

Cold Storage of Carnation Cuttings Brought up to Date  
by W. D. Holley

Large numbers of carnation cuttings have been stored commercially during the past two growing seasons. Recent developments in carnation growing make it imperative that large numbers of cuttings at the same stage of development be available at a definite time. Cold storage as a means of accumulating these cuttings is a valuable tool.

Some growers are accumulating cuttings in cold storage while those in the propagating bench are rooting. As soon as the bench is emptied it is sterilized and cuttings are ready the following day to fill it. In this manner several days are saved with each propagation and more time is available for careful selection of cuttings. Cold storage also offers the best means of conserving cuttings from selected mother blocks.

With wider usage cold storage of cuttings is bound to uncover problems that did not exist previously. Some of these problems can be answered and some may require additional research. A wide variety of temperatures, containers and conditions have been used commercially. Only a few successes and failures have reached this author. It is the purpose of this article to pass on a better understanding of carnation cutting storage.

A brief review of our early work on cutting storage should serve to eliminate some misconceptions.

From Bulletin 3, January 1950:-- Cuttings were stored successfully when sealed in cellophane while those wrapped in moist sphagnum and wax paper dried out in storage. Fluorescent lights were not beneficial to stored cuttings.

From Bulletin 10, August 1950:-- Cuttings were stored at 36 to 45°F. for periods up to 91 days. The need for a moisture proof covering was emphasized. Cuttings stored at 30°, 40°, and at variable 36-45° temperatures were all satisfactory. Repeated trials with longtime storage of rooted cuttings were not successful. When sealed, the rooted cuttings molded. When not sealed, they dried out.

From Bulletin 21, July 1951:-- Scald in stored carnation cuttings was produced by sealing the containers absolutely air tight. A 24-hour period of 50-60°F in the middle of the storage period (simulating defrosting) did not produce scald. Some air interchange is necessary for successful storage of cuttings.

Scald of cuttings is a form of breakdown typified by loss of color and the odor of insilage. It may occur in varying degrees depending upon the tightness of the storage container. Some cuttings within a large container may scald slightly while the others appear normal. Cuttings showing only slight loss of color will root readily but may be slow to grow after transplanting. Severely scalded cuttings are worthless.

Containers for storage of cuttings:-- With scald in mind, let us try to draw the specifications for an ideal container. We must have an interchange of gases without allowing the stored cuttings to become dessicated. Slight wilting is more desirable than even the slightest scald symptoms. Cellophane or polyethylene bags make ideal containers for small lots of cuttings. Instead of sealing these bags, fold the open end over and fasten them with paper clips or similar fasteners.

Waxed flower shipping boxes have proven satisfactory in several instances. Air can move freely through the entire container if cuttings are packed upright in the box and the basal end of the cuttings will be in the highest humidity. When a large container such as this is used, the tops of the cuttings should be misted well and the open container set in storage overnight to eliminate initial heat quickly.

The lid should be placed on the box the following day with no attempt to tape it up. This sort of container will fit on shelves in the storage and will allow regular inspection and moistening if necessary.

At least one firm uses lever pack drums for storing cuttings, in larger quantities. The cuttings are collected in net nylon bags, pre-cooled overnight and then packed in large drums with tight fitting lever tops. This type of container may be too tight unless alterations are made. In the first place this container holds several thousand cuttings. The more cuttings in the package the more gaseous interchange required. The walls of the drum should be perforated and provision made for air movement inside the container by leaving an open area down the center. Large containers are less desirable for these reasons.

Storage temperatures:-- Up to this time facilities have not been available to storing cuttings at 31°F. They have been stored at Colorado A & M at temperatures ranging from 34 to 45° with success at all temperatures. One lot of cuttings froze at slightly below 30°, was thawed, rooted and grown successfully. Some of the frozen leaves later developed blister-like structures but no other detrimental effects appeared up to one year in a producing bench.

When storing most live products it is desirable to supply a set of conditions that will conserve the carbohydrate and other organic compounds within that product. The coldest possible temperature without freezing is usually the best way to prevent these compounds from changing. Although carnation cuttings can be stored successfully at temperatures above 35°, lower temperatures would probably be better.

Time of storage:-- Cuttings have been stored at Colorado A & M for varying lengths of time up to five months. Cuttings that were stored for three months have now been in the producing bench 15 months without loss. No differences have been observed in the performance of properly stored and fresh cuttings in any case.

Although it is possible to store cuttings for long periods, it is not always desirable. Cuttings which are stored from early spring until midsummer are not acclimated, hence are more difficult to establish. Summer cuttings would be undesirable if taken out of storage in December.

The most desirable cuttings for storage:-- Cuttings that have been produced during cool sunny periods store best and produce the best plants. If cuttings are soft, they should be hardened up before taking them for storage. Cuttings store better and wilt less when removed from storage, if the stock plants are watered thoroughly the day before the cuttings are taken.

It is desirable to prepare cuttings for the propagating bench before they go into storage, especially for longtime storage (two months or more). At 40°F. root primordia begin forming in storage. Cuttings stored at 40°F. for five months may be well rooted provided the humidity within the container is uniformly high.

To summarize in a few points, unrooted carnation cuttings can be stored for periods up to five months by

1. Taking them from clean healthy stock,
2. Devising a container that will permit a free interchange of gases,
3. Controlling the storage temperature between 30 and 40°F, and
4. Sprinkling the tops of the cuttings occasionally if they appear to be drying out in storage.

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