

DEVELOPMENTS IN THE PROPAGATION AND NURSERY BUSINESS DURING THE PAST 46 YEARS

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To take you step by step or year by year through the tremendous changes that have occurred during my 46 years in contact with the propagation and nursery business would be cumbersome and take too much time. New ideas and information propagates rapidly and mutates frequently, and the original idea, like the first sprout from the acorn, may be overshadowed by later branches. Other horticulturists might select other events, but for my part I believe the following four are the ones that have given the phenomenal success rates in propagation that we experience today.

(1). In 1934 Professor Knudsen grew orchid seedlings on a sterile nutrient augar. From this small beginning came the study of plant tissues, knowledge on the use of auxins and other hormones, tissue culture propagation, and now to the point where we are doing genetic engineering.

(2). In 1951 the International Plant Propagators' Society was formed with its motto, "To Seek and to Share." No longer were propagation houses locked up, but new information was quickly shared with others. To this end we have to thank Jim Wells and others who helped bring the Society into being. The organization now has six Regions in the world.

(3). In 1957 we saw the publication of *Manual 23: The U. C. System of Growing Healthy Container-Grown Plants* (1). The editor was Kenneth F. Baker of the U. C. Plant Pathology Department.

(4). In 1959 we saw the publication of the first edition of *Plant Propagation: Principles and Practices* (2) with Hudson T. Hartmann and Dale E. Kester as co-authors.

These four events seem to me to have had a far greater effect on the field of propagation and growing of plants than merely the sum of the parts. This effect was not local in nature, but worldwide.

Before going further, I think it is important to point out that members of the Western Region of the International Plant Propagation Society were instrumental in the last two-mentioned events. When I talked with Dr. Baker he said that *Manual 23* could not have been written if he had not had the cooperation of the commercial nurserymen in southern California: Henry Ishida of the American Plant Growers, Carl Tasche of Union Nurseries, Bob Weidner of Buena Park Greenhouses and, of course, the lab work by O. A.

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Matkin of O. A. Matkin Soil and Plant Lab, Inc. Henry and Bob have been presidents of the IPPS Western Region, and Henry went on to be president of the International Board. All, incidentally, are charter members of the Western Region.

Both Dr. Hartmann and Dr. Kester were members of the original Eastern Region IPPS Society and became charter members when the Western Region was organized in December, 1960. It is interesting to note that the text, *Plant Propagation*, has been translated into five different languages, and in 1989 will come out with the fifth, revised edition. Since 1974 Dr. Hartmann has also served as editor of the *Combined Proceedings* of the six Regions. It is no small wonder the International Board has named him an honorary member.

In addition to the four big events there are thousands of other changes for the good, some of which I will mention. To simplify the presentation I have listed them under the following general headings: (1) information, (2) equipment, (3) materials, (4) techniques, (5) facilities, (6) markets.

(1). **Information.** The report of Dr. Knudsen's work in growing orchids in nutrient agar appeared in print in 1934. As a graduate in horticulture in 1936, with major interest in propagation, neither my professors nor I knew of it at that time. Today, with the computers, instant print-outs, and inter-library access, one can find in a matter of minutes just about everything of importance that has been written on a particular subject. The entering of new information into bibliographic data bases now occurs at the time of publication, which speeds up access to information by at least six months. The growth of the International Plant Propagators' Society is an indication of the great interest in access to information, and attendance at these meetings makes new information even more quickly available.

(2). **Equipment.** I believe this paper could be devoted alone to the many new pieces of equipment that have been invented and developed, but these are a few of the most important ones: the many carts, trailers and special vehicles that move our plant material from place to place; the canning machines that make it possible for a crew of 12 to pick up the cuttings, can-up the plants and place them in their new beds at a rate of 35,000 plants per day for an average of 2,916 plants per person; the movable benches which allow a 90 per cent use of greenhouse space rather than the old system of about 68 per cent; the equipment which allows us to not only water our plants automatically, but also to fertilize them at the same time—quite a change for tapping a pot with a nut on the end of a bamboo cane to determine if the plant needed water. Gone are the days of crews of men sweeping through the fields with their different-sized scoops. They did not always hit the container, or use the proper-sized scoop for fertilizer, or then hand-water each plant. How we have pro-

gressed through the different stages of mist. First, it was constant mist, timed-interval mist, electronic leaf, fog, and now high-pressure fog. I am sure I am missing a lot of the new mechanization, but time and space is limited.

(3). **Materials.** Perhaps the greatest change has been in our concept of potting soils. Prior to *Manual 23* some of the largest growers of interior plants had as many as 14 different soil mixes for the different plants they grew. One nursery I knew of had two acres of ground on which they composted their potting soil for nearly a year before use. They gathered oak leaves in the fall from mountain elevation above 4000 feet to be sure there would be no oak root fungus present. They got the manure from the race tracks, and they got their loam soil where available. This was layered, then turned and watered every month before use. The UC Mix was not the only one, but the Manual set forth the basic principles. Now there are many proprietary mixes that are available.

We have always had containers, originally clay pots or wooden boxes like those used in the Orangery at Versailles Palace circa 1689. A rim was added to keep the pots from jamming, and to indicate the proper level of potting. But how they accumulated alkaline and held disease, and they were so heavy! During World War II when there was a scarcity of containers, backyard nurserymen were putting plants in anything that would hold soil. Oil cans, then old #10 commercial cans, normally referred to as gallon cans, from hotels and restaurants were used. An improvement was the painting or tarring of these containers to prevent rust. Along came the plastic container, first round in the smaller sizes, which quickly changed to the square tapered pot that was manufactured so it exactly fitted the standard 18 inch flat. Today we have plastic containers in all shapes and sizes as well as plastic flats. The advantage is that they are lightweight, attractive, easily sterilized, and can be re-used many times. In addition to the above there are the new "plug" trays. Very often these are used in direct seeding and the plugs then transplanted to larger pots without the shock of bare-rooting. This has replaced the old soil blocks used so much in Europe. Now we have the new foam material where you stick your cutting into a prepared notched material that can be broken off after rooting and potted directly into a large container, again without the shock of transplanting.

Originally there was only peat moss to add as a soil conditioner, now we have perlite, fir bark, and a host of local materials that add aeration, improve drainage and, in some cases, hold moisture.

When I think of my early days of budding and grafting with raffia for binding and the complex formulae used in making grafting wax, I shudder. The raffia soon got too dry and unwrapped, or was not cut soon enough and the bud was girdled. The grafting wax did

not have enough resin and melted in the sun, or it had too much beeswax and the bees actually cleaned the graft for the wax. Today we have the special budding rubber in all sizes. It is manufactured with an extra amount of sulfur in it so that the moisture from the plant forms a sulphurous acid that causes the rubber, under normal conditions, to disintegrate in about 15 days. Our grafting wax needs are taken care of with asphalt emulsion materials, such as Tree Seal and, if grafting boxes are used, it may not be necessary to use any grafting wax at all. I can remember visiting one nursery which covered each gallon can graft with a quart jar. As the graft began to grow the jars were tilted to allow a normalization of the humidity.

Who of you can remember blood meal, bone meal, cotton seed meal, and well-rotted manures? These have been replaced with balanced fertilizers of about any combination that you desire. Many of them are coated so that the nutrients are slowly released over a long period of time. These have been particularly useful as a final top dressing when the stock is sent to the retail nursery where the plants will not receive nutrients with the regular watering.

(4). **Techniques.** With our greater knowledge of how plants grow and what chemicals, auxins, and hormones will do it is possible to have our stock plants in optimum condition for propagation. No longer do nurseries take cuttings from plants in their display gardens, which weakens the plants, but they take the cuttings from young, vigorous container stock, and in this way are able to shape the plant for better appearance.

(5). **Facilities.** The old greenhouses are like pre-historic animals beside the efficient and automated, controlled houses of today. No longer is it necessary to send men hurrying through the houses to open top and side vents for sudden hot spells. The coating of the house with whitewash is out because the fiberglass that is used today is opaque and thus diffuses the sunlight. Fiberglass is also cheaper and easier to put up or replace. Today, with the pad and fan cooling, we control the temperatures in our houses for pennies a day, and the reaction time is practically instantaneous. Hot air heating with the large plastic tubes in the top of the houses is so responsive and uniform and so much cheaper to install than the old cast iron pipe under the benches. The fin tubing was an improvement over the cast iron, but the fins soon became coated with deposits, which decreased their efficiency. Using the hot air heating allows the use of the under-bench space for plants requiring low-light intensity. Though not used in propagation, one cannot discount the importance of the use of computers now in use in the horticultural industry.

