

of propagating roses on *R. fortuniana*. The cost of grafted miniature roses is much higher than that of the own-rooted plants, but the greatest difference between grafted miniature roses and those on their own root is the size of the plant and the number of flowers the same aged plant will produce. In a landscaped area, standards can be used as accent points. When a miniature rose cultivar is on a standard, there is no change in the size of the leaf or the size of the flower.

The most frequent question asked is: Do miniature roses have to be cared for any differently from the larger type roses? The answer is: No. However, these roses like a high-organic, well-drained soil that retains moisture and nutrients. These roses need to be fertilized frequently, every 3 to 4 weeks, using any well-balanced fertilizer. A high nitrogen content will produce more vigorous bushes and more flowers. The amount to use of a 6-6-6 or a 10-6-8 would be one-fourth to one-half cup per bush when miniature rose plants are *in beds*. Only one teaspoon of fertilizer should be used per 6 or 8 inch *pot*. Adequate watering is necessary because the plants on their own roots have shallow root systems, and when they are under moisture stress, the damage to the rose bush becomes visible.

Besides fertilizing and watering regularly throughout the year in Florida, it is necessary to protect the foliage from the common pests that attack other roses: blackspot, spider mites, and powdery mildew. One should use the same materials on miniatures that are recommended for control on other roses. Good coverage on the underside of the leaf is most important, but the plants should not be whitewashed or phytotoxic conditions can cause defoliation.

Some cultivars have a tendency to drop their foliage after a flush of bloom. The cause is unknown, if mites have not been the culprit. Both mites and blackspot will cause foliage to become yellow and drop off. Whatever the cause, the bush should be trimmed back with sharp, clean shears. With sufficient fertilizer, water and protection with spray, the plant will resume active growth.

Some cultivars have a tendency to have large canes that

will die back throughout the season. Other cultivars do not have this problem. The hybridizer does not understand why this die back is a problem. The author suggests that perhaps it is a genetic weakness, and the recommendation is to cut the dead canes out, thus opening the bush, and new growth will fill in the void. Cultivars that have shown this problem are 'Beauty Secret,' 'Judy Fischer,' 'Toy Clown,' 'Janna' and 'Jet Trail,' to name a few. These varieties have similar parentage lines. Even with *this problem* they are still among the most popular cultivars grown.

The author recommends that at least once a year the plants be pruned. There are different ways to prune, depending on the growth habits of that particular cultivar. For example, 'Starina' and 'Yellow Doll' should be pruned in the early spring using the same practices of pruning for larger type roses. More compact types like 'Cinderella' or 'Gold Coin' can be pruned by reducing the size of the plant with sharp hedge clippers and a little thinning and removing of dead wood with sharp clippers.

There are basically two flower forms: the hybrid tea type and the decorative (fully open form). The choice to make is influenced by the purpose for which one is growing the roses. If they are for exhibition, the hybrid tea type usually will be the blue ribbon winner. If they are for color and a multiple amount of bloom is desired, as in a garden, then the decorative types are preferred.

Miniature roses make beautiful small rose gardens outdoors and indoors. They can be used as hedges or within rock gardens. They are relatively easy to grow and can provide much enjoyment for the young, the old and all those in between! These tiny roses make wonderful conversation pieces!

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## LEARNING BY DOING—ANOTHER APPROACH: A SABBATICAL VIEW OF INSTRUCTION AT THE LARGEST ORNAMENTAL HORTICULTURE SCHOOL IN THE UNITED STATES

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**Abstract.** Ornamental horticulture students at California Polytechnic State University, San Luis Obispo, California, receive an education that differs from traditional university programs. Instruction is occupationally oriented to prepare the graduate to enter commercial practice. Courses in ornamental horticulture are taken during the first 2 years, while basic university courses are taken later. Lecture and laboratories stress the application of the latest, practical information rather than history and theory. Students are required to

conduct a research project and write a thesis. A non-profit corporation within the university finances individual student-grown crops which serve both as a learning experience and as a method of financing one's education. Many aspects of Cal Poly's program merit consideration in the traditional university program, especially in a state such as Florida, where large industrial employment opportunities exist, similar to California's. This report is based on the teaching experiences of a traditional, land-grant university, teacher-researcher on sabbatical leave.

Undergraduate enrollments in ornamental horticulture are at an all time high (3). Witte and Johnson (10) reported an almost 14-fold increase in the student body at the University of Florida between 1966 and 1976. Similar increases have occurred in all colleges and universities teaching ornamental horticulture (4, 6, 7).

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Very few new positions have been created to meet this enrollment crisis in university ornamental horticulture teaching programs (3). While research personnel have been shifted into teaching (4), many problems still exist. The most critical problem in teaching, other than adequate personnel, is in the area of practical student experience. Sanderson (7) has reported that increased enrollments and requests for laymen-oriented courses have made classroom experience almost impossible. Buila and Jahn (2) have charged that practical learning has been judged too costly and gutted from 4-year schools. Laurie (5) has noted that college graduates may be completely deficient in experience. The American Association of Nurserymen (1) and the Society of American Florists and Ornamental Horticulturists (8) have concluded that the current education system does not truly recognize the needs of industry.

The student experience problem has not gone unnoticed in academic circles. Storey (9) has suggested that Horticulture faculties should encourage students to take advantage of work/study programs, summer employment, and other temporary job opportunities in horticulture so they can qualify for positions where employers cannot or will not provide an initial training program. Last year Witte, and Johnson (10) described such a work/study program for ornamental horticulture students at the University of Florida and compared it with other university and industry programs. Coincidentally, the main title of Witte and Johnson's paper was "Learning by Doing"—the motto of California Polytechnic State University, San Luis Obispo, CA.

During 1976-77 Auburn University granted the author a 9-month leave of absence to teach at Cal Poly plus a 3-month sabbatical leave to study California's ornamental industry. While on the staff of the Ornamental Horticulture Department at Cal Poly, the author taught floriculture courses, advised students, was a member of Ornamental Horticulture Club, and served on departmental committees concerned with the operation of the greenhouses and limiting student enrollment. During my studies of the industry, many products of Cal Poly's teaching program were also observed in managerial positions throughout the state.

Cal Poly is a part of the California State University and Colleges and is fully approved as a four-year degree-granting institution by the Western Association of Schools and Colleges. Degrees are granted in more than 50 academic programs. Approval to grant the master of science degree was received in 1947. The campus consists of over 5,000 acres<sup>1</sup> adjacent to San Luis Obispo an urban community of 35,000 located on U.S. Highway 101, midway between San Francisco and Los Angeles and 12 miles from the coast of central California. It is a compact campus which does not seem to have the same number of buildings of comparable universities its size. Classroom space and facilities therefore require extremely efficient management. Enrollment figures for fall quarter of 1977 exceeded 17,000.

The Ornamental Horticulture program is quite different from that of a traditional land-grant university. Since the primary responsibility of the faculty is teaching, the staff is not involved in research or extension. Faculty have been selected for their academic and commercial experience. Instructors receive strong support in the classroom from the university administration, a renown audio-visual department, and clerical staffs throughout the university. The OH department furnishes laboratory set-up and clean-up personnel, laboratory assistants, and graders. Instruction is *occupationally oriented* with the objective being to prepare the graduate to enter commercial practice. A constant

inter-play between general principles and practical application characterizes instruction. The latest techniques and "know how" are more important than academic history and theory in the classroom. Enrollment figures for the fall quarter 1977 were 767 students and 20 staff.

More than 40 courses stress the production and marketing of nursery crops, cut flowers, pot plants and tropical foliage plants; landscape design and construction; turf management; floral design and marketing; and diseases and pests. Unique course offerings include Bonsai, Ikebana and tissue culture. Some courses are designed to aid the student in passing federal and state examinations necessary for certain ornamental operations. Courses cover four areas of specialization: nursery production and management, floriculture production and management, landscape technology and floral design. A basic OH curriculum exists for all students. Students take many ornamental courses during their first 2 years.

Cal Poly provides practical experience to its students in many ways including: 1) an Agricultural Enterprise program, 2) a senior thesis, 3) a special projects course, 4) laboratory exercises, 5) internship programs, and 6) public service projects sponsored by the OH club and the Department.

The Agricultural Enterprise Program is the most distinctive feature of Cal Poly's OH Department and approaches the zenith of practical experience. This program provides students with production, management, and sales experience while permitting them to share in the profits from their efforts. The enterprise program is financed by a non-profit corporation, the California Polytechnic State University Foundation which performs many funding functions within the university. This foundation operates under a lease agreement made with the Trustees of the California State University and Colleges and approval of the State Department of Finance. All accounts are subject to audit by the State Department of Finance and other control agencies.

A student wishing to participate in an enterprise project must have completed 2 quarters at Cal Poly or completed courses necessary for certain projects. Projects on bedding plants, vegetable plants and ground covers are typical projects for beginning students. Projects on flowering potted plants, container ornamentals, foliage plants, sod, and quality control of flower and vegetable seeds are available to advanced students. Original project ideas are encouraged. Projects must gain the approval of an advisor and the Departmental Enterprise Committee prior to submission to the Foundation. The student must research the crop, prepare a record book outlining the materials needed and a budget, and sign a contract with the Foundation before starting the project. Most of the enterprise products are marketed through a student-operated flower shop and nursery. Many are sold during a University-wide open house, Poly Royal. Some of the plants are wholesaled to commercial nurseries and landscape contractors. Net profits from these projects are divided so that the student receives 66% and the Foundation receives 33%. The Foundation absorbs any and all losses. Recently, the Foundation contributed \$8,000 to the OH Department for greenhouse expansion.

Senior thesis are required of each graduate. They provide both report writing and research experience and are completed in 2 to 3 quarters. Topics selected for senior projects have included: Design and Construction of a Modular Propagation Structure, Vertical Vegetable Gardens and How to Water Them, Starting a Vocational Gardening Program at the California Men's Colony, Testing Insecticides on Greenhouse Pests, Hydroponic Gardening of

<sup>1</sup>For metric conversion see table near the front of these Proceedings.

Foliage Plants and Gibberellic Acid and its Effects on Dormancy of Caladium Tubers. Occasionally, the projects have been published and many of them have improved the OH teaching program and the landscape of the community. Individual advisors guide the students, however a co-ordinator keeps the projects on schedule.

A special problems course is also offered. The course is limited to advanced undergraduates and may only be taken with the permission of the Department Head. The course consists of individual investigation, research, studies or surveys of selected topics.

Laboratories are conducted on campus and in a student-operated commercial greenhouse range and nursery. The facilities were built 5 years ago and include 23,000 ft.<sup>2</sup> of glasshouses; 3,000 ft.<sup>2</sup> of lathouses, cold frames, and seed beds; an arboretum; an All-America test garden; and several acres devoted to cut flower, container ornamentals and sod production. Students actually built 5,000 ft.<sup>2</sup> of glasshouses and are currently erecting a 3,000 ft.<sup>2</sup> solar heated glasshouse. The campus is planted with many interesting and unusual ornamentals and serves as an outdoor laboratory. Students are certified to operate the very latest models of ornamental equipment. All Cal Poly OH students are also qualified in agricultural mechanics, tractors and equipment, and surveying. A disease and pest course applies most of the pest control materials throughout the teaching area. Field trips are taken to the ornamental producing areas in Santa Barbara, Salinas, Los Angeles and Lompoc. Nearby Hearst Castle offers a unique laboratory for ornamental study.

Cal Poly students participate in an internship program. Interns are registered as full-time students but spent an entire quarter as paid employees in commercial establishments working in production and managerial capacities. The internship is developed in advance by the University and the employer. The intern is visited on the job at least twice a quarter by his departmental advisor.

Service projects of the Department and the OH club provide the students with a different kind of experience. The Department sponsors workdays at the teaching facility. The Rose Bowl Parade float is a University and community project that receives strong departmental support. On Arbor Day, the OH club and the department planted trees at local schools and throughout the community and restored a 200-year-old mission fig tree. The OH club sponsored a forum on the farm labor referendum, an educational field trip between quarters, and a native plant symposium. An

entire day was spent on landscaping a home for the mentally retarded.

The practical experience provided a Cal Poly student is in stark contrast to that of a traditional land-grant university. While the latter stress theory, Cal Poly stresses modern commercial techniques and action. It is felt that a blend of the 2 systems is needed in teaching ornamental horticulture today. The criticisms of industry make it imperative that the land-grant institutions initiate practical experience programs such as the one instituted at the University of Florida (10). Cal Poly offers many other approaches. The high priority on teaching and teaching methods at Cal Poly should also be considered in land-grant institutions that have historically placed major emphasis on research. Request for graduates and observations of their successful performance in the industry makes criticisms of Cal Poly's program difficult. Nonetheless, it is apparent in the classroom that some Cal Poly students wish to be challenged in a different way. Evidence of the need for some basic theory is that Cal Poly is placing students in our most highly respected ornamental graduate schools. Also, it has been observed that some training on basic theory would facilitate the solution of production problems encountered by graduates in the industry.

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### COMMERCIAL PRODUCTION OF GESNERIADS IN SOUTH FLORIDA

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**Abstract.** Gesneriads are best known to the public for Gloxinias; lovely as they are, other representatives deserve to be well known. In particular, the trailing forms, so well

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sued to the modern fashion of hanging baskets, are worthy of notice. Various of these are described, together with observations on the culture of Gesneriads in south Florida, their resistance to cold and their general cultural requirements.

The Gesneriad Family has contributed much to modern horticulture. *Saintpaulia*, the African Violet and *Sinningia*, the *Gloxinia* bring satisfaction to plant enthusiasts and to growers all around the world. Though these two genera account for the majority of plants sold within the family