


# CHRYSANTHEMUM 'DETROIT NEWS' INJURY DUE TO HIGH LIGHT

Thomas G. Byrne, Specialist, Floriculture Research Facility, UC Deciduous Fruit Field Station, San Jose, and  
Lyle E. Pyeatt, Farm Advisor, Santa Clara, Alameda, and Contra Costa Counties



Leaves of the bronze standard chrysanthemum 'Detroit News' often exhibit an interveinal spotting or general chlorosis (yellowing), which usually intensifies as the terminal bud develops and side buds are removed. The disease has been observed at all times of the year at San Jose but has been more severe on summer and early fall flowering crops. The outer south-facing rows of plants have been most affected. One commercial planting observed in September 1973 appeared to be

nearly unsalable because of the malady. The grower had assumed it was a chemical spray injury. Another chrysanthemum grower indicated that he had noticed similar symptoms only after he had stopped shading developing blooms with cheesecloth.

It seemed at this point that the symptoms might be due to a physiological disease similar to that reported on 'Blue Chip' in Florida (Engelhard and Woltz, 1972). A planting was

established in October 1973 to determine if shading or lower fertilization levels would reduce the severity of leaf symptoms.

### POT EXPERIMENT

Rooted 'Detroit News' cuttings<sup>1</sup> were planted singly in 6-inch pots and grown under prevailing greenhouse light or under a layer of cheesecloth. Both groups were divided to receive either a typical complete liquid fertilizer at each irrigation (high fertility) or the same solution diluted 1:1 with tap water (low fertility). The high-fertility solution included 200 parts per million each of nitrogen and potassium. The planting was lighted (10:00 p.m. to 2:00 a.m., 10 foot-candles minimum) until November 1, after which flower buds were allowed to initiate and develop under natural daylength. Typical commercial growing practices were followed, with the high-fertility program discontinued 3 weeks before harvest. Plants receiving the low-fertility treatment began receiving plain water 2 weeks earlier.

The flowers were judged commercially salable January 7. At this time the single, disbudded stems were subjectively rated for severity of leaf injury symptoms. In addition, the third, fifth, seventh, ninth, and eleventh leaves below the bloom were removed from each plant as a composite sample, placed in a plastic bag, and immediately frozen. They were later thawed at room temperature, blotted with paper towels, and crushed. The sugar content of the sap was read with a refractometer of the type commonly used to determine fruit maturity in the field. Table 1 summarizes the data.

### Results

The plants shaded with cheesecloth showed much less severe leaf spotting and interveinal yellowing than those grown without it. They also had lower leaf-sugar concentrations than

nonshaded plants. Reducing the fertility level appeared to slightly reduce the severity of symptoms, but the plants were smaller, pale green, and otherwise of sub-commercial quality.

TABLE 1. Sugar Content and Disease Rating of 'Detroit News' Chrysanthemum Leaves Grown under Two Light Intensity and Fertility Levels. San Jose, 1974.

Light and Fertility Level*	Sugar Content †	Disease Rating ‡
natural light; high fertility	9.4 b	9.5
natural light; low fertility	12.3 a	8.3
shaded light; high fertility	6.6 c	2.4
shaded light; low fertility	7.1 c	1.3

\* See text for description.

† Average of nine composite leaf samples (3rd, 5th, 7th, 9th, and 11th leaf below the bloom). Sugar content given as percentage in expressed sap as read with a hand refractometer; figures followed by different letters are significantly different at  $p = .01$ .

‡ Composite of two separate ratings for leaf spotting and leaf chlorosis based on a scale of 0 = no symptoms to 10 = most severe (average for nine plants per treatment).

In the nonshaded plants, the reduced fertility level resulted in much higher leaf-sugar concentrations. It may be that, under these conditions, the nitrogen-deficient leaves accumulated carbohydrates that would otherwise have been translocated or assimilated as nitrogenous organic compounds.

### GROUND BED EXPERIMENT

A preliminary observation indicated that the selection '#3 Detroit News' might not be as sensitive to high light intensity as 'Detroit News'. A second trial was begun in July 1974 to determine if this is true. Rooted cuttings of both selections were interplanted in row replications in two raised benches at typical commercial density. One bench was shaded with cheesecloth at the onset of short days (black-cloth from 5:00 p.m. to 8:00 a.m.), beginning on July 29. Again, typical grower

<sup>1</sup> Plants used in these experiments donated by California-Florida Plant Corp., Fremont, California.

practices were followed, and fertilization was discontinued September 2. The blooms were considered salable the last week in September, at which time the plants were rated for leaf injury symptoms.

## Results

The '#3 Detroit News' had much less severe leaf spotting and interveinal yellowing than the original selection of 'Detroit News'. The ratings in table 2 were made on plants in the outer south-facing row. North-facing plants of the #3 selection showed only slight spotting in the nonshaded bench and no symptoms at all in the shaded bench. Shading the original selection did not reduce the severity of symptoms to the degree that it did in the previous winter trial.

TABLE 2. Disease Rating of Leaves of Two Selections of 'Detroit News' Chrysanthemum Grown Together under Two Levels of Light Intensity. San Jose, 1974.

Light Intensity	Selection	Disease Rating*
high	'Detroit News'	8.9
high	'#3 Detroit News'	4.7
low	'Detroit News'	4.8
low	'#3 Detroit News'	2.3

\* Average of interveinal leaf spotting and general chlorosis rating for eight outer south-facing plants based on 0 = none and 10 = most severe.

## CONCLUSION AND RECOMMENDATIONS

The interveinal spotting that commonly occurs on the older leaves of *Chrysanthemum* 'Detroit News' and that often develops into a severe interveinal chlorosis is associated with high light intensity and the accumulation of sugar in the leaves. The spotting occurs at all seasons of the year in San Jose and is easily confused with chemical spray injury symptoms. The symptoms intensify after the terminal bud begins to develop and side buds (photosynthate "sinks") are removed. Reducing the fertility level reduces apparent injury only slightly, if at all, and only at the expense of overall quality. Shading the plants, particularly during the later stages of the crop, is an effective way to minimize the problem. Substituting a more resistant selection, such as '#3 Detroit News,' is also effective (and perhaps more practical). A combination of these two approaches would probably eliminate the problem under most conditions.

## LITERATURE CITED

- Engelhard, A. W., and S. S. Woltz  
1972. *High Sugar Disease of Chrysanthemum—or the Excess Photosynthate Syndrome*. Bradenton, Florida  
AREC Mimeo Report GC 1972-2.