Economic Potential for Selected Horticultural Crops in Australia: Overview
Occasional Paper No. 87

Economic Potential for Selected Horticultural Crops in Australia: Overview

Project 23300

Jim Douglas

Australian Government Publishing Service
Canberra 1984
In April 1983, the newly elected Government implemented an undertaking in its rural policy platform by requesting the Bureau to assess the economic prospects of a range of horticultural crops on both domestic and export markets. A horticultural task force was established in the Bureau in May 1983 to undertake this analysis.

A great deal of interest has arisen in Australia in recent years in some of the new horticultural crops. Some of these crops are seen as offering Australia the same sort of potential as did the kiwifruit industry in New Zealand. A major objective of the task force was therefore to appraise the economic situation and outlook for these new (or at least newly developed) crops.

With the considerable attention already given to Australia's large-scale traditional perennial horticultural crops in the Bureau's regular situation and outlook studies and other more specialised research work, the task force project did not cover this group of crops (with the limited exception of citrus exports to East Asia, which was examined as a special case). It did, however, consider some examples from the very large group of long-established horticultural industries which are not subject to the regular situation and outlook process - the vegetables group, bananas and the nursery industries.

This paper is in fact an overview. It draws heavily on three detailed attachments:

I The situation and profitability of selected horticultural crops, by Rhonda Treadwell, Kate Woffenden, Jim Douglas and Debbie Brown.

II Domestic and export market prospects for selected horticultural crops, by Tim Ebbott, Tim Yapp, Lindsay Jolly and Jim Douglas.

III Competitiveness in Australian agriculture, by Rob Young.

Because of the amount of detail included in these attachments, only limited copies have been printed. For most readers, the overview will contain sufficient information about the prospects for alternative crops.

The bulk of the work for this report and attachments was carried out in the Horticultural Crops Production Research Section and the Fruit and Wine Marketing and Outlook Section of the Bureau. However, considerable use was also made of the resources of the Quantitative and Econometric Services Section, the Rural Statistics Section, the Data Processing Section and the Macroeconomic Analysis Section.

ANDY STOECKEL
Director
Bureau of Agricultural Economics
Canberra A.C.T.

January 1984
ACKNOWLEDGMENTS

The Bureau gratefully acknowledges the generous co-operation and assistance of the government and private organisations contacted during the course of this task force project. Inputs by Australian Trade Commissioners around the world, by all State departments responsible for agriculture, the Queensland Committee of Direction, the CSIRO Division of Horticulture and the many new fruit growers' associations around Australia were particularly significant in allowing the task force to complete its analyses.

The individuals from these organisations and the many private growers and others who provided information, guidance and advice are too numerous to name here, but the Bureau records its special thanks to all of them.
CONTENTS

Foreword iii
Acknowledgments iv
Summary, Conclusions and Policy Issues 1

1. Background and Objectives 7
   1.1 A perspective on the horticultural sector 7
   1.2 Scope and objectives of the task force study 7

2. Methods of Analysis and Summary of Results 9
   2.1 Crop situation and outlook reviews 9
   2.2 Domestic market for selected crops 16
   2.3 Regional and selected crop export market prospects 18
   2.4 Competitiveness: input factors 20
   2.5 Competitiveness: marketing factors 21

3. An Assessment of Crop Potential 22
   3.1 A ranking system 22
   3.2 Results 26

4. Policy Implications 27
   4.1 The new fruits sector 27
   4.2 The vegetable group 36
   4.3 The nursery group 37

References 38

Figures

1 Cumulative probability internal rate of return functions 11
2 Logistic consumption pattern for fruits 17
3 Australian consumption of fresh fruit and juices per person 29
4 Australian consumption of fresh fruit per person 29
5 US consumption of fresh fruit per person 30
6 Gross value of production of selected horticultural crops 32

Tables

1 Estimated returns to growing selected horticultural crops 10
2 Australian agricultural industry rankings: by performance criteria 21
3 Assessment of potential: selected horticultural crops 24
In May 1983, the Bureau of Agricultural Economics was requested by the Minister for Primary Industry to investigate prospects for horticultural crops in Australia. A task force was established in the Bureau, with the following objective:

'to identify horticultural products which have promising domestic and export markets where Australia will have production and marketing advantages over such competitors as New Zealand, the USA and South Africa'.

Most emphasis in the ensuing research program was given to an evaluation of newer or less researched crops. The 'new' crops group within the horticultural sector are those which have recently become commercially important in Australia, even though many of them have been grown on a smaller scale for many years. They include such crops as mangoes, avocados, macadamias, blueberries and kiwifruit.

Interest in these newer crops has increased in recent years. Two reasons for this increased interest are the adjustment pressures facing existing horticultural industries and other intensive agricultural industries, and successes by other countries in marketing new products (for example, by New Zealand in marketing kiwifruit). At present, the new fruits industries have a value of output of some $40m a year, compared to the total orchard, berry and other fruit production figure of around $460m. It is argued in this report that the proportion of newer fruits in the total output will rise, due to the considerably greater potential for expansion that these industries seem to have; some seem likely to increase very rapidly from present levels, if economic conditions remain favourable. It is particularly important, therefore, that some assessment of the current and potential economic situation confronting these newer industries is attempted. Returns to growing, market prospects and the competitive structures of the industries involved are all relevant.

There are some essential issues to consider when evaluating prospects for the newer industries. First, there is the question of whether they can achieve and maintain competitiveness, given the relative demands for resources from other sectors of the Australian economy. Thus, the rates of growth of other sectors in the economy, especially the rural sector, will be critical. The significant factors in the performance of the new crop industries themselves will be the specific locational advantages, and market advantages from the timing of production and the sales which they can achieve. Second, there are the group of issues surrounding initiation of small, new industries: risk factors in production and marketing; research and development constraints; and the nature and extent of demand growth likely for the product.
Accordingly, the analytical efforts of the task force so far as the new fruits are concerned were concentrated in three major areas.

- An analysis of returns to growing a selected range of crops or, in the absence of sufficient reliable data on investment parameters, a review of the present situation for these crops. The initial selection of crops was made by the task force on the basis of prior information, and then amended in consultation with CSIRO and State organisations. (Attachment I contains the detailed analyses and assessments.)

- An analysis of the likely patterns of domestic consumption that might arise for a group of newer crops for which data were available, and a review of export prospects in traditional and emerging market areas. (Attachment II contains the detailed analyses and reviews.)

- An analysis of the factors determining competitiveness in Australian agriculture, with particular emphasis on defining how input and marketing factors relate to competitiveness, for application to some of the newer crops. (Attachment III contains the detailed analyses.)

A ranking system was devised, to allow an encapsulation of the results of application of the above analyses or review processes to the 42 specific crops chosen. The rankings are presented later, in Table 3, with surrounding discussion defining the rankings, and pointing out the caveats and limitations which apply.

Conclusions: New Fruits and Other New Crops

General

The new fruits group (including avocados, mangoes, macadamias, blueberries and kiwifruit) within the horticultural sector is presently worth some $40m a year in gross value of output. It seems capable in aggregate of growing by 50-60 per cent over the next ten years; the export component will be an important factor in this growth.

The gross value of total orchard, berry and other fruit production in Australia in 1981-82 was estimated by the Australian Bureau of Statistics at $464m. On present indications, domestic consumption of fruit will have risen by 15-20 per cent in aggregate in ten years; this is based on projection of recent trends, and amounts to a rate of increase slightly in excess of the rate of growth of population.

The export situation for the longer established fruit crops in Australia is more difficult to predict. Some major traditional markets have been lost, or greatly reduced in recent years, mainly due to the entry of the United Kingdom into the EEC, continued policy developments in the EEC, and some institutional problems of entry into other major markets. On the other hand, some new markets have been developed. Overall, however, it seems reasonable to suggest that export outlets for the longer established fruit crops as a whole will not expand as quickly as domestic consumption, and conceivably may contract.

On the basis of the above three points, new fruits could comprise 15-20 per cent of total fruit output in Australia in ten years. This would
make the group similar in size to the apple growing industry, and would represent a considerable development and investment potential for Australia. It would also bring about a shift in regional emphasis in Australian horticulture, toward the subtropical and tropical zones, where most of the high growth-potential industries are located.

Less is known about crops such as tea and coffee. Early experimentation with these crops on a commercial scale has shown some promise. In the past, Australia has had a comparative disadvantage in production of these crops, due to the labour intensity of both the growing and processing phases. Moreover, the very volatile nature of the international markets for these products has been a barrier to long-term profitability. If these problems could be overcome, then, on the basis of the size of the Australian market alone, these crops would present very considerable potential for expansion in Australia.

Presently, Australia is a net importer of horticultural products, by about $100m a year. Developments in the new crops area as a whole could reduce this figure markedly. Import replacement and export growth would both be significant factors in such a result.

The nursery industries as a group represent a large proportion of the horticultural sector, with an annual value of output of around $145m. Despite its obvious importance, there is relatively little systematic information available on the existing economic situation or prospects of the nursery sector.

Returns to growers

Most of the new fruits for which specific estimates of returns to growers could be made generated real internal rates of return above 10 per cent a year. Mangoes, lychees, kiwifruit, fresh raspberries and blueberries generated internal rates of return above 15 per cent a year. Returns of this order considerably exceed those applying on average in the vegetable sector and in the established large-scale fruit growing sector. It is important to bear in mind that assumptions of optimal site selection and establishment were made in calculating returns to the new crop industries. If more marginal sites were to be included in the total crop area (as is the case in many of the longer established horticultural crop industries), then average returns would be lower. Moreover, expansion of production of these crops will, at least in some cases, produce price falls and consequent declines in returns to growers.

