control the disease in propagation. Further, drench treatments of Morsodren®, basic copper sulfate, captan-ferbam combination, and Puratized Agricultural Spray® reduced the disease. However, benomyl (Benlate® or DuPont 1991) when employed as a drench was 100 percent effective in controlling *Cylindrocladium*. The 50-percent wettable powder of Benlate® was used at the rate of 1 pound per 100 gallons of water and 1 pint per square foot applied.

® = Registered trademark

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CARNATION BUD OPENING II

A Progress Report
Seward Besemer*

The November 1970 issue of the Flower and Nursery Report published results of an initial experiment dealing with the opening of carnation flowers cut at the "in bud" stage. The test results at that time showed that flowers treated with stems immersed in preservative solutions of Everbloom®, Floralife®, Petalife®, or FM Budmagic® opened satisfactorily and had excellent fresh flower life after harvest. The following tests were made to further study the effects of modifying some of the previously used preservative solutions on flower bud opening and keeping qualities.

Peterson's New Improved Pink Sims were cut on January 21, 1970, with ½ to ¾ inch of petals extended beyond the calyx. Stems were recut to 18-inch lengths and 10 stems placed in each treatment of 1 quart of solution.

The conditioning room temperature was 75-80 F, constantly lighted with fluorescent lights and ventilated with an exhaust fan in the ceiling. The relative humidity was approximately 45 percent.

A rating was made each day for rate of bud opening as follows: 0 = tight bud, 1 = ¼ opened, 2 = ½ opened, and 3 = flower opened to normal commercial harvest stage. A treatment of 10 stems would, therefore, have a rating of 30 if all buds opened normally. For keeping life, the termination date of each flower was noted when the petals lost turgidity. They were removed from the container at that time.

As in the previous experiment started on January 9, 1970, the buds were possibly a little too tight when harvested. The author suggests harvesting when the petals have a slight outward flair and the bud diameter across the top of the petals measures 1 to 1½ inches.

OBSERVATIONS

As shown in table 1, nearly 96 hours (4 days) after harvest were required for the majority of buds to open in the treatments. Buds in the three treatments, oxaline citrate at 100 ppm plus 2 percent sugar, oxaline citrate at 200 ppm plus 2 percent sugar, and Cornell solution, opened well in 72 hours.

In 5 treatments, all buds never opened completely. These solutions were oxaline citrate at 100 ppm (no sugar), oxaline citrate at 200 ppm (no sugar), 8-Quinolinol sulfate 200 ppm (no sugar), distilled water only, and tap water only.

Cornell solution produced the most desirable results in this experiment. The buds subjected to this treatment opened the most rapidly and uniformly. Flowers were generally larger, 3½" to 4" in diameter, than those in all other treatments. The flower life in this treatment averaged 4 to 6 days longer than that in the next best treatments. Flower diameter was progressively smaller in the Floralife®, Everbloom®, Petalife®, oxaline citrate at 100 ppm plus 2 percent sugar, and oxaline citrate at 200 ppm plus 2 percent sugar treatments. The latter four treatments resulted in essentially equal flower-keeping performance. Buds treated with the FM Budmagic® solution opened completely and had good keeping life, but the flowers were small and lacked "sharpness."

It appears from this experiment that chemicals such as oxaline citrate and 8-Quinolinol sulfate

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have little benefit in increasing keeping life unless 2 percent sugar is added. Where 5 percent sugar was added as in the Cornell solution, additional benefit was achieved. Tap water (Colorado River water) used in the formulation of the solutions appeared not to have any adverse effects although it was chlorinated, had a pH of 8.2 and contained approximately 700 ppm soluble salts. Likewise, there was no apparent benefit derived from the use of distilled water.

In general the most desirable results in these tests were obtained in the same treatments that were found to be best in the first experiment and previously reported. The greatest difference was noted in increased flower diameter and prolonged flower life when sugar was added to hitherto relatively ineffective preservative solutions as noted above.

Table 1. Carnation Bud Opening and Flower Life.

Treatment	Bud opening rating[2]			Average days fresh flower life from harvest[3]
	48 hrs	72 hrs	96 hrs	
Everbloom® 12 g/qt	5	18	30	14.1
Floralife® 20 g/qt	2	13	28	14.4
Petalife® 20 g/qt	0	12	22	16.0
Oxaline citrate 100 ppm	1	10	20[4]	7.9
Oxaline citrate 100 ppm + 2% sugar	10	26	29	13.5
Oxaline citrate 200 ppm	2	10	16[4]	7.3
Oxaline citrate 200 ppm + 2% sugar	10	25	29	13.2
FM Budmagic® 7.5 ml/qt	3	13	23	14.5
8-Quinolinol sulfate 200 ppm	4	10	14[4]	7.8
Cornell solution[1]	13	25	30	20.3
Distilled water only	3	11	17[4]	7.1
Tap water only	3	11	18[4]	7.3

[1] Cornell solution is 8-Quinolinol sulfate 200 ppm, silver acetate 50 ppm, and 5% sugar. All treatments (except distilled water only) were made with tap water with a pH of 8.2 and EC_e of about 1.0.

[2] A rating was made each day—0 = tight buds, 1 = ¼ opened, 2 = ½ opened, and 3 = flower opened to commercial harvest stage. A treatment of 10 stems would therefore have a rating of 30 when all are opened.

[3] Includes time for opening buds.

[4] All buds never opened completely.

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