Colorado Flower Growers Association, Inc.

IN COOPERATION WITH COLORADO STATE UNIVERSITY

Doris Fleischer, Executive Secretary

Bulletin 153 655 Broadway, Denver 3, Colorado December 1962

Effects of Temperature and Potash on Marginal Burning of Carnation Petals

by Howard W. Hopkins and W. D. Holley

Marginal burning of the petals, especially on dark colored carnation varieties, is a problem on which little or no research has been done. Either the problem has worsened in recent years or handlers are becoming more critical. Red and dark pink colored varieties are the worst offenders, although petal burning sometimes occurs on lighter colored varieties.

While all preharvest and postharvest environmental factors are, or will be, under investigation at Colorado State University, this report is issued to show the progress to date. Two preharvest factors first suspected of influencing petal burn were growing temperature and potash. An experiment was designed and started July 20, 1961, to investigate the effects of three levels of potash nutrition from three fertilizer sources growing at three temperatures.

Rooted cuttings of Red Gayety were started in 10-inch pots of volcanic scoria and watered with untreated tap water for the first three weeks. After this time they were irrigated with nutrient solutions in which the potash content was 1 milliequivalent per liter of K for low potash, 4 me K for medium, and 8 me K for high potash. Further, the three potash levels were derived from 1) potassium sulfate, 2) potassium nitrate, and 3) potassium chloride. All nutrient solutions contained, besides potash, 8 me of N, 1 me H_2PO_4, 4 me of Calcium, 4 me of Magnesium, and 4 me of SO_4 per liter of solution plus adequate trace elements. This nutrient experiment involved nine combinations with 3 pots in each treatment, and 2 replications. The same experiment was repeated at night temperatures of 50, 55, and 60° F, with day temperatures controlled at 10 degrees above night temperature.

As flowers were cut daily they were identified and place in water with petalife added according to manufacturer's directions in a 65-70° room. Controlled air movement was supplied by means of a 16-inch 1200 rpm fan. Relative humidity in this room varied from 30 to 45% during the period of the experiment.

The percent of each day's cut developing petal burn symptoms is shown in Fig. 1. Very little petal burning occurred until January. There was a low period of petal burn around mid-January, followed by in-

creasing percent burn to February 5, then a decrease to near zero in early March. The period effect obtained in these results indicates some connection with weather, however, no correlation with sunshine, cloudiness, or outside maximum temperature could be found.

