at least heavy shading is not required. Therefore, much higher light intensities can be used.

The combination of high light intensity and reduced tissue temperature results in situation where the products of photosynthesis can actually accumulate and be utilized in the process of root initiation. Cuttings under the low light, high temperature environment of double glass actually utilize carbohydrates at rate greater than they are manufactured during most of the propagating period.

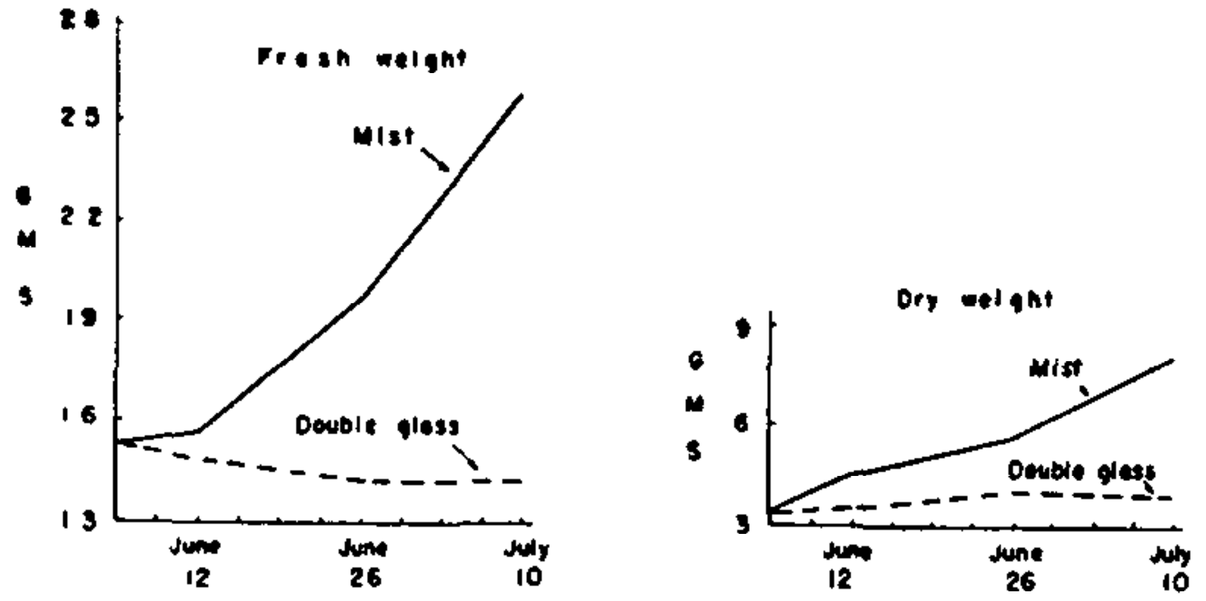

FIG. 2. Comparison of fresh and dry weight of cuttings under mist and double glass

	Gain in fresh weight	Gain in dryweight	Water increase x loss
Mist	8.85 gm	4.17 gm	4.14 gm
Double glass	– 1.22 gm	0.66 gm	– 1.88 gm

MODERATOR HARTMANN: Thank you, Charles, for a most enlightening discussion. I think we can see now that the better results we have been obtaining with mist is not just a matter of good luck, but it is based on sound physiological principles, which are not difficult to understand.

We will now hear from Mr. Peter Mordigan, of Mordigan's Evergreen Nurseries, Sylmar, California, who will discuss the Economics of Mist Propagation. Mr. Mordigan.

THE ECONOMICS OF MIST PROPAGATION

PETER MORDIGAN
Mordigan Evergreen Nurseries
Sylmar, California

The increased use of mist propagation throughout the country has necessitated that progressive propagating nurseries experiment and energetically use their findings for the sole purpose of a more efficient operation. The cost of production has become such a serious problem that thoughtful propagators should stop and analyze their particular situation. There are those who are already satisfied with their results. However, there are many who are interested in new methods of propagation. Perhaps this discussion on "The Economics of Mist Propagation" will give hope and comfort to the new adventurer and give reassurance to the "Old Timer" that he is on the right track. To best illustrate this, a quick analysis of our own operation, should throw a new light on the subject.

Our operation is in the Sylmar area of the San Fernando Valley in Southern California. It is an area 1160 ft. above sea level with extremes of 105° F to 29° F; windy from October to May; sunny days, 300 plus when there is no smog. Any similarity to other places is co-incidental.

We have three areas in which mist propagation is in operation. One has electric cables for heating, the other two have circulating hot water.

