SUGAR SOIL TREATMENT

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Sugar solutions are frequently used to reduce excessive soluble salt or nitrogen levels in greenhouse soils. The situations where this practice is appropriate are:

1. A soluble salt level of 125 to 150 (1:2 extraction) is found just prior to planting a bench crop. Leaching in this case is not practical because of puddling the soil and the long time required for the soil to dry out. An application of sugar (1-2 lbs./ 10 gallons) may reduce the level to about 100 which is relatively safe.

2. A high ammonium nitrogen level occurs, generally a few weeks after planting in benches, pots or paks. Ammonium nitrogen is not readily leached. Sugar will reduce this excess and nitrate nitrogen may then be applied a few days later if necessary.

The sugar concentration found effective in Connecticut soils is from 1 to 2 pounds per 10 gallons when applied at 1 quart/square foot. For pot plants, the solution should wet the soil ball.

"If a little is good, a lot is better" does not apply to sugar any more than to fertilizer. The sugar reduces the level of soluble salts or nitrogen by causing a microbial population explosion in the soil. This has been reported in Newsletter #39.

Dr. D. C. Kiplinger reported in the Ohio State Florists Bulletin #508 that established pot mums were not damaged by sugar at 10 or 20 lbs./10 gallons but that 40 lbs. was detrimental. An experiment was set up to determine the effect on chrysanthemum cuttings.

Two 'Mountain Snow' cuttings* were planted in 4" pots in a low salt soil (3 replications) and a marginally high salt soil (4 replications). Sugar concentrations were 0, 1, 2, 10, 20, 30 and 40 lbs./10 gallons. To each pot, 140 ml (about 5 oz.) of solution were applied. Only a few pots evidenced a few drops of solution draining through.

The cuttings were planted and treated between 7:00 and 9:00 p.m. the evening of April 25, 1972. At 8:00 the next morning, all cuttings in treatments of 10 lbs./10 gallons or higher were severely wilted (figures 1 and 2). The cuttings were then misted and shaded with Saran. Mr. Joe Bujak, the grower in this section, was determined to save the plants and diligently cared for them. Scores based on "0" for hopeless and "9" for hurrah were recorded as follows:

	Sugar Rate (lbs./10 gallons)						
Date	0	1	2	10	20	30	40
April 26	9	9	9	1	0	0	0
27	9	9	9	4	1	0	0
28	9	9	9	6	2	1	1
30	9	9	9	7	2	1	1
May 2	9	9	9	7	3	1	1
7	9	9	9	7	3	1	1
April 28 Salt Level	140	115	120	127	145	130	150

*Chrysanthemum cuttings supplied by courtesy of Stafford Conservatories, Stafford Springs, Conn.

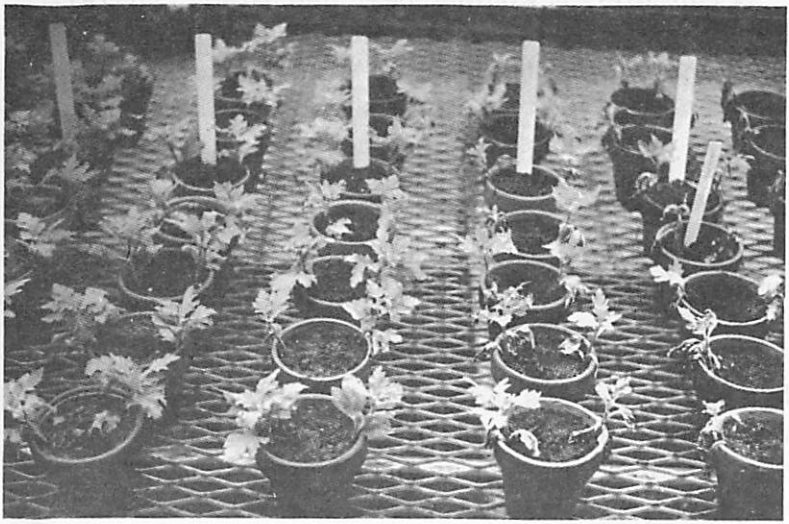

Figure 1. Chrysanthemum rooted cuttings seven days after planting and treatment with sugar solutions. At 10 lbs./10 gals. (left center), they had nearly recovered but were hardened somewhat. Rates of 20 and 30 were excessive. At 40 lbs. few survived.

Figure 2. The lone survivor of the 40 lbs. sugar/10 gals. after nine days.

From this, it would appear that 10 lbs. sugar/ 10 gallons restricts water intake by newly planted mum cuttings. The subsequent near recovery of cuttings treated at this rate shows that the adaptation of the cuttings to this concentration of sugar and the reduction of the sugar level by the soil microbes will permit growth as long as TLC is provided. Rates over 10 lbs. were not tolerated by mum cuttings in this experiment.

