograph. Final height measurements and observations were made on October 26, 1961. The table also gives the varieties tested and average heights, complete with the standard deviation, as affected by several CCC concentrations.

Concentrations

The concentration of 1½ ounces per 3 quarts of water (treatment A) had a pronounced dwarfing effect on the plants, but the plants were not very uniform in their reaction. Cardinal Sim became chlorotic at this high concentration. In general, the plants treated with a lower concentration (treatment B) were slightly more uniform and had an added advantage of being a more proportionate plant than the other treatments. These plants had greater appeal in the size pot in which they were grown. There was no consistent habit of bloom due to treatment, that is, there were all stages of flower development in all of the treatments. The photograph was taken to show average height differences and not the stage of flowering.

Flowering

In spite of the fact that there is extreme variability in flowering and a fair degree of height variability, the practice of treating the plants with 1 ounce per 3 quarts of water twice may have commercial application. If large numbers are grown and treated, selection for sale can be made

Average final heights in inches of some carnation varieties as affected by three levels of CCC applied twice to the soil. There were 8 plants of each variety for each treatment.

Variety	A 1½ oz. per 3 quarts	B 1 oz. per 3 quarts	C ½ oz. per 3 quarts	D Control (water)
Cardinal Sim	10.2 ± 3.57	12.3 ± 1.91	16.9 ± 4.04	25.3 ± 1.81
Exquisite	8.6 ± 2.17	7.6 ± 2.95	9.7 ± 1.95	16.4 ± 6.33
White Sim	11.5 ± 3.81	10.0 ± 2.52	18.9 ± 5.05	26.8 ± 1.26
Hollywood Sim	8.5 ± 1.33	9.6 ± 1.85	11.9 ± 2.61	26.0 ± 2.22

periodically to fill orders with fully developed flowers. Short carnation plants in small individual pots might have great appeal for garden-center sales. Eventually the plant loses the effect of the CCC and again grows normally.

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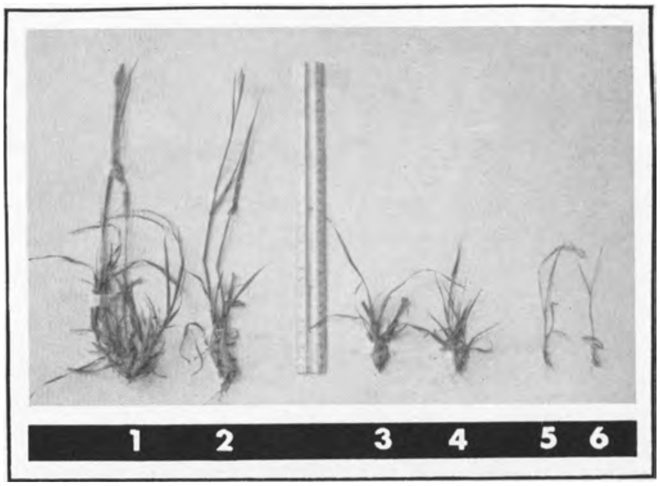
The CCC material was supplied for the tests by the American Cyanamid Company.

PERENNIAL RANGE GRASS SEEDLINGS STOPPED BY WEEDY COMPETITION



PROOF THAT UNCONTROLLED weedy competition can often completely stop the establishment of perennial range grasses is seen in this photo taken in Marin County as a side result from a range fertilization test plot. Growth of two grasses under three different conditions is illustrated: Plants 1, 3 and 5 are orchard grass and plants 2, 4 and 6 are hardinggrass.

Plants 1 and 2 were taken from an area cultivated before seeding and having some light weed competition grazed off by sheep during April. Plants 3 and 4 were seeded in oat stubble with much competition from velvet grass and tarweed. Grazing during April controlled this competition enough to allow the small perennials to become established.

Plants 5 and 6 were in an area next to that from which plants 3 and 4 were taken. Weed competition was not controlled by grazing. Seedlings were scarce and those still alive were chlorotic. Weeds were 18 inches tall.

This test plot was 3 miles north of Pt. Reyes Station on rolling hills at about 500-foot elevation. The entire area had been fertilized with 50 pounds of P_2O_5 and seeded on November 10, 1961. Photographs were taken on June 13, 1962, and were typical of the grasses in each plot.—*Winston L. Engvall, Farm Advisor, Marin County.*

PHOTOSYNTHESIS IN GREEN FRUITS

GROWING FRUITS are generally assumed to obtain most of their growth material by translocation from the photosynthesizing leaves of the plant. Yet, most fruits contain chlorophyll during a large part of their development and should be able to contribute to their own growth by photosynthesis. Published studies on work done in Riverside have shown that lemons, oranges, avocados and cucumbers can, in fact, carry on photosynthesis to the extent that they may provide a substantial amount of their own growth material. Recently, this research has been extended to other fruits and to varied conditions with the surprising discovery that the capacity of the fruit for photosynthesis may be considerably greater than it normally appears—but is limited by the respiration and structure of the fruit.

This conclusion came from observations that the upper limit for photosynthetic assimilation of carbon dioxide in most of the fruits used appeared to be almost exactly equal to the loss of carbon dioxide which would be expected from respiration. No matter how bright the light, photosynthesis could nót be made to exceed this "compensation point" in a number of different fruits and at different stages of development. To confirm the suspicion that the photosynthetic rate was, in some manner, limited by the respiratory rate, fruits were subjected to temperature conditions which changed the respiration above or below the rates usually being observed. Normally, changes of temperature affect photosynthesis in leaves much less than respiration. Upon lowering the temperature to reduce the respiration, the maximum photosynthesis in fruits was correspondingly reduced. At higher temperatures, with respiration almost doubled, photosynthesis was similarly increased. Under these elevated temperature conditions, assimilation rates almost approaching that of leaves could be found.

A basis for this respiratory control of photosynthesis was found by microscopic examination of the fruit surface layers. Leaves generally have only a thin single layer of epidermal cells overlying the photosynthetic cells and many openings (stomata) for entrance and exit of gases. Fruits usually have several layers of cells covering the photosynthetic cells and few or no openings in the surface for gas exchange. This means that diffusion of gases into and out of the fruit may be much more restricted than in leaves. The photosynthetic assimilation of the fruit is thus restricted, practically, to the carbon dioxide available internally from respiration.

One of the puzzling questions still remaining is the manner in which respiratory carbon dioxide escapes from the fruit while assimilation from the air is restricted. Preliminary studies indicate that this may be due to the build-up of carbon dioxide concentration gradients within the fruit.—*Ross C. Bean, Assistant Professor of Biochemistry, Department of Biochemistry, University of California, Riverside.*