

with whom I have consulted at the University. I guess it has not gone to court yet, and the only way it could be broken is by taking it to court.

THURSDAY EVENING SESSION

October 7, 1971

MODERATOR RICHARD MAIRE: We are fortunate to have tonight a presentation by Jolly Batcheller, complete with slides, on his recent trip to Australia and New Zealand to study various aspects of the nursery industry and horticulture in general in these two countries Jolly:

ORNAMENTAL HORTICULTURE IN AUSTRALIA AND NEW ZEALAND¹

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As nearly 20% of the plants commonly used in southern California originated in the Australia-New Zealand area, I felt a study of (a) the nursery industry, (b) the plant materials they use, (c) the institutions training men for the horticultural fields and (d) arboreta, botanic gardens and municipal parks would be of particular interest and value to the Ornamental Horticulture Department and California State Polytechnic College, Pomona, California.

As I think back over the attitudes and philosophy of education as I perceived it in both Australia and in New Zealand, there is a great similarity to that found in Central Europe. It is quite distinct and different from that found in the United States, and one which I feel is better not only for the students but for the country as a whole. In both Australia and New Zealand it is recognized that all students are not college caliber and that all students do not learn either at the same rate or by the same means.

Our visit coincided with the final examinations, and we were privileged to be in on some family conversations regarding school and college exams. In several cases where the students and the parents were discussing a failure in a class, there was no shame or disgrace associated with the failure. In one case, it was apparent that the student was not ready to pass on to the higher level. Both parent and

¹This presentation is a result of a sabbatical leave taken in Australia and New Zealand from September, 1970 to March, 1971.

student accepted the facts of life that if he was not able to pass the examination this year he would be in a poor position to begin the advanced studies. A second case was where the son of a well-to-do nurseryman who had excellent grades and the mental ability to enter any college or university, had decided that if he was going to be a nurseryman it would be to his advantage to go into it via the apprentice route where he would be well grounded in all of the skills and abilities, and then get what he might need as additional work in a college. A third conversation which took place in a family gathering when all children were present was the fact that the youngest child would go on to college while the older child would go the technical training route. This would make them both useful, well prepared for their life's work and happy. I think these three situations clearly show that it is the knowledge and abilities that count most with the thinking people, rather than the fact that the student had attended a prestigious college.

AUSTRALIA

I cannot start this report on Australia without indicating the warm hospitality and friendliness which was extended to us throughout this vast and challenging country. Our 30-day visit, September 20 to October 21, included Perth in Western Australia; Adelaide, South Australia; Melbourne, Victoria; Hobart, Tasmania; Canberra, the capital city; Sydney, New South Wales, and Brisbane, Queensland. All except Canberra were in the coastal areas.

The following geographical description of Australia is presented in comparison to the United States to help the readers orient themselves. Australia is practically the same size as the U.S.A. with a population of only 12,000,000 compared with 200,000,000 in the U.S.A. If we were to orient the Australian continent in the northern hemisphere, it would reach from latitude of the Panama Canal to Boston, Massachusetts. Much of Australia is desert (50%). Much of the land (95%) is below 3,000 feet elevation. Few mountains are found in the western two-thirds of the country, and in the eastern section the mountain ranges seldom exceed 8,000 feet. Water is a major limiting factor; many of the soils lack organic matter and plant nutrients. The oceans which surround Australia have a very moderating effect on an area about 60 miles in depth. It is in this coastal fringe that 95% of the population is found. The coastal areas of Perth, Adelaide, Melbourne, Sydney and Brisbane grow much the same range of plant materials as are found in southern California. There is no volcanic activity in Australia.

The Nursery Industry. Each state visited had an association of nurserymen which also was a part of the national body known as "The Federation of Australian Nurserymen's Association." In the

major coastal cities visited there was an active, aggressive nursery industry which I felt met the expressed needs of the population. Typical of the industry in every country I have visited, there were exceptionally well-organized and well-run operations and nurseries that appeared marginal in nature. I do not believe the industry has developed to its full potential.

