Developing An Independent Sales Staff and Sales Organization

Many of our larger growers have chosen to hire and train their own sales staff and develop their own sales organization. A lot of our nurseryman do not have sufficient volume to warrant this kind of expense or effort. On the other hand, larger volume growers often are unable to market their entire output through the other grower developed market outlets discussed above. These growers must either market through established marketing systems or develop a marketing organization of their own. There are both advantages and disadvantages to this approach, also.

Advantages

1. *Control.* The grower with his own sales organization can be in complete control of the sales activity and sales effort for his material. This can be financially beneficial when prices are high and sales are booming. When prices are low and normal market outlets are glutted, the grower may find the lack of contacts with established marketing systems leaves him to the mercy of the ability of his own sales organization to compete with other established systems. Both his affectiveness as a grower and as a director of sales activities will play a part in his outcome.

2. *Marketing margins.* The grower selling through his own sales organization usually retains a larger share of the consumer dollar than growers marketing through established marketing systems. He is doing the job of both the grower and the established marketing system. This is an advantage only as long as his sales organization is efficient enough to net his growing operation more than he would receive going through established systems.

3. *Opportunity.* Potential for expansion in production and sales is limited only by the national market and effectiveness of his sales organization. The grower is not limited by inflexibilities in the established system. Special custom packaging and handling techniques can be used to capture segments of the market.

4. *Service to others.* A grower with his own sales organization can also accommodate the production of other growers if he wishes to. This can result in a expansion of his sales volume and possibly add other varieties that might be complementary to his own offerings.

Disadvantages

1. *Duplication.* A grower who develops his own sales organization is duplicating the facilities already available through established marketing systems including those of other growers who also have developed their own marketing organization.

2. *Cost.* There are economics of scale in marketing operations. Growers with insufficient volume to warrant the development of a complete and effective sales organization will limit the ability of his staff to do a good sales job for him. Insufficient volume to fully utilize the sales organization developed will result in high cost per unit sold, thus limiting returns to the growing operation.

3. *Product line.* A grower with his own sales organization will need either to grow or to obtain through purchase or contract with other growers sufficient volume of reliable quality to develop and establish a reputation and recognized product line for his business.

4. *Personnel.* A good sales organization requires competent, well trained and well paid personnel to compete successfully. Fnding such people can be a problem. Without adequate volume, the cost of retaining this kind of personnel will be prohibitive.

5. *Seasonality.* Most growers who produce only seasonal crops such as poinsettias and Easter lilies probably cannot afford to maintain an effective year-round marketing organization.

Summary

This has been a brief review of advantages and disadvantages of alternatives available to growers wishing to develop their own marketing program. No single alternative will work well for all growers. Some growers may be able to specialize in one alternative, while others may find utilizing more than one alternative works best for them. Still other growers will find that they are best served by utilizing a marketing system that is already established and operating.

Proc. Fla. State Hort. Soc. 90:294-296. 1977.

CONTROL OF BACTERIA IN CUT FLOWER VASE WATER[1]

F. J. Marousky
U. S. Department of Agriculture,
Agricultural Research Service,
5007 60th St. East, Bradenton, FL 33508

Additional index words. cut flower longevity, cut flower quality, vase-life.

Abstract: **The slow-release chlorine compounds sodium dichloroisocyanurate (DICA) and 1,3-dichloro-5,5-dimethylhydantoin (DDMH) effectively maintained low counts of bacteria in cut flower vase water. A 1-minute exposure to 50 mg DICA or DDMH/liter killed cells of 7 of the 11 bacterial species tested while a 5-minute exposure killed cells of all 11 test species. Cut flowers held in DICA or DDMH had slightly improved quality. Greatest improvement in cut flower quality and longevity was obtained when DICA or DDMH were combined with sucrose.**

The presence of bacteria in cut flower vase water has been amply documented (1, 3, 4, 8). Aarts (1) who demonstrated the effects of bacteria on wilting and longevity of cut flowers, concluded that bacteria act directly on cut flowers by physically blocking the stems and indirectly by producing substances that are absorbed by the flowers. Ford et al (4) showed that most of the microorganisms associated with cut flowers are soil and water-borne bacteria. Dansereau and Vines (3) showed that bacteria infiltrate and move in the stems of cut snapdragons. Those results confirm Aarts's premise and imply that a large population of bacteria may physically plug the flower stem. Another dimension was added to the problem of cut flower bacteria when Taplin and Mertz (8) published their findings. They reported excessively high microbial populations in vase

[1]Florida Agricultural Experiment Stations Journal Series No. 602.

water (10^{13}/ml), but more importantly, they identified bacterial species (pathogens) that could cause diseases of humans. Since pathogens were present in vase water, Taplin and Mertz suggested that flowers be removed from high risk areas in hospitals. These findings were misinterpreted and the distorted stories that appeared in newspapers and magazines caused considerable anxiety to florists.

