GROWING FORCING AZALEAS IN PLASTIC HOUSES

J. H. KLUPENGER
Klupenger's Nursery and Greenhouses
Aurora, Oregon

Eight or twelve years ago nurserymen and florists in different areas of the country developed the idea that a temporary construction could be built and covered with poly film and used in the spring and summer to finish some of the various crops such as azaleas, foliage plants, and many types of cut flowers. As time went on there has been many types of construction and various shapes of structures erected and used for growing under polyethylene.

Our first experience in the use of polyethylene was in 1953 for growing azaleas for the final year, or the final season of spring and summer, to bud them up for market. After having good results the first year, we continued the following year with more such structures for azaleas.

In building the first structure we checked to see which widths of polyethylene would be available in our area in four-mil thickness. We found the 20′ x 100′ in four-mil was most popular in wide sizes. We constructed our houses 24′ wide with about 5 to 5½ foot on the eaves. A twenty-foot roll would reach from the ridge to the ground on a side, or one-half of the house.

As time went by we decided to try other types of structures. We finally settled on a quonset-type construction, using ½ inch galvanized pipe, set on gutters similar to greenhouse gutters six feet above the ground to give head clearance and also cross ventilation.

Heating the houses was much easier to control with open houses joined together. Polyethylene film will construct a very air-tight house but will not protect plants from cold if they are not heated. With no heat in the houses and temperatures outdoors down to 32° F., a good breeze blowing and no frost, we would find frost inside the polyethylene houses; this is because there was no breeze inside of the poly houses to move the cold air.

We have run checks on outdoor temperatures against indoor with heaters; at 20° F. outdoors a 100,000 B.T.U. heater would maintain 34° F. inside the covered area of 3,200 square feet. For cooling, or to move the proper amount of air necessary to do a job of growing, it takes three 4′ fans, at ¾ horsepower each; this will move 60,000 cubic feet of air per minute.

Our poly houses are built in sections 100 feet long and 11 to 16½ feet wide. If air during warm weather is pulled a longer distance than 180 feet there will be 8 to 10° difference at the end of the house where the fans are installed than at the opposite end where the air enters the house. Without water cooling pads it will get quite warm at times, but with this amount of air movement, growing conditions have been very good. In

growing azaleas under polyethylene using these conditions we find we can finish off a more compact plant with a much heavier body than we can under glass.

Saran cloth is used under the poly for shade in the summer months. When the weather warms up (late June and July) the poly film is removed, fans are turned off and the azaleas are then finished off in open air; the same conditions are under lath. About mid-or late-September new poly is placed on the roofs for the coming year; the saran remains under the poly which works two ways; first, it helps to support the polyethylene and second, eliminates part of the condensate drip in the winter months.

In growing azaleas under polyethylene through the months, we have to be careful not to get too much condensation; this will cause mold on the foliage, also foliage-drop, the same as on many other crops grown under poly. During the warmer days in the winter months we run the ventilation fans as much as possible for two purposes: to eliminate condensed moisture and to move fresh air over the azaleas, which is very important for growing conditions. Our method of heating is also done with fan-type heaters, whether it is gas or hot water heat — again for two reasons: to keep air moving over growing plants and to eliminate condensation.

We are quite certain other crops can be grown successfully under poly as under glass with as good, if not better, quality. Under present cost of growing, with a small mark-up, it is impossible to build enough glass-covered area, which many of us need today, to protect our crops at the price of glass per square foot. The reason for looking into fiber glass is to eliminate recovery every year, and the danger of tearing during storms, which can happen with polyethylene.

In the spring of the year, or in early summer, when we spread out our azaleas that are growing in containers, moving them from glass-covered areas to the poly houses — in a very short period of time they have a heavier, dark-green foliage and become stronger plants. Our explanation for this is that under glass you will get so much sun that the rays will burn; if you shade the glass too heavily to eliminate this condition, then you cut down the growth, which again requires high light. We eliminate shading under poly except for saran cloth; this gives us plenty of light and seems quite hot at times, but if the stock is well-watered you will not get any damage to the foliage.

Our feeding program is the same under poly as under glass. After azaleas are planted in containers or beds and well-established in early spring, we start feeding liquid food (25-10-10) at the rate of one pound per hundred gallons of water about every two weeks. In late spring and summer we feed 25-10-10, one pound to one hundred gallons of water, about every eight days or as weather conditions permit. If we have a lot of cloudy

weather and the plants do not dry out, we will cut down or skip a week.

We feel that the stock should be watered occasionally with no added fertilizer so as to eliminate salt build-up. Salt problems can develop if the stock is not watered so the water will go on through the container or bench. We feel that many plants have been damaged or killed in the past in this area due to overwatering with liquid feed at times when we have overcast skies and cool weather. You will get a fertilizer build-up; then when the sun comes out and temperatures rise you will get a fertilizer release ,which will damage the roots, sometimes to the extent that it will kill the plant. The same problem will develop if you are feeding regularly in warm weather then let the plants get too dry following feedings. I will sum it up in this way: when growing plants, we can not be too careful in any one phase of growing a crop.

