

the name 'Pink Pearl' has been an important factor in the continued popularity of that variety.

Registration. At the time the Code was adopted, provision was made for setting up a system of registration. Over 20 institutions and organizations have been designated as Registration Authorities, some in the U.S.A., some in Great Britain, and some in continental Europe. Check-lists, including all known names have been published for most important groups of ornamental plants. Breeders should contact the Registrar for their particular plant interest and work with him.

MODERATOR BROWN: Thank you, Dr. Clarke. Our next speaker has been chairman of the Ornamental Horticulture Dept. at California Polytechnic College, Pomona, since 1946. He is going to speak on the topic of facilities for teaching plant propagation. It is my pleasure to present Oliver (Jolly) Batcheller:

FACILITIES NECESSARY FOR TEACHING PROPAGATION

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I feel highly flattered that the program committee felt I was able to come up with a magic formula for "Facilities Necessary for Teaching Propagation" at the high school and junior college level.

It is pleasing to many of us to see this new interest in the horticultural field at this level. Not only is *horticulture* an ancient and honorable profession, but *home gardening* is the number one hobby in the United States. Nearly all individuals at one time or another will be concerned with the gardens around their homes.

Propagation is the heart of any horticultural program, but as the various phases of propagation involve nearly all of a horticultural unit, I am broadening my presentation to include the overall layout of an Ornamental Horticultural Unit. This will include the following: an enclosed area for the unit and for growing plants, the greenhouse and headhouse combination, the classroom and a shade or lathhouse area. I will limit my presentation to the facilities that should be planned for a new school ground, rather than attempt to suggest how an existing school ground should be made over. Unfortunately, I have not had the opportunity to visit any of the new horticultural programs here in the Northwest, and will have to base my remarks on the programs that I have observed in Southern California.

I would like to say at the outset that unless there is an intelligent, well-trained, enthusiastic teacher for the program,

all the facilities in the world will not make the program a success.

The first and most important facility is to have an area of ground set aside particularly for horticulture. This should be good agricultural soil and should be well-drained with necessary walks and roads. It should be fenced off from the rest of the school area so that only authorized persons will be able to enter. Most schools that I am familiar with have this as a part of the school grounds itself, although in a few instances this has been a separate piece of ground some distance from the main school grounds. An acre of ground is normal, although I have seen some larger, and a few smaller. I will discuss the arrangement and use of this area later.

The second most important facility is the greenhouse and headhouse combination. Certainly here in the Northwest, with the long periods of inclement weather, these two structures must be considered as one unit. The greenhouse should be a minimum of 20 feet wide by 40 feet long. It should be equipped with wide doors, wide cement walks that are crowned and finished with a broom finish rather than smooth troweled. The unit should be equipped with automatic controls for both heat and ventilation, and if the summer months have extreme heat conditions, I would recommend "pad and fan" cooling. I would recommend that the heating system be of the hot water type. Hot air types may be satisfactory for very mild climates, but for prolonged cold periods they do not provide as satisfactory results. Some school units are heated by steam, but for a small greenhouse such as this, the high upkeep of the steam unit, plus the danger of live steam with students, make the use of steam questionable.

Cedar or redwood should be used in the construction, and although these woods are rot-resisting, it usually is desirable to treat them with preservative or paint before construction as well as after the greenhouse is completed. The widths of the benches should be such that the plants and materials can be easily reached, and the height of the benches should be about 29 inches. Great strides have been made in the manufacture of plastics as a substitute for glass, and I would recommend the use of the clear or translucent solid material. I would not recommend the use of the flexible polyethylene sheeting, as it is short-lived and has little resistance to wind.

A part of one bench should be equipped with an automatic mist propagation system. I would recommend that this be a timed interval control with a cycle of 12-15 minutes, the misting period should be a minimum of 15 seconds. The system should be connected to a day and night clock with adjustments for the hours of operation. The heads or nozzles should be spring loaded so that water is passed only with positive pressure. The system should have proper screens that may be easily cleaned, and the system should be of plastic pipe beyond the solenoid control. This will materially reduce stoppage of

the nozzles and make for better operation. If heat cannot be trapped beneath the bench for proper temperature, an electric heating cable may be used with a sand bed covering.

