

plied in the north at great cost for the housing of tender plants. Far more necessary it seems, is the wintering of many of our normally hardy plants in their early stages of development. Is it not conceivable that some modification of our northern winters is economically possible in the future on a large scale? I feel certain it will be so and that structures will be built to provide all essentials of a controlled modified winter climate.

MODERATOR SHUGERT: Our next speaker is Mr. Bill Cunningham from Waldron, Indiana, who will speak on over-wintering in poly structures.

OVER WINTERING PLANT MATERIALS IN POLY STRUCTURES

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In recent years this subject has been discussed at great length by many speakers, and the subject still bears interest because growers are deeply concerned about ways and means of successfully over-wintering container-grown plants. Perhaps my subject should be titled, 'controlling environment in poly structures.'

I hope you will forgive me if I seem rather brusque in this opinion, but I believe the problem of winter-storage of plants in containers is an elementary one. Permit me to say, when plant materials are grown in containers and winter-stored above ground, then subjected to wide temperature extremes, often coupled with high wind, we cannot expect 100% survival every winter. In simple terms, the environment is unsatisfactory.

What is the answer? In my opinion any nursery stock worth propagating and growing should not be subjected to deep-freeze conditions while above ground. There's no doubt the market for nursery stock in containers will be even greater in the future, so let's face it, if we are to produce and have available a continuous supply of prime stock, then this material *must* be grown in structures wholly suitable for the growing season as well as for protection from wind, freeze and thaw during the dormant period. To succeed, we must have greater control over the environment in which we grow container stock.

To accomplish this I feel the wind-resisting, versatile and functional quonset-type polyhouse permits a means by which producers may successfully manage these crops. Of course, I realize construction costs do not permit rapid nor complete change-over to this system, for in many instances very large acreages are involved. But there must be consideration of this or a similar program in order to profitably compete, otherwise in the future the greater part of this production will be in frost-free areas of the country.

I believe we are justified in using heat to control minimum temperatures in poly-covered storage units, just as we are justi-

fied in relying upon refrigeration for storage. Either system has cost involved, and I don't believe any of us will argue that refrigeration isn't practical. Refrigerated storage is controlled environment, so perhaps we can look upon the use of heat in plastic house storage in the same way. We're exercising some control over the elements.

Now, perhaps we can disregard the costs involved in erecting facilities suitable for growing and storing container stock, for there are so many variables involved. Construction standards vary from grower to grower. If poly is used as an annual protective covering, compared to standard greenhouse construction, we know the costs are substantially less.

Quonset-type construction permits an easy application of poly for winter cover, and equal ease in removing the cover in the spring. Then by putting on saran, we also find it easy to convert these facilities to conditions most favorable for summer-growing. No other type of construction permits such fast and easy exchange of fabrics.

Exclusive of electric power and routine maintenance costs, polyhouses can be covered with liners inside and out and heated with unit heaters burning LP fuel, and carried at frost-free temperatures at an annual cost of less than 12c per sq. ft. of area covered. So in conclusion whether we are storing ground cover stock or larger canned material, we believe these costs are fully justified. These costs are minor, certainly, considering the assurance we have that our production inventory is protected.

MODERATOR SHUGERT: Our final speaker this afternoon is Bill Flemer who will answer the question, "Does cultivation preserve soil moisture?"

DOES CULTIVATION PRESERVE SOIL MOISTURE?

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At the time of the publication of Laurie and Chadwick's *The Modern Nursery* in 1931 and for countless years before, there would have been hesitation in answering affirmatively the question which forms this title of this paper. Agricultural and horticultural experience had long endorsed the practice of cultivating the soil not only to control weeds, but to conserve soil moisture during summer dry periods.

So the matter rested until the advent of the modern herbicides which for the first time made it possible to control and virtually eliminate weeds in crop rows without even a single cultivation during the growing period. Soil scientists at many experiment stations began to question whether there was any value to cultivation at all, now that weeds could be suppressed by herbicides, and experiments seemed to show that soil mois-