

THE HORTICULTURAL REVOLUTION OF THE LAST 25 YEARS IN AUSTRALIA

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You may have thought at first sight that the title was chosen because it is the "in thing" to be involved in, or promoting, a revolution of some sort. However, I believe "revolution" is the most appropriate way to describe the order of the changes which have occurred in horticulture in Australia over the last 25 years.

Amenity horticulture and the associated propagation of plants has been largely neglected in the past but there is currently an upsurge of interest in this aspect. It may be useful for propagators to review the changes that have occurred during the "revolution" so that they may avoid some of the pitfalls during the present period of rapid change in their industry.

I want to define the manner of changes which have occurred, illustrate these by some specific examples of significant changes over that period in whole horticultural industries, in the management of individual crops and, finally, to draw attention to the consequences of these changes in research, extension and horticultural education.

Changing attitude. The changes which have occurred over the last 25 years might be described in terms of changes in attitude to fruit growing as an occupation, with parallel changes in the apparent needs of the industry with respect to research, extension and education. Three stages can be identified during this evolution — the traditional period when horticulture was an art, which gave way to the day of the scientist who, in turn, was displaced by the accountant. Each of these three stages saw a distortion of horticultural industries by over-emphasis, in turn, on traditional skills, on scientific investigation of detailed problems, and then on financial controls.

The future viability of horticulture lies in a rational integration of horticultural experience, strengthened by an appreciation of the scientific principles behind plant growth, using business management skills as an aid in decision making.

The traditional period — Horticulture, an art. Twenty-five years ago, horticulture was regarded as an art and many of our horticultural practices, and the general attitude of the fruit industries, were traditional. At that time, the successful fruit grower was the one who planted his trees or vines so painstakingly that even the diagonal rows were perfectly straight. He was a grower who made every pruning cut a major decision,

and then trimmed the edges of the larger cuts with a pen knife. He was a grower who ploughed deeper, straighter and more often than other growers.

Pruning and training of trees and vines often lacked understanding of the growth habits of the plants, and methods used were determined by tradition rather than being based on scientific principles. Similarly, methods of soil management often lacked an understanding of the principles behind what we were doing. Success in pruning competitions or show exhibits was the ultimate goal of the horticulturist and his orchard was always neat with soil clean cultivated and trees hard pruned to the traditional shape.

Inefficiencies in financial management of the horticultural enterprise were often excused on the grounds that fruit growing was a way of life.

Research and extension workers had to cope with a tremendous resistance to change from the traditional horticultural practices and horticulture as a vocation could only be learned by an apprenticeship.

Problems seen in isolation — Horticulture, a science. The late 1940's saw the decline of this traditional attitude to horticulture. Fruit growing came to be regarded as a science rather than an art during the 1950's, and the emphasis turned to the application of science to individual problems. It was a period when factors affecting production were looked at in isolation, and research and extension were directed at detail.

The most suitable crop and most efficient irrigation method were determined for each individual soil type and the fruit salad block was the result of this emphasis on the choice of crop and irrigation design for each micro environment.

The rapid development of new chemicals to control pests and diseases was a very significant scientific advance, but the tendency was for each pest and each disease to be looked at in isolation. Without a proper understanding of biological control agents and emphasis in screening pesticides on reducing the incidence of a particular pest from 10% to 1% to 0.1%, some new pest species exploded into prominence with disastrous results.

DDT came available just in time to control the codling moth that had developed resistance to lead arsenate, but the two-spotted mite that was released from biological control soon rivalled codling moth as a pest species. The aerial application in the irrigation areas of South Australia of broad spectrum insecticides like carbamates and organic phosphates was accompanied by the appearance of San Jose Scale and Vine Scale as major pests.

During this period, plantings of trees and vines were still regarded as long term — to be there for a lifetime. So the field experiments with rootstocks or fertilizers were put down on research centres with the assumption that after 15 to 20 years, when the results became available, the structure of the industry would not have changed greatly and results would still be applicable. The fallacy of this assumption is illustrated by the impact on the citrus and stonefruit industries of the change from furrow to sprinkler irrigation, and then to under tree sprinklers and drip irrigation as the salinity situation of the water in the Murray River deteriorated. Not only did fertilizer requirements change, but entirely new systems of soil management accompanied the changes in irrigation methods, and many long term field trials, commenced before the changes, became irrelevant before they were completed.

The mark of the successful horticulturist at this time was an ability to cope with the technical details of newly identified pests or diseases, and the newly developed chemicals for pest or weed control, and for blossom thinning or fruit sizing. Sometimes those associated with fruit industries found themselves overwhelmed by the technical detail that went with a change from a simple choice between lead arsenate, nicotine sulphate, sulphur, or oil and between Bordeaux mixture and lime sulphur, to a choice between literally hundreds of insecticides and fungicides.

Fruit growers relied heavily on the research and extension workers for technical advice and they, in turn, got a lot of satisfaction from being able to come up with answers to new problems.

Horticultural education was stimulated by the need for an adequate training in the sciences to cope with new technology in fruit growing, but the traditional horticultural skills were often neglected.

Outside financial interests — Horticulture, a business. During the early 1960's, investment in the horticultural industries by North Terrace/Collins Street/Pitt Street farmers was accompanied by a significant change in attitude towards fruit growing as an enterprise. A new measure of success was introduced into horticulture, that of the balance sheet for the whole enterprise at the end of the year. The most significant consequence of this period to the horticultural industries was that decision making was freed of the constraints of 'experience' and 'tradition'. While acknowledging the need for science to cope with the technical problems, fruit growing was seen first and foremost as a business enterprise.