Drainage is of great importance in the greenhouse, and if the soil is slow in taking up the excess water, additional drainage must be provided. It generally helps to have the area under the benches covered with coarse gravel.

Corrosion in the greenhouse is a big problem, and all fixtures must be of a material or grade that will withstand high humidity, temperature changes, and the presence of chemicals. Although there is nothing particularly difficult about the construction of a greenhouse, most institutions contract for their building. Care must be taken that the heating unit is adequate to maintain the proper temperatures despite the weather conditions. Even though night classes are not contemplated, I would suggest that proper lighting be provided for the greenhouse and that weather-proof outlets be provided at intervals in the structure. The use of the structure for adult education or for "Open House Displays" are a possibility for which you must provide.

Nearly as important as the greenhouse is the headhouse. This is the area in which most of the work will be done, and for this reason it should be conveniently arranged, well-lighted with windows and supplementary electrical lights, and be properly heated. I would suggest that the building be at least 20 feet by 60 feet, that it have a cement slab floor. It should either connect directly to the greenhouse or it should connect to the greenhouse by means of a glass-covered passageway. One door should be large enough so that truck deliveries of soils, materials and supplies can be handled. The benches should be metal covered, and one portion of the building must be partitioned off to provide for proper locked storage of tools, equipment and extra supplies. The space under the benches provides for adequate storage for some soil and soil additives and for pots and containers most frequently used. A few shallow cupboards over one bench will be found very handy for small items frequently used. There should be one large sink with easily cleaned traps, and there should be at least two hose connections for moistening soil and watering plants. A portable blackboard will be found most convenient. Safety regulations will normally require that gasoline-powered equipment be stored outside of the building.

The use of cold frames or hotbeds do provide additional propagation area and are not expensive to construct. If the school has a shop class in carpentry, these can make a very desirable project. Such frames will materially increase the propagation area and for certain materials they will be most satisfactory. They also allows overflow space for students with special projects.

If at all possible, I would suggest that a separate classroom be constructed within the Ornamental Horticultural

area. This is the plan that has been adopted by the Los Angeles City School System and has proven to be most desirable. First, it gives a permanent home to the program and allows for the permanent display of horticultural information without distracting other classes. Many of the Los Angeles schools have special collections of books and reading materials in an open-type library that are readily available to the students. These buildings are all equipped with washroom and toilet facilities and, in addition, have an office for the instructors. I do not feel it is necessary to discuss further the features of the classroom other than to mention that a raised lecture table with sink and running water is most desirable.

The lath or shade house should be 30 feet by 30 feet, and for the Northwest I am sure that a wooden structure would be most satisfactory. In Southern California, where we are not bothered by sleet or snow, we find the use of Saran plastic makes the most satisfactory shade and permits much easier construction. I would suggest that the lathhouse be equipped with an overhead watering system—Rainbird or the like — to take care of summer watering. Some schools that I know even have the system set up on a time clock so that most of the summer watering is taken care of automatically.

One further word about the ground in the enclosed area. In addition to the walks and road, it should be provided with adequate water faucets, so spaced that all areas may be easily reached with one section of hose. Most of the area should be divided into plots which will be used by the individual students for growing their plants and the balance should be planted with materials useful for instruction. The choice of this material would have to be made on the basis of what is most beneficial for the instructional program in the area. It would be impossible for any school on such a small plot of ground to grow all of the plant material necessary for instruction. For this reason I suggest that the instructor work closely with the grounds maintenance department so that full use of the plants grown on the institutional grounds can be made. This type of cooperation can and has been used in many cases. The students use the grounds for their laboratory and in turn, the students often grow material that will reduce the operation budget.

It should be mentioned here that plant materials grown by the department become a very acceptable means of communicating with the administration and other departments. Flowers and corsages for special functions and plants for the offices do a lot in creating good will. The quality of the materials grown should be such that surpluses should find ready market with the local nurseries, either as sales or exchange for needed materials.

MODERATOR BROWN: I think at this time we could entertain questions. Perhaps we should start with this last panel. Does anyone have a question? Yes, Brian Gage.

BRIAN GAGE: Dr. Clarke, if you want to take the name,

'Pearl', that is now applied to a rhododendron, could you use that same name for a rose?

DR. CLARKE: No objection to that. In fact, one of the best places to find rhododendron names is to look over the list of iris names.

RALPH JACK: Another question for Dr. Clarke. One of the large southern nurseries has an R within a circle, for some plant name like 'Scotch and Soda'. Now if we buy such plants from them and propagate it by cuttings do we still use that name with a little R in it, as 'Scotch and Soda', or do we have to pay them something, or what is the deal?

MODERATOR BROWN: The question here is on the use of copyrighted names — a registered trademark name. Dr. Clarke, would you answer this?

DR. CLARKE: I think the best example of this is the 'Golden Delicious'. I understand that name is registered and copyrighted, while 'Yellow Delicious' can be used most anywhere.

RALPH MOORE: The use of 'Sunkist' as the name of a rose can be done by getting the permission of the Sunkist Citrus Growers.

MODERATOR BROWN: I have one that I want to call attention to; that is, this morning one of our speakers wondered why Four Winds Growers would go to the trouble of using rubber bands from a stationery store to wrap their citrus grafts when he wrapped his grafts with regular budding rubbers. Don, would you or Fred answer that?

DON DILLON: As far as I know the rubber bands work well. They don't have to be held flat. They can be turned over and I haven't really checked the price but we think the rubber band is a pretty cheap item.

VOICE: This is a question on the program as a whole. I wonder if it would be feasible at all to arrange for a Verifax or some other copying machine so that if there was a particular five-page speech we wanted we could copy it for 2 bits a page, or so. We could crank one out and take copies with us — or would the editors object to this?

MODERATOR BROWN: How about that Hudson? Would there be a possibility of having a copy machine, so we could take this information home and use it while we are still thinking about it, instead of waiting until the Proceedings come out?

HUDSON HARTMANN: This is a decision that would have to be made by the International Board of Directors. If the decision was to invest in or rent such a copier and make copies right here and now, I am sure it would be possible to do so.

RALPH PINKUS: We had a trade show in Dallas last January and the Xerox people loaned us a machine and gave us all of the paper we could use and invited everyone to bring their papers to copy. Everybody could have copies of all the papers to take with them. They loaned it to us free and we ran off 900 sheets.

MODERATOR BROWN: A good suggestion. A complimentary gesture from the Xerox Co. Perhaps we could have our Fresno program chairman next year contact some of these outfits and see if they would be interested. Certainly they do go all out for advertising their product.

DON DILLON: I am wondering if Mr. Walters is here, and if he can tell us where the plastic "planting bullets" he spoke of this morning are available?

MODERATOR BROWN: Bill Curtis, could you make a comment concerning the plastic "bullets"?

BILL CURTIS: I talked with Mr. Walters and he gave me the name of the concern here that manufactures the "bullets". I called them on the phone and they are going to bring us a sample of the plastic bullets before the evening is over.

MODERATOR BROWN: Thank you Bill. This is very quick service.

BRIAN GAGE: I would like to ask a question on plant names. We often see a single "i" or a double "i" at the end of a person's name, used as part of a plant name. Is it correct to use one "i" or two "i's"?

DR. CLARKE: Well, that is for a latin ending and it shouldn't be used for cultivar names. For a species name it has been our practice to follow what is in the RHS Rhododendron Handbook and, in most cases, they use two "i's". This is really from the botanists; whatever they give us I am willing to use. But I wouldn't eliminate one "i" just because I can't see the reason for it. That is the name that has been given to the species and you should use it although it may not always be pronounced.

MODERATOR BROWN: I believe our new manual in California on nomenclature has used the two "i's" for all names.

MR. WILSON: We have a problem in late or early spring with green algae. It builds up to about 1/4 inch deep in our flats. Has anyone had this problem and how do you get rid of it?

MODERATOR BROWN: I will entertain an answer from any of you. A problem in the spring with green algae developing to quite a depth over flats — flats of cuttings under mist, probably.

BILL CURTIS: There are two materials you can use. One is "Purispray" or "Puratized Agriculture Spray". You use one tablespoon of either to a gallon of water. The only thing I have used it on is mugho pine; it didn't hurt them but it killed a growth of liverworts. Another material which is common in the trade is "Knoxmoss". It is a powder. I have also used this on mugho pine. It is used at two ounces per gallon; we put on both of these materials with a knapsack sprayer. We drenched them even in full sun and it did not hurt the plants at all. It is best, though, to try such sprays at first only on a few plants rather than kill the whole crop.

MODERATOR BROWN: I would like to say that green algae or moss is sometimes a problem along concrete walks, where it does present real hazards for somebody slipping and falling. A very good material for removing it is Sani-Flush, and then spraying afterwards with copper naphthenate, which will prevent it from coming back.

DUANE SHERWOOD: There are some of the Puratized types agricultural sprays that have not been released for edible crops; there have been serious illnesses in humans where this has been used.

BRUCE BRIGGS: In the winter we ran tests with "Puri-spray" on azaleas in the lathhouse and our results, where it didn't give plant injury, was poor. This was in a lathhouse and in a plastic house. I am curious about "Knoxmoss"; is that an iron product?

VOICE: Yes.

BRUCE BRIGGS: Well, we ran tests with such iron products and they give control if you can get a level which will not also give plant injury. It will kill moss and other algae, but you also get injury if you use too much.

CHARLES PFEIFER: The azalea growers in the Seattle area use copper sulfate. It is metered into the water every time they irrigate. I will have to find out what the concentration is, but every time they water they use copper sulfate. This keeps the moss off the stems but there will still be some on the pots, but at least the moss is not on the stem of the azalea plants.

RALPH MOORE: Two years ago we had quite a serious problem in a new plastic house during the winter with moss and algae on plants. The material was grown in a sand-peat mix for growing miniature roses; the difficulty stemmed from the fact that the house was probably a little too tight; we also get a great deal of winter fog in central California and the outside air was saturated. The fan pulled this cold moist air in from the outside to give us a high level of moisture. A lot of algae and moss built up on these flats of roses, producing other molds and rots. One day I got the idea to tilt each flat along an edge so as to let it set on the edge of the next flat. That is the way we have been doing in this particular house ever since; this lets excess moisture out one end and we haven't had any trouble since.

MODERATOR BROWN: This sounds like a very simple solution. Just tilting the flat, and getting rid of the excess water, eliminates the growth of the algae.

BERNARD DOUGLAS: Dr. Kelley mentioned that high nitrogen content of tissues of broad-leaved evergreens cuttings inhibited rooting; I wonder if that situation would apply to the coniferous species in rooting.

MODERATOR BROWN: I would say — yes, the carbohydrate/nitrogen relationship is as important too with conifers, particularly in milder climates, as it is with the broad-leaf

evergreen materials. Here again, when we say a low concentration of nitrogen, we don't mean absolutely nothing. A low to moderate concentration of nitrogen and a relatively high concentration of carbohydrates would probably give the best rooting.

DUANE SHERWOOD: Some of the blueberries are very difficult to root; they often root best in straight sawdust. Perhaps this carbohydrate/nitrogen balance may be increased by lowering the nitrogen level in the cutting due to the competitive action of the sawdust for the nitrogen.

FRED REAL: We didn't know we were doing this but when we rooted our citrus rootstock cuttings in straight sawdust we got so many roots we couldn't take the cuttings apart. That is why we gave it up and started the rooting in vermiculite.

VOICE: Was this fresh sawdust or old sawdust?

FRED REAL: Either. It was redwood sawdust.

VOICE: I would like to make a comment on Douglas fir sawdust. If you get old material you may have some real serious problems. Don't use black Douglas fir sawdust. Fresh sawdust is far better.

VICE-PRESIDENT TICKNOR: Before we close, be sure to turn in your critique sheets or mail them to the Secretary-Treasurer. We thank you very much for being a good audience and we thank all those who have participated in the program this year. Thank you.