MR. BILL ROBINSON: I would like to ask Joe what form of nitrogen he uses.

MR. JOE KLUPENGER: We use quite a bit of mix per year. It runs into tons, so we have this special, 25-10-10 fertilizer; its ammonia nitrate, di-ammonium phosphate, and muriate of potash.

MR. BRUCE BRIGGS: In your original dry mix, are you using any nitrogen in it?

MR. JOE KLUPENGER: We have a dry formula that we use. but I can't give you the exact figures. I don't have them with me, but we do use blood meal, dolomitic lime, a small per cent of super phosphate and small per cent of potash, lesser potash than super phosphate. The per cent of bulk weight per hundred would be pretty near 45 for lime and blood meal and the difference — the balance — would be super phosphate and potash We use this formula for our basic soil mix or peat mix — peat with a little shavings. When we plant we mix this ahead of planting and we use it at the rate of about six or seven pounds per cubic yard. Now that sounds heavy, but nearly 50% of it is lime.

MR. BRUCE BRIGGS: Then, Joe — the other question is, did I understand you right that you were using a 25-10-10 liquid feeding program for your containers; is that right?

MR. JOE KLUPENGER: That is right.

MR. BRUCE BRIGGS: You also mentioned that near the end of summer you applied some iron. What form of iron do you apply so that you won't tie up your phosphate.

MR. JOE KLUPENGER: FTE 3-30, I believe it is, This is for azaleas — the chelated form. Of course, we use it very sparingly. We have used considerably larger amounts in the past. I believe that this year we were using it anywhere from

2 to 4 ounces per gallon in 100 gallons of water; so it is not very heavy.

MR. FRANK DOERFLER: Can somebody discuss methods of shading in fiberglass houses?

MR. JOE KLUPENGER: Frank, our thinking along this line is if you are going to use fiber glass you get high light intensity and it gets pretty hot. Now it costs a little more money to get set up and do it, but I think that you would find it would pay to put in air-conditioning fans. Check out the size you would need for the amount of air you would want to move. I'll give you this information: a four-foot, three-quarter H.P. fan will pull 20,000 cubic feet of free air per minute, so this will give you some idea of your area. We're using three, four-foot fans, with three-quarter H.P., 220 volt, motors on each bank of saran houses or poly houses; that would be moving 60,000 feet of free air per minute. Now what I mean by free air; if you're not restricting your air through filters with water, why you'll drop down about five per cent. We find that we don't have to shade. It is much better if you are using fiber glass or polyethylene to go into this little greater cost at the start. I think you'll wind up in the best shape at the end. Forget the shading. I think we'll find eventually we'll be doing more of that on glass because they are coming out now with what they call diffused glass. There is some greenhouse being built with this in Eugene, Oregon, right now. I know there is some already built in California, the same as they use in Europe, and I guess they are not shading that at all. It's clear glass, but it is diffused. It looks like water ripples on the glass. It is equivalent to double strength, and in many crops they're not using any shading at all. I think we should look at our air conditioning and try to get all the light we can and forget a lot of the paint, white-wash, and shading.

MR. RAY BURDEN: I would like to direct a question to Mr. Goddard. On your deciduous azaleas, do you find that some varieties root better than others or do you have equal success with all varieties you try?

MR. BILL GODDARD: No, they do not root at the same speed. Therefore, I would say to keep a given variety together in one flat and not mix half a flat of one and half a flat of another variety. I have found them all equally easy to root, but definitely some are faster than others.

MR. ED. WOOD: I would like to ask Mr. Goddard if he would give us a quick resume of his method of handling azaleas ready for sticking for propagating.

MR. BILL GODDARD: The average cutting is taken sometime during the month of June, depending upon the variety. The average cutting I would say, has a length of 3½ to 4 inches. It would contain then, approximately 6 leaves. The bottom leaves are, of course, removed. The cutting is merely cut straight

across with an ordinary pair of secateurs, no knives or anything else is involved. We haven't used too much in the way of the various hormones, although we have used at times Chloromone, Seradix, Hormodin 2, and, I believe, Rootone; and frankly we have found them I believe, all of equal response; if anything, results are actually in favor of Chloromone. The percent of peat in the rooting medium runs about ten percent, which is an average medium grade. The balance would be at least 40-45% Styrofoam and the rest would be a quite coarse sand. We find that the azaleas and rhododendrons will root solidly across the flat whereby you can take hold of the plants and lift the flat. The medium, of course, is quite light being so high in Styrofoam which, being a plastic, is quite light in weight.

MR. BILL CURTIS: My understanding is that with deciduous types of azaleas that if you take out the tip bud that they will branch better. *Do you take out the tip bud?*

MR. BILL GODDARD: Yes, I believe that is a general practice but, of course. at the time of taking the cuttings, practically no buds are visible. They develop later in the propagation bench. We go over the cuttings at that time and remove them.

MR. BRUCE BRIGGS: Mr. Goddard, can you take long cuttings and cut them into pieces, or must you take all tip cuttings?