Visible Differences. The most obvious difference, as compared to California nurseries, were:

- a. Lack of planning and layout to make use of the best known merchandising and selling techniques (Examples: narrow gravel or dirt paths, no focal point, sales point and the garden center building not developed to fullest potential).
- b. The use of plastic bags as containers rather than the metal gallon can.
- c. The use of circular tubes instead of square pots.
- d. The direct sticking of cuttings into tubes.
- e. The sale of small size plants, 2-, 3-, and 4-inch tubes, to the general public.
- f. The small number of 5 gallon size plants grown and sold. With rare exception, the general lack of what we call "specimen size" landscape material.
- g. The neatest and best arranged nurseries were in the chain stores.

Quality of Nursery Stock. I would say, in general, that the quality of the plant materials was very comparable to that found in California nurseries. It appeared that many plants seemed to propagate more easily and grow a little faster in Australia than in the U.S.A. The uniformity of nursery stock was poor.

Pricing. Throughout most of Australia, the common practice was to mark up the green goods wholesale price only 60%. The prices as related to wage structure and dollar valuation was a little lower than found in California. The mark up on hard goods varied on availability—mostly 33 $\frac{1}{3}$, some 60, and a few items 100 percent, if in scarce supply.

Merchandising and Promotion. The formation of the "Trade Association Selection Committee (TASC)" and the national promotion of the "Captain Cook Bottlebrush" is a giant step in developing a promotional program for the nursery industry. One of the great difficulties of doing this on a national scale is the scarcity of people outside the few major population centers and the great distances between the major populated areas. I believe local cooperation on promotion as is done in the Sydney area would be most helpful.

Techniques and Procedures. I found the techniques and propagation procedures remarkably good in spite of the lack of available information from state and federal agencies. It was quite apparent that the most advanced operators had read a good many publications from overseas and had traveled outside of Australia. The use of the UC mix and aerated steam was nearly a "fetish" with the Australian nurserymen. The growing of seedling bedding plants at Alan Newport's nursery in Sydney was, from a technical standpoint, one of the best and most efficient operations I have seen anywhere in the world. There were other minor ingenious devices which indicated to me that the nurserymen of Australia are alert and progressive, but lack technical assistance from their state and federal governments. No bulletins or publications are available in Australia from the agriculture departments regarding ornamental horticulture, cultural practice, equipment, economics or operations.

The only state publication I found was "The Cultivation of Native Plants, published by the Western Australian Education Department.

Variety of Plants. It was quite evident that there are a good many species and varieties of Australian native plants that we should be using in southern California. This is being worked on by the arboreta and the commercial wholesale nurseries. Every nurseryman, landscape architect or park administrator who travels should keep pestering the arboreta and botanic gardens in the U.S.A. for plants which should be introduced. As an example, we do not have some of the better eucalyptus trees that are small to medium height and would serve our purpose, such as *Eucalyptus maulosa*, "White Brittle Gum," which is a tree far better than the monstrous *Eucalyptus citrodora* or *Eucalyptus viminalis*.

Educational Institutions. I was shocked to learn there is not a single chair of horticulture or a department of horticulture in any four year degree granting institution in the entire country of Australia. Degrees are available in agriculture and an individual who desires can take a few courses in horticulture. The term horticulture is all inclusive and includes vegetables, fruits, berries and citrus. The field of ornamental horticulture is practically unheard of as are college or university programs in park administration. These areas of study or courses are handled at the technical school level or in apprentice type training programs. Most arboreta and some parks have apprentice programs. I actually attended classes in two of the apprentice programs and was less than impressed as the work appeared to be below our high school level of instruction.

Waite Agricultural Research Institute in Adelaide, South Australia, had good facilities and program for research in horticulture. It provided no direct and / or continuous help for the average nursery operator or manager. The program was pure research of a rather basic nature and not applied to the industry.

