polyethylene on the end to gather it all together and tie it in a bunch as if it had an old-fashioned puckering string.

Still a fourth method which in itself is very simple, is shown by the next illustration where tall container grown material is laid on its side and then stacked up two or three high like a double or triple stacked row of barrels and then covered with polyethylene.

A variation of this arrangement is to lay two rows of material down with the tops heading toward each other and overlapping. Down through the center we put a 2x4, supported occasionally by up ended concrete blocks. This forms a ridge pole and polyethylene is draped over both rows of containers as shown by the picture which I feel illustrated them very clearly.

The last word has never been said on these methods, and I am sure that many of you will copy what we have done and vastly improve upon our methods. Frankly, we know right now some changes that we ourselves will make next year. I would appreciate knowing some of your ideas. Thank you all.

CASE HOOGENDOORN: Do you water that balled and burlapped material?

DICK BOSLEY: In the "A" frame structure we do ventilate and whenever you ventilate you have to water. On the *Ilex oppaca* in the large containers that were laid over, no, we don't water. We make sure they are thoroughly watered before they are covered.

MODERATOR TINGA: Our next speaker is Andrew Adams, Jr.

"OVERWINTERING AZALEAS IN TEMPERATURE-CONTROLLED PLASTIC GREENHOUSES"

ANDREW N. ADAMS, JR.
Ten Oaks Nursery & Gardens, Inc.,
Clarksville, Maryland

It became apparent to us back in 1955, if we were to continue in the Azalea business we would have to find some means of protecting our plants better in order to have saleable plants in the early spring with good foliage and buds.

Polyethylene plastic was just coming into the picture around this period so we constructed a small house (12'x96') by bending some old electrical conduit into a half circle and covering with some concrete mesh wire 6"x6", thus making a quonset type of house. We installed a small exhaust fan in one end and several louvers in the opposite end, plus a couple of propane gas heaters used for curing tobacco in the Southland. The idea was to keep the plants just above freezing, with plenty of air to prevent leaf drop. The following spring the results were so gratifying, plus the fact the Azaleas were gone in no time, that we decided to expand this idea.

We constructed 12 gutter-connected houses with a truss

type roof design of ½ pitch for quick snow removal. These houses are each 23′x96′; holding approximately 15,000 4″ Azaleas. Each house has a 42″ two speed exhaust fan in one end. The opposite end of the house has a door 3′x7′ and two 3x3′ louvers. In each end of these houses we have suspended, from the rafters, a 75,000 BTU unit heater fired by propane gas. Both fans and heaters are thermostatically controlled with heater thermostats set at 40° F and fan thermostats set on 50°F in the winter. When the weather warms up above freezing outside, the fans run continually. Also, we have found through experience that if our heater fans run continually it keeps the air circulating in our house eliminating stagnant conditions which occur under poly in the winter.

As can be seen by the slides I will show, we have one double decker bench, 4′ wide and 5′ high, down the center of each house over our ground beds. Next year's crop of Azaleas are potted up during the winter and placed in these deck benches. This works very well and keeps the per unit cost down. These plants, being next to the heat and light, really start to hop in March.

Saran shade cloth, 40% shade, is put over the houses during the first week of June and left on until the first week of August when it is removed so the plants can be hardened off. We use 6 mil poly which is put on the last week of September or the first week in October.

Cost of this material annually, including labor for putting it on, is approximately 01½c per square foot. The cost of house, fans, heaters, heat and electricity per year is approximately 20c, 10c of this cost is amortized over a 10 year period for the houses and equipment. This works out to an approximate cost of 03c per 4″ Azaleas with 15,000 plants per house, or 24c per plant for 10/12″ plants.

We learned years ago, in order to have good saleable plants for spring sales you must spend good money, but this is a lot cheaper than not have anything to sell in the spring.

During my short 21 years experience, we have found no such thing as winter-kill in Azaleas. Most of your damage is done in the early fall with the first cold snap or freeze when everything is growing very lush and we get no hardening off of the plants. We call this Fall-kill at Ten Oaks. Nine times out of ten this will occur here either in the first or second week of October when temperatures suddenly drop in the 20's after being in the 70's with ample moisture.

As Azaleas go into the second or third year they seem to harden off or stop growing earlier in the fall; but for the younger, protecting under plastic seems to be the only answer if one is to have a saleable plant in the spring, and of course, the demanding market is there from March 15th on when one can't find a decent Azalea around.

ANDREWS ADAMS: We are changing some houses to fiberglass. We find that over a five-year period the cost is

the same as polyethylene. The labor to put the polyethylene on is expensive and it comes at the wrong time of the year for us.

HANS HESS: How long have you used fiber glass?

ANDREWS ADAMS: We have had it on a lean-to greenhouse for 11-12 years. The fibers are starting to show. What we did this year was to put on a fiberglass refinisher. We coated the fiberglass and it keeps the dust from accumulating on the fibers. We really should have done it a little earlier. The material is available from Geiger in North Wales and is advertised in the American Nurseryman.

MODERATOR TINGA: The next talk we have is overwining container stock under plastic my Mr. Gil Nickel. He has 40 acres of containers.

OVERWINTERING CONTAINER STOCK UNDER PLASTIC

GIL NICKLE
Greenleaf Nursery Co.
Park Hill, Oklahoma

The need for cold weather protection of container grown broadleaf ornamentals became apparent at our nursery after severe losses during the winters of 1960, 1961, 1962. We are located in northeastern Oklahoma, in the Ozark Mountains. The average low temperature is 5 to 10 degrees F. below zero, and most broadleaf evergreens grown in containers, such as holly, pyracantha, euonymus, and some shrubs, are subject to varying degrees of winter damage. We felt that polyethylene covered houses offered the most promising solution to providing the needed protection, but several criteria had to be considered:

1. The houses had to be low in cost.
2. They had to be able to hold snow loads of 6″-12″.
3. They had to withstand winds in excess of 60 MPH.
4. They had to be easily erected and dismantled as we intended to put up the houses in the fall and take them down in the spring.
5. They had to do an adequate job of protecting the plants.

The structures I am going to describe are now being used for their third winter. We decided on A-frame construction because of its relative strength and simplicity. By making individual A-frame bows and joining any number of bows with stringers, a house of any desired length can be erected. The A-frame bow is constructed from two 2x6's - 19½′ long, with a 12′ 2x4 cross brace, and gussets of ⅜″ plywood, resulting in a bow 33′ wide, 11′ high, and each leg making an angle of 31 degrees with the ground. The bows are spaced 8′ apart with 2x4 stringers 16′ long, nailed at the bottom, middle and top. Diagonal braces are put at each end and, in the case of a long house (200′ or more), braces are put in the