Specific estimates of returns to growing many of the new fruits were not able to be calculated on the information and data available. However, for many of those not analysed, indications from the field and elsewhere were that returns to growing are generally expected to be in the high grouping and comparable to those calculated for mangoes and the others listed above.

Considerable non-bearing areas of some of the more developed newer crops are already established in Australia. For some, supplies considerably in excess of demand at current prices seem in the offering, failing unexpected export or domestic market shifts. Avocados and guavas are examples of this possibility.
Markets

For the new fruits for which assessments were possible, most appeared to be in, or near, the rapid growth phase in levels of domestic consumption (although this is always a difficult point to establish). Avocados, macadamias and mangoes have all shown rapid domestic consumption growth in recent years.

Export market prospects for the new fruits which have been grown with the export market in mind seem good, with strong growth forecast in the East Asian region.

On past performance, Australia has encountered trade barriers and quarantine-based exclusions on the European, US and Japanese markets. Similar problems can be expected to have a significant effect on exports of many of the new fruits to these markets.

Australia has major competitors (existing or potential) for most of its significant new fruits exports. New Zealand, the USA and South Africa are major suppliers but, for many of the tropical exotic fruits, suppliers internal to the preferred market region of East Asia have the potential to compete for significant market shares. Australia has a significant lead-time advantage in some of the major new fruit crops - mangoes, macadamias and kiwifruit are examples - over all or most potential competitors.

Australia has, in the past, lost advantages in its overseas horticultural markets because of relatively poorer performances than competitors in the areas of supply, quality and reliability; flexibility of approach in commercial practices (such as terms of credit); and promotion and image identification.

Competitiveness

An analysis of the competitiveness of Australian agricultural industries carried out in this study has shown that an ability to vary input mixes according to relative input prices is an important factor. Although it is difficult to generalise, many of the new fruits industries being developed in Australia are on a relatively larger unit scale, with larger capital and investment bases per farm than has been the case in the traditional horticultural industries. To an extent, this may enhance their ability to invest in new production techniques and capital when the need arises.

In general, Australia exhibits a comparative disadvantage in horticultural food processing, storage, fruit and specialised handling for fragile or delicate produce. Value-to-weight ratios and proximity to major markets must be viewed as important factors to offset these disadvantages in Australia's case.

Conclusions: Vegetables, Pineapples and Bananas

General

Demand for vegetables and for the larger and more established fruit crops is typically not responsive to changes in price. Output per grower and per unit of area have been increasing in recent years. The combination
of this trend and the relatively slow increase in aggregate demand suggests that grower numbers and areas under production are likely to continue to decline.

Returns to growers

. Returns to growing these crops can reach high levels due to variable seasonal patterns, but risks of loss - due to climatic and market factors - tend also to be high.

. Considerable adjustment - technical, economic and locational - is occurring in these industries. Some vegetable crops are becoming rapidly more capital intensive in production; others are moving location, from high rainfall to irrigated areas. Banana production in the north of Queensland has increased rapidly in recent years, and interest in sectors of that industry in price and market stabilisation measures has increased as a result.

Markets

. For most of the more important vegetable crops, overall consumption in Australia is unlikely to expand at much beyond the demographic rate. For some - beans, for example - consumption actually seems to be in decline.

. There do appear to be some relatively small-scale export market prospects for Australian vegetables; onions, for example, have already been fairly successful on the export market. If significant export vegetable industries do arise in Australia, it seems likely they will do so in patterns and regions similar to the new fruits industries, rather than as offshoots of the existing domestic industries.

. Import competition, based on processed rather than fresh produce, is occasionally significant for the domestic vegetable sector, and has also been identified as potentially so for pineapples. However, in most cases, no trend in import penetration overall is apparent, and it is not possible to determine, on the information available, whether such developments as closer economic relations with New Zealand will alter this situation.

Policy Implications

. From the specific analyses carried out under the task force program, and from more general information and opinions collected during the course of the work, the following policy implications emerge.

Marketing and promotion

. There have been, and remain, major problems associated with the marketing and sale of Australian horticultural produce overseas. The problems have arisen from an unco-ordinated approach to export sales - especially in some of the newer market regions - and difficulties in the areas of quality control, market research, and promotion. Improvement of co-ordination and control in this area seems essential to improving market prospects, especially given the tendency on the part of Australia's major competitors to centralise and co-ordinate their promotion and marketing efforts for horticultural crops. Basic issues such as the extension of joint industry/government-funded export inspection services need to be
considered in this context. Also, the matter of extending market information services, as are currently supplied to other sectors of the agricultural economy, needs to be assessed in the light of trends in output and grower numbers in the newer industries.

Investment and market analyses

. There is already some indication of potential oversupply (at existing prices) of some newer crops, and significant price falls may introduce profitability and income problems. Promulgation of realistic investment analyses and market outlooks will reduce, if not entirely avert, this problem. Because of the dearth of knowledge about some of the newer crops, many investment decisions will have been made without adequate knowledge of the situation. Considering the nature of the market, and the cost to the individual of collecting the necessary information on it, the implication is that there may be net benefits from some centralised research into these matters.

. On a similar basis of argument, there may also be some justification in examining whether current general research into production of the newer crops is concomitant with their potential, or whether the same government- and industry-funded assistance as is applied in other areas of agriculture should be extended to the new crops sector.

Regional and resource use issues

. Conflicts in land use zoning and pricing, and water usage have arisen in some of the rapidly developing horticultural areas, usually with urban and holiday-resort developments as the main competitor. Because of the relatively small land base of the new crop industries, these problems are unlikely to raise land and water use issues of national significance.

Processing industries

. A high degree of processing of a horticultural crop in Australia often leads to high product prices, and import competition problems. These could probably be averted in the case of some new industries by higher initial levels of investment in research and capital establishment. An alternative would be to investigate the prospect of off-shore development of processing facilities in market countries. This option could also assist in breaking down institutional barriers to product entry in cases where this is a problem.

Vegetable crop industries

. Some potential for export sale increases from the vegetable group exists, but probably not at a level to affect total output from the sector significantly. The concerns of the developing vegetable export sector would be more akin to those of the new crop industries than the traditional, domestically oriented vegetable sector and would, therefore, be covered in the preceding policy points.

Nursery industries

. Little information is available in systematic form on these industries. Given the importance of the sector, some further investigation of its nature, potential and problems seems warranted, as a precursor to consideration of appropriate policies for the sector.
1. **Background and Objectives**

1.1 **A Perspective on the Horticultural Sector**

According to Australian Bureau of Statistics figures (ABS 1983), about 23 per cent of the total crop production value of $6000m in 1981-82 was within the horticultural sector. Obviously, this proportion fluctuates from year to year, due to different seasonal effects in the various cropping sectors. The official data probably underestimate the contribution of the horticultural sector overall, because many of the newer, faster growing cropping industries are concentrated in the horticultural sector and are more poorly documented than the traditional cropping enterprises.

Australia exports some 20 per cent, by value, of its horticultural produce. In 1981-82, exports totalled nearly $206m worth of vegetables and fruit, and a further $31m from the coffee, tea, cocoa and spice group (much of this being re-exported material). Imports of all these products totalled almost $335m of which a large proportion was taken up by coffee and tea imports, thus making Australia a net importer of horticultural products. This contrasts with the situation in the food sector in general, where Australia is a substantial net exporter - exports in 1981-82 totalled almost $5803m, compared to imports of about $732m.

1.2 **Scope and Objectives of the Task Force Study**

In Australia, there has been considerable monitoring and analysis of the longer established perennial horticultural crops (apples and pears, citrus, deciduous canning fruit, multi-purpose grapes and wine grapes). However, these crops comprise less than a third of the total value of output of the horticultural sector. The larger annual crops (mainly the vegetable group) are analysed on an irregular basis at both the Federal and State levels. A third grouping of crops, perennials and annuals, defined loosely as 'new' (1) crops, have in general been subject to very little systematic situation and outlook analysis.

In March 1983, the newly elected Government requested the Bureau of Agricultural Economics to undertake special research into horticultural crops in Australia. Its objective, as specified in the ALP rural policy platform, was

'...to identify horticultural products which have promising domestic and export markets where Australia will have production and marketing advantages over such competitors as New Zealand, the USA and South Africa'.

To keep the project within a reasonable time frame, some constraints were applied. First, little emphasis was given to the large, perennial crops, because the situation and outlook for these is regularly researched, in the BAE and elsewhere. An exception was made, in that some analysis of citrus export potential to East Asia was included because of the relative newness of some market developments in that area. Second, a

(1) In this analysis, the term 'new crop' will refer to newly introduced crops as well as to crops which may have been cultivated for some considerable period at a relatively low level, but which have recently begun to attract a higher order of commercial interest.
strict limit was applied to the type and amount of information collected. It was focused directly on the potential of crops, rather than being more generally descriptive.

The third limitation applied was to the number of crops included for analysis. This necessitated some prima facie selection of crops likely to be of interest. To facilitate this selection, the task force team constructed a list of high priority crops (i.e. those where there were indications that the industry would grow at a fairly rapid rate, and to an appreciable size) and medium priority crops (those of relative significance, and with some growth potential).

The original task force listings were circulated to the various State departments responsible for agriculture and to CSIRO, with a request that they make additions or deletions. The listings, with annotations and additions to reflect comments received from the six organisations which responded, are reproduced below.