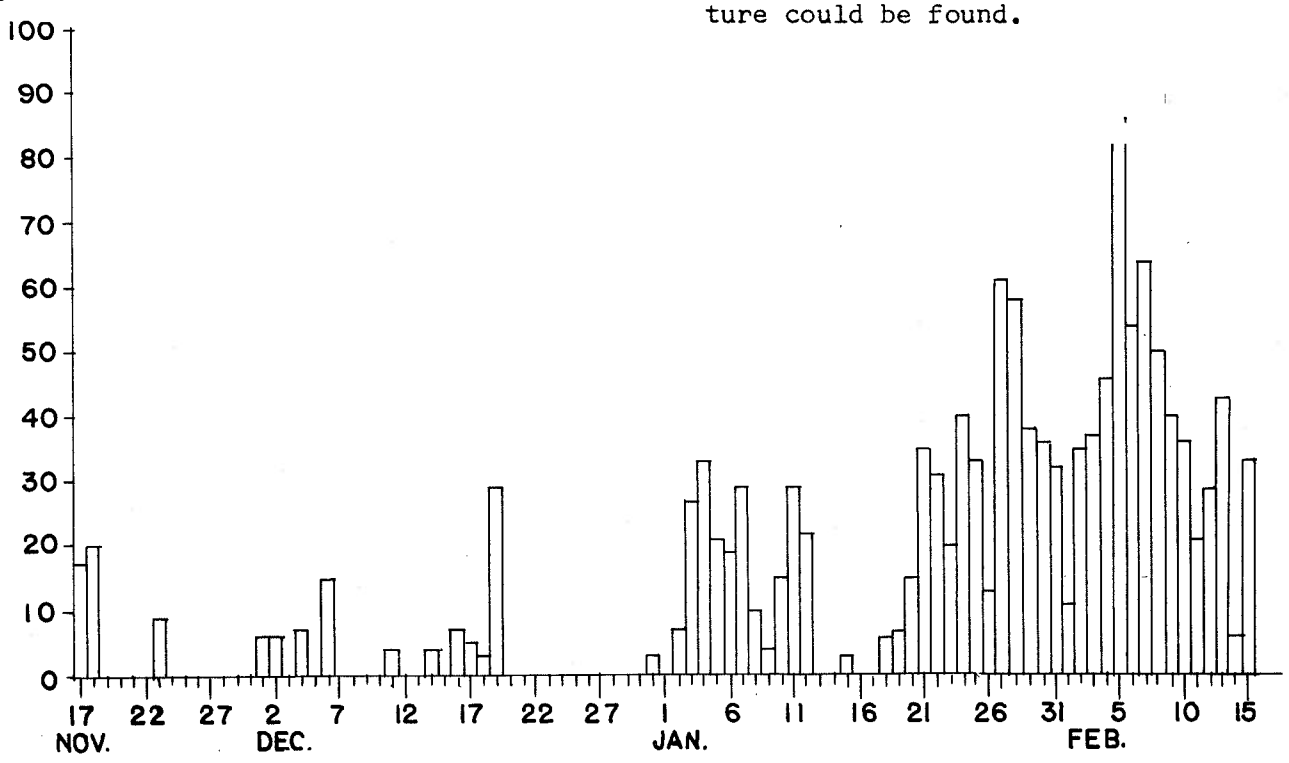


Fig. 1. The percentage of flowers developing petal burn from daily cuts of Red Gayety carnation, 1961-62.

Effects of Temperature

The percent of flowers showing petal burn is shown in Fig. 2 for the three temperatures. Approximately 25% of the flowers cut from November to March from the 50-60° house developed petal burn while 5% from the 60-70° house developed burn. Low temperature is indicated as one of the most important factors conditioning the flowers for petal burn. The post-harvest conditions supplied in this experiment were ideal for producing the burn, hence the high percent of burned flowers. Flowers would normally be handled better in commercial channels.

This poses a serious problem for carnation producers. If the plants are grown warm enough to minimize petal burning, flower stems will be weak and grade of flowers reduced. Research is needed on ways to reduce petal burning other than temperature manipulation. Somewhat higher temperatures than 50-60° can be tolerated in Colorado. Warm temperature selections of present varieties may be a possible solution.

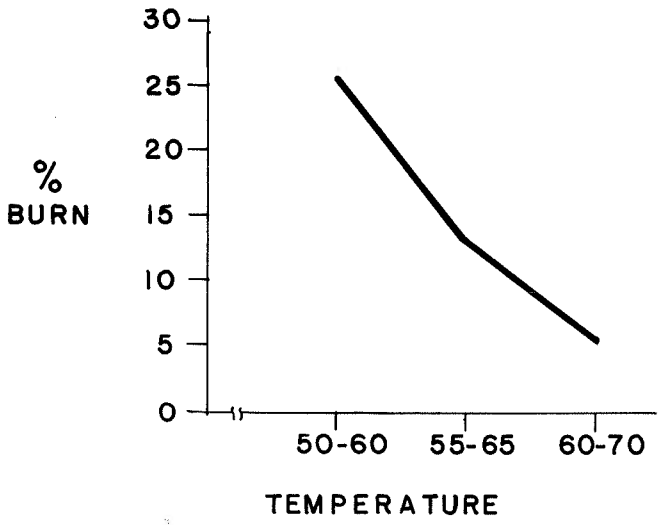
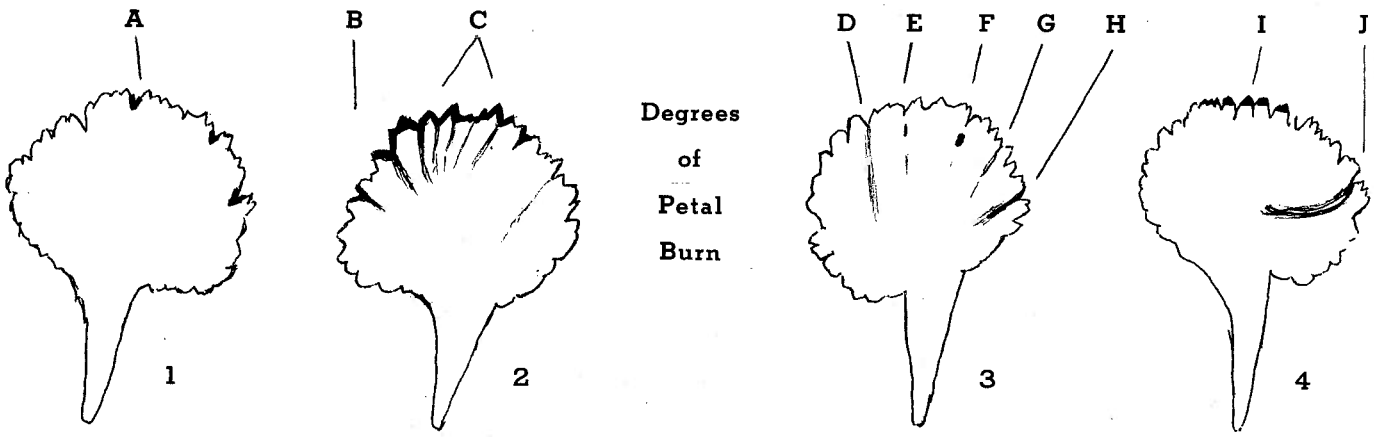


Fig. 2. Cooler growing temperatures increase the marginal burning of carnation petals when exposed to high water loss conditions.



