lars per acre. Glass greenhouses vary in cost from $1.00 to $3.00 per square foot or $40,000 to $120,000 per acre. Calculated cost per year per square foot, oddly enough, is very close for both types. These costs include interest on investment, taxes, maintenance, and depreciation, and are calculated on an acre size unit; averages are — for glass, 15c to 26c per square foot per year, and 11c to 19c per square foot per year for plastics.

The market today demands quality products, and profit and quality are keys to all successful business operations. Physical facilities must be well-planned, heated, ventilated and highly mechanized and automated; tempered with the rapid urbanization of the nursery neighborhood, the key to your choice, the type of greenhouse structure you should build.

MODERATOR BODDY: Thank you very much George. Our next speaker is Jim Perry, who will discuss his use of plastics in the production of bedding plants. Jim was voted the outstanding nurseryman of the year at the recent California State Nurserymen's Convention, receiving the Pacific Coast Nurseryman Award. Jim:

ANATOMY OF THE PLASTIC HOUSE

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The use of plastics has greatly increased during the past few years and, until something better comes along, I feel that plastics will be used for many years as coverings for preservation of heat and for climate control in the growing of plants.

Perry's Plants has benefited greatly by the use of plastics in our growing procedures. We are currently using polyethylene sheeting, 4 mil, for winter covers and protection, as well as the corrugated PVC (polyvinylchloride) for a permanent structure.

The polyethylene sheeting is used for covering, during the winter, our temporary structures, which are made of bent ½″ pipe, giving the shape of the quonset hut, with a curved dome top. We have taken a standard 21-foot length of galvanized pipe and with the use of a homemade jig, bent the pipe to conform to the shape that we desire. There is a three-foot straight leg on each end and the rest of the pipe between these three-foot legs is curved into a half-circle. The reason for the straight legs is to give us a perpendicular wall to accommodate the benching and growing close to the outside edge; the curve then swings over the top. Our houses are constructed with about 6′6″ clearance in the center. This gives us a floor space 16 feet wide. The bow is then fastened on the inside of a 1′ x 12′ (a 2′ x 12′ could be used) that stands on edge as an outside wall. Pipe clamps are used to secure and hold this bow in an upright position by nailing to the inside of the 12-inch board that rests on edge on the ground and is held upright by metal stakes on the outside edge. Many of these bows are used for each house; ours are placed approximately 8 feet apart. We have limited the length of our houses to 98 feet.

With all the ribs of this house fastened in place, in order to secure the top center, we have used a one-inch mesh metal wire screen fastened to each of the bows to act as a stabilizer for the bows; they also give support to the crown of these houses for the plastic, so that the rain water will not be trapped in a sagging pocket on the top. At each end of the house we have two 4 x 4's (you could use rough 2 x 4 posts) on each side of the doorway at each end to support the outside rib and to give strength to the end for closing in. A framework is put up at each end and covered with fiberglass or polyethylene, or any desired covering, whether it be permanent or temporary, as the needs might be.

The two posts at each end is all that holds the house down, in addition to its own weight. We use a sliding door at each end that runs on an overhead track. In this way we do not have swinging doors to get broken and be caught by the winds. This makes a house 16 feet by 98 feet long. The reason it is designed in this fashion, on length as well as width, is that this fits a standard size roll of polytehylene. The poly is spread out over the top of these bows and fastened to the boards on each side at the bottom; the ends are fastened to the framework previously mentioned, so that all edges are fastened down securely. With this 20 by 100 foot roll of plastic, there is no fastening in the center, only on the edges.

The only ventilation used or needed is by opening the doors on either end. Ventilators could be put in the tops if desired, but we have not found it necessary for the type of material that we are growing. We have constructed also a little larger sized house where we have used 1½ lengths of pipe, coupled together, and bent in the same fashion as formerly mentioned; this makes a house 24 feet wide by whatever the desired length might be. On this framework we used a 32 foot x 100 foot roll of plastic to cover these rib bows, which would have a length of 31½ feet.

In all of these houses heat is provided as needed. We do not try to maintain a high or even temperature. The heaters are manually lighted during the colder spells in winter.

Our more permanent structure is built like a greenhouse and now looks like a greenhouse, although the original framework was designed as a chicken house. The metal trusses come prefabricated, 30 feet in length, but we have added a 6-foot extension on each side of the 30-foot trusses, making a 42-foot house, 210 feet long. We have two walkways, the outer edge of each lining up with the end of the 30-foot trusses, which must be supported by posts. These posts are on 9′6″ centers throughout the house. This was designed so that the

18-inch flats could be placed on the benches without having the post interfere as they would if they were on 10-foot centers. Wooden stringers are used over the metal trusses, supported at the ends only; sheets of corrugated PVC are then nailed to the wooden stringers.

We find that plastic-covered structures are much tighter than the conventional glasshouses. We have three comparatively new glasshouses that are not nearly as tight as the plastic structures. This may or may not be an advantage, but care should be given if you are accustomed to glass house conditions and then switch to plastic; with the latter there is much less air seepage and more condensation.

MODERATOR BODDY: Thank you, Jim. The next speaker is from Oregon. Joe Klupenger is recognized as one of the leading pot plant growers of the Northwest. He grows a complete line of flowering plants and foliage plants. He is also in the nursery business with the production of rhododendrons. Joe is very active in the American Association of Nurserymen and has been active in our Plant Propagators' Society — Western Region. He has spoken to us before at West Linn, Oregon, about his new operations at Wilsonville. We're looking forward to Joe's further remarks on the use of plastics in Oregon. Joe —

PROPAGATION AND GROWING UNDER FIBERGLASS AND POLYETHYLENE

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Our experience with propagation and growing under polyethylene and fiberglass gives us encouragement for the future. I would like to give a few pointers resulting from our experience in propagation and from the changes we have made over the past few years. At one time we would not propagate rhododendrons under any condition other than enclosed cases in the greenhouses. At a later date we decided we could do a better job of propagation in closed greenhouses but in open benches, although with no ventilation for fear of the cold air "chilling" the cuttings.

At the present time we are propagating in open benches but with air-conditioning fans (on thermostatic control) moving the air directly over the cuttings. We are having a greater percentage of rooting now than ever before.

At earlier dates, we were cautious as to the type of mist nozzle used so as not to get too much water on the cuttings. Now we are using Foggit nozzles; their output is three-gallons per hour. Formerly we used one-gallon per hour nozzles which did not cover the area as well as the nozzles now in use.

Our plans for next season are to move our propagation