<table>
<thead>
<tr>
<th>High Priority(a)</th>
<th>Medium Priority(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almonds (b)</td>
<td>Bananas (f)</td>
</tr>
<tr>
<td>Apricots, fresh and dried (c)</td>
<td>Beans (f)</td>
</tr>
<tr>
<td>Arthuriu (d)</td>
<td>Blueberries (i)</td>
</tr>
<tr>
<td>Avocados</td>
<td>Cashews (j)</td>
</tr>
<tr>
<td>Blueberries (e)</td>
<td>Coffee</td>
</tr>
<tr>
<td>Broccoli (f)</td>
<td>Corambolas (i)</td>
</tr>
<tr>
<td>Cabbages, chinese (d)</td>
<td>Custard apples</td>
</tr>
<tr>
<td>Carrots (d)</td>
<td>Ginger</td>
</tr>
<tr>
<td>Cauliflowers (f)</td>
<td>Guavas</td>
</tr>
<tr>
<td>Celery (d)</td>
<td>Herbs and essential oils</td>
</tr>
<tr>
<td>Cherries (c)</td>
<td>Hops</td>
</tr>
<tr>
<td>Chestnuts (b)</td>
<td>Mangosteens (i)</td>
</tr>
<tr>
<td>Coffee (d)</td>
<td>Melons</td>
</tr>
<tr>
<td>Custard apples (g)</td>
<td>Opium poppies</td>
</tr>
<tr>
<td>Flowers, other</td>
<td>Passionfruit</td>
</tr>
<tr>
<td>Grapes, table</td>
<td>Pawpaws (papayas) (g)</td>
</tr>
<tr>
<td>Hazelnuts (b)</td>
<td>Peas (f)</td>
</tr>
<tr>
<td>Kiwifruit (h)</td>
<td>Pecans (j)</td>
</tr>
<tr>
<td>Lettuces (d)</td>
<td>Persimmons</td>
</tr>
<tr>
<td>Limes (d)</td>
<td>Pharmaceutical crops</td>
</tr>
<tr>
<td>Longans (e)</td>
<td>Pineapples (f)</td>
</tr>
<tr>
<td>Lychees</td>
<td>Rambutans and sapotes</td>
</tr>
<tr>
<td>Macadamias</td>
<td>Sweet corn (f)</td>
</tr>
<tr>
<td>Mandarin (d)</td>
<td>Sweet potatoes (g)</td>
</tr>
<tr>
<td>Mangoes</td>
<td>Tea</td>
</tr>
<tr>
<td></td>
<td>Walnuts (f)</td>
</tr>
</tbody>
</table>

(a) Crops in the list appearing without annotation are those originally included by the task force and left intact by all respondents. (b) Deleted from lists by two respondents. (c) Downgraded from high to medium by two respondents. (d) Added to high list by one respondent. (e) Added to high list by two respondents. (f) Deleted from lists by one respondent. (g) Upgraded from medium to high list by one respondent. (h) Downgraded from high to medium by one respondent. (i) Added to medium list by one respondent. (j) Added to medium list by two respondents.
2. Methods of Analysis and Summary of Results

2.1 Crop Situation and Outlook Reviews

(a) Stochastic investment analyses

For seven crops which appear in the high priority list (avocados, mangoes, lychees, kiwifruit, raspberries, blueberries and macadamias), it was possible to carry out quantitative investment analyses, based on present cost and price information. Two other crops not in the high priority list (custard apples and pecans) were also analysed in this way, for purposes of comparison.

Because a deal of uncertainty surrounds the cost and price estimates used in these analyses, there were two basic choices of method:

- to run sensitivity tests on all parameters where a range of estimates existed; or

- to define a distribution function around each parameter where a range existed and utilise a simulation approach to select parameters from each distribution and combine them into estimates of investment returns (repeating the operation a sufficient number of times to produce a convergent solution).

The first option was unwieldy, because of the number of tests needed (and, therefore, the number and range of results needed to be produced). For this reason, the second option was chosen. The criterion selected for investment analysis in this case was the internal rate of return. This is a suitable criterion to apply in this case, where the standard difficulties with the internal rate of return formulation can be relatively easily handled (some further discussion of the basis of this selection is given in Attachment I). The simulation operation was carried out a sufficient number of times to produce a stable solution.

This approach produces a range of internal rates of return for each crop, and the range actually describes the degree of uncertainty surrounding the median internal rate of return estimated in each case.

In Figure 1, crops A and B have similar median internal rates of return but different distributions, illustrating the considerably greater risk of investment in growing crop A rather than crop B (on the information used).

By using this stochastic approach, the need to include sensitivity tests on all variables was eliminated. However, where there was specific interest in the response of the investment to variation in a given cost or price parameter, this could be included. The real price for each crop was allowed to decline by 2 per cent a year, as an alternative to the constant price assumption. This allowed some judgment to be made as to the likely effect of the well-known agricultural phenomenon of declining terms of trade on profitability of growing the crop in question.

The results are summarised in Table 1. (Details of all parameter estimates and assumptions, and of the simulation results for the nine crops, are given in Attachment I.)
Table 1: ESTIMATED RETURNS TO GROWING SELECTED HORTICULTURAL CROPS

<table>
<thead>
<tr>
<th>Crop</th>
<th>Constant prices</th>
<th>Prices deflated by 2% a year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean IRR</td>
<td>75% probability of IRR being above</td>
</tr>
<tr>
<td>Avocados</td>
<td>13.2</td>
<td>10.5</td>
</tr>
<tr>
<td>Blueberries (a)</td>
<td>27.1</td>
<td>24.0</td>
</tr>
<tr>
<td>Custard apples</td>
<td>11.6</td>
<td>10.4</td>
</tr>
<tr>
<td>Kiwifruit</td>
<td>15.4</td>
<td>13.2</td>
</tr>
<tr>
<td>Lychees</td>
<td>18.4</td>
<td>16.3</td>
</tr>
<tr>
<td>Macadamias (b)</td>
<td>10.1</td>
<td>9.2</td>
</tr>
<tr>
<td>Mangoes (c)</td>
<td>15.2</td>
<td>14.3</td>
</tr>
<tr>
<td>Pecans</td>
<td>3.4</td>
<td>1.9</td>
</tr>
<tr>
<td>Pecans, high yielding (d)</td>
<td>11.6</td>
<td>10.7</td>
</tr>
<tr>
<td>Raspberries (e)</td>
<td>24.0</td>
<td>19.5</td>
</tr>
</tbody>
</table>

(a) For fresh blueberry production. Returns would be higher with the use of mechanical harvesters, in place of manual harvesting. (b) Assuming a productive life of forty years. Returns are marginally lower if the productive life is only thirty years. (c) Assuming export sales are possible. Returns are slightly lower if no export possibility is assumed. (d) For newer high yielding varieties, which have not yet been grown in Australia. The yields assumed are approximately double those assumed for the analysis of other pecans. (e) For fresh raspberry production. Returns are significantly lower for production of processing raspberries.
(b) Gross margin and situation and outlook assessments

For seven major annual horticultural crops — all vegetable crops — it was possible to obtain gross margin analyses (from State departments responsible for agriculture) and various other pieces of information on the situation and outlook for these crops. The objective in this case was to determine the extent to which the individual crops examined deviated from the general pattern for vegetables in Australia, and what this indicates for the future of these crops.

The general picture for the vegetable growing sector in Australia is one of rather slow growth. Most of the vegetables grown are consumed domestically — only about 3 per cent of the quantity produced is exported. In value terms, Australia imports well over twice as much vegetable produce as it exports, despite the relatively high tariffs which apply to processed vegetable imports.

The situation and outlook for each of the seven major vegetable crops is summarised briefly below. (Detailed profiles are given in Attachment I.)

- Potatoes

In 1981-82, some 920 kt of potatoes, valued at $180m, were produced. Production has risen slowly in recent years, but grower numbers and areas sown have declined. Returns to growers fluctuate considerably on major markets. The future for the industry seems likely to be a continuation of
these trends. A rising proportion of potato consumption per person has been in processed product form but, to date, imports of such processed products have remained fairly low. Little in the way of export prospects is apparent.

- **Tomatoes**

  Tomatoes are the second largest vegetable crop produced in Australia - production in 1981-82 was valued at $79m. In recent years, production has fluctuated considerably. Marketing costs are high, and a fall in prices received by growers relative to costs has been in evidence. Demand for the product is fairly unresponsive to changes in price, and export prospects are limited.

- **Onions**

  Considerable change has occurred in the onion industry in recent years, both in the areas where the crop is grown - away from the high rainfall areas, toward irrigation areas in South Australia and New South Wales - and in the technology of production. Exports have reached significant levels in some years, although the trend has been erratic and difficult to predict. Growers have faced generally declining real prices in recent years and, seasonal factors aside, a continuation of this trend, and consequently of the associated one of departure of smaller production units from the industry, seems likely.

- **Carrots**

  Areas sown to carrots have been increasing slowly over recent years, and fresh exports have increased to around 6 per cent of production. Domestic prices and returns to growers have fluctuated widely. On current indications, a continuation of the trend of slow growth in output seems the most likely outcome.

- **Lettuce**

  Production of lettuce has risen in recent years, and prices received also seem to have moved upward. Returns to growers appear to have been generally reasonable. Exports are presently insignificant, and continued rises in production more or less in line with the growth in population appear the most likely trend for this industry.