The Queensland Agricultural College, Lawes, Queensland. An all male residential college with over 3,000 acres of farmland and campus. This is a full-time in-residence course with options of (1) a two-year sub-tertiary course, (2) a three-year associate course and (3) an elective fourth year for specialization. There are 435 students in the following majors: Animal Industries, Food Technology, Poultry Technology and Plant Science. The Plant Science includes sixteen students interested in general horticulture who, in their fourth year, can take three specialized courses which deal intimately with the ornamental phase of horticulture (Course number: 402, Ornamental Horticulture; 403, Turf Management; 404, Landscape Gardening). The nursery industry of Queensland is raising money to provide facilities and to handle the cost of establishing a chair of ornamental horticulture and to increase the course offerings. Potentially, this college appears to have the greatest possibilities for a good horticulture program. The one factor which I view as limiting is that of location. Situated as the college is at Lawes (or Gatton), it is far enough away from the ocean to lack the ocean's moderating effect. It appears to me that this will limit the plant material and make the effective use of their greenhouses difficult.

Ryde School of Horticulture, West Ryde (Near Sydney), State of New South Wales. Although listed as a school rather than a college, Ryde has better facilities than Burnley (Melbourne) and it appears that a more practical applied program is presented in several areas as follows:

- a. Horticultural Certificate Course, 7-8 hours per week for 3 years.
- b. (Post Certificate Courses), 3 evenings per week for 2 years in the following subject areas:
 - (1) Park Administration
 - (2) Nursery ManagementAdditional courses are available which do not require the horticultural certificate.
 - (3) Greenskeeping Course, 6 hours per week, 2 years

c. Courses of shorter duration:

(1) Home Gardening	2 hours per week	36 weeks
(2) Floral Art	2 hours per week	36 weeks
(3) Bonsai I	2 hours per week	12 weeks
(4) Bonsai II	2 hours per week	24 weeks
(5) Orchid Culture	2 hours per week	6 weeks
(6) Australian Wild Flowers	2 hours per week	July to October
(7) Indoor Plants	2 hours per week	6 weeks

The Horticultural Certificate Course appears to be a well-balanced course in the subject areas, but includes no courses in Business Economics, Chemistry, Marketing or any of what we call general education including Math, English and History

Although this was the best practical school I saw in Australia, I would place it on a par with some of our junior colleges.

Burnley Horticultural College, near Melbourne, Victoria. This institution offers a two-year part-time evening course 6-8 p.m., 2 nights per week for 30 weeks. This is known as a "part-time evening vocational course." It is also my understanding that students in agriculture at the University of Melbourne take some ornamental horticulture training at Burnley during the day. Located on the same campus adjacent to Burnley was the state's horticultural research facilities. Work under progress at the time of my visit was: (a) tissue culture for developing virus-free chrysanthemums and (b) a study on the virus mosaic of bulbs. Since facts are available on these subject areas and virus-free stock is readily available, this research in my opinion was a waste of hard-to-get funds and space. The facilities at Burnley as shown to me were good for show and demonstration, but I could not see how a challenging, productive program could be presented with so little student involvement in production.. The plant materials on the grounds were excellent.

College in Sydney. Although I heard a great deal about the establishment of a chair of horticulture at one of the colleges or universities in Sydney, this is still in the talking stage and I am not aware of the curriculum or facilities planned.

Apprentice Programs. There is no uniform apprentice program for nurserymen or park men throughout Australia. In some states the nursery trade is recognized as a trade and a closely regulated state apprentice program is in operation. In

other states the nursery trade is not recognized as a trade and no apprentice program can be adopted or supported by the state government.

Other Sources of Training. Except for night schools which are available in some states, there are no state or national training programs by correspondence.

Educational Meetings. While in Adelaide it was my privilege to serve on a panel of educators and nurserymen discussing the need of horticultural training for nurserymen. The Waite Agricultural Research Institute representative indicated their goals and objectives precluded their involvement in any such program. For the Ministry of Education, horticulture must be declared a trade before apprentice programs can be planned and courses given.

Generally, the small size of the nursery industry and the few numbers of employers who would use apprentices make it difficult to interest sufficient people to declare the nursery industry a trade and, therefore, subject to the state apprentice programs. Only in a few states is it so recognized.

Arboreta, Botanic Gardens and Municipal Parks.