The physiology of cut flowers usually is studied in the laboratory where water is changed frequently and bactericides, such as silver or quinoline salts, are used. Hence, in experimental work the microbial population has been kept to a minimum and microorganisms have not been a factor in cut flower quality. The typical recommendation given to the florist has been based on such laboratory data. In commercial floristry, however, flower handling is much different; many flower stems are arranged in a relatively small container with a small volume of water. Given these circumstances, contamination is very high. In vase water of floral arrangements microbial population can reach as high as 10^6 bacteria per ml. Preservatives have been recommended for prolonging flower life and reducing the microbial population in vase water. Although florists use floral preservatives, many still complain about "odoriferous," "cloudy," or "stale" water. Recently the most common preservatives, in commercial trade and research, have been centered on quinoline salts, on their derivatives, and sucrose (9, 10).

The quinoline compounds are effective bactericides, but recent evidence (3) suggested that quinoline salts may inhibit growth rather than kill certain bacterial species. The effectiveness of silver compounds in the laboratory is indisputable (1). However, silver is not available commercially and its use as a practical preservative-bactericide is questionable. First, silver salts form a black precipitate with time (depending on light exposure). This precipitate can coat the flower stem. Second, silver salts cannot be used with chlorinated water because the silver combines with chloride to form insoluble silver chloride. Most water supplies in the U. S. are chlorinated. Third, silver might spot and mar furnishings if vase water were spilled. Lastly, it is difficult for the average florist to obtain silver salts from chemical and laboratory supply firms.

All the evidence indicates that the floral industry needs an effective means, chemical or biological, to "sanitize" vase water, but reduce neither quality or display life of flowers. The *ideal* bactericide for cut flower water might be defined by the following points:

1. The agent should be water soluble.
2. The agent must not be drastically changed by solution pH and must remain soluble.
3. The agent must eliminate all bacteria and have a long (7-8 day) residual effect as a bactericide.
4. The agent must not be phytotoxic to flowers or leaves.

Many of the effective commercial bactericides on the market are not water soluble so we did not test these. In the laboratory we tested chemicals on mixed cultures of bacteria obtained from cut flower water. We simply exposed bacteria to various chemicals for 1 hour and then analyzed the water for bacteria. This screening test allowed us to check many compounds at several concentrations. Chemicals that were relatively effective were then tested on cut chrysanthemums because chrysanthemum leaves are extremely sensitive to chemicals. We inoculated all vase water with bacteria, then sampled the water and cultured it to determine whether or not bacteria were eliminated. Typically, bacteria were effectively controlled by most compounds tested but the leaves or stems were injured. The one group of compounds that repeatedly gave good microbial control with minimum leaf injury were chlorinating chemicals, particularly the organic chlorinating chemicals, sodium dichloroisocyanuric acid (DICA) and 1,3-dichloro-5,5-dimethylhydantoin (DDMH). These chemicals have long residual effects as bactericides.

Although chlorinating chemicals have been used for cut flower studies (5), they have not been evaluated on specific organisms usually found in cut flower vase water (4, 8). We evaluated the organic chlorinating chemicals against 11 bacterial species by a procedure similar to that described by the Association of Official Agricultural Chemists (2). Using this method we demonstrated that both DICA and DDMH effectively eliminated many of the microorganisms after a 1 or 5 minute exposure (Table 1). All microorganisms tested were eliminated after a 30 minute exposure to either chemical. Many of the organisms tested were gram-negative bacteria species previously found in cut flower water (8).

Table 1. Growth of various bacterial species after exposures of 1, 5 and 30 minutes to 50 mg dichloroisocyanurate or 50 mg 1,3-dichloro-5,5-dimethylhydantoin per liter.