- **Beans**

  Bean production has declined over the past decade in Australia, and a concentration of growing areas (especially toward Tasmania) has occurred. Most bean consumption is now in processed form. Imports of processed bean products are occasionally significant, but seem to be more a 'market filling' exercise due to widely fluctuating domestic production than to direct competition. Continued declines in this sector appear likely.

- **Peanuts**

  Pea production has fluctuated widely in recent years. Prices have also varied significantly, but about a slowly rising trend. Imports have been relatively minor and seem likely to remain so. Virtually all pea
production is consumed in processed form, and increased competition from other processed produce seems to be a distinct possibility. Therefore, if growth in output occurs in this sector, it is likely to be below the rate of growth in population.

(c) Broad situation and outlook reviews

There is a third group of horticultural industries — including both perennials and annuals — for which the task force was unable to gather sufficient reliable information to allow investment analysis or gross margin calculation. However, some information relevant to the situation and outlook for these industries was available, and it was used to formulate profiles of them. The basic findings and assessments from this process are summarised below (and are given in more detail in Attachment I).

* Nurseries

The nursery sector is extremely large (gross value of production in 1980-81 was $145m) and diverse, ranging from cut flowers to the supply of trees and shrubs for horticultural and ornamental uses. Australia is presently a small net exporter of nursery produce. Some growth in the cut flowers export sector is expected in the industry.

* Bananas

Banana growing is an important enterprise in Australia, with a gross value of production of just over $61m in 1980-81. About half of production is in northern New South Wales; the remainder is in Queensland, apart from some relatively small plantings in Western Australia. The northern Queensland plantings have increased rapidly in recent years. The industry expects growth in demand for bananas to be slightly above the rate of population growth. Price fluctuations in the industry are severe, and overproduction is a common occurrence.

* Pineapples

About 85 per cent of all pineapples grown in Australia are canned. Returns to growers for pineapples directed to processing have, in recent years, increased roughly in line with the rate of inflation. Import competition is potentially a serious problem for local producers, on present cost and price levels.

* Passionfruit

Although the gross value of production was worth only around $2.1m in 1981-82, Australia is among the world's leading producers and consumers of this fruit. Returns to growing the crop are sensitive to the very considerable fluctuations in prices and yields. The outlook for this crop will be highly dependent on promotional efforts in potential markets. Presently, there is little such activity.

* Papayas

The papaya growing industry has expanded considerably, and production is now aimed principally at the fresh domestic market. The fruit is difficult to grow, and cyclone damage risk is significant in areas where it is grown.
• **Guavas**

The guava industry of Australia is in an infant state, with much of the plantation as yet non-bearing. Some processing capacity plans for guavas have apparently been shelved, and some concern has been expressed about whether a market of sufficient size in Australia exists. There is little prospect of exports.

• **Persimmons**

Production of persimmons in Australia is presently less than 100 t. At this very low market level, demand is expanding faster than domestic supply, and there appears to be some prospect for export of non-astringent varieties to the Middle East.

• **Exotic tropical fruit**

A wide range of tropical fruits (apart from those reviewed elsewhere in this report) is being tested in Australia at present. Rambutans and longans appear to be the most promising, but little can be said about prospects at this stage.

• **Strawberries**

Production of strawberries in 1981-82 was estimated by the Australian Bureau of Statistics at 3259 t, worth almost $10m. However, State department figures give a total output of 8598 t for that year. ABS data exclude holdings of less than 2 ha, and this may account for a large part of the difference between estimates. Most production goes to the fresh market. There have been significant imports of frozen strawberries in recent years. As noted in subsection 2.2, little growth in the strawberry market seems likely in the foreseeable future.

• **Other berries (excluding raspberries and blueberries)**

This group includes black currants, loganberries and gooseberries. General problems of subeconomies of scale, outdated production techniques and lack of promotion constrain this industry. If these were solved, there would be some potential for market expansion.

• **Almonds**

Something over half of the domestic market for almonds is supplied from local production, which had a gross value of about $5m in 1981-82. Current consumption per person in Australia is low. Thus, promotion in the local market, and entry into the export market (due to a seasonal advantage for Australian output) could allow considerable expansion of this industry, provided grove size were increased sufficiently to allow the highly mechanised approach to growing practised elsewhere in the world.

• **Pistachios**

Limited plantings of pistachios on a trial basis have been made in Australia. About $1m worth of nuts were imported in 1981-82. There have been heavy plantings of pistachios in the USA and Iran in recent years,
and an intensification of competition on the world market can be expected in a few years. Returns to growers in Australia are difficult to determine at present.

- **Other nuts**

Several nut species other than those discussed are, or could be, grown in Australia. These would include the temperate varieties (hazelnuts, walnuts and chestnuts) and the tropical varieties (brazil nuts and cashews). Around 7 kt of these varieties (in shelled or unshelled form) are currently imported into Australia each year.

- **Ginger**

Production of ginger is centred in the southern Queensland area. Output increased from 4078 t in 1977-78 to 7308 t in 1981-82, worth some $2.3m (at the farm gate). Crystallised and syruped ginger accounts for some 80 per cent of the Australian crop. About 80 per cent of of Australian requirements are met from the domestic industry. The export market has developed significantly; exports of processed ginger rose to $3.6m in 1980-81 (falling back to $2.5m in 1981-82).

- **Hops**

Hops are grown in Victoria and Tasmania. Some 2400 t of hops were produced in Australia in 1981-82, with a gross value of production of about $8.8m. Although world trade in this commodity fluctuates widely, the industry in Australia is more stable due to long-term contracting by centralised marketing agencies. Exports are a major outlet for hops - some 819 t, worth $2.5m, were exported in 1981-82.

- **Tea**

There is only one commercially productive tea plantation in Australia at present (near Innisfail), and in 1981 it produced 340 t, with a value of between $0.75m and $1m. Obviously, there is potential for expansion of the tea growing industry, given that Australian consumption of tea is around 30 kt a year. Australian tea competes favourably with imports in terms of cost and quality. Presently, producers cannot meet demand for their product. Tea growing is apparently profitable in Australia (provided mechanisation is used for all phases of the operation) but profitability is highly sensitive to yields and prices.

- **Coffee**

Commercial production of coffee has not yet commenced in Australia. The market is large - imports were valued at $72m in 1981-82. Profitability is dependent upon substitution of capital (especially mechanical harvesters) for labour. Some success with a specially adapted harvester has been obtained in northern Queensland. World prices for coffee have been fairly stable, and there seems to be considerable potential for the infant Australian industry.

- **Poppies and other pharmaceutical crops**

Opium poppies are presently the only commercially cultivated pharmaceutical crop in Australia. Production has fluctuated widely in
recent years and was as high as 8755 t in 1978-79. In 1981-82, 2284 t were produced. Australia is the third largest producer of morphine in the world, and is also a large supplier of alkaloids for codeine manufacture. World markets have been unstable, but the Australian industry has achieved some stability, aided by plant improvements.

- **Essential oils**

  Although some of the essential oil industries in Australia have been through a long period of decline, renewed interest in them is current, due to technological advances in producing them without labour-intensive methods, and also to a trend in consumption back toward natural oils. Presently, the industries are on a very small scale in Australia, and Australia is a net importer of these products. Both domestic and export market opportunities for Australian producers appear to exist.

2.2 **Domestic Market for Selected Crops**

  For the more traditional, well-established horticultural crops, it is at least feasible to project future domestic market size on the basis of existing consumption, population, income and price trends. Some allowances for technological and taste changes can also be made. However, in the case of new crops - which, by the definition given earlier, are those which have only fairly recently become significant in the market - this approach is inadvisable. Most such crops are in an early, rapid expansion phase of market development. It is more relevant in the case of such products to explore the dynamics of consumption growth through the various phases of market development. Even when this is done, it remains problematical to apply the resulting analysis to a specific projection of when the growth rate of consumption per person of a given fruit will begin to taper off and stabilise. Yet, obviously, this is the critical issue, the one of fundamental importance to growers, the industry, and the government alike. For this reason, priority has been given in this report to exploring a methodology for specifying a life-cycle consumption pattern for fruit products in particular (these being the crops that, because of relatively long maturation periods in production, require longer term forecasts of consumption). Using Australian consumption data (where some series are of reasonable length, i.e. in excess of ten years) and US time series data (where consumption series for certain fruits relatively new to Australia are available over long periods), it is possible to build up a picture of the likely consumption growth curve for a given fruit over time.

  Typically, the pattern is as shown in Figure 2.

  Statistical and mathematical tests on consumption data verify that the logistic curve in Figure 2 is not only intuitively appealing, but in fact generally best fits the actual data series used. Using this curve as a model for the development of the pattern of consumption for a given fruit, it is possible to derive the locus and shape of the curve using available consumption data. Thus, the duration and rate of the growth phase can be estimated, and the point in time when consumption growth will begin to slow down can also be estimated. Cross-sectional comparisons with logistic curves fitted to data from other countries with similar income and consumption parameters but longer data series for the fruit in question allow some verification of the pattern projected. (The
details of the analyses carried out using the above methodology are given in Attachment II.)

There is a group of fruit crops in which interest is currently high in Australia and for which sufficient data exist to allow some consumption curve inferences of this nature to be drawn. In most cases of interest in this analysis, there were difficulties involved in obtaining statistical fits for logistic curves, because of the insufficient length of the data series. For this reason, both logistic and linear curves were fitted and the projected use of the linear projections was based on the assumption that a linear fit would be an acceptable approximation of the logistic curve for the period under analysis.