Arboreta and Botanic Gardens. In the typical English tradition, horticulture was brought to Australia early in the development of the country. With it came the elms, oaks and the perennial flowers. There were arboreta in each of the major cities visited; some of them were established as early as 1814. Considering the late development of the continent, this is quite amazing. The gold rush in Australia following the one in California brought many people from California who, in turn, brought plants native to the west coast of North America (Example: *Pseudotsuga menziesii*, Douglas fir; and *Pinus radiata*, Monterey pine). Both of these trees are now of great economic importance for lumber and will mature in 25-28 years. Botanic gardens were also found in the major cities, some devoted to native Australian plants, others covered a wide range of plants from all over the world. Unfortunately, most arboreta and botanic gardens are not well financed. The directors get a fair wage, but not comparable to the pay in the U.S.A. and the worker's pay is extremely low.

Municipal Parks. No city visited was without extensive municipal parks. For example, Melbourne has 13,000 acres of parks, nearly $\frac{1}{4}$ the total area of the city. The parks generally are well-spaced and planned for the activities most needed, i.e., downtown parks are smaller and designed for passive use, suburban parks are larger and designed for active sports. Australia has strong feelings regarding physical fitness and

this is quite evident by the use of athletic facilities throughout the week, month and year. Women's sports are very prominent. There are many private clubs which hold weekend competitions that keep the playing fields in constant use. Here again it appears that a few of the top men in the park system get a fair wage, but the average worker has very low pay

NEW ZEALAND

A few geographical facts about New Zealand may help orient the reader. New Zealand is approximately two-thirds the size of California. It consists of two major islands each 500 miles long. No spot in New Zealand is more than 70 miles from the ocean. A comparison of New Zealand's latitudes with those of our West Coast would show New Zealand extending from Santa Barbara, California, to Portland, Oregon. Fifty percent of the country is over 3,000 feet elevation. The highest mountain is Mt. Cook, 12,400 feet, which is perpetually covered with snow. Water is abundant, and rain comes intermittently throughout most of the year. The west coasts of both islands are wetter than the east coast and only a few areas have low rainfall. The population is 2,900,000 with approximately 2,000,000 in the north island. This compares with 20,000,000 population in California. Both islands have volcanic activity. During my 6-week stay in New Zealand I covered most of both islands driving 4,000 miles from Auckland to Invercargil. We were in intimate contact with the country and the people. New Zealand is a lovely gentle country with beautiful scenery and the most hospitable people we have met.

The Nursery Industry. There is only one Association of Nurserymen for all of New Zealand. Most of the nurserymen are located on the north island. Despite the limited buying public as compared with California, it appears that the New Zealand nurserymen do a per capita volume of business greater than California and greater than Australia.

Visible Differences.

- a. Plastic bags in gallon size were used most commonly for nursery stock.
- b. Plants were sold in small sizes, 2-, 3- and 4-inch pots or tubes, but selling of such small plant sizes was not as common as in Australia.
- c. Round tubes instead of square pots were used for liners.
- d. Cuttings, particularly fast rooting material, were stuck directly into tubes.
- e. Relatively few specimen size materials were available.

- f. Nursery plants were often sold along with vegetables in the stores in small towns.
- g. The best large retail nurseries were laid out as expertly as any in California. These sophisticated or modern layouts were in the most populated areas.
- h. After adjustment for wage differences, the cost of quality plant material in New Zealand was higher than the cost of comparable material in Australia or California.
- i. Mark-up on green goods was generally 100% of wholesale price and mark-up for hard goods was generally 33%.

Merchandising and Promotion. Here again with the small scattered population, promotion as we know and see it in southern California is not present. However, quality plant materials are available in even the smallest of towns.

Techniques and Procedures. The operation of a small general nursery does not lend itself to mechanization or extensive research in new techniques. I did find, however, that even the smaller nurseries had good, clean, neat operations and the nurserymen had made ingenious devices to increase efficiency. Soil treatments (often aerated steam) were used primarily for killing clover seed in soil mixes; however, many large nurseries did not steam soil. Clover is a basic plant in the perennial pastures. The seed is found everywhere and is a real problem. Duncan and Davies, located in New Plymouth, is the largest wholesale nursery in New Zealand. It covers 300 acres. I was impressed by the neat, orderly operation, the research department, the testing and trials given plant materials before releasing them to the public and the excellent rooting percentage obtained with the *Protaceae* by direct sticking in individual pots.