Bacterium	Control (water) (min.)			DICA (min.)			DDMH (min.)		
	1	5	30	1	5	30	1	5	30
Bacillus cereus	+	+	+[w]	+	+	−	+	+	−
Bacillus subtilis	+	+	+	−	−	−	+	+	−
Escherichia coli	+	+	+	−	−	−	−	−	−
Pseudomonas aeruginosa #62[y]	+	+	+	−	−	−	+	+	−
Pseudomonas fragi	+	+	+	−	−	−	−	−	−
Pseudomonas cepacia #143[x]	+	+	+	−	−	−	−	−	−
Micrococcus luteus	+	+	+	−	−	−	−	−	−
Aerobacter aerogenes	+	+	+	−	−	−	+	−	−
Aeromonas hydrophila	+	+	+	−	−	−	−	−	−
Micrococcus roseus	+	+	+	−	−	−	−	−	−
Klebsiella pneumoniae	+	+	+	−	−	−	−	−	−

[w]Growth: + = growth; − = no visible growth, after 48 hrs.
[y]Isolate obtained courtesy of M. N. Schroth, Univ. of Calif., Berkeley, CA 94720.
[x]Isolate obtained courtesy of D. Taplin, Univ. of Miami, Miami, FL 33152.

Although these "test tube" experiments demonstrated the effectiveness of chlorinating chemicals against specific bacteria, they did not test the effectiveness of the chemicals on bacteria in water containing cut flowers. We tested low levels of each chemical (50 mg/liter of water) on roses, asters, carnations, gladiolus, snapdragons, chrysanthemum, and gypsophila. Since cut flowers respond favorably to sucrose, we tested each chemical with and without sucrose. We used water as a control and a floral preservative (8-hydroxyquinoline citrate plus sucrose) for comparison. We also inoculated each container with bacteria to simulate commercial conditions. Most of the conditions during these tests approximated those that would be typical for displayed flowers (temp. 23.5-25°C, light, 1-1.6 Klx, relative humidity, 40-60%). Although we added high levels of microorganisms and of flower stems, the microbial population in the water was low in comparison with the control (Table 2). Bacterial populations were extremely low in waters from asters and roses but slightly higher in waters from gladiolus and carnations. To date, we have not been as successful with gypsophila as with the other cut flowers. Although DICA and DDMH reduced the bacteria to low levels, this reduction did not necessarily have a favorable effect on cut flower quality and longevity (Tables 3 and 4). Cut roses held in DICA and DDMH without sugar (sucrose) maintained weight and turgidity better than flowers *held in* water (Table 3). However, aster flowers held in DICA or DDMH

Table 2. Bacterial populations (per ml) in vase water treated with sodium dichloroisocyanurate (DICA) and 1,3-dichloro-5,5-dimethylhydantoin (DDMH) with and without sucrose and 8-hydroxyquinoline citrate (8-HQC) plus sucrose.[z]

Chemicals, conc/liter	Forever Yours Roses	Purple King Asters	Peter Pears Gladiolus	Elegance Carnations
Control (water)	1.5 x 10^6	3.1 x 10^6	3.0 x 10^4	4.5 x 10^6
50 mg DICA	0	0	0	550
50 mg DICA + 20 g sucrose	0	0	450	2.2 x 10^4
50 mg DDMH	15	5	15	400
50 mg DDMH + 20 g sucrose	50	0	150	1.2 x 10^4
200 mg 8-HQC + 20 g sucrose	6.9 x 10^5	4.4 x 10^6	4.1 x 10^6	1.1 x 10^6

[z]Bacterial populations determined after 3, 3, 6, and 5 days for roses, asters, gladiolus and carnations, respectively.

Table 3. Changes in fresh weight (%) of Forever Yours roses treated with sodium dichloroisocyanurate (DICA) and 1,3-dichloro-5,5-dimethylhydantoin (DDMH) with and without sucrose and 8-hydroxyquinoline citrate (8-HQC) plus sucrose.

Chemicals, Conc/liter	Percent weight change[z] after 2 days	4 days	6 days
Control (water)	−3	−7	−20
50 mg DICA	+5	+2	−12
50 mg DICA + 20 g sucrose	+5	+10	+12
50 mg DDMH	+7	+1	−10
50 mg DDMH + 20 g sucrose	+8	+9	+6
200 mg 8-HQC + 20 g sucrose	+3	+3	−16

[z]Data expressed as percent change from initial fresh weight.

Table 4. Changes in fresh weight (%) and quality of Purple King Asters treated with sodium dichloroisocyanurate (DICA) and 1,3-dichloro-5,5-dimethylhydantoin (DDMH) with and without sucrose and 8-hydroxyquinoline citrate (8-HQC) plus sucrose.

Chemicals ,conc/liter	% weight change after[z] 7 days	10 days	Flower quality[y] 7 days
Control (water)	−16	−43	3.8
50 mg DICA	− 9	−48	3.7
50 mg DICA + 20 g sucrose	+25	+24	1.0
50 mg DDMH	− 7	−34	3.8
50 mg DDMH + 20 g sucrose	+32	+35	1.0
200 mg 8-HQC + 20 g sucrose	− 4	−17	2.4

[z]Data expressed as percent change from initial fresh weight.
[y]Flower quality: 1 = excellent; 4 = wilted, no decorative value.

without sugar wilted and quality was similar to flowers held in water. The most dramatic effect on cut flower quality and longevity was from the use of sucrose combined with DICA and DDMH. Roses and asters held in 8-HQC plus sucrose were superior to similar flowers held in water (Tables 3 and 4). However, 8-HQC plus sucrose treated flowers were not equivalent in quality and did not last as long as flowers held in DICA plus sucrose or DDMH plus sucrose. 8-HQC plus sucrose did not control bacteria as adequately as DICA plus sucrose or DDMH plus sucrose (Table 2). We also tested high levels of each chemical on snapdragon, carnation, chrysanthemum, roses, and gladiolus. Gladiolus and carnations were not injured at 300 mg DICA or DDMH per liter whereas 100 mg produced chlorosis in chrysanthemum leaves. Chlorosis was related to concentration of chemical used; the greater the concentration of chemical used, the greater the incidence of chlorosis. Snapdragons, held in 100 mg DICA or DDMH, had "bleached" stems and leaves which wilted prematurely. The injury on the chemically treated flowers, however, did not develop until the flowers in water were wilted. We concluded that if the chemicals were used in combination with sucrose, the benefits in quality and longevity of the flowers and in water "sanitation" would outweigh any possible detrimental effects.

These chemicals, DICA and DDMH, have potential use in the floral industry. They are not, however, fail-safe chemicals and should be tested further in the laboratory, by retail florists, and flower growers to determine suitability and their full potential. Under commercial conditions, flower containers and water quickly become contaminated; DICA and DDMH have the advantage of maintaining better bacterial control than present day preservatives. At present, DICA and DDMH are not marketed for use as bactericides for cut flowers. They are used extensively in many industrial products, bleaches, deodorizers, detergents, dishwashing compounds, swimming pool additives. The suitability of DICA and DDMH for marketing for use in vase water for cut flowers has not been established by federal regulatory agencies. Based on the widespread use and apparent safety of DICA and DDMH, the chance of acceptance by regulatory agencies is realistic.

Literature Cited

1. Aarts, J. F. T. 1957. Over de doudbaarheid van snijbloemen (on the keepability of cut flowers). Medel, Landbouw. 57:1-62.
2. Assoc. of Official Agr. Chem. 1965. Methods of analysis 10th ed.
3. Dansereau, B., and H. M. Vines. 1975. In-stem movement, isolation, and identification of two bacteria and their antibiotic sensitivity. *Acta Horticulturae* 41:183-197.
4. Ford, H. E., D. T. Clark, and R. F. Stinson. 1961. Bacteria associated with cut flower containers. *Proc. Amer. Soc. Hort. Sci.* 77:635-636.
5. Kofranek, A. M., H. C. Kohl and J. Kubota. 1974. A slow-release chlorine compound as a vase water additive. *Flor. Rev.* 154(4000): 21, 63-65.
6. Larson, F. E. and R. W. Cromarty. 1967. Micro-organism inhibited by 8-hydroxyquinoline citrate as related to cut flower senescence. *Proc. Amer. Soc. Hort. Sci.* 90:546-549.
7. Marousky, F. J. 1976. Control of bacteria in vase water and quality of cut flowers as influenced by sodium dichloroisocyanurate, 1-3-dichloro-5,5-dimethylhydantoin and sucrose. *U. S. Dept. Agr. Res. Bul.* ARS-S-115, 14 pp.
8. Taplin, D. and P. H. Mertz. 1973. Flower vases in hospitals as reservoirs of pathogens. *Lancet* II (7841):1279-1281.
9. U. S. Patent No. 2,230,931. Feb. 4, 1941.
10. U. S. Patent No. 3,287,104. Nov. 22, 1966.