- **Avocados** are currently consumed in Australia at about 0.2 kg per person. Linear or logistic projections of the trend lead to a consumption level by 1992 of about 0.25 kg per person a year. Obviously, consumption could reach higher levels than this - perhaps even the level of 0.5 kg per person, which is presently the case in the USA. However, consumption at this level would imply considerable real price declines for the local product.

- **Macadamia nuts** are consumed at about 0.035 kg per person in Australia at present. A linear projection of recent trends would take consumption to 0.05 kg per person by 1992. A logistic curve fitted to the data produces a consumption level of 0.07 kg per person by 1992 but shows
that, by then, the mature phase of the consumption pattern is being attained.

- Nectarine consumption has been growing only slowly in Australia, to a level of about 0.3 kg per person. A linear projection of this trend would take consumption to about 0.43 kg per person by 1992. The consumption pattern for this crop demonstrates the characteristics of the low-growth infant phase, and the projections assume that this will continue to be the case for some time (which appears likely, failing any sudden upsurge in promotional activity or some similar event). Nectarine consumption in the USA has entered a rapid growth phase, starting from levels similar to present consumption in Australia. It seems that this is due to some increased promotional activity for the fruit.

- Mangoes have been consumed at low levels in Australia for many years, and a linear projection based on this trend produces a consumption estimate of 0.16 kg per person by 1992. However, in recent years, consumption levels have begun to rise quickly and there are also other indications that the rapid growth phase is beginning. Thus, it appears that the figure of 0.16 kg is a considerable underestimate of the actual outcome (unless export demand and very high domestic prices suppress local consumption).

- Strawberries seem to be in, or approaching, the mature phase of the consumption development pattern, and the linear trend estimate of consumption of 0.32 kg per person by 1992 (from a present level of 0.20 kg per person) may be a slight overestimate.

- Almond consumption is projected on a linear basis to be 0.15 kg per person by 1992. This figure has already been attained once (in 1981) in the widely fluctuating pattern of consumption for this crop. Australian consumption of this commodity is quite low by comparable international standards. Given this, if the industry mounted a significant program of structural adjustment in production and promotion, a rapid growth phase of consumption could result, taking per person levels well beyond the 0.15 kg mark by 1992.

2.3 Regional and Selected Crop Export Market Prospects

Consumption life-cycle analyses, or, in the case of more established crops, the more usual methods of demand forecasting, are of relatively little practical application when considering the export prospects for most of the industries involved in this study. Experience has shown that export market projects which appear attractive on the basis of purely economic assessments frequently do not materialise, due to a range of ad hoc institutional factors, or to local market peculiarities which may not be obvious to the analyst in the case of relatively new or unresearched crops. Equally, markets have sometimes been created in quite unlikely venues, due to individual effort, larger than expected expenditure on marketing and promotion, or institutional and political factors, working in this case in the opposite direction.

In view of this, the approach taken to export market assessment by the task force was essentially qualitative, and relied heavily on local opinion, gleaned from Australian trade representatives in major market or supply regions. This approach is far from ideal. It relied on subjective
opinion, in the frequent cases where hard market data were not available; it relied on responses to a standard questionnaire, which varied considerably in both intensity and quality; and, due to the qualitative nature of the questions put, relatively little was possible in the way of direct checking and validation of results. On the other hand, some alternative sources of information on market developments and prospects for certain crops are available in the literature, and these were used to augment Trade Commissioner information. In one way, there is some advantage in using commercial trade sources for information of this nature, as opposed to more rigid economic analysis. Such sources are more attuned to the frequently short-term vagaries of local markets, and to the sorts of exogenous influences that so commonly disrupt the time series data upon which economic expectations are usually formulated.

From the specific regional and crop assessments (given in more detail in Attachment II), it is possible to draw some important overview observations.

- The best prospects overall for Australia appear to exist in the fast growing and relatively close markets of East Asia, which in this context refers to South-East Asia, Hong Kong, Taiwan and the Republic of Korea. Competition for these markets is intensifying, from both intraregional suppliers and large international suppliers such as the USA. Australia has managed to establish a significant presence on the Singapore market, and may be able to develop markets for some of the newer crops through this outlet.

- The Middle East offers the next best potential for Australian products. Continued income and demand growth (at slower rates than in the recent past) is expected in this area, and Australia may be able to take advantage of its established presence in this market to diversify into the newer crops and also into Northern Hemisphere off-season sales for vegetables and table grapes.

- Europe is an expanding market for horticultural produce but, with some possible speciality exceptions in the exotic tropical fruits area, Australia will continue to experience problems of distance, institutional barriers to entry and image and promotion on this market.

- Japan and the USA are enormous markets, and even very small increases in percentages of imports taken from Australia would represent significant market gains. However, many of the impediments to Australian penetration of these markets are institutional, and these would need to be resolved before progress could be made.

- Africa, South America and the Pacific region offer little scope for significant gains for Australian horticulture exports.

- Competition on all the major markets of interest to Australia is intense, and in most cases the same is likely to apply to the newer crops for which Australia will seek export markets. In the past, Australia has lost ground in some important product markets, due to inadequate research and promotion in the markets compared to the efforts of competitors.

- Australia has also lost opportunities due to a poor image as a supplier. This has arisen through unco-ordinated export sales efforts
causing unreliable supply, variable quality of product and a lack of flexibility in the area of commercial practices, terms of credit and so on.

2.4 Competitiveness: Input Factors

Many of the items discussed in subsections 2.1-2.3 relate to the question of competitiveness - how well the industries examined perform relative to their present (or potential) competitors, and how market developments are likely to influence the many factors involved in defining an industry's competitiveness, in the area of inputs, production and outputs (including marketing factors).

From the point of view of Australian producers, the factors over which they have most control are the input, or cost factors (this point is taken up at greater length in Attachment III). A major objective, therefore, becomes one of determining whether there is some relationship between competitiveness (variously measured) and input structures and trends. Competitiveness, as such, is difficult to measure. It is reasonable to treat the export performance of industries which have a significant export component as a proxy for competitiveness. For these purposes, four basic measures of export performance are suggested:

- the trend in Australia's share of the world market for the commodity;
- the share of total output of a commodity exported;
- the trend in the ratio of exports to production over time; and
- the absolute growth in exports of the commodity.

It is possible to rank Australian agricultural industries according to their performance as measured by these criteria (the details of this analysis are described in Attachment III). The rankings are from 1 to 10. A ranking of 1 indicates that, over the period of analysis, that industry showed a greater positive rate of change (or a less negative rate of change) than all others, for the particular criterion being used. The rankings listed in Table 2 arise from this procedure.

Very briefly, the interpretation of these results follows.

- Exports of the horticultural products (except fresh citrus) declined over the period 1966-81. This reflects the generally poor performance of these products on international markets.

- Exports of wheat, beef and dairy products increased absolutely and as a proportion of total production, although the Australian share in total world trade for these commodities fell.

- Exports of wool fell but, unlike exports of the other broadacre commodities, this was in the context of a world decline in trade in this commodity.

It is possible to compare input price movements and input weights to these rankings to determine whether any general correlations emerge. On the basis of these data, and some more general observations of the farming sector, the following conclusions can be drawn.
Table 2: AUSTRALIAN AGRICULTURAL INDUSTRY RANKINGS: BY PERFORMANCE CRITERIA

<table>
<thead>
<tr>
<th>Industry</th>
<th>Value of exports-to-value of world trade</th>
<th>Value of exports-to-value of production</th>
<th>Rate of change in value of exports-to-value of production</th>
<th>Rate of change in quantity exported</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Fresh citrus</td>
<td>2</td>
<td>9</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Wool</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Beef and veal</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Dairy</td>
<td>5</td>
<td>7</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Fresh pears</td>
<td>6</td>
<td>6</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Dried vine fruit</td>
<td>7</td>
<td>3</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Canning fruit</td>
<td>8</td>
<td>5</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Wine</td>
<td>9</td>
<td>10</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Fresh apples</td>
<td>10</td>
<td>8</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Table III.1, Attachment III.

- The beef and wheat industries, which performed relatively better in the competitiveness indexes used, showed a greater capacity than other industries to vary input mix according to relative input prices.

- Recent studies of size economies in farming show that the greatest gains in production efficiency are to be made up to the point where operator labour is fully utilised on the farm unless adequate off-farm employment opportunities exist in the area (see Vlastuin, Lawrence and Quiggin 1982). Thereafter, gains to size increases are less pronounced. The wheat, beef and dairy industries have recorded significant average farm size increases in recent years, whilst rates of increase in the wool and horticultural sectors have been lower. The principal conclusion on this matter (from the results in Attachment III) is that new agricultural industries (in horticulture or elsewhere) will need to be established on a basis where operator labour is, and will continue to be, fully utilised.

- All of the agricultural industries examined have adopted new technology, and it is difficult to quantify the effects of it in each case. To the extent that productivity increases reflect the implementation of new production techniques, only the citrus and multi-purpose grape industries demonstrated statistically significant trends in this factor (taken from results given in Table III.3 of Attachment III). Accordingly, little of substance can be deduced from this result.

2.5 Competitiveness: Marketing Factors

Marketing is the group of processes involved in getting a commodity from the farm gate to the point of final sale. It is not possible to estimate specific correlations between marketing factors and agricultural industry performances, but some observations can be made from available information collected in the course of this review.
* Processing

In general, it can be argued that Australia faces a comparative disadvantage in labour-intensive manufacturing, and many of the agricultural produce processing industries are of this nature. In the specific case of horticulture, added disadvantages are present, due to the short processing season, the fragmented nature of the sector and the relatively low value-to-volume ratio of the final product.