Fairs and Shows. The largest horticultural show I attended was the Auckland "Garden Week Show." It covered about 5 acres of buildings and grounds. Displays were varied and well executed. There was a cross-section of effort: the university, private garden clubs, cities, park reserves, specialty societies, and commercial nurserymen and suppliers. Speakers were scheduled throughout the week. The talks were practical, down-to-earth and well presented. The Garden Show received excellent coverage on T.V., radio and the press, and attendance was very good. Displays were not as elaborate as the horticultural display at the Los Angeles County Fair, but I felt that the people in attendance at the Auckland show carried away more usable information.

Variety of Plants. As in Australia, many of the better varieties of plants native to New Zealand are not readily available in southern California. Examples are: (1) *Tetrapanax tricolor*, (*T. papyriferus*) (2) the three species of *Metrosideros* and (3) several *Leptospermum scoparium* varieties. With members of the California Association of Nurserymen going to New Zealand in November 1971, I am sure some of these new varieties and clones will be brought back to California.

Educational Institutions. New Zealand is fortunate in having two institutions where horticulture is taught: Massey University located in Palmerston North in North Island and Lincoln College located near Christchurch in South Island.

Massey University. Massey University, although originally an agricultural college established in 1928, it added science in 1958 and became a full university in 1964. In 1969 graduate programs were added. There is a great similarity between Massey University and Cal Poly, Pomona, not only in its development, but in the problems it is now facing with agriculture enrollment only a small fraction of the total university enrollment. Space and money are at a premium and maintaining a meaningful, practical program is becoming difficult. Massey University offers the following horticultural curricula:

- a. Diploma in Horticultural Science (2 years)
- b. Degree, Bachelor of Horticulture (3 years)
- c. Degree, Bachelor of Horticultural Science (4 years)
- d. Special post graduate diploma on Horticultural Science offered for specialized study (1 year following B.H.S.)
- e. Masters of Horticultural Science (2 years following B.H.S.)
- f. The Doctor of Philosophy is offered only in Science (may have horticultural emphasis)

There is a practical work requirement of 48 weeks required for the bachelor degree. This must be done at places of business approved by the college and may be spread out over the four years. A review of the curriculum indicates that the Massey program is excellent. The new greenhouse facilities will further improve the program. Professor Murray Richards is well thought of in the nursery trade. In addition to the educational programs, Massey University also handles short courses, skills programs, and seminars for the nursery industry. No program is offered at present in park administration. Massey University has adequate grounds and

facilities for field work. A new climate control laboratory with the finest setup for plant study is located on the same campus. Massey University had by far the best instructional program in ornamental horticulture that I saw "down under."

Lincoln College. Lincoln College (University College of Agriculture) at Canterbury, a suburb of Christchurch, is in south island. The college was established in 1880 and has been in operation since that time. The college is entirely agriculturally oriented, although joint degrees in bioscience are offered in collaboration with the University of Canterbury. Lincoln College offers the following horticultural curricula:

- a. Diploma in Horticulture (2 years)
- b. Bachelor of Horticulture (3 years)
- c. Bachelor of Horticultural Science (4 years)
- d. (1) Diploma in Horticultural Science (1 year)
(2) Diploma in Landscape Design (1 year)
(3) Diploma in Park Administration (2 years)
(4) Certificate in Landscape Design (1 year)
- e. Masters in Horticultural Science (2 years beyond B.H.S.)
- f. Doctor of Philosophy with horticultural emphasis (2-3 years)

Prior practical work in industry is expected of students entering Lincoln College. As at Massey University, 48 weeks of practical work is required for the Bachelor of Horticulture. This work must be spread out over several different areas in the horticultural field. Students must keep diaries of work experience and supervisors are expected to make comments. This is much like the European system. The curriculum is well-balanced and adequate. I was not impressed with the greenhouse facilities. There was no sign of a nursery or ornamental emphasis. It appears that great effort and stress is now being placed on the landscape design field.