Number I Mist House, (and by the way — the first in California), has dimensions of 34′ x 36′ with solid redwood sides up to 24″ then 1 x 2 redwood slats to enclose the area. Thirty percent saran cloth was used to cover the top. This saran coverage was necessary because leaves from a deciduous tree adjacent to the mist house fall continuously.

Our observations point out that the haze of water mist gives a blanketed effect on the cuttings, which in turn eliminates the cost of lath or saran covering. Besides, the higher light intensity on these plants, especially on short winter days was most beneficial. The mist system was installed 6′ above the cutting beds and consists of nine lines of 3/8″ copper tubing with ten Monarch 160 mist nozzles spaced at 4′ centers on each line. This has resulted in an ideal coverage condition.

Each of these lines can be operated independently or all as a unit. This was done by installing a manually-operated valve on each line, which is used as conditions require. For example; first, controlled watering of rooted cuttings for hardening purpose; second, on our many, many windy days, we can shut off, by manual operation, all but one line on the windward side. As the continuous gust of wind hits this line of mist, the whole propagating area is blanketed with a swirling, floating fog-like mist. This is an important saving of water when it is realized that this condition can be constant for several weeks at a time. Also, it is a big factor in lessening salinity problems. Further, by the use of by-pass valves, the whole system is operated intermittently by a clock which can be switched off. We wish to emphasize that we disagree with the theory that mist areas should be protected from winds to prevent water loss from cuttings. The proof is in our own operation.

Our flats are placed on raised beds 8″ high, enclosed on all sides to ensure uniform heat from electrical cables stretched upon a surface of gravel. This creates an area in which the hot, moist air is confined close to the base of the cuttings in the flats. The cool mist from the top and the warm moist air from the bottom creates an ideal environment for rapid rooting and slow top growth We have not as yet encountered *Rhizoctonia* or any other diseases under these conditions. Due to compactness and efficient use of space it is interesting to note that this house has a capacity of 460 flats; the aisles will hold an additional 84 flats. Averaging 300 to 500 cuttings to a flat, the potential capacity of this house is 200,000 plus cuttings. The capital output of $1200 to construct this house is small compared to the low operational cost and highly efficient performance.

In contrast to this low cost propagation house, we had previously constructed an 18′ x 36′ greenhouse for a total sum of $4,000. This house included mist, fans, coolers and hot water heating. We had an idea that we would speed up production. However, we were due for a disappointment. In the first year of operation over 50% of the cuttings had to be thrown out due to *Rhizoctonia* infestation. It was not long before we realized that something had to be done. We cut down the benches to 16″ and enclosed the sides to prevent heat loss. We utilized the heating line adjacent to the outside walls of the greenhouse and built two enclosed benches for additional space flanking the greenhouse to hold 86 more flats. We redesigned the mist system. We opened the sides of the greenhouse below bench level to allow heat to reach these new areas. The mist operation is controlled both by a clock and a humidistat. However, we still feel that manual operation is necessary for complete control. All roof vents in this house are kept open at all times with the exception of hot, dry, windy days. To insure efficiency of operation, high percentage of rooting, and elimination of *Rhizoctonia,* we installed on each hot water line a mist line which operates at night or on cold days when the hot water is circulating. The hot, moist air created filters through the flats, keeping the cuttings in a turgid condition, thus elminating the necessity of overhead misting geared to the humidistat. The over-all capacity of this house is now 276 flats or 100,000 plus cuttings.

In the construction of a third house we capitalized on our experience from the two previous constructions. However, in this case we left all sides and top open. The capacity of this house is 296 flats or 118,000 plus cuttings. By these figures you can readily see that economical production of cuttings under mist is not only probable but very much possible. Bear in mind, however, that the solution of the problem is not the same in any two given areas.

To sum up this discussion, our pattern of economy has been the maintenance of a certain sense of uniformity in all three of our mist propagation houses with continuity in compactness, in design, and in operation. Our results are most gratifying. We have had our failures but they have come from our over-anxiousness. We let caution go to the wind when hot items were in demand. That is a human failure, not a mechanical one.

We have observed in this mist propagation a factor that often may not be recognized. That is, the ease with which plants propagate, given the ideal conditions. This success gives the propagator a sense of confidence in what he is doing, which in turn spurns him to greater success both economically and spiritually.

MODERATOR HARTMANN: Thank you, Mr. Mordigan. We will now hear from Mr. Don Sexton in regard to his work in rooting cuttings of California native plant species under mist. Don.