* Handling and storage

Australia has a comparative disadvantage in handling and storage of agricultural produce, except where a relatively high level of automation can be applied. Disadvantages from the point of view of the Australian producer competing on the international market will apply to bulkier crops (unit value) and to crops requiring specialised handling. Some of the fruit crops come into this high-cost category.

* Freight

The high cost of freight from Australia to large traditional Northern Hemisphere markets is well known. Once again, products with high volume-to-value ratios suffer most from this disadvantage in international markets.

In very broad terms, there is a rough inverse correlation between the competitiveness ranking of commodities as outlined in subsection 2.4 and the proportion of value added after the commodity leaves the farm gate. From Australia's viewpoint, commodities which require little or no processing, and which can be handled in bulk via automated systems, would be expected to compete more effectively on international markets. In the case of fruit crops in particular, it is important to bear in mind the price of the product, per unit of volume, and the likelihood of marketing it in regions close to Australia, as offsets to the relatively high handling and storage costs that apply. Moreover, flexibility in the form in which the product can be sold (i.e. processed or fresh) will probably be a major asset, where uncertainties as to cost and efficiency factors in processing are pronounced.

3. An Assessment of Crop Potential

3.1 A Ranking System

The purpose of the analyses described above has been to define an initial list of horticultural crops likely to be of interest in terms of their growth potential, and then to test these crops, to the extent that the data allowed, in the areas of profitability, market performance and competitive structures. The objective has been to assess their potential for expansion and growth, and it is now the intention to summarise the findings of the task force on this matter.

It is not possible, in the great majority of cases studied by this task force, to be specific in quantitative terms about the extent to which markets, production and returns will increase. However, it is possible in many cases to gain some sense of the direction and nature of
trends in major parameters from the information and analyses provided. Therefore, in an attempt to answer the major questions on potential posed in subsection 1.2, it is necessary to summarise and codify the information obtained in a comprehensible and useful way, without 'overinterpreting' the data. The route chosen in this case has been to select a group of performance criteria from each major area of analysis, and assign simple numerical rankings for each crop analysed. Obviously, in some cases, insufficient information was available to allow a reasonable judgment, in which case this is noted with a nil entry in the table of results (Table 3).

(a) Situation and profitability criteria

From the specific profitability analyses or more general situation information given in Attachment I, it was possible to generate rankings as follows.

- **Returns to growers.** In the case where calculations of internal rates of return were carried out, high returns (ranking 1) were classified as those above 15 per cent; medium returns (ranking 2) were those above 10 per cent; and low returns (ranking 3) were those below 10 per cent. These rankings were based on the mid-point of internal rates of return (at constant prices) in each case. For crops for which descriptive rather than analytical information was given, the rankings 1 to 3 were assigned on a more subjective basis, according to gross margin data, industry opinion and published assessments.

- **Risk and uncertainty.** The risk and uncertainty in production factors for the crops analysed was classified as low (ranking 1), medium (ranking 2) or high (ranking 3). A ranking of 1 was assigned where there was a 75 per cent probability that the internal rates of return would vary from the estimated value by less than 10 per cent. A ranking of 2 was given where the variability in rates was higher, by up to 20 per cent, and a ranking of 3 indicates variability in internal rates of return above 20 per cent.

  For the crops where no internal rate of return analysis was possible, risk was subjectively assessed on the basis of observed variance in prices received, data on seasonal fluctuation in production, and any specific projections in the information compiled which suggested some specific result for risk.

- **Sensitivity to price decline.** All crops tested were fairly sensitive to this test. Where the effect of this assumption reduced the internal rate of return by less than 50 per cent (of the internal rate of return), a ranking of 1 was assigned. Otherwise, a ranking of 2 was applied.

  For crops where no calculation of internal rate of return was carried out, a judgment on the basis of published and/or field observations of sensitivity to price was made, and assigned a numerical ranking of 1 or 2.

(b) Domestic market

For six crops, some consumption curve fitting was possible, as described in subsection 2.2. For others, a more subjective assessment was necessary. In Table 3, a ranking of 1 was assigned to those crops for
<table>
<thead>
<tr>
<th>Crop</th>
<th>Situation/profitability</th>
<th>Marketing factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Returns to growers</td>
<td>Risk and uncertainty</td>
</tr>
<tr>
<td>Almonds</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Avocados</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Bananas</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Beans</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Blueberries</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Carrots</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cashews (c)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chestnuts</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Coffee</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Custard apples</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Essential oils</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Exotic tropical fruit</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ginger</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Guavas</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Hazelnuts</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>Hops</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kiwifruits</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Lettuces</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Lychees</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Macadamias</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Mangoes</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Nectarines</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Nurseries</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Onions</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Opium poppies</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Other berries</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Papayas</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Passion fruit</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Peas</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Pecans</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Perimmons</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pharmaceutical crops (c)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pineapples</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pistachios</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Potatoes</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Raspberries, fresh</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Raspberries, processed</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Strawberries</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Table grapes</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tea</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Walnuts</td>
<td>3</td>
<td>-</td>
</tr>
</tbody>
</table>

(a) Cost structure of this industry presently altering rapidly. (b) Current plantings indicate possible overproduction problems, despite indications of market growth potential. (c) Industry currently in trial stage; export prospects seem good if trials prove satisfactory and industry is established. - Denotes insufficient information.
which aggregate consumption seemed likely to grow at no less than 2 per cent a year in excess of the rate of change of population over the next decade. In round terms, this would imply a total growth in consumption by 1992 of something over 40 per cent. Crops which seemed likely to expand at something less than this figure, but at more than, or equal to, the rate of growth of population, were assigned a ranking of 2. Crops for which consumption seemed likely to decline in per person terms over the next decade were assigned a ranking of 3.

(c) Export market

There is little doubt that, in general terms, the most desirable outlets for Australian produce are those in the East Asian region. They have diversity, thus reducing the disruptive effect of individual market closure (see some discussion of this factor in subsection 4.1). They are in a region where economic growth has been, and is projected to remain, above general international levels. Also, many of the countries involved are approaching the middle-income status, where rates of change of consumption of food items, particularly foods above the staple classifications, are high. Lastly, they are closer to Australia than to its significant supply competitors for some major (or potentially major) crops, and this is an important factor for Australian exporters of food items in general.

For these reasons, where a crop was assessed as having good market prospects in this area, a ranking of 1 was assigned. Where a crop was assessed more generally as having good growth prospects (with some more reliance on major Western markets implied), a ranking of 2 was assigned. For products where general prospects for export appeared poor (or non-existent), or where some specific barrier existed, a ranking of 3 was given.

(d) Cost structure

In very broad terms only, it was possible to categorise some of the developing horticultural sectors according to how well they approximated the input types and mixes correlated with relatively better performance in the agricultural industries, according to the analysis described under subsection 2.4. Given the complexity and variability involved, it was really feasible to assign only two rankings, 1 for those industries which seemed to possess relatively desirable input mix and adaptability characteristics, and 2 for those which did not.

(e) Processing

In subsection 2.4, the relatively common problem of processing cost disadvantages in Australian horticulture was raised. Whilst it is not necessarily the case that a heavy reliance on processing in the horticultural industries will cause problems, the possibility is there (on the basis that, in the past, many processors of horticultural products have encountered problems of economies of scale and locational constraints, due to fragmented growing areas for various crops). A ranking of 1 was assigned to industries which would not need to rely heavily on processing. A ranking of 2 was assigned to industries which would rely on processing, but where locational disadvantages seemed less likely to arise. A ranking of 3 was assigned to industries where
processing would be significant, where the disadvantages applying to present horticultural processors in Australia seemed likely to arise.

(f) **Marketing**

Information contained in returns to the questionnaire sent to Australian Trade Commissioners suggests that Australia has a comparative disadvantage in freighting, due both to distances from large Northern Hemisphere markets and high costs of handling at Australian ports. Further disadvantages from the Australian viewpoint are added when the product to be exported has a relatively low value-to-weight (or volume) ratio, and when it requires specialised storage (cool or frozen). A crop which is fragile and, therefore, difficult to handle in bulk will also be at a relative disadvantage to its overseas competitors, in Australia, where specialised handling costs are high. The following criteria and rankings were used to classify industries in the marketing cost area.

- **Value-to-weight ratios.** A ranking of 1 was applied where the crop had a high value-to-weight ratio. A ranking of 2 was given in the median case, and 3 elsewhere.

- **Perishability or fragility.** Crops which are easily stored and handled received a ranking of 1; those with some perishability or fragility problems received a ranking of 2; while those with severe perishability or fragility problems were given a ranking of 3. These rankings were based on the form in which most of the product were expected to reach the market.

3.2 **Results**

In Table 3 the results of applying the rankings discussed above to the crops considered in this analysis are presented. The rankings assigned represent the best assessment possible on the basis of information available to the task force of domestic and export market potential. A crop with a relatively high proportion of favourable rankings (1 under the system used here) would be expected to perform better than a crop with generally low rankings under the various criteria.

There are some obvious caveats that should be applied when perusing this table.

- Although every attempt at consistency was made, the quality of information upon which rankings were based varied. This could have been the case even within a given criterion, where some crops may have been quantitatively assessed and others appraised on the basis of impressionistic information from the field or published sources.

- The importance of the various criteria used may vary from one crop to another. Some, for example, are likely to be more flexible than others in terms of both inputs and outputs. This is difficult to quantify realistically, but could affect the efficacy with which different crop industries bypass problems identified in this table.