The wilting response was the same in the high and low salt soils. As indicated in the above chart, salts were decreased at sugar rates of 1 to 10 lbs. The apparent lack of effect at higher rates is a bit of a surprise.

Where excessive sugar is supplied, the soil microflora are unable to utilize all of it rapidly. This was evidenced in these clay pots by syrupy accumulations on the pot exterior. In fact, droplets frequently formed along hairline cracks in the pot (figure 3).

Nitrogen insufficiency may have stopped the bacterial utilization of excessive amounts of sugar. Nitrates dropped from 8 ppm in the low salt soil to a trace at the 10 lb. rate and dropped from 15 to trace at the 20 lb. rate in the high salt soil. Ammonium levels in this test tended to decline with increasing sugar levels, then increase as excessive sugar is applied.

With higher rates of sugar, fungi may "bloom." The excessive mycelium or spores (figure 4) do not affect the mums but simply show massive colonization of the soil by nonpathogenic fungi where an imbalance in the microflora exists. These occurred on the pasteurized soil, but not on the composted soil.

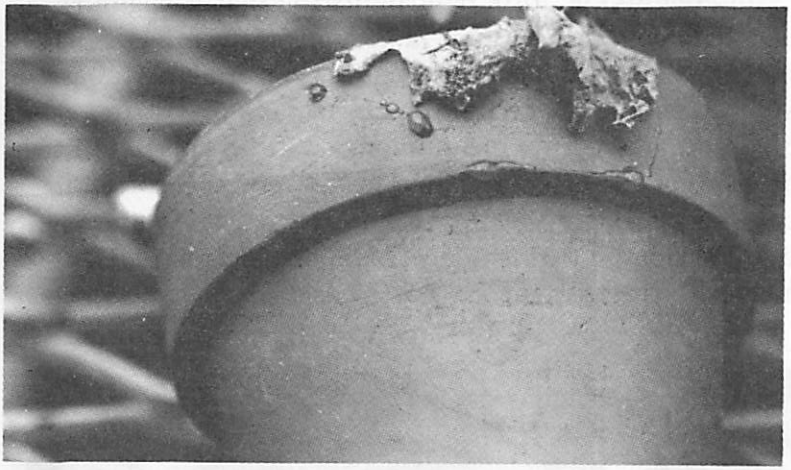

Figure 3. Sugar solutions applied to soil in excess of that which can be readily utilized by the soil microflora collects on the pot surface as water evaporates. In this instance, drops of syrup accumulate along hairline cracks.

Figure 4. In pasteurized soil, saprophytic fungi may dominate the microflora following excessive sugar applications. In this pot treated with 30 lbs./10 gals., a Penicillium sp. sporulates freely.

In conclusion, this data indicates that a sugar rate of 1 or 2 lbs./10 gallons is not only safe for chrysanthemum cuttings but also is effective in decreasing soluble salt and nitrogen levels (figure 5). It is anticipated that further experiments will be conducted to determine the effects of levels between the safe 2 lb. rate and the detrimental 10 lb. rate. For further information on this subject, see Connecticut Greenhouse Newsletter issues 30, 39 and 47.

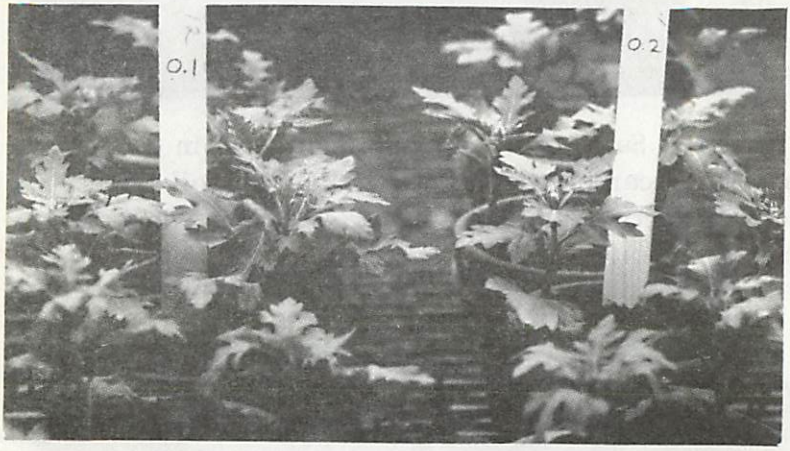

Figure 5. Chrysanthemum cuttings treated with 1 and 2 lbs./10 gals. At this, the recommended rate, salts were reduced and no detrimental effects were noted.