Petal burn so serious that the carnation is unsalable (2) includes continuous areas of blackened or "burned" petal margins. This burned area (C) develops progressively, starting as A in the valleys of the serrations, progressing to B and then to C. A purple streak may or may not precede A, as in D. Petal burn may also start as a dark spot (E), develop to a lesion (F), then to a hole in the petal (G), and finally work out to the edge of the petal to form a slit (H).

Another type of petal burn caused by mechanical injury is illustrated in (4). Note the position of the damage is across the tips of the petals (I) instead of continuous across tips and valleys (C). Another mechanical damage in the form of an irregular tear (J) compares to the straight opening (H) that develops along the veins of the petal.

For experimental purposes, a carnation has been considered burned when it has reached the stages of A or F. In the work covered by this report A, B and C burning were counted. In work to be reported in the next bulletin F-type burning is also counted. Petals such as (4) were not considered burned since they were damaged mechanically. A petal burned as A or F may or may not develop to the advanced stage (2).

Effects of Potash Level

Fig. 3 shows the lack of influence of potash concentration on the percent of petal burn. Approximately the same percentage of flowers burned from plants receiving low potash as from those receiving 4 or 8 times as much. Flowers grown at all three temperatures are included in the data for this graph and the next.

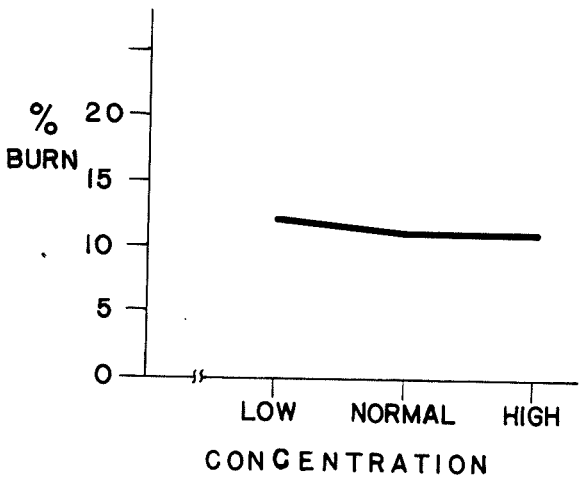


Fig. 3. Concentration of potash in the nutrient solution had no effect on percentage of petal burn.

Effects of Source of Potash

While slightly more petal burn is shown for potassium nitrate in Fig. 4, the difference is not large enough to be significant. Generally speaking, source of potash was not a cause of petal burn. While chlorides have sometimes been suspected of causing petal burn, the high level of chlorides in the solution containing 8 milliequivalents of KCl was not sufficient to induce petal burning in this experiment.

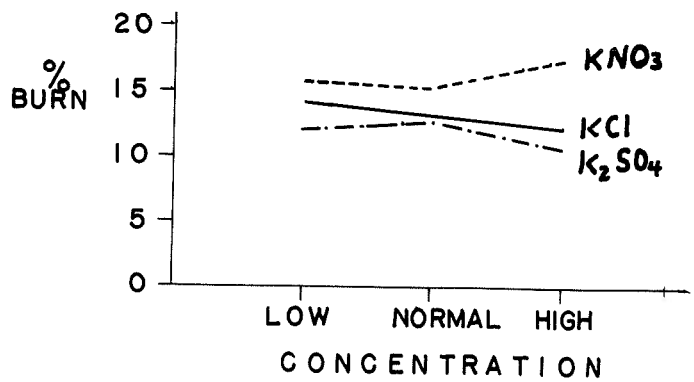


Fig. 4. Type of potash fertilizer had little effect on the percentage of flowers developing petal burn.

Summarizing this work in brief:

1. Petal burning was most prevalent under the conditions of this experiment in January and February.

2. The colder the carnations were grown the higher was the percentage of flowers developing petal burn.

3. Potash concentrations in the nutrient solution from near deficient to very high did not influence the percentage of petal burn.

4. Potash derived from sulfate, chloride, or nitrate salts caused little or no difference in amount of petal burn.

5. Relatively high chloride content in the nutrient solution did not increase petal burn.

Additional observations on petal burning that seem certain at this time are:

1. Cutting the flowers in a tighter bud stage reduces the amount of petal burn. Flowers allowed to open on the plant are more subject to burning.

2. Almost all malformed flowers burn during periods when the flowers are susceptible to petal burn, probably because malformed flowers (slabsides and bullheads) take longer to open. It is a mistake to leave these on the plants in hopes that they will open into fancy flowers. If they open and can be placed in a grade higher than design, the chances are good they will cause the rejection of some bunches because of their burned petals.

Your editor,

W D Holley

COLORADO FLOWER GROWERS ASSOCIATION, INC.
OFFICE OF EDITOR
W. D. HOLLEY
Colorado State University
Fort Collins, Colorado

FIRST CLASS