- In the table an attempt was made to identify potential, which is interpreted in this case as the likelihood of market and product growth. Therefore, crops which rank generally poorly in the table should not
necessarily be regarded as being generally undesirable; rather, their capacity to generate significant market growth was assessed as low.

In general, the figures in Table 3 bear out the proposition that the newer crops examined have greater potential for growth than the longer established horticultural industries examined and, by implication, the traditional perennial sectors not examined here. Crops such as mangoes, blueberries, macadamias, kiwifruit and lychees show strong growth potential - not that this will necessarily avert the risk of overproduction which could result, given currently high levels of investment in all of them. For avocados and guavas, limits to growth are clearer and production overruns in these sectors seem likely on current indications.

For a great many of the newer crops, the information available is both scant and of highly variable quality. By definition, therefore, from an investment viewpoint, these industries are high-risk ventures. Nonetheless, a group of them are in markets (domestic and/or export) where the Australian share seems capable of very significant growth. Tea and coffee, the exotic tropical fruits, some of the nut crops, table grapes, essential oils and a range of nursery products are in this category.

For the larger scale, longer established crops examined - vegetables, bananas and pineapples - prospects for growth appear to be limited to the demographic trend, or even below it, and problems of price instability and import competition apply to varying extents.

4. Policy Implications

4.1 The New Fruits Sector

(a) Background

As with most studies of this nature, the major impetus for the study came from perceived production and market problems in the current situation and outlook for the sector of interest. It is useful, therefore, to review briefly the broad problems which presently or potentially confront the fruit growing industries of the horticultural sector, as they are presently structured in Australia. This, then, provides a basis and a direction for the formulation of policy proposals arising from the information, analyses and conclusions on crop potentials presented in this report.

* The export market

On the export side, the fruit growing sector in Australia has faced a generally difficult situation in recent years, although for some products in some markets a more favourable outlook has arisen. Three major groups of factors have contributed to the difficulties encountered by most of the large, traditional horticultural export crops.

* Market closure. The best known example of this is the significant deterioration of Australia's market position in Europe (principally the United Kingdom) since the United Kingdom joined the EEC. The position
has, if anything, deteriorated further since that time, due to the rigidity with which the EEC has pursued import controls via the Common Agricultural Policy, the extent to which it has subsidised domestic fruit industries and the intensification of competition from Third World countries (principally ex-European colonies) which receive market advantages under the preferential, entry arrangements. However, other large markets have also been made difficult or impossible for Australia to enter, because of quarantine regulations (some of which are genuinely relevant to the importing countries' plant health concerns, while others apparently are not), or regional preferential entry systems which have political as well as economic connotations which go well beyond the ambit of the horticultural sector. It is apparent, for example, that Australia could compete much more effectively in certain products on both the Japanese and US markets, were there no institutional barriers to entry of these products.

- **Exogenous cost problems.** These are defined here as costs which impact significantly upon the horticultural sector, but which are outside its immediate control. The most frequently cited example, from industry and other sources and from the many cases cited elsewhere in this review, is that of freight and handling charges. The high direct costs of transporting produce from Australia to distant Northern Hemisphere markets, the high costs of port handling in Australia relative to the costs to most of Australia's competitors, and the indirect costs (manifested in market confidence and related factors) of apparently less reliable shipment from Australian ports, all contribute to this factor.

- **Internal sectoral problems.** There is a wide range of production and marketing problems from within the sector, and many of these are mentioned throughout the review and the attachments. It would be neither appropriate nor practical to attempt to review all the relevant issues here. Many of the major ones have received considerable government and industry attention in recent years, particularly in the context of adjustment or other forms of industry assistance from various government agencies. However, the promotion and marketing of Australian produce does warrant some further emphasis. These are problems which have received considerably less systematic attention than have internal growing or processing production problems in Australia. However, from the point of view of Australian export market performance, they seem, from the review of products and markets carried out under this task force program, to be important impediments to market success in many cases. It is apparent that Australia's image as a supplier, in terms of both reliability and quality, is less than impressive on a number of markets, and it seems that lack of supply co-ordination and involvement of producers in the marketing process is a principal reason behind this. Moreover, it appears that Australian efforts and expenditure on promotion - particularly for newer products, or for more traditional products in developing markets - leave much to be desired, and a loss of regional market shares is either manifest or in the offing as a result.

- **The domestic market**

  On the domestic market, a somewhat different problem is apparent. On a per person basis, total fruit and juice consumption in Australia has been rising (see Figure 3). However, the per person consumption of fresh fruit alone has been declining (see Figure 4). Rapid increases in juice
Figure 3: AUSTRALIAN CONSUMPTION OF FRESH FRUIT AND JUICES PER PERSON
In fresh fruit equivalent

Figure 4: AUSTRALIAN CONSUMPTION OF FRESH FRUIT PER PERSON
consumption (principally orange juice) have taken the total figure on its upward trend. In summary, it can be seen from the graphs that per person consumption of fresh fruit plus juices rose by 40 per cent in the period 1961-81, but the level of fresh fruit consumed per person actually declined by about 35 per cent in the same period.

The problem inherent in this trend is that, to date, Australia has proved to be a reasonably efficient producer of fresh fruit, but has tended to be an inefficient processor of it. The canning fruit processing sector in Australia, for example, has faced problems of a lack of economies of scale in some units and institutional barriers to efficiency in recent years (see BAE 1982). More significantly, the industry most responsible for the overall increase in per person consumption in Australia — the orange juice industry — itself receives considerable protection from import competition in the form of a tariff package and sales tax exemptions. It remains to be seen whether growers and processors will be able to withstand effectively the increased competition that seems likely to emerge over time under this protection package as presently structured.

This is not the venue for a review of the merits of free trade and protectionist arguments. It is obvious, however, that, where a given sector of an economy is and seems likely to remain under considerable import competition pressure and in receipt of high levels of protection, alternatives to continuing in that area of production should at least be investigated.

In the particular case of horticultural processing, a partial alternative may in fact simply evolve through natural consumption trends. Observation of the pattern of fruit consumption in the USA (see Figure 5)
gives some indication that the decline in fresh fruit consumption in that country may have halted. Fresh fruit consumption per person has actually been rising slowly since the mid-1960s, presumably under the impact of promotion campaigns, increased interest in the natural health area, and so on. If this trend is also manifested in Australia under the impetus of recent heavy campaigns for fresh fruit consumption (the New South Wales 'Fresh is Best', and the national 'Life Be In It' program are examples), fruit grower reliance on the processing sector may decline but adjustment and employment problems are likely to arise as a consequence within the processing sector.

(b) Policy guidelines

It is clear from the above overview of the major problems of the horticultural sector that a diversification into some of the newer (or at least presently less developed) crops may provide a means of bypassing some of the more intractable difficulties that currently apply. The rankings given in Table 3 summarise the possibilities and potentials for this approach which arise from the information and analysis undertaken in the task force program.

When considering alternatives, it is useful to attempt to gain some perspective on the extent to which they might be pursued. This is necessarily a highly speculative exercise, even when confined to the domestic market. So far as the export market is concerned, attempts to speculate on the actual size that it may reach in each crop case is even more difficult. The international markets for many of the products reviewed in this report are in the early stages of growth. Australia's share of those markets will not evolve naturally, but will be determined by competitiveness, marketing and promotional actions taken by producers and merchants.

From the linear projection in Figure 3, it can be surmised that the total national consumption of fresh fruit and juices in Australia will rise by around 30 per cent by 1992 (assuming a population then of 17.6 million, compared to the 1982 level of 15.5 million). These figures are the averages from projections in ABS (1982). The range of estimation by ABS about the 1992 figure is about 2.2 per cent.

The present trend of consumption in Australia is toward higher levels of processed fruit, at the expense of fresh fruit. In the USA, as noted earlier, this trend has been reversed. If it is reversed in Australia, under the impetus of 'fresh' promotion programs, fresh fruit consumption will be considerably higher than implied by the present trend.

The total gross value of orchard, berry and other fruit production in Australia in 1981-82 is estimated by ABS as $464m and, as argued in subsection 1.1, this is probably an underestimate. The new fruit crops (examined in sections I.2 and I.4 of Attachment I) have a present gross value of production of about $40m. This is an estimate based, where necessary, on linear extrapolation to 1983 of production estimates from recent years. The rates of expansion of domestic consumption for these new fruits are rapid - per person consumption of avacados, for example, will rise by 20 per cent (on the logistical-curve-fitting basis described in section II.2 of Attachment II) by 1992, and if US levels of consumption were to be attained in that period, the per person increase
would be 100 per cent. Domestic consumption of mangoes has risen dramatically recently, due to the opening of previously quarantined markets; the trend projection for consumption per person of mangoes is for a rise of about 14 per cent by 1992 but, given that new State markets are yet to open to mangoes, this is likely to be a very conservative estimate.

Given that relatively good export prospects exist for some of the newer fruits (certainly better prospects for expansion than would be the case for more traditional exports), it seems fairly conservative to assume that, by 1992, total consumption of the new fruits group could be 50-60 per cent above present levels. This would imply that the new fruits group could comprise 15-20 per cent of the total fruit output by 1992, on basically very conservative assumptions. This would make the group a similar size to the present canning fruit growing sector - larger than the present citrus growing sector and over half the size of the present apple growing sector. Put in these terms, it can be seen that development of the sector along fairly feasible expansion lines would go some considerable way toward maintaining and perhaps expanding the total contribution of the horticultural sector to the national economy. However, rather different structural and regional patterns would emerge. Some perspective on the overall size of some of the new fruit sectors individually is needed. In Figure 6, a comparison is made of estimates of output of three of the more developed new fruit sectors, and some other sectors within the horticultural group.