With the decision makers responsible for property management demanding recommendations backed by information on costs and returns, the research worker found he must carry out his field experiments and assess his results in the framework of the whole orchard or vineyard. Fruit quality characteristics to meet specific market demands was recognized as a necessary consideration in research work and the assessment of results.

The extension worker found his clients more amenable to change, but more critical in their evaluation of his recommendations — they looked at costs and profits rather than conformity with previous tradition. They demanded demonstrations rather than opinions, and the regional research centres became much more important to the extension services.

In horticultural education, the demand was for training in financial management. This was a stimulating period for the horticultural industries — a period of critical review of our traditional horticultural practices and an opportunity for research workers to test out ideas that previously could not have been even considered. Just one example — the idea of a meadow orchard — instead of growing apples on trees planted at 250 to the hectare, why not plant at a density of say, 125,000 per hectare, such as we normally use in the nursery, and harvest the fruit after the second year by mowing off the orchard with a combine type harvester. Field trials of this idea are now in their tenth year.

A blend of skills, science and economics — Horticulture, an agricultural science. It was not unexpected that the substantial investment of finance in horticultural industries by businessmen with little horticultural background resulted in some cases of excessive control of the management decision making by the accountants. For example, some expensive lessons were learned during the establishing of new properties when business acumen rather than horticultural skills was the principal criterion in selecting managers.

The economic advantage of the large area of one crop compared with the small fruit salad blocks has resulted in the establishment, during the last 15 years, of mono culture enterprises of up to 500 hectares in one unit. Entirely new techniques, such as mechanical harvesting and aerial spraying, accompanying this trend and required the application of new technologies by the research workers. Developmental projects were initiated involving engineers and economists cooperating with horticulturists. At the same time, the large areas of single crops demanded a high level of managerial skills.

The stimulus to horticultural education has been good. At Roseworthy Agricultural College for example, specialist courses in horticulture and viticulture have been introduced, research grants have been attracted for work on mechanical pruning and fruit quality. Horticulture is no longer just the poor relation in agriculture.

The climate of rapid change encourages those involved with horticultural education to place more emphasis on training people with an understanding of the principles of soil science and plant nutrition, plant growth and fruit production, insect ecology and plant pathology. However, the experience of the last 25 years has ensured that the horticultural skills are not neglected in educational programs.

The future stability and economic viability of the horticultural industries requires a blend of the traditional horticultural skills based on an understanding of the scientific principles of plant physiology and biology, using business management procedures as a tool to assist in making decisions, but not to the exclusion of good horticultural management.

We must be flexible enough to consider any modification of what we have regarded as a traditional practice if an economic advantage can be demonstrated for it. Our planning of plantings for the future must be guided by market trends, including changes in quality demands. We cannot ignore the need to change to new crops and new cultivars and even improved clones of standard cultivars if necessary. The research and extension workers must look wider than the individual problems, and work within the context of the whole orchard or vineyard property, not forgetting the context of properties as a part of communities.

Horticultural education must also look wider and, besides the obvious plant and soil sciences, courses must include training in business management and marketing. A sound basic training in the traditional horticultural skills, from plant propagation to pruning, must be given. Finally, we must meet the future needs for people trained to cater for rapidly increasing demands in the field of horticulture, as it contributes to environmental improvement in industrialized areas, to recreation in the individual home garden and the community, and to the therapeutic use of horticultural skills.

The plant propagation and nursery industries need to keep in tune with these changes. Not only are there scientific advantages, such as new propagation techniques which they can use, but the changing demands of their consumers must be followed. Changes in cultivars, improved clones, different rootstocks for replanting, virus-free scions and rootstocks are but a few of the

new demands by the fruit growing industries. The recreation and amenity horticulture industries open up entirely new fields for Australian horticulturists.

The last 25 years has seen a real revolution in the horticultural industries in Australia, but with a rational integration of skills, science and economics in our horticultural education, research and extension, the horticultural industries can look forward to a productive and profitable future.

Plant propagation will play an increasingly important role in this future of horticulture with the change in emphasis from fruit and vegetable production to include amenity horticulture. By considering the sorts of changes we have seen in fruit production we should be able to maintain a more balanced development of the propagation industry by ensuring integration of all the inputs (skills, science and economics) in our education and in our industry.

WHERE IS THE NURSERY INDUSTRY GOING IN YEARS TO COME?

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The progress made in the Australian nursery industry over the past 25 years has been quite remarkable. There is no reason to suppose that this same rate of progress will not be maintained in the future but the industry will need to adapt to new social, cultural and economic situations which will exist in the future.

I have no crystal ball and am reluctant to predict what the future holds for the industry. Instead, I would like to pinpoint some of the areas where developments can be made in the industry. There are six which I think deserve attention: Education; Research and development; Business management; Nursery efficiency; Specialization; Marketing.

Education. Education and training are of vital importance at all levels within any industry, including the nursery industry. At management level there is a great need for more graduates who can integrate basic plant sciences and business efficiency to develop sound nursery production techniques. At supervisory level there is a need for more personnel with a detailed knowledge of nursery production techniques; and at nursery worker level it is vital that we can recruit and train workers to a high standard in routine nursery operations.