(6). **Markets.** When the nurserymen realized their major competition was not the other nursery, but the merchants selling television sets, cars, cameras, and other items, real progress was being made. In the old days, sales in the nursery business was generally

local in nature. Today we find that California, and principally Southern California, produces nearly 35 per cent of all the plant material grown in the USA. Climatic conditions there make it possible to grow and ship many types of plants year round cheaper and more reliably than the nurseries in other parts of the US. Shipments of plant materials out of the US have also shown an increase.

(7). **The Industry.** Without the propagator there could be no nursery business, no landscape contractors, no landscape architect. The home gardener would be hard put to take care of his needs, for where would his seed and plants come from? Gardening today is the biggest avocation or hobby in the United States. For many it is their recreation, and I like that word for it means "re creation," rejuvenation, or putting things in proper perspective. In 1820 in Leipzig, Germany, Dr. Shriver told the Town Council that people who lived in hotels and apartments had lost contact with the soil, plants, and God; that it was the responsibility for the cities to make available at a minimum cost a plot of ground where these people could re-establish their contacts with nature. Thus, the People's Gardens of Europe were established and continue to flourish even today. Despite many Europeans' lower income, higher taxes, and smaller yards, the horticultural use of plants is higher than in the USA. Mr. Ishizu of Sunnyslope Gardens in Pasadena, California told my class many years ago that there was a Japanese saying, "If you want to be happy for several hours, have a good meal. If you want to be happy for a weekend, get drunk. If you want to be happy for a week or more, get married. If you want to be happy all of your life, work with plants."

There are no finer people in the world than horticulturists. They have tolerance, understanding, and compassion. Some time ago Moto Asakawa of the Presidio Nursery in San Diego had a fire just before Christmas just after he had stocked his nursery for the big Christmas sales. The nurserymen of San Diego thought so much of Moto that they pooled their resources, helped him clear his parking area, put up a tent and put him back in business for the Christmas sales. Do you know of any other business that would have done more?

Below is a brief review of the nursery industry as given me by the California Nursery Association Executive Director, Jack Wick:

In 1940 there were 4017 nursery licenses in California. In 1985 there were 9030. Wholesale value in 1940 was \$41,032,000 (no break-down of sales.) In 1985 the sales of nursery items in California amounted to \$946,224,853, with an additional \$291,465,915 in sales of cut flowers, foliage, and seed for a total of \$1,237,690,768 ornamental horticultural sales.

One must remember that in 1940 the average gallon-can plant sold for 20.6 cents. Today the same cultivars sell for \$2.45 which is

11.89 times more expensive. So if we multiply the 1940 sales by 11.89 and divide it into the total sales of 1985 we approach the approximate growth of the industry. There are many other factors to consider, but this will give us a rule-of-thumb estimate. It appears the nursery industry has grown 2.45 times the 1940 figure, disregarding inflation.

Horticulture has been a wonderful vocation for me. Although I might have made more money in some other field, I would have missed the fun and fellowship of men and women like IPPS members. Of all the organizations that I have belonged to over the years, there are none that I hold in higher esteem than the International Plant Propagators' Society with its motto, "To Seek and To Share."

LITERATURE CITED

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PLANT PRODUCTION BEHIND "THE REDWOOD CURTAIN"

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The geographical area referred to in this article includes only a portion of the internationally famous "Redwood Empire" of the state of California. But, it is a portion that is particularly unique. Rhododendrons, heathers, azaleas, and pieris thrive in this area.

The boundaries of this Northern California area include the entire coastline from Point Arena to Cape Mendocino. This is a land area resembling a bench. The ocean is to the west and a mountain range is a few miles to the east. Summer temperatures rarely exceed 75°F and the coldest winter temperatures normally do not drop below 15°F. A great portion of the area directly along the coast will not even have a frost. Giant redwoods [*Sequoia sempervirens* (D. Don) Endl.] have grown in this area for thousands of years.

Before the turn of the century, this entire coastal area was a vast grove of prime redwood. (Strangely, however, the initial major forest crop was tanbark.) In this area there were formerly many major lumber companies. Only a few survive today, the most promi-