Lincoln College has had a good reputation for preparing students for the ornamental horticultural field. I did not see a program there which I felt warranted this endorsement from the nursery industry. The work at Lincoln College on strawberries was excellent and the work on other horticultural crops was good. The program in landscape design was good and developing. The addition of a diploma in Horticulture (1 year) plus 1 year in park administration is a good move. This program is to begin in 1972. It is planned that a student in park administration would first serve 3 years with the park departments or reserves then take the course at Lincoln. It appears that the practical program for which Lincoln College

was noted has gone and in its place has come the emphasis on theory and research. Lincoln College is suggesting more practical experience prior to entrance to make up for the reduction of practical work at the college.

Correspondence Courses and Apprentice Programs. The apprentice training program is a well-established and respected program which over a period of time produces well-qualified artisans and technical people. Under the program the apprentice must, along with his practical work, have certain course work. Much of this schooling is done through The New Zealand Technical Correspondence Institute located at Lower Hutt, Wellington. To give an idea of the scope of this educational system, these figures may be of interest. In 1967, 17,000 candidates wrote on 261 different subjects covering 45 different trades. Today there are 220 teaching staff for handling papers, 5 specialists who work with industry in preparation of written work, and four illustrators and photographers who assist in the preparation of the assignments. At present there are 300 students in horticultural courses. Six out of the 220 teaching staff are assigned to the agricultural areas. Each student usually takes four subjects a year for 3 to 5 years, depending upon the program he is pursuing.

For those unable to attend either Massey or Lincoln, this correspondence program does provide uniform information. I have read some of the assignments and observed some of the written answers. My feeling is that a student would have to be very highly motivated to carry this program through to completion. One feature of the correspondence courses for those applying in the apprentice program is the "block courses." For three weeks each year the students go to a suitable center where materials impossible to handle by correspondence are presented (field trips, laboratory skills, equipment operation, etc.). It must also be remembered that the apprentice is working in an establishment approved for the program and is able to get practical work and the application of principles. It is my understanding from talking with men in the nursery trade that the percentage of those who complete the correspondence courses is low (10-15% estimated).

In order for an apprentice program to be fully qualified, the trade or industry must be recognized as such by the Ministry of Education. With this official recognition the proper correspondence courses are established. The nursery trade has such recognition. The apprentice program for the nursery industry is usually for 3 years with 8,000 hours of practical work required for a candidate with a secondary school certificate and 9,000 hours in the absence of a certificate. The

places of employment are limited to qualified shops where employers provide proper supervision and make regular reports on the student's progress. Technical Correspondence Institute courses and practical work are carried on simultaneously.

Night Schools. Some adult education courses of 12-week periods are held in New Zealand but were not presented as being a way in which men for the nursery trades were prepared.

Arboreta, Botanic Gardens and Parks. The major cities of New Zealand had excellent arboreta and/or botanic gardens. Surprisingly, the resort town of Taupo with a population of about 1,000 had a 5 acre botanic garden well laid out and planted. This is financed from private funds. The park systems, both municipal and federal reserves, are of great magnitude. Each and every village, town or city has its park systems. Except in the downtown areas, the parks are designed for active sports with large playing fields. The parks are heavily utilized by club and organization competition, particularly on weekends when most businesses are closed. Although there is some vandalism in the parks, it is far less than in California. Many parks showed unique and challenging play equipment designed in storybook fashion.

In addition to municipal parks are the "reserves" comprised of land held by the federal government. Some of this is in national parks, some is in forest reserves, and some just government land held in reserve. The total government land so held is 6,000,000 acres which amounts to $\frac{1}{8}$ of the total land in New Zealand. Of course, New Zealand with its adequate rainfall appears much as one gigantic green park area. The low density population is another factor which enhances the beauty and naturalness of the country.

FRIDAY AFTERNOON SESSION

October 8, 1971

MODERATOR HOWARD BROWN: As in all well planned programs, we save a couple of good strong speakers for the end of the program to keep people around I can see from the crowd here that we were justified in putting these speakers on now. The first one for this session is Clyde Elmore, Extension Weed Specialist, University of California at Davis; he'll be talking to us on the use of herbicides. Mr. Elmore: