

SATURDAY MORNING SESSION

October 15, 1960

Dr. Vernon T. Stoutemyer, Chairman of the Department of Floriculture and Ornamental Horticulture, University of California, Los Angeles, moderated the symposium. Chairman Stoutemyer submitted the following paper as an introduction for the symposium

SEED PROPAGATION AS A NURSERY TECHNIQUE

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Seeds often offer the simplest and most practical method of propagation, both for commercial production and for the person interested in the introduction and trial of unusual plants. Seeds are easy to bring from foreign countries, and they are much less apt to be damaged in fumigation than cuttings or scions. Seed minimizes, but does not entirely prevent, the chance of introducing some new foreign insect or disease. Few seeds carry any viruses

Many of the fine horticultural collections of the world have been built on the importation or exchange of seeds. A good seed list of a reliable dealer is a kind of magic carpet which brings the plants of the world to us regardless of where we live.

Most of the seeds which we use in our nurseries present no particular germination problems for a reasonably skillful propagator or even the rankest amateur. If, on the other hand, we consider the whole field of plants we may fairly state that seed germination is indeed a complex problem.

The existing information on seed collection, handling, storage and processing has never been well organized in most areas. A few exceptions which might be pointed out would probably be in the fields of forestry and agronomy where the industries concerned have been large and important, with well financed research institutions, adequately staffed.

When we turn to the field of ornamental plants, we find rather meager and scattered information in many areas. Perhaps some of this is due to the relatively small economic importance of many of the plants with which we are concerned. Also, many details of the flower seed business in particular have been closely guarded trade secrets

A number of outstanding general books on plant propagation are available but all of them list comparatively few ornamental plants and present only meager information regarding their propagation. What is needed is the detailed "cook book" type of manual on ornamentals or at least on certain general groups of ornamentals.

There have been a few good European books on propagation of alpine plants. Mr. Percy Everett of the Rancho Santa Ana Botanic Garden at Claremont a few years ago published a compilation of years of

results in the propagation of California native plants, entitled "A Summary of the Culture of California Plants at the Rancho Santa Ana Botanic Garden. 1927 - 1950"

Some excellent compilations of information on flower seeds, according to those who read the languages, have been published in Sweden and Holland.

The Woody-Plant Seed Manual, Miscellaneous Publication No 654, of the U.S. Department of Agriculture was prepared by the Forest Service. It contains much information on seed treatments and stratification. Much of the detailed information on this subject was developed at the Boyce Thompson Institute for Plant Research at Yonkers, New York.

One general compilation of recommended procedures for seed germination in mimeographed form which has been most useful in answering inquiries was prepared by Dr Charles F. Swingle, formerly of the U.S. Department of Agriculture, when he was with the Soil Conservation Service. This is very scarce but grants of assistance are being sought to amplify this and publish it in more permanent form. If this project can be completed, a much needed addition to the literature of propagation can be made.

Many supposed problems of seed germination are due to the commercial handling and storage methods of seed collectors and firms. The seeds may have been immature when collected. A surprising number of seeds, especially from the tropics but also many woody plants of temperate regions lose viability quickly if stored up dry. Fortunately, air transport has solved many problems related to seeds having a short period of viability. In the days of sailing vessels, the problem of introduction of many plants was solved by permitting the seeds to germinate and grow while in transit. The Wardian case was developed to facilitate long distance transport of tender plants.

Much has been learned about the means of prolonging the viability of seeds. Under the urgent need in World War II for carrying over stocks of vegetable seed, such as onions, for an additional year, scientists of the U.S. Department of Agriculture developed effective methods of prolonging storage life. The moisture content of the seeds was reduced and stabilized and the seeds were stored at low temperatures. Carbon dioxide atmospheres will prolong the storage life of such difficult seeds as the South Africa composites, as for instance, gerberas.

Much more is known about prolonging the life of seeds than about their behavior after they are removed from such treatments. One vegetable seed buyer for a large seed firm stated that he would never buy a lot of seeds which had been in cold storage.

Several pressures will doubtless force a reevaluation of these treatments. The development of hybrid seeds is creating a demand for longer carry-overs of seeds in order to avoid the organization and expense of producing the seeds every year. At the present time we do not know what will happen to these seeds in the hands of the customers.

Another movement which is creating a demand for more knowledge regarding prolongation of seed viability is interest in the creation

of seed banks for the use of plant breeders. Plant materials of no apparent immediate use can thus be made available for use at any time when a certain type of genic material is needed, without the great expense of growing it each year. The rapid destruction of much of the natural vegetation of the world is creating a serious problem for the plant breeder, and our own U. S. Department of Agriculture is struggling with the problem of creating a gene bank for the breeders of economic crops.

We could doubtless use seed propagation much more than we do in producing distinct varieties of woody plants. We would need to have pedigreed, tested seed sources, sometimes properly isolated. Foresters have long known about the importance of seed selection in order to get properly adapted forest tree populations.

For instance, European nurseries of the last century often grew the following horticultural varieties by seed

- Red leaved Norway maple
- Red leaved common barberry
- Red leaved beech (some strains variable)
- Weeping European larch (variable)
- Wier's cut leaved maple
- Weeping Scotch pine
- Weeping peach
- Chinese peaches with red and white flowers
- Weeping black locust
- Lacinate elderberry (variable)
- Variegated pelargoniums

Some varieties of *Ligustrum vulgare* were observed to come true from seeds while others did not. They were not able to reproduce certain varieties of lindens, alders, beeches, variegated hollies, ornamental double flowered varieties of *Prunus* from seeds. The literature reveals a lack of agreement on this subject, doubtless because of the great genetic variability of the material. Plants which appear to be closely similar may be vastly different in genetic make up or genotype.

Some years before the writer arrived at UCLA, Dr. Walter E. Lammerms devoted some attention to improving the foliage and flowering qualities of jacarandas. He grew progenies from various superior trees which he selected on the basis of certain desirable characteristics. A number of distinct types were clearly apparent, some retaining much more foliage in some winters than others. Practically all of the progenies were remarkably uniform in character. Lack of space and changes of personnel prevented growing these trees to maturity, but the possibility of improving woody plant populations by selection was clearly shown. The writer is convinced that selected seed from isolated superior jacaranda trees would have definite advantages.

Seed of flame eucalyptus — available in California invariably produces many off types — dwarfs and undesired colors. Older seedsmen and nurserymen agree that years ago, seeds imported from Australia produced fine uniform trees with deep, rich red flowers. Apparently, Australian seed does not now guarantee uniform stock. The explana-

tion is simple and has been given by Dr. William S. Stewart and Mr. George Spalding of the Los Angeles State and County Arboretum, who have visited the locality of the species in West Australia. The native grove is small and is surrounded by *E. calophylla*. Seed collected from the edge of the grove will probably be contaminated and will contain many hybrids. That collected in the middle of the grove will be more apt to breed true. The difficulties of seed propagation has led to inarch grafting of this species on the Riviera of France and Italy. Dr. George Ryan of the Department of Horticultural Science at UCLA has worked out simpler grafting methods.

One very desirable flowering tree, the Cape Chestnut, *Calodendrum capensis* of South Africa is so variable in appearance and performance that vegetative propagation is suggested. The writer has noticed great and consistent yearly differences in blooming dates in several trees in Elysian Park, Los Angeles, and at the Stephen Vavra Estate in Bel Air, there was a tree which regularly bloomed in the winter. It might be worthwhile to determine if selected seed sources of this tree would solve the problem of numerous trees which never thrive and make good specimens.

The following lectures will treat many of the phases of technology relating to seeds with much more detail. In conclusion, the writer would like to mention two objectives which a society of propagators could foster. First of all is the exchange of information on reliable dealers in seeds. The knowledge of sources of unusual plant materials is one of the assets of a good landscape architect. May we not similarly say that a similar knowledge of seed collectors and dealers is part of the equipment of a good propagator. This information is not easy to come by and seed collectors living on the frontiers of civilization are not al-

Table 1 Sources of California Native Plants

1	O. Kenneth Smith, P. O. Box 100, Magalia, California
2	L. L. Edmunds, Danville, California
3	Calmers California Wild Flower Nursery, Dos Rios, California
4	Herman Seyforth, Padua Hills Gardens, 555 West 8th St., Claremont, Calif.
5	Ted Hutchinson, Greasewood Nursery, Barstow, California (desert plants)
6	Eustace Rush, Seedsman, 1014 W. Olive Ave., Burbank, California
7	S. S. Lawrence, Seedsman, P. O. 408, Las Vegas, Nevada
8	Mrs. E. W. Cislei, Route 2 — Box 89A, Hemet, California
9	LaTuna Nursery, 10459 Tuxford, Sun Valley, California
10	Roy Carter, P. O. Box 551 on 14950 Mission Blvd., San Fernando, California
11	Gregg's Nursery Service, 407 E. 165th St., Gardena, California
12	Clyde Robin, Collector of Wild Flower Seeds, Carmel Valley, California

Most of the large retail nurseries are selling an increasing variety of native plants.

Not commercial sources for the trade, but sources of rare plants for propagation purpose and introduction:

- a. Santa Barbara Botanic Gardens, Santa Barbara, California
- b. Rancho Santa Ana Botanic Gardens, Claremont, California

ways as reliable as one might desire. A really good directory of specialized seed sources could be a worthwhile activity of an organized group.

Another possible area in which a group might function is in the salvaging of information which would otherwise perish — perhaps forever. We have not conserved our harvests too well. Some very able horticulturists of an older generation have died leaving very little of their hard earned knowledge behind them. Having, in many cases, very little literary skill, they have left few records of their immense knowledge.

Chairman Stoutemeyer introduced Dr. Dale E. Kester of the Department of Pomology, University of California, Davis. Dr. Kester discussed seed dormancy as it is related to certain nursery practices.

Table 2. SEED SUPPLIERS

NAMES	ADDRESSES
1 S S Lawrence	P O Box 408, Las Vegas Nevada
2 Theodore Payne	2969 Los Feliz Blvd, Los Angeles, Calif
3 Eustace Rush	1014 West Olive Ave. Burbank, Calif
4 Morris & Snow	776 Wall Street, Los Angeles 14 Calif
5 Herbst Brothers	92 Warren Street New York 7, New York
6 Edwin A Menninger (The Flowering Tree Man)	Stuart, Florida
7 Conyers B Heu, Jr	Ross and Montana Streets Germantown, Philadelphia, Pa
8 Harry E Saier	Diamondale, Michigan
9 F. W Schumacher, Horticulturist	Sandwich, Massachusetts
10 Albert Wilson (tropical plants & seeds from South & Central America, and Mexico)	9127 Juniper Avenue Fontana, Calif
11. Central Nursery Company (Exotic Subtropicals)	2675 Johnson Avenue, San Luis Obispo, Calif.
12 Evergreen Farms (Conifers)	P O Box 497, Palo Alto Calif
13 Roy Carter (Palms, shrubs, trees)	Box 551, 14950 Mission Blvd, San Fernando, Calif
14 Willard Hagen (Tree Seeds)	135 Las Tunas Drive, Arcadia Calif

Forest Service U S Department of Agriculture
Washington 25, D C maintains a list of Tree Seed Dealers