Figure 6: GROSS VALUE OF PRODUCTION OF SELECTED HORTICULTURAL CROPS
(Recent years)

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Gross Value (US$ million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grapes</td>
<td>250</td>
</tr>
<tr>
<td>Nursery products</td>
<td>150</td>
</tr>
<tr>
<td>Potatoes</td>
<td>100</td>
</tr>
<tr>
<td>Tomatoes</td>
<td>50</td>
</tr>
<tr>
<td>Avocados</td>
<td>50</td>
</tr>
<tr>
<td>Macadamias</td>
<td>50</td>
</tr>
<tr>
<td>Mangoes</td>
<td>50</td>
</tr>
</tbody>
</table>

BAE chart
Overall, the new fruits sector warrants attention, by potential investors and by the government agencies concerned with the horticultural sector. From the government viewpoint, the following policy items emerge from this study.

- **Marketing and promotion**

There is ample prima facie evidence contained in the information from Trade Commissioners and other sources cited in this report to suggest that some of the major problems associated with the marketing and sale of Australian traditional horticultural produce overseas will attach to the newer crops as well, unless remedial action is taken. Specifically, it is apparent that considerable benefits could be obtained from co-ordination of sales activity and quality control. More rigorous analysis of specific market trends, more direct representation of products and growers in the market, and more flexible approaches to terms of credit for specific buyers, are all important ingredients in market success. They represent areas where Australia's major competitors (especially in the preferred market zone of East Asia) have obtained significant advantages in recent years.

Another group of problems which need to be addressed when considering policies to enhance Australia's export market performance are those related to market imperfection and institutional market closure. (These were raised in the background analysis in subsection 4.1.) A recently released paper from the Trade Development Council points out that 30-40 per cent of all international trade is on an intracompany basis, and a further 30 per cent is government-to-government trading. It is not possible to estimate at this stage the extent to which horticulture follows this pattern, but it seems reasonable to suggest that a significant problem in this area exists.

- **Investment and market analyses**

As is the case with any economic area where both uncertainty and entrepreneurial activity are high, there is a danger of overinvestment and/or overproduction in the newer sectors - particularly if they are perceived by growers of more traditional crops as avenues for adjustment out of presently uneconomic pursuits. It is possible, for example, that such a situation could emerge for avocados. If all trees estimated as bearing and non-bearing in 1981-82 are fully bearing by 1992, production then would be between 6.3 kt and 7.0 kt a year (see subsection 11.2 of Attachment 1). This would imply per person consumption levels of about 0.4 kg in that year, which would be feasible, but well above the projected level from consumption curve fitting, and would approach US levels (which are based on radically lower prices than the Australian equivalent). Moreover, this level of consumption assumes no further planting of avocados after 1981-82 that will bear before 1992, an obviously conservative assumption.

Taxation is a factor in investment in many of the newer crops. In the case of the macadamia industry, for example, tax considerations have had a significant influence on the whole pattern of ownership and development of the industry. In a recent article in *Australian Business Review* (Wragg 1982), it is argued that the taxation benefits for high-income-earning individuals from investment in crop enterprises of this nature may not be
as great as was originally believed by many. If this is so, the rate of investment from this source can be expected to slow. However, there has already been considerable inflow, and levels of immature plantings of avocados (see earlier), macadamias and mangoes are currently at very high levels.

It is probably inevitable that some overproduction will emerge somewhere in the new fruits sector. The likelihood could be reduced via promulgation of realistic investment analyses and market outlooks. At present, no regular system for the production of these sorts of analyses exists. Investment counselling is carried out to some extent by State departments responsible for agriculture, but more broadly based production, market situation and outlook studies (along the lines of those currently done for the more traditional horticultural crops, but with more emphasis on the new investment situation) would improve investors' knowledge of the situation. Because of the fixed nature of the perennial tree crops, and the very high costs involved in establishing plantations, the cost of adjustment out of production could be high. Recent and current entrants into these sectors have paid high prices for land, seedling stocks and so on and their demand for assistance in the event of price declines would be significant, and quickly manifested.

Regional and land use issues

Most of the new horticultural crop industries are being, or will be, established in areas which have existing alternative agricultural uses - longer established horticultural or other intensive cropping pursuits; intensive livestock production; or some broadacre production uses. Essentially, therefore, the process of development implies some adjustment out of other production. In broad national land use terms, the transfers are unlikely to be significant, because many of the new crops have a small land base, in comparison to the capital inputs and to the returns expected. Thus, it is not likely that significant national water and soil use policy implications will arise.

At the regional level, however, some significant changes will occur. Water demand is one aspect which is likely to alter, because many of the new crops require relatively heavy irrigation, and seem able to pay the full supply cost price for it. In one area of increasing horticultural interest - the North Coast region of New South Wales - some conflicts between new crop farmers wishing to irrigate at higher levels from waterways on the higher land and the municipal authorities seeking to expand tourist and holiday resort facilities on the coast are already in evidence. It is likely that some of these conflicts will come to rest at the Federal level, in the form of requests for assistance in water storage and/or reticulation capital works.

Zoning regulations in some regions are another issue that may create problems. For example, in certain parts of Queensland and New South Wales, horticulture competes for land with residential holiday home development. It is feasible that some fairly simple zoning to encourage residential development on steeper land might allow horticultural production on the more optimal growing sites, at relatively little cost. This is a matter that could be included in a land use priority study in areas where strong growth is indicated. As an aside, it is worth pointing out that no feasible form of zoning would prevent the very high land
values which are beginning to become a problem in some horticultural areas as a result of interest in the new crops. It seems fairly likely that land values in many cases will overshoot levels justified by longer term assessment of returns. But, beyond adequate promulgation of the best possible investment analyses which can be provided, there seems to be little justification for Commonwealth Government involvement.

- **Processing**

As has been pointed out in this report, a high degree of processing - especially in the fruit commodities - generally adds to cost and competitiveness problems for Australian produce. There are basically three solutions (not necessarily mutually exclusive) to this problem. First, an upgrading of the processing units, through capital expenditure, amalgamations (where diseconomies due to small size are apparent) and so on could be undertaken. Or, in the case of new crops which require processing, higher levels of research and capital input may be required to achieve an efficient and competitive industry structure at the outset.

Second, greater reliance on commodities which do not require a high degree of processing could be encouraged. This is, in effect, the 'comparative advantage' solution, provided price signals to growers and others involved are clearly transferred.

Third, the option of joint projects for processing off-shore may warrant investigation. Clearly, there are some commodities for which a processing option, if it is low cost and efficient, could add considerably to the sales potential for domestically grown produce, either through providing an end use for lower grade material, or by allowing greater variety in the forms in which the product can be marketed. Moreover, joint arrangements can have advantageous effects in the area of institutional barriers to importation of commodities; in effect, by offering other countries some financial interest in importing from Australia (possibly for re-export) and thus stabilising the market environment. An interesting example of this occurred recently, when a shipment of macadamia nuts in shell was sent from Australia to China, processed there and re-exported (back to Australia in this case) - apparently for a delivered cost somewhat below the domestically processed equivalent. Given that many of the newer crops discussed in this report have (or could have) a processing option, there may be some point in including investigation of joint projects in major target market areas in future consideration of mechanisms to improve Australia's marketing and promotion performance.

- **Plant variety rights**

The issue of plant variety rights is an active and contentious one in Australia at present. It was raised frequently in the field during the information gathering phase of the task force program; it was the subject of a recent issues paper released by the BAE (Ockwell 1982); and debates on the matter in the Federal Parliament and elsewhere have been extensive. It would be difficult to summarise the range of arguments and issues involved here. At the time of writing, the Senate Standing Committee on National Resources was due to release a report on the subject, and presumably this report will canvass the issues and make recommendations on the desirability or otherwise of a plant variety rights bill.

35
It is clear that, in the new horticultural crops area, there is likely to be increasing demand for improved varieties. This has implications for the domestic plant breeding effort, which is frequently cited as being inadequate in Australia. It also suggests that importation of genetic stock from other parts of the world will be necessary for some time. It is essential that, when the plant variety rights issue is being considered in general, the special requirements of the newer crops sector are taken into account. This leads to the general issue of research and development in the newer crops sector. No figures on research expenditure in this area are available, so it is not possible to determine whether the sector receives allocations of government research funds in keeping with its needs, its size (relative to other agricultural sectors), its potential and its competitors elsewhere in the world.

4.2 The Vegetable Group

(a) Background

The vegetable growing sector in Australia is large and, in aggregate, fairly stable, although considerable seasonal and regional fluctuations for individual crops occur. At present, exports are insignificant - around 3 per cent by quantity. Imports are more significant, particularly in value terms, due to the preponderance of processed material; in total, almost $60m worth of vegetable products were imported into Australia in 1981-82.

Demand for vegetables as a whole appears to be relatively unresponsive to changes in price, and can be expected to move more or less in line with population growth. Given recent production trends, this probably implies fewer producers and lower areas under production to satisfy the domestic market in future than is presently the case. A trend toward consumption of processed products - as in the fruit case - has been apparent in some of the major vegetable markets in Australia and, as with fruit, domestic processors have encountered import competition problems, although perhaps not to the same extent.

Little of a definite nature was gathered by the task force on the export prospects for Australian vegetables. Obviously, the advantages and disadvantages identified for export of Australian fruit in section 4.1 above also apply to varying extents to the vegetable sector. It is apparent that the best prospects exist for exports of fresh product.

In aggregate terