

that the use of weed killing chemicals will have an enormous influence on future ornamental nursery operations.

MODERATOR FURUTA: Thank you, Arthur, for a most interesting presentation. We will now open our question and answer period on the talks we have heard so far this morning.

MR. DAVID ARMSTRONG: I would like to ask Harry Kohl what is the effect of air pollutants on CO₂ in the air and what is the natural level of CO₂ in the air.

DR. HARRY KOHL: The natural level of CO₂ in the air is about 300 parts per million. The effect of pollutants on CO₂ is nothing — directly — but the air pollutants can affect the photosynthetic mechanism and make it impossible for carbon dioxide to do anything valuable.

MR. JOHN DRUECKER: What is the effect of the various pre-emergence weedicide chemicals on large-leaf rhododendrons? Have you had any experience with them?

DR. ARTHUR MYHRE: No. The only rhododendrons we have used like those are the large-leaf Cynthia; some of these large-leaved rhododendrons seem quite tolerant — things like Sapphire, Jock, and Beau Belle; but in our experiments we have limited amount of ground. It would take acres and acres to try all these different plants. We try to hit the high spots and take one or two rhododendrons. Generally the broad-leaved evergreens tend to be quite tolerant to the chemicals we used — at least with the varieties that we had.

DR. O. A. BATCHELLER: In connection with Peter Lert's comments about growth control in plants and the use of maleic hydrazide, one of our students wrote an undergraduate thesis on foliage plants; with *Aralia elegantissima* and *Dieffenbachia* he found beautiful control. It gave branching on *Dieffenbachia*. On *Aralia elegantissima* there was beautiful breaking and plant compaction. I feel this is a perfect thing for indoor pot plant growers.

MODERATOR FURUTA: At this time I would like to turn the program over to your next moderator, George Dobbins, so we can get on to the next group of speakers.

MODERATOR DOBBINS: Our first speaker on this symposium on Propagation by Seeds and Spores will be Percy Everett, who we really don't need to introduce at all because you all know him, our past leader, from the Rancho Santa Ana Botanic Garden in Claremont, California. He was given the title "Native Plants of Commercial Value". Percy:

NATIVE CALIFORNIA PLANTS OF COMMERCIAL VALUE

PERCY C. EVERETT

*Rancho Santa Ana Botanic Garden
Claremont, California*

I am not quite sure how the title of my discussion fits into a "symposium on propagation by seeds and spores" as it will deal in only a minor way with the role of seeds in the production

of commercially valuable native plants and certainly not at all with spores. Further, I am not altogether sure a discussion of the salable qualities of a plant is proper when our main concern is with the various means whereby we can produce by the most economical procedures.

And I am not at all certain that I am the one to carry on this discussion. A "dyed-in-the-wool" enthusiast by nature, I am often accused by some of my close friends of gross exaggerations known as "Everettisms"! Be that as it may, I shall endeavor to look at the subject with a critical eye.

One has only to peruse the literature as far back as the early years of the 19th century to gain an understanding of the role the native plant of California has played in the worldwide field of horticulture. Especially is this true in the European and British literature. Through the earliest pages of the *Gardener's Chronicle*, *Curtis' Botanical Magazine*, and *Revue Horticole*, to name a few, one finds numerous references to our native plants. In our day many notable publications such as *Sunset Magazine* and the *Journal of the California Horticultural Society* as well as many other periodicals seldom fail to have some article on the qualities of our native plants. You have even requested a discussion of California native plants in this symposium.

Yet what does one find in the nursery trade today? Almost daily, by phone, mail, and personal visit, I am continually asked the question, "Where can I buy such and such a native plant?" True, there are many of the more common varieties found almost universally in the California trade, but by and large there is a woeful lack in nurseries of many of our fine plants. And I know the chief reason — at the least I think I do! Probably our native plants are in the same category as American Indians — too much competition from more vigorous races! While there are few plants offered for sale that can hold a candle to our native plants for profuseness of flowering, the natives should probably have the foliage and flowers of camellias or rhododendrons, the fragrance of roses or jasmine, the disease-resistant roots of any number of introduced plants, the ability to grow under any kind of cultural condition. It is not their fault that the native plants were born and raised in an arid climate and were not introduced here from a faraway country — you know, the grass is greener on the other side of the fence — nor is it their fault that nursery salesmen, both wholesale and retail, have to know something about them. There is a woeful lack of information concerning our native plants among those endeavoring to move them into commercial channels.

How much time and effort have been spent on the hybridization and breeding of the native plants? Comparatively little, when balanced against the time and effort spent with many other groups. However, let us now examine a few that may hold some interest. My choices will not follow the usual line of *Ceanothus*, *Arctostaphylos*, *Baccharis*, *Toyon*, or *Rhus*. We all know about them. I shall discuss four plants and show you how

they look. If we may have the slide now, we'll go ahead.

(Slides with talk from this point)

Heuchera 'Santa Ana Cardinal'

Among the several species of *Heuchera* native to California, there is a rather vigorous insular entity known as *Heuchera maxima*. It has large, roundish leaves that may turn a deep crimson any time of the year, and 18" to 2' stems surrounded by a large inflorescence of small creamy-white flowers. Under best cultural conditions it is moderately rapid in growth.

After observing this plant for several years, growing on a shady hillside with rocky adobe clay soil, and noting its hardiness, we began to wonder if a more colorful plant could be produced by hybridizing it with *H. sanguinea*. Although this combination had been attained by others, the upshot of it was that nothing very successful was produced until Dr. Lee W. Lenz, Director of Rancho Santa Ana Botanic Garden, started serious work on the project.

The most vivid and deepest red strains of *H. sanguinea* were searched out. Then began the processes of crossing and back crossing; along the way a number of interesting clones were produced. However, we were searching for the plant with the brightest flowers combined with a sturdy, tall, upright stem, relatively large inflorescence, and the general growth habits of *H. maxima*.

The study of many clones gradually narrowed down to the final selection of the clone we offered for introduction into commercial channels. We have preserved at the Botanic Garden many of the other clones, but although we have noted a demand from nurserymen and landscapers, no other clones have been released.

Flowering peak for *Heuchera* 'Santa Ana Cardinal' occurs during March to July with sporadic flowering through the year. Since asexual reproduction is necessary for continuous production of the clone, it fortunately is relatively simple. As soon as each plant is large enough to produce several branches, it can be lifted and the branches cut from the main stem. By careful procedures, 100% rooting can be attained. Our gardeners often dig up a large clump, tear it apart, and replant the unrooted branches. A very large percentage will take root and quickly fill in vacant spots.

Deigaard Nursery, Monrovia, California, undertook the process of naming and introducing *Heuchera* 'Santa Ana Cardinal' to the nursery trade.

Pacific Coast Iris

Searching for novelties to satisfy the increasing appetite of the specialist and enthusiastic amateur, the iris growers have brought into the trade many interesting color combinations produced naturally among the widely scattered species throughout the Pacific Coast states. Most of these were color selections of *Iris douglasiana* and *I. innominata*. More thorough searching

during the past 15 years has revealed a wealth of what is presumed to be natural hybrids.

Seeking to improve upon what Mother Nature already had done, Dr. Lenz sought out and studied all the native species, and brought together in one place a wide selection of color forms. It appeared that to produce an acceptable clone for the commercial interests, several qualities had to be introduced into the various strains. Most of the native species flower rather profusely, but their flowers may be small, down among the foliage; they may have poor standards or very narrow falls, or spindly weak stems. These needed to be corrected, and this we set out to do.

Since then a multitude of color combinations and tall, upright, strong-stemmed clones with flowers above foliage, broader falls, and stronger and broader standards have been developed. They have become extremely popular with our visitors.

If seed were sown, still greater color combinations would be produced, and iris seed is relatively simple to germinate. Just sow the seed either in its site or in a flat and wait for about a month. Of course, embryo culture can be employed, but on the whole the simple methods are the quickest and best. The technique of dividing the clone needs only one strict rule to follow — start irrigating the plants in early fall and when examination shows white new roots about an inch to two inches long, then dig them up for clonal increase — never during the dormant summer periods.

Berberis 'Golden Abundance'

The progeny from seed harvested in the Botanic Garden are always observed with a critical eye for some unusual feature. Invariably we have discovered that Botanic Garden harvested seed will produce any number of hybrids when, of course, more than one species of a genus is present.

This was the case with our immediate subject. While nothing particularly unusual among a large group of *Berberis amplexans* seedlings showed up in the seedling stage, after two years in the Botanic Garden the wide variation among the plants was quite evident.

When the first flowering season was in full swing, we noted with considerable interest one plant with masses of large, somewhat drooping clusters of golden flowers, later followed by an equally attractive fruiting period. Here was an exceptional plant. The plant continues to prosper, and is even more beautiful with large leaflets of shiny dark green leaves and a rather compact habit of growth. It is now about 5' tall, 4 years from seed.

Although we first considered it a cross between *B. amplexans* and *B. piperiana*, we are now quite confident it is a cross between *B. amplexans* and *B. aquifolium*.

