

Sucrose Spray on Tomato

foliage sprays applied before pulling help transplants to survive storage, heat, other shocks

Paul G. Smith and Frank W. Zink

Sucrose foliage sprays reduce transplant shock of tomatoes.

Experiments suggested practical application of sucrose treatment to plants not properly hardened in coldframes, to plants intended for shipment, and to those planted during high temperatures.

A water solution of 10% sucrose made from commercial grade table sugar was used, with a small quantity of detergent added as a spreader. The plants were treated by spraying the foliage, thoroughly wetting the upper leaf surfaces, and wetting the lower surfaces as much as possible without unduly disturbing the plants. Most applications were made at daily intervals for three days before pulling.

Plants for greenhouse tests were of either the Pennheart or Earliana variety, grown in flats in the greenhouse and transplanted to four-inch pots after treatment. Plants for the field tests were grown in flats in the open or in field seed beds.

Some of the plants were hardened in the greenhouse by withholding water, and in the field by exposing them to stress such as high temperatures and low humidity.

Non-hardened or moderately hardened plants transplanted into a relatively favorable environment immediately after pulling showed little or no benefit from sucrose applications applied before pulling. When subjected to carbohydrate depletion by dark storage at 68° F, non-

hardened or moderately hardened plants were better able to survive and were less injured when sucrose had been supplied before they were pulled. Sucrose treated plants, moderately hardened, showed a definite reduction in shock and mortality when planted during periods of high temperature and low humidity.

Thoroughly hardened plants were better able to withstand stress, so that sucrose applications had no appreciable value.

Under very high temperature and low humidity conditions at transplanting time, differences in survival were observed between plantings made at different times of the day, and between plantings made in the morning and at night. The degree of stress, primarily from high temperature and high vapor pressure deficit, during and shortly after planting was more important in relation to plant shock and mortality than the degree of stress later.

There appear to be several practical applications of sucrose treatments to the production of tomatoes.

1. Where weather conditions prevent proper hardening of plants in coldframes, sucrose applications would put the plants in a better physiological condition to withstand transplanting.

2. Shock and plant mortality may be reduced appreciably by sucrose applications when transplanting is done under high temperature and low humidity conditions. The use of sucrose applications

for the plantings of green-wrap tomatoes made in late June and early July in interior California and for the early fall planting in the Imperial Valley is being investigated further. At present the production of early winter market tomatoes in the Imperial Valley is hazardous because a stand of plants must be obtained by early September, when air temperatures are still very high. Sucrose treatment, combined with night planting, may make it possible to obtain earlier and more consistent stands of plants. One commercial planting made near Yuma, Arizona, this past season, using these techniques, was highly successful.

3. Sucrose application might be useful to tomato plants to be shipped for transplanting in other areas. Annually large quantities of plants are grown in southern and southwestern areas for planting in areas farther north. Since several days may elapse between the time of pulling and of planting, during which the plants may be held at temperatures as high as 70° F to 80° F, considerable carbohydrate depletion through normal metabolism can be expected to occur.

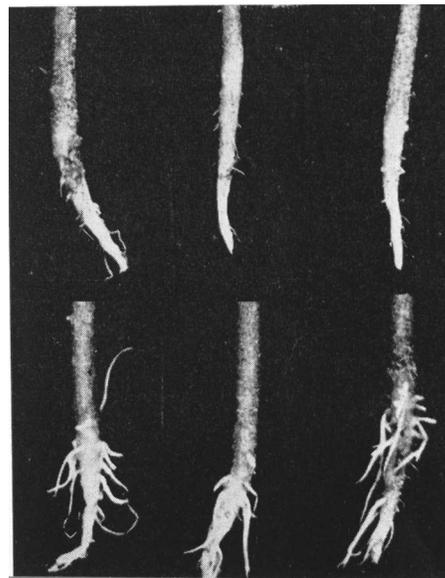
Studies of sucrose-treated plants, even those hardened to a degree comparable to plants used in commercial operations but planted under conditions of considerable stress, show striking reduction of mortality and shock as compared to untreated plants following various periods

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Effect of sucrose sprays on wilting after transplanting. Plant on left received four applications of sucrose spray at daily intervals. Plant on right received no treatment. Plants planted immediately after pulling and placed in 70° F to 80° F greenhouse. Photographed 24 hours after transplanting.