MR. BILL GODDARD: That brings us into seasonal variations. The length of growth at a given season is dependent upon temperature and precipitation. If you have sufficient shoot length of a sufficient firmness it will make one, two and possibly three cuttings. Three would be exceptional because that would denote quite high growth.

MR. BILL CURTIS: Should you cut back the plant from which you are going to take the cuttings, or does growing the plants under the light contribute something which makes the cuttings more easily rooted?

MR. BILL GODDARD: To that question, I think it would depend a lot upon the tvpe of plant that was taken. If it was a nice, bushy plant with plenty of stems, I wouldn't cut it back; but if it was a somewhat straggly plant, yes, I would definitely cut back quite hard. *I would cut back hard even the wood that was* a quarter of an inch or more thick to induce heavy branching. I would then, of course, take cuttings from the first flush of growth. I believe after the secondary growth has arrived, you could take some more cuttings, but further than that I honestly believe that the constitution of the plant would not stand it. You would tend to get weaker cuttings.

MR. BILL CURTIS: I would like to have Dr. Clarke give us some information about his use of Clorox in propagation.

DR. HAROLD CLARKE: We have been making all of our cuttings into a tub of Clorox solution for seven or eight years. One of the reasons I like to use it, among others, is that we take a lot of cuttings from all small plants and at this time of year in our

sandy soil they are well splashed with mud and sand. In a Clorox solution they do get washed clean and we think it has helped in the control of fungus infections. Now we use it at about 5% as it comes out of the bottle — a gallon bottle would make 20 gallons of the final solution. Clorox is 5.25% sodium hypochlorite, the same as Purex and several other of those cleaning solutions. I don't think it makes any difference which brand you use. We started using it because we were interested in something that would prevent rotting of cranberries and we tried this sodium hypochlorite dip. I got to thinking why not use it for cuttings. At one of the Science meetings an Extension man from Iowa said that all the chrysanthemum growers there were using Clorox dip. So we've been using it to our satisfaction.

We started in a number of years ago using straight peat for rooting rhododendrons. They all rooted very well. In our area peat is cheaper than sand. There's no reason to spend the extra money to make a mixture of peat and sand. We started out with a continuous mist before there was any intermittent mist apparatus. The continuous mist worked fine and we still use it. A lot has been said about the timing of the taking of cuttings. We have a very scientific approach to that one. We take all of our cuttings alphabetically. That sounds rather queer, but actually when you're talking about the timing of cuttings you have to consider the growing conditions. We're right down at the beach and right now everything is growing very lushly. To say that we should take the cuttings in August, September, or October, or on May 13th — it just doesn't make any particular sense, when we have practically continuous growing weather. I think that one should consider this matter of timing very much in that respect; so since with all our rhododendrons — we propagate as many as 300 varieties — it is a lot easier to take them alphabetically and then we plant them out in the plastic house alphabetically and from there out into the field. If you have 300 varieties and you have four or five fields where you have one-year, two-year, and three-year plants and someone comes in and wants a particular variety, it is awfully nice to not have to look over the whole field to find it. Go down the row alphabetically and it's there.

VOICE: How long do you leave the cuttings in the dilute Clorox solution?

DR. HAROLD CLARKE: Well, we make the cuttings on a table. We have a tub with the Clorox solution at the end. We shove them in there. If it's lunch time or coffee time, we leave them in. It doesn't make any difference. I think they're better off in the solution than out in the air. There is one other short cut that perhaps I might mention and that is in making the cuttings. We do it all with sharp pruning shears. In making the cutting we cut right back to the node or just beyond it so that there won't be a stub left there. We take the cutting, the leafy part, in the left hand and the shears in the right hand and whack

them off, straight across, and then almost in the same motion we turn the shear just a little bit and give it a scrape that way. A wound is made with the shear in almost one operation.

MR. MIKE ZELASKI: Does anyone know about the use of CO_2 enrichment in greenhouses?

MR. JOE KLUPENGER: That's been experimented in the pot plant departments up in Seattle and I think a couple of places in the Portland area. We can vent heaters most of time through the winter when it's necessary and get all the CO_2 we need without applying it to the greenhouse. The cost was running quite high for the noticeable difference in the plants. There's been more work done at Seattle on it than there has at Portland, but I think it's dying on the vine at the present time — in this area.

I was going to answer one question here that Mr. Goddard brought up awhile ago in reference to the different types of media used for propagation of rhododendron cuttings. Some use 25% peat, some 50%, and some 75%. Dr. Clarke says peat moss is cheaper over where he is than sand. Mr. Goddard here says that he gets good results with sand and only a small per cent of peat. That has been proven around this area by the commercial growers for quite some time. We're all propagating twice or three times as many cuttings in a given area than we should. We chop the leaves off, cut them short, and put them as close together in the benches as we can. If you put them too close together in the bench with straight sand, or with very little peat, when you remove them after they're rooted in the benches, you have to take a knife and cut them apart. The sand is quite heavy and in many cases, on many varieties, you lose the entire root system in removing them from the bench. I believe, among the commercial growers, that is basically why — where we have both peat moss and good sand in this area — we use proportions of around 30 to 50 to 60% peat in the rooting mixture.