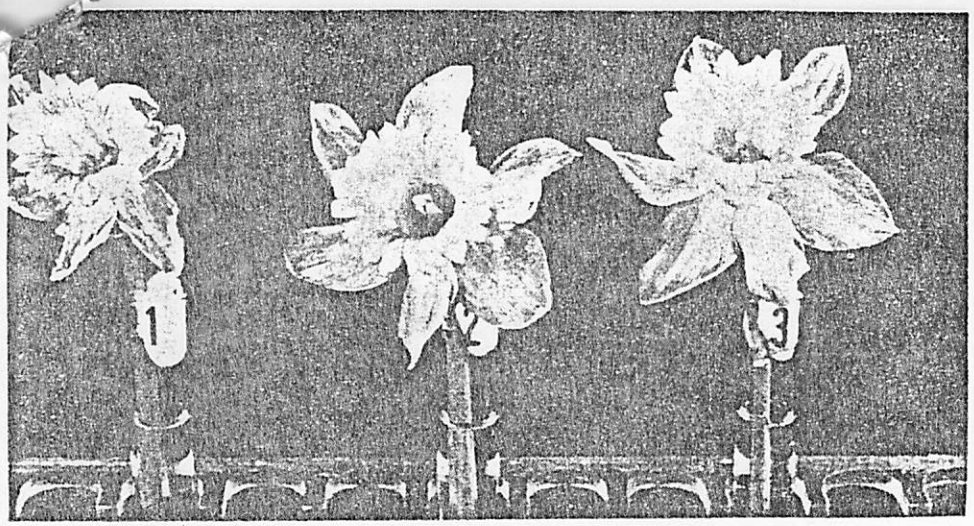

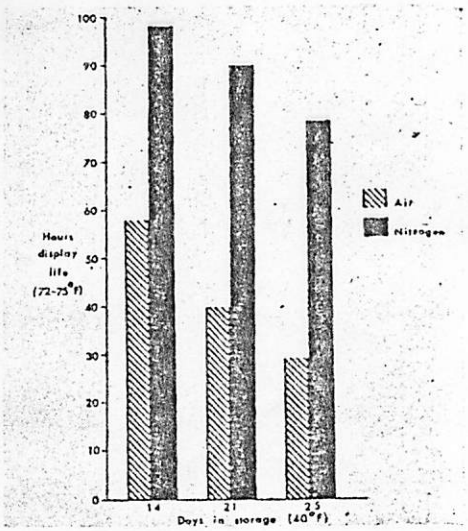

Graph at right, Fig. 1, shows effect on display life of storing freshly cut King Alfred daffodils at 40°F. in air or 100% nitrogen for various periods of time. At left, Fig. 2, King Alfred daffodils 74 hours after storage for two weeks at 40° in 1) air; 2) 99% nitrogen, 1% oxygen; 3) 100% nitrogen. Flowers were fully open at start of storage period.

Sam Asen,
C. S. Parsons
and N. W. Stuart

Controlled Atmosphere For Storing Flowers

REDUCING the oxygen content in storage atmospheres to prolong the life of perishable commodities has been the basis of considerable research. With most atmosphere modification, the oxygen concentration has been reduced and the concentration of carbon dioxide increased. Beneficial effects have been attributed to both the lowered oxygen and increased carbon dioxide. The results with apples have been so gratifying that today about 8% of the apple crop in the United States is stored in rooms with modified or controlled atmospheres.

A limited amount of research has been devoted to the storage of cut flowers in controlled atmospheres. Thornton (3) reported that carbon dioxide concentrations between 5 and 15% prolonged the life of Briarcliff and Mrs. F. R. Pierson roses, and concentrations between 5 and 30% prolonged the life of Talisman roses. Van Stuivenberg (4) concluded that for short periods (three to four days) controlled atmosphere storage for cut flowers was of no value. But, he reported, Better Times roses, freesia and May Time and Peter Fischer carnations could be kept fresh, even after 22 days in cold storage, in a special atmosphere of decreased oxygen and increased carbon dioxide.

This investigation seeks to determine the effect of controlled storage atmospheres on the subsequent display life of King Alfred daffodils that were forced in the greenhouse following storage of the bulbs at 50°F.*

Materials and Methods

Atmospheres of 100% nitrogen, 99% nitrogen plus 1% oxygen, and air were maintained at 32°, 40°, and 70°F in 5-gal. jars as illustrated on the front cover. Freshly harvested King Alfred daffodils were placed in water (except when stored at 32°, where they were stored dry) in Erlemeyer flasks inside the jars. The jars were then sealed and flushed with prepurified nitrogen to the desired atomspheres as indicated by a Beckman D-2 oxygen analyzer.

During the course of the experiments, the atmospheres in the jars were determined daily and readjusted as necessary. Packets of fresh hydrated lime which had been inserted into each jar minimized the accumulation of carbon dioxide. Thus, increased carbon dioxide concentration, which has been one of the bases for the beneficial effect reported from controlled atmosphere storage, was not a factor in these experiments.

It was soon learned that daffodils could tolerate storage in 100% nitrogen, and that this treatment was more effective in increasing the display life than storage in an atmosphere of 99% nitrogen plus 1% oxygen. For this reason, the latter atmosphere was eliminated from later tests.

Display life, following storage, was determined at temperatures ranging from 72° to 75°F, and was considered terminated when the trumpets showed the first signs of desiccation.

Results

The effect of storing freshly cut King Alfred daffodils, with perianths fully expanded, at 40°F in air or 100% nitrogen for various periods of time is shown in Figure 1. It is obvious that storage in 100% nitrogen

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*Supplied through the courtesy of the Washington Bulb Commission.

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Florist Exchange 141(24):30,45,54.

Flower Storage

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greatly increased display life, regardless of length of storage. The display life of freshly harvested daffodils at the same stage of development as those treated was 90 to 100 hours. Thus, daffodils stored at 40° in 100% nitrogen for as long as three weeks had a display life equal to that of freshly cut flowers. Storage for periods longer than three weeks slightly reduced the display life below that of freshly cut flowers. When stored in air for two weeks the flowers lost approximately 30% of their display life and after 3½ weeks approximately 70%. The appearance of King Alfred daffodils 74 hours after storage for two weeks at 40°F in air, in 1% oxygen plus 99% nitrogen, and in 100% nitrogen is seen in Fig. 2.

At higher storage temperatures, 100% nitrogen atmospheres were also effective in increasing display life if the length of storage was considerably reduced. For example, daffodils could be stored in 100% nitrogen at 70°F for a maximum of 2½ days and after removal the display life was 88 hours as compared to 24 hours for those stored in air.

Commercially, daffodils are stored dry at approximately 32°F and it was found that nitrogen storage was also effective under these conditions. Daffodils with perianths fully expanded when stored dry for three weeks at 32° in air had a display life of approximately 85 hours. Those stored in 100% nitrogen had a display life of approximately 125 hours. Less effective results were obtained when the daffodils were stored in the bud stage (sheath split and approximately ½ in. of the yellow flower protruding). Those stored in air had a display life of approximately 105 hours as compared to 125 hours for those stored in 100% nitrogen.

Conclusion

Asen and Lieberman (1) reported that the display life of cut roses could be prolonged by an application of ethylene oxide gas. Ethylene oxide is considered as an anti-aging hormone and it affords a valuable tool for basic research on the phenomena of aging. A practical application of these findings is at present not feasible because of the critical dosage range and the hazards of using the gas. Kidd and West (2) emphasized the value of modifying the storage atmosphere for prolonging the life of tomatoes and they concluded that "at each temperature some form of gas storage is better than storage in air." The data obtained with the controlled storage atmospheres with daffodils certainly support their conclusion. Under the conditions of these experiments, King Alfred daffodils had a longer display life when they were previously stored in an atmos-

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Calendar

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9-15, Ste. Anne de Bellevue, Que., Regional Division of Allied Florists and Growers of Canada, Second Annual Design School, MacDonald College.

12, Mt. Carmel, Conn., Connecticut Agricultural Experiment Station Annual Science at Work Program, Lockwood Farm.

16-21, Houston, International Shade Tree Conference, 40th Annual Convention, Shamrock-Hilton Hotel.

16-21, Seattle, AAN Management Conference, University of Washington Campus.

19, Framingham, Mass., Massachusetts Nurserymen's Ass'n Summer Meeting, Wyman's Garden Center, Inc.

23-25, Corpus Christi, Tex., Texas Ass'n of Nurserymen, Convention and Nursery and Garden Supply Show, Driscoll Hotel.

23-27, New York, FTD World's Fair Convention, Hilton Hotel.

30-Sept. 1, Portland, Ore. Roses Inc. Annual Meeting, Portland Hilton Hotel.

September

18-21, Lake of the Ozarks, Mo., Missouri State Florist Convention, Tan-Tar-A.

25-27, Des Moines, Ia., Society of Iowa Florists, Annual Convention, Hotel Fort Des Moines.

26-27, Indianapolis, Mid-West Trade Fair and Design School, Indianapolis State Fairgrounds.

27, Des Plaines, Ill., Ben's Supply House Design School, O'Hare Inn.

27-30, Miami Beach, Florida Flower Ass'n Convention, Doral Beach Hotel.

27-30, Miami Beach, WF & FSA Meeting.

28-Oct. 2, New York, National Hardware Show, Coliseum.

30-Oct. 3, New York, American Horticultural Congress, Hotel Commodore.

October

3-4, Chicago, Allied Florists of Illinois, Annual Christmas Trade Fair and Design School, Palmer House.

4, Columbus, Ohio, Flower Promotions Associates Trade Fair and Design School, Veterans' Memorial Auditorium.

4-5, New York, Metropolitan Retail Florists Ass'n Trade Fair and Design School, Statler-Hilton Hotel.

10-13, Boyne Falls, Mich., Michigan State Florist Ass'n Meeting, Boyne Mountain Lodge.

21-25, Tyler, Tex., 1964 Texas Rose Festival.

27-2, Westminster, England, British National Carnation Society Autumn Show, Old Horticultural Hall.

29, Miami Beach, Gold Coast Florist Ass'n Annual Design School.

29-31, Billings, Mont., Annual Convention of Montana State Florists.

31-Nov. 1, Boston, Northeastern Florists' Trade Fair and Design School, Massachusetts Horticultural Building.

February 1965

20-22, Detroit, Michigan State Florist Ass'n Annual Winter Meeting, Statler Hilton Hotel.

Flower Storage

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phere of 100% nitrogen as compared to air. The use of controlled storage atmospheres as reported for the prolonged storage of fruits and vegetables may also afford a practical solution to the problem of prolonging the display life of cut flowers.

Literature Cited

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2. Kidd, F., and C. West. 1932. Gas storage of tomatoes. Rpt. Food Investigation Bd. for 1932. pp 209-212.
3. Thornton, N. C. 1930. The use of carbon dioxide for prolonging the life of cut flowers, with special reference to roses. Cont. Boyce Thomp. Inst. 17: 614-626.
4. Van Stuivenberg, J. H. M. 1951. Gas storage of cut flowers. Proc. 8th Int. Cong. Refrigeration. 425-429.

The foregoing article is released for publication under the terms of the Memorandum of Agreement between the Society of American Florists and the U.S. Department of Agriculture.

Flower Grades

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grade. The same principle can be applied easily to cut flowers —and this, of course, favors our adopting weight grades now.

During this discussion, a retailer member of the committee, George Harris, was asked what things he looked for in pompons. The point he hit first and hardest was that he liked a loose, open spray — one from which he could pull off the lower two or three flowers (and use them separately)—and still use the rest of the spray in an arrangement. Retailers don't like clubby sprays. After that, a desirability of more stems per bunch was brought out.

About Grading Roses

For these many years, roses have, of course, been graded—on a strictly stem length basis. The grade used varies in different parts of the country. Here is a common Midwest grade:

Up to 18 ins.	short
18 to 20-24 ins.	medium
Anything over 24 ins.	long

Here is a common West Coast grade:

Fancy	26 ins. and up
Long	20 ins.-22 ins.-24 ins.
Medium	14 ins.-16 ins.-18 ins.
Short	8 ins.-10 ins.-12 ins.

It's not perfect—but it's a grade, and it has worked for years. The method commonly used in the Eastern United States runs like this:

Extra special	24 in. to 36 in.
Special	21 in. to 24 in.
Fancy	18 in. to 21 in.
Extra	15 in. to 18 in.
No. 1	12 in. to 15 in.
No. 2	9 in. to 12 in.

Too bad we don't have a set of uniform grades, used nationally.

Gladiolus Grades

Here is essentially the grade used presently by the Florida Gladiolus growing industry:

	Head Length	Stem Length
Blue	17¾ min. ins.	43 min. ins.
Red	14¾-17¾ ins.	40-43 ins.
Green	11¾-14¾ ins.	36-40 ins.
Yellow	9½-11¾ ins.	31-36 ins.
Buff	7¼-9½ ins.	26-31 ins.

Conclusion

Virtually all of the important fruit and vegetable industries have established grades. Actually, cut flowers are the only important horticultural product which are not graded today. We are firmly of the opinion that a proper set of grades for each of our important cut flower crops would go far to improve the efficiency of the marketing of these crops.

Ferry-Morse Account Moves

The advertising account of Ferry-Morse Seed Co., will move west to the San Francisco office of the J. Walter Thompson Co. Selwyn Eddy, chairman of the board of Ferry-Morse, announced the appointment of the new agency effective August 15.

The movement westward of the Ferry-Morse advertising account follows the company's earlier move of its headquarters from Detroit to Mountain View, Calif., four years ago. This new location is near its 1000-acre research plant and breeding station at San Juan Batista.