Effect of sucrose on root regeneration. At time of pulling, all lateral roots were removed and plants then stored in dark at 68° F for 96 hours. Upper row received no sucrose. Lower row received three applications of sucrose spray at daily intervals prior to storage.



Refrigerated Locker Plants

preliminary survey indicates operations can be improved by application of industrial engineering techniques

Louis E. Davis

The following report is based upon a survey undertaken at the request of the Division of Food Technology, University of California College of Agriculture.

Refrigerated locker plant operations can be improved by simplifying and standardizing existing processing and merchandising methods.

A preliminary survey was made in three locker plants representing city, town and rural areas, to ascertain how industrial engineering techniques might be applied to improve operations.

For each survey a plant layout, a process chart showing each step of the operation, and a complete description of clerical procedures used were obtained.

There was little uniformity among the plants as to procedures and methods used in processing and merchandising. As some plants complete their operations more quickly, simply and cheaply than others, the possibilities of standardization and improvement in some of the methods employed should be studied.

The clerical operations associated with merchandising and processing showed the greatest amount of variability. There seemed to be a direct relationship between the amount of clerical work done per unit of product processed and the distance from an urban center. This quantity of clerical work—which is largest in the locker plants in the city—may be related to the price of locker rentals.

The operations of wrapping and packaging of meat, and identifying the packages, vary greatly. The paper products used range from double wrapping with a sheet of cellophane and one of wax paper to a single sheet of waxed paper. Wrapping techniques vary from a drug store wrap to double wrapping the corners.

Many sealing methods are used, from a single piece of tape to taping the four sides of the package. Also there is a large variation in the operation of identifying the packages going from preprinted tape for meat and number stamp for customer to marking all information by hand.

The general procedure for receiving incoming meat is highly variable and not efficiently performed. This is due mostly to poor planning of the storage operation and to poor layout of the storage or aging box, as well as to poorly conceived clerical operations involved in the receipt and inventory of incoming meat.

Clean-up operations at the end of the day are generally in need of improvement and standardization. These operations take 10% to 12% of the working time of one or more people in the processing department.

The meat cutting operation in the plants studied was performed differently in each plant. Variation may be required by the condition of the meat but methods could be devised to eliminate inefficiency and speed up the operation.

The ratio of nonproductive to productive personnel was high. Nonproductive personnel—those not associated with processing operations—ranged from 40% to 75% of the plant personnel.

A uniform procedure—both simple and comprehensive—should be developed for the clerical system. This would include designing the necessary forms, tags and books. For example, a properly designed tag containing cutting instructions attached to the meat while in

storage would provide the necessary information for the butcher, eliminating the need for the use of books and records. The procedures to be developed should be flexible enough to permit their use in small and large plants, and would be best developed on an industry-wide basis.

The wrapping and packaging operation, being most like the industrial assembly type operation, probably can be improved and standardized most easily. Along with simplifying the methods, the materials—such as paper—needed to insure proper meat storage should be investigated. The workplace layout, auxiliary equipment, tools and method can be developed so that they would be universally applicable.

The procedure for receipt and inventory of incoming meat will in part be improved by a simplified clerical system. The improvements through effective layout will not be available to existing plants, but layout plans can be useful in designing new plants and remodeling existing ones.

Clean-up and meat-cutting operations can be improved by the design of proper methods and by the study and redesign of the layout of the processing department. The layout of the processing department should be studied from the viewpoint of the processing and clean-up operations. Along with this investigation a study of auxiliary equipment used in processing should be undertaken.

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of storage. The conditions of planting for southern-grown plants in the mid-western and eastern states are normally less rigorous, but sucrose treatment of these transplants may nevertheless be beneficial.

The use of sulfanilamide or other fungicides was not investigated in these preliminary studies. When plants are grown for immediate use, the inclusion of a fungistatic material probably is un-

necessary. When storage is involved, mold is sometimes encountered and the inclusion of some suitable fungicide may be needed.

The best mode of sucrose application remains to be determined. The one used—three daily sprays just before pulling—was entirely arbitrary. It seems possible that increased period of time from initiation of treatment to pulling might permit greater sugar absorption.

Although tomatoes were the subject of this experiment, there seems to be no reason why the use of sucrose on other

transplanted crops and on many ornamental plants would not be possible. Sucrose sprays on a small scale on commercially grown pepper and tomato plants in southern California have been used for the past several years with reportedly favorable results.

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