under fiberglass. We find that with a high light intensity we have less burning and we are sure of a greater percentage of rooting but with fewer problems of damping-off, and other fungi, developing. As to growing-on in the liner stages for both rhododendrons and azaleas, our present procedures give us a better quality plant with heavier caliper stems and foliage. This has been our experience resulting from growing liners under poly and fiberglass; this is due to higher light intensity, giving top quality results with no burning of the foliage.

We established a test plot this summer growing plants under clear fiberglass using air-conditioning fans but with no cooling pads. Using several varieties, we find this fall that the plants have come through in top condition with a good bud set.

Later in the summer, approximately late June, we completed building 18 000 square feet of house, covered with inexpensive fiberglass (acrylic-treated, 4½ oz., clear, corrugated). Upon completion, we filled these houses with several varieties of potted azaleas which were to finish for fall, 1966; this was budded stock for dormant shipping. Although we were very late in spacing this stock, we were fortunate in finishing this block of stock off in first class condition with a good early bud set.

We have an overhead sprinkler system using Superior nozzles which are tapped into the lines at 10 ft. intervals. Each line covers a 20 ft. wide house. We are using three 4-ft., ¾ HP, 220 V. fans for air-conditioning and cross ventilation on our nine houses. Temperatures did hit 100°F. inside the houses when it was 90°F. outdoors, but with enough water and with the cooling fans, our azaleas came through in No. 1 condition.

MODERATOR BODDY: Thank you very much, Joe, for coming all the way down from Portland to deliver that fine talk and for the detail with which you gave it. The next speaker on the program is a specialist in ivys. He is going to tell us about it tonight. It's my pleasure to introduce Ken Inose of Gardena, California. Ken —

AIR-SUPPORTED PLASTIC GREENHOUSES

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PURPOSE: To propagate ivies, which is my principle crop during the fall, winter and early spring, with a structure that could be erected quickly when needed and then dismantled after the winter season. This type of house can easily be used during the summer with the addition of more coolers.

Two houses were in use from September, 1965, through March, 1966. The dimensions of each were as follows: 30′ x

50′ x 15′ in height at the highest point. The height is always one-half the width with this type house since it is built in a half-circle. Each Airhouse was equipped with a desert cooler on the south end-wall; a 100,000 BTU heater, thermostatically-controlled, was integrated with a squirrel-cage blower on the north end-wall. One or both of the blowers was in constant operation at all times to keep the houses up. During the heat of the day both blowers were in operation in order to move as much air as possible to keep the houses cool. With approximately 17,000 cubic feet of air in the house, the estimated air change was once every two minutes at 4500 C.F.M. per blower, with both blowers running. This would decrease to once every four minutes with one blower. During the night, only the heater blower was kept in operation, with the heater turning on at the preset temperature level. Ventilation was achieved through a weighted flap located on the top center of the house.

CONSTRUCTION: The houses were made out of 20-mil vinyl, each panel 42″ wide, hand-fabricated with the help of a machine that looks like a rotary iron. P.V.C. glue was used to laminate the panels together; no heat was applied in any way. The Airhouses were anchored to the ground by an 18″ diameter water tube which was laid around the perimeter of the house. The water tube was held in place in an 18-inch deep ditch. This was the first mistake we made. The ditch was one of the causes of failure of the Airhouse during heavy rains in December, 1965. Heavy runoff from the roof of the Airhouse filled the ditch with water; because there was some air in the watertubes, they floated up and the water inside the tubes drained out. The winds which usually follow a rainstorm got underneath the water tubes and the house collapsed. There was little damage to the plants but there was some tearing of the vinyl. This was easily repaired by patching. The rain problem was partially solved by placing a swimming pool vacuum pump into the ditch each time it rained.

Entry into the Airhouse was gained though a six-foot zipper located at each end of the house. The zippers gave trouble after about three months use. The answer to this problem possibly is an airlock system using two sets of doors. In this way fairly large pieces of equipment can be easily passed through. The house was loaded with flats through a 12″ x 20″ opening located in the center side of the house. A hinged Aluminum flap was used here and it was pushed open from the outside. The flap was kept closed just by the air pressure within the house.

To fill the house with flats, the flats were rolled down a 25′ conveyer through this opening and then carried to where they were to be placed.

PLANT GROWTH: Using a regular glasshouse for comparison, plants in the Airhouse had similar growth but with less fungus problems; this is probably due to fresh air circulating at all times. As a practical example, I could get a crop out of both kinds of houses ready to sell in six to eight weeks. These were the Hahn's and the English Ivy. This amounted to three crops plus during the fall and winter months.

CONSTRUCTION COSTS: These were approximately $1.00 per sq. ft., including heater, blowers, and coolers. Heating cost were about $50.00 per month per house with the thermostat set at 68°F. Since my crops are not a high value type, as compared to other greenhouse crops, for economic reasons I had to lower the temperature setting to 50°F. Even at this setting, on a cold night the heater burned continously. A better method would be to recirculate the air, with an arrangement of louvers or ducts, bringing in fresh, outside, air only for the burner. The burners on the heater would not fire-up unless the blowers were turning as a safety factor. All operations for cooling were done manually. This includes watering the plants by hand.

CONCLUSION: I would say that the economic feasibility of an airhouse for a commercial grower will be based primarily on the longivity of the type of material used. There are coatings available to prolong the life of vinyl. Much more experimentation will have to be done by growers, much of it on a hit or miss basis. A more efficient method of fabrication could be attained if the plastics manufacturer could make wider sheets, thereby eliminating as many seams as possible; this alone would greatly reduce the cost of fabrication.

MODERATOR BODDY: Thank you very much, Ken. The next speaker on our program is Al Holland, the Agricultural Extension Service representative from Orange County, California. He, too, has worked very closely with air-supported houses and has spent considerable time with Ken's house. He has additional information, however, and at this time I'll call on Al Holland to give us that information. Al —

DEVELOPMENTS IN AIR-SUPPORTED PLASTIC GREENHOUSES

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Dr. Errol Rodda, Department of Agricultural Engineering, University of California, Davis, prepared a paper with the above title. It reports on two air-supported, water-anchored greenhouses which were used experimentally over chive plants. Construction details and estimates on costs of maintenance as well as production of some other crops are reported. It also briefly discusses air-supported row-covers.

From my experience I expect to see air-supported plastic greenhouses become quite common. There will be a diversity of designs for diverse uses. Some will be for long life and great durability against heat, cold and winds. Others will be