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Issue . . .

Storage, Vic Ball	1
G. K. Ball	6
"Mum Corner," Vic Ball	15
G. K. Ball	19
Vic Ball	20
G. K. Ball	23
Business Outlook, Babson	23
Hybrid Really a Hybrid? Ball	Back Cover

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Latest dope on

CUT FLOWER STORAGE

Vic Ball

(Note: The data that follow are mainly from the talk given by Prof. Kenneth Post of Cornell at the March 11 meeting of the Commercial Flower Growers (Chicago) held at the Geo. J. Ball Inc. range.)

You get the distinct impression, after hearing Ken Post's discussion of flower storage, that long term storage is here to stay. There are, as always, problems to be worked out, and many of them. However, there is good reason to believe that Carnations and Mums, for example, can be stored for a month at 31 degrees—and have just as long life after storage as fresh cut flowers. Certainly if this weren't true, no responsible grower would want any part of the plan—"pickled" flowers are a credit to no one. However, the surprising number of established growers who have already gone into large scale storage gives the project a powerful boost in our opinion.

ABOUT REFRIGERATORS

The first, most important, and most expensive requirement for effective long term storage is a refrigerator that will hold at 31 degrees Fahrenheit—plus or minus 1 degree. If the temperature should drop to 29, some flowers would freeze. If the storage temperature rises to 33 much of the time, the period of "safe" storage will be noticeably shortened. It's that sensitive. Good modern refrigeration equipment can easily meet this requirement.

Refrigeration coils to operate effectively at 31 degrees must be defrosted several times daily. The only practical way to do this is with automatic defrosting units. In effect, such units will run warm liquid thru the coils four times a day for a minute or two—long enough to melt the frost from the coils. It's automatic entirely.

Lastly, the refrigerated chamber must have good air circulation. This means some sort of good strong fans—and also filling the

BALL 52

chamber in such a manner as to permit circulation of air around all the containers. If, for example, a chamber is filled up tight from floor to ceiling and wall to wall with square boxes and the cold air cannot circulate, then, very likely the temperature will drop to 26 or 28 in some containers—and flowers will freeze. This has happened. Round cans lend themselves much better to good air circulation than square containers.

All this will quickly add up to at least several thousand dollars for a box big enough to be of real use to the average grower of 50-100 thousand sq. ft.—but the way flower prices fluctuate it isn't hard to see how the investment could be recovered.

If you're considering converting a room into 31 degree storage, look into Foamglass from the Pittsburgh-Corning Corp., 307 Fourth Ave., Pittsburgh. A four inch layer is reported to be enough for 31 degree storage. Details in John Seely's *Pennsylvania Flower Grower* April 1952, page 2. John recommends two 2" layers with joints overlapping. It is strong enough to support a cement floor.

STORING THE FLOWERS

It's all quite simple. The flowers are cut just as always and either before or after grading and bunching are put into some airtight containers, and set into the refrigerator. In our trials so far, we have graded and bunched the flowers, feeling that it saves some space in storage.

Ken recommends that the flowers not be placed in water prior to storage. Actually, tests show that they will keep better and longer if put directly into storage without "watering." Putting cut flowers in water overnight before storage even at cool temperatures has the effect of accelerating the deterioration of the blooms. An interesting sidelight: two lots of roses were kept in a 33 degree box for two weeks. One lot was set in a can of water, the other lot dry packed (air tight). The lot that had been in water turned blue while those packed dry came out still red—apparently less aged than those kept in water.

"Misting" or moistening flowers before storage is not necessary. If flowers are put in sealed containers and kept at 31 degrees, the humidity within the container will be so near saturation that further humidifying will not be necessary. Actually the main reason for the air tight container seems to be to keep the flowers in saturated or near saturated air—without trying to keep the entire refrigeration chamber saturated.

Flowers to be stored must be freshly cut, not over-ripe at time of cutting, and must be free of botrytis and other diseases. Flowers affected with botrytis spores will deteriorate very rapidly in storage.

Flowers may be stored in any type of container that is airtight. Various types of plastic or cellophane bags will do, altho

from a practical point of view, the larger cardboard type drums seem more practical. We have used the Lever-seal cans (Continental Container Corp., 404 East North Water St., Chicago, Ill.) with good results. The tops are removable, can be sealed quite tight, and being cylindrical in shape, they lend themselves to good air circulation in the refrigerator. A can three feet high costs several dollars, but may be used indefinitely. In packing cut flowers in this type container, the can should be filled completely with flowers. Ken Post suggests some arrangement of tying flowers "head to foot" to use the space more efficiently. Cans may be loaded with flower heads pointing both up and down, but unless they are tied together, heads of those pointing down will be crushed.

Brominated charcoal has been used in some of the trials—to absorb any possible ethylene gas that might be present—or that might be produced by such flowers as Snaps. Also, it has some value in control of botrytis. Ken says that charcoal has not been found necessary under properly set up 31 degree storage conditions. Flowers stored at higher temperatures will keep better with the charcoal.

REMOVAL OF THE BLOOMS

The trick here seems to center around getting the flowers to take water again after removal from the refrigerator. Under some conditions, tiny air bubbles will start up into the water conducting tissues of the stem—may go up only $\frac{1}{8}$ or $\frac{1}{4}$ inch or so from the bottom, but will be in enough to block flow of water up the leaves and flowers. This problem can be very effectively licked with the following procedure: As flowers are removed from storage, cut an inch or so from the bottom of the stems and immediately set the flowers in a can of hot water in a cold room. The water should be around 100 degrees Fahrenheit, the room preferably around 50. Cutting the bottom off the stem gets rid of the air bubbles, use of hot water accelerates flow of water up the stem, and cool room temperature reduces the loss of water at the top. Result: turgid flowers, stiff, fresh and nice. Flowers should be left in the chilled room for 4 to 7 hours. Actually, cutting stems off is probably not necessary in many cases; trials will establish this in individual cases.

LET'S GET DOWN TO CASES

We have discussed generalities so far. Here is the latest data on specific crops, again per Ken's talk:

Roses: Two weeks storage seems about the maximum safe period—to bring the flowers out with as good keeping quality as fresh cut blooms. Sidelight here: One grower stored 100,000 Roses up to two weeks for this past Christmas. At Christmas he sold both stored and fresh roses. Complaints on fresh flowers: two. Complaints on stored Roses: none. Possible explanation: The

fresh flowers had been forced somewhat to make the holiday, while the stored flowers had been matured at normal temperature. Interesting.

Again on Roses: Ken reports that flowers stored *experimentally* for 40 days at 31 degrees had the same keeping quality after storage as flowers stored 8 days at 50, or for 4 days at 70 degrees.

Better Times is the most difficult variety to store.

Carnations: Safe maximum storage period: 4 weeks. In other words, flowers stored up to 4 weeks come out with as good keeping quality as fresh blooms. They have been kept much longer experimentally, but 4 weeks is for sure. Don't miss the interesting photo below showing the striking difference between Carnations stored at 31, 36, and 41 degrees—taken 24 hours after removal from storage. Carnations *can't* be stored 30 days at 36 degrees!

Chrysanthemums, both mums and pomps are safe up to 4 weeks. The large standards keep as well if not a little better than pomps in tests run so far. Nearly all of our own trials with cold storage have been with mums. They seem to store well.

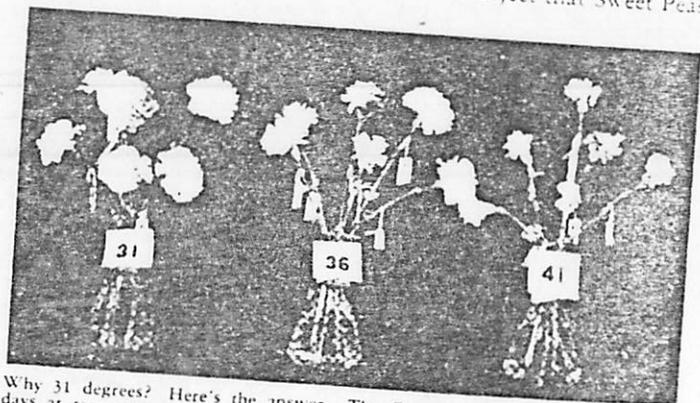
Tulips OK up to 8 weeks.

Iris satisfactory for 2 to 3 weeks.

Lily of the Valley: OK up to 4 weeks.

Don't store: orchids or gladiolus per current information. Peonies weren't mentioned, but have, of course, been cold stored in the bud for many years. Snaps—some promise here, but nothing definite yet. Gardenias were reported as OK for 2-3 weeks. Daffodils for two weeks.

We note in the Cornell bulletin* on the subject that Sweet Peas



Why 31 degrees? Here's the answer. The Carnations above were stored 30 days at temperatures indicated. Above photo taken 24 hours after removal. Note that those stored at 31 degrees are O.K. Those stored at 36 degrees are definitely gone. Flower aging is in direct proportion to temperature of storage. (From Cornell Bul. No. 853.)

*Commercial Storage of Cut Flowers, by Post and Fischer. Copies available from Dept. of Floriculture, Cornell University, Ithaca, N. Y.

were reported as OK after two weeks storage at 31 degrees—per a commercial grower.

WHERE TO NOW?

All this sudden burst of flower storage development leaves us staring one big question in the face: what effect will all of this have on our wholesale flower markets? Certainly, we are rapidly rushing to the point where the time honored scarcity of flowers for holidays will be a thing of the past. It isn't hard to see where, a few growers going into Christmas with refrigerators loaded with Roses, Carnations, etc., could handily satisfy the extra demand for the holiday. But is that bad? Actually, as we see it, the net effect after the first excitement wears down will be just this: more flowers will be available to the public when they really want them—and the flowers that used to be dumped during glut periods, in many cases at least, will be stored over into periods of better demand. Both the grower and the retailer should benefit. The over-all effect will be one of supply much better matched up with demand.

The grower who follows the market closely can gain most as we see it. It won't be simply a case of holding flowers for holidays. It will be a 365 days a year deal—it will surely develop that flowers will get so scarce before holidays (because of flowers put in storage) that they will be worth more than even on the holiday itself.

The big thing is that the grower is finally relieved of the pressing necessity of putting his product on the market the very day it matures—he has a few weeks to play the market. So long as the potato-wasting "fair dealers" leave the flower markets alone, this new development has promise of being a real help to the grower.

Flower storage can easily be abused—and no doubt will be. There will be the temptation to leave flowers "on ice" a week too long. But as with any other producer of goods, the "short changer" will soon enough be known for what he is—and the responsible grower likewise.

ALREADY

Quite a list of commercial growers are practicing 31 degree storage—on a large scale. Ken Post reports that eight up-state New York Rose growers are using 31 degree refrigeration. A California Rose grower stored 1/4 million Roses for this past Christmas. Carnation growers are using it commercially already.