

# METHODS FOR PREPARING AND USING THE STS COMPLEX

## Progress Report

Michael S. Reid and Delbert S. Farnham

Pretreatment of flowers with the silver-thiosulfate complex (STS) has proved to be a very effective means of extending the vase life of cut carnations. The key to its successful use is to choose a suitable combination of pretreatment time, STS concentration, and pretreatment conditions (relative humidity, temperature, flower transpiration rate) that will provide each flower with at least 85 micrograms and not more than 850 micrograms of silver in the complex form. In this report we describe, for testing of this new material, a series of simple steps by which the STS complex can be prepared and the required treatment conditions determined.

### 1. Preparation of the stock solution

Weights to be used vary depending on the the type of sodium thiosulfate used.

Check the label and weigh out:

EITHER (a) Prismatic sodium thiosulfate pentahydrate

Grams      Ounces

120      4 ½

OR (b) Anhydrous sodium thiosulfate

80      2 ¾

Dissolve the weighed material (a) or (b) in 1 pint of deionized water.

Then weigh out silver nitrate

20      ¾

Dissolve this in a separate pint of deionized water.

Prepare the stock solution by slowly pouring the silver nitrate solution into the sodium thiosulfate solution. Stir rapidly as the solutions are mixed. Some browning of the stock solution may occur during mixing, but this does not matter.

### 2. Deciding on the treatment conditions

In our experiments we have generally settled on one of two treatments, either a 10-minute pulse with STS at room temperature (25° C) (4 fluid ounces of concentrate per gallon), or an overnight (20-hour) STS pretreatment in the cool-room (0° to 2° C) (1 fluid ounce of concentrate per gallon). Because pretreatment conditions and practical needs of individual growers vary widely, these two examples are not suited to all commercial operations. A wide range of treatment regimes is possible that will supply the necessary silver to the flower.

To conveniently determine the optimum times and concentrations for pretreatment of carnations with STS, we use a nomogram (see figure) in the following way:

A. Determine water uptake rate of the flowers under the proposed pretreatment conditions (packing room, tinting shed, or cool store). This is done by measuring 100

ml of deionized water (using a graduated measuring cylinder) into a jar, then placing a bunch of typical flowers (25 flowers) into the water for exactly 1 hour. The difference between 100 ml and the final volume is the uptake rate in ml per bunch per hour.

B. Decide on the most convenient pretreatment time (overnight, 10 minutes, 2 hours, or the like) under these conditions.

C. Use the nomogram to determine the concentration of STS required under these conditions.

An example of the use of the nomogram is shown in the figure as a dotted line. Work across the nomogram from left to right:

A bunch of flowers took up 25 ml of water in 1 hour (that is, 75 ml water was left after 1 hour). Mark 25 on the left-hand scale.

- Mark the desired treatment time (10 minutes) on the center scale.
- Use a straightedge to draw a line between these two points, and extend the line to where it intersects the third scale (4). This point gives the number of fluid ounces of stock STS needed to make 1 gallon of treatment solution—in this case 4 ounces.

### 3. Preparing the treatment solution

Add the number of ounces of stock solution determined from the nomogram to 1 gallon of deionized water. This will give the proper concentration of STS for the treatment conditions that you have selected.

Another example of the use of the nomogram described here could be: A grower determines that in his cool-room the uptake rate of a bunch of carnations is 2 ml per bunch per hour. He wants to treat the flowers over the weekend (60 hours). Using the nomogram he finds that his treatment solution should contain 1/8 fluid ounce of stock solution per gallon. Incidentally, even at the current high price of silver this gallon of pretreatment solution will cost the grower only 20 cents! It will treat, under these conditions, more than 800 flowers.

*Michael S. Reid is Postharvest Physiologist, Cooperative Extension, University of California, Davis, and Delbert S. Farnham is Farm Advisor, Cooperative Extension, Santa Cruz County.*