What about its asexual production? The various species of *Berberis* have always been somewhat difficult for us to root. Yes, we have had nominal success, but not what could be called good. However, this hybrid was rooted reasonably well, in the

65% - 75% average, with best results occurring in November when cuttings were firm and beginning to turn a slightly reddish color — treated with regular Rootone and put under mist and fogging conditions in 50% perlite and 50% peat moss.

I believe this clone is worthy of introduction to the trade. It looks good in a gallon container, is moderately fast in growth, has clean dark shiny green leaves, and produces an abundance of flowers in large drooping clusters to be followed by equally beautiful bunches of dark purply-blue fruits. Above all, it can accept plenty of water. Do I have any takers?

Fremontia 'California Glory'

In the winter, 1962, issue of "Lasca Leaves" (Vol. XII, No. 1) a publication of the Los Angeles State and County Arboretum, Arcadia, California, there was published my formal description and other pertinent information concerning this cultivar.

We had observed this presumed hybrid of *F. californica* x *F. mexicana* for some ten years| After our formal introduction, rooted cuttings were sent at their request to the Royal Horticultural Society testing garden at Wisley, England. Some two years ago I visited Wisely and there saw our cultivar growing reasonably well in a protected site adjacent to the administration building. Nearly a year ago a picture and an extensive article about it appeared in *Gardener's Chronicle*.

Just recently I received a letter from Lord Talbot de Malahide who grows all sorts of plants in his castle grounds near Dublin and who visited the Botanic Garden about two years ago. Lord de Malahide discussed some of his results with California native plants, some of which we had sent him. In his discussion he referred to various types of fremontias he was cultivating, with comments on growth and results. He went on to say that just recently Frank Knight, Director at Wisley, had shown him a branch of *Fremontia* 'California Glory'. Lord de Malahide's comment was "An astounding plant"! Now watch out for an "Everettism"; his sentiments are exactly our own because this plant at the zenith of its flowering is certainly a most glorious spectacle. Visitors by the hundreds have told us they wait until after the middle of April to visit the Botanic Garden so they can enjoy the beauty of this plant.

To my knowledge descriptions of methods for clonal production of *Fremontia* by asexual means had not appeared in literature, at least I could not find any, and judging from questions put to many propagators I thought failure would be our lot. (Even the propagators at Wisley have rooted only one!) Such was not the case, and with some experimentation we have been able to produce all the plants we need and have some left over for others.

While we have taken and rooted the cuttings in various seasons, we get best results in the fall from firm tip growth, treated with Rootone, and bottom heat. An expert propagator tells me that he has had nearly 100% rooting, and I believe him, and

have seen his results. But other professionals have not fared so well.

In a gallon can, this would be a good, salable item because huge flowers clothe the stem the first season. But like the species, a weak root has been inherited and while our mature plant losses are minimum, they might not be so for the commercial producer. While some fine plants are produced, seedlings are highly variable and losses are high from the many weaklings in every lot. So what does one do until a satisfactory root system is found for this fine cultivar? We continue to search for and to study various characteristics of other genera within the same family. And until we find a suitable understock, this beautiful flowering shrub may never be fully accepted.

MODERATOR DOBBINS: Thank you very much, Percy. We will move on now to our next speaker, Mr. Eugene Baciú, from Santa Barbara, California, who will speak to us on seed collecting. Gene.

METHODS OF SEED COLLECTING

EUGENE BACIU

*Mistletoe Sales, Wholesale Seeds
Santa Barbara, California*

There are many ways to get started in the seed harvesting business. In 1952, I was gathering dry materials for the florist trade, and one day on the way to the disposal area a nurseryman stopped me and asked what I was doing with the load of *Streptolitzia nicolai podds*. He was informed that the color was not suitable for the florist trade and the pods had to be discarded. His reply was that the nursery growers "could surely use the seeds in those pods." So the pods were returned home, the seeds extracted, and a trip to Los Angeles was made. I received .02 cent each for the seed and a list of different shrub and tree seeds that were in demand. Now all that was necessary was to match the odd latin names to the trees, so you can imagine what a time one would have, not knowing one plant from another. After much misinformation, many mistakes and much time studying, the list was ready to go out to the growers. The first years were spent in supplying seed brokers.

There are many problems that arise in harvesting seed; I will attempt to give a few that cover the wide ranges of methods used.

Many of the trees and shrubs do not bear fruit every year and some will go many years before they set a crop. A good example of this is *Araucaria bidwellii*, which has a very good crop about every fourth year; in between, the crop is almost nil.

The method used in harvesting *A. bidwellii* is to gather the cones from the ground, or from the trees when the cones are beginning to fall very heavily. These are brought into the yard and as they fall apart, each petal is handled separately. There