Colorado Flower Growers Association, Inc.

IN COOPERATION WITH COLORADO STATE UNIVERSITY

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Plant Injury from Flue Gases

by

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Improper combustion of fuel or inadequate draft to burners has caused injury to greenhouse crops in a number of instances this year. Prolonged periods of extremely cold weather cause icing of houses and reduce the air available to some burner systems. Plastic construction, which is often tighter than glass, also reduces the air available to burners.

When any fuel is burned without adequate oxygen, the products of combustion contain more carbon monoxide than normal. Unsaturated hydrocarbons such as ethylene may also be increased in the flue gases. With inadequate draft, the flue gases do not all go up the stack, some diffusing into adjacent plant houses.

Individually fired space heaters have also caused injury in several instances. When a greenhouse is tightly constructed and becomes tighter due to icing on the inside, flue gas injury may result even though the burner has an adequate exhaust stack. Unless air is supplied to the burner, the vent stack cannot function properly, nor is the fuel burned completely.

Symptoms of flue gas injury are illustrated in the several photographs. One symptom is not unlike that from boron deficiency. The apical tips of chrysanthemum (Fig. 1) may be destroyed resulting in

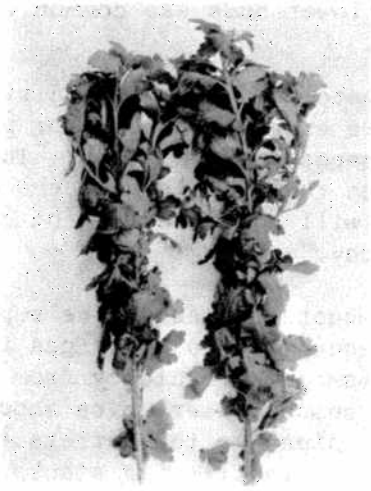

Fig. 1. Flue gases cause branching at the top of chrysanthemums.

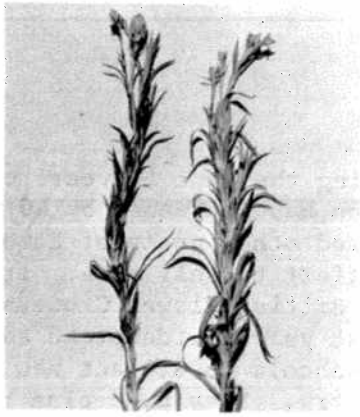

Fig. 2. Continuous presence of flue gases cause this type of growth on carnation.

growth similar to that following a pinch or crown bud formation. Carnations have shown the same response to flue gas injury, Fig. 2. Prolific branching along the flower stem, with shortened internodes, is very similar to that caused by boron hunger.

Other symptoms observed on carnation are:

1. Yellowing of oldest leaves on rooted cuttings just planted.
2. Breaking over of young plants at the nodes following rapid growth at these points.
3. Unusual curling of the leaves on soft new growth (Fig. 3),
4. Yellowing and death of leaves on flowering stems with some bending at the upper nodes (Fig. 4), and
5. Sleepiness of opening flowers.

Where flue gases were causing injury, green plants such as philodendrons have been observed to yellow and drop their leaves prematurely. Dry sepal and blasting of flower buds was common on Cattleya orchids.

Tomato plants or tall African marigolds are excellent indicator plants for the presence of flue gases. They wilt even when the soil is wet; the most obvious wilting will occur during the coldest part of the day.

Adequate air should be supplied all burner equipment to avoid gas injury and to get maximum efficiency from fuel. Gas burning space heater units should have intake air pipes to the burners the same size as the ventilating stacks.

Fig. 3. Carnation growths on left injured by gas while those on right are normal winter growths.

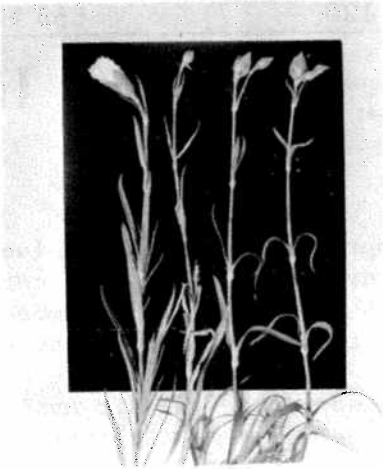

Fig. 4. Injured stems and foliage on left and normal on right. This response appears within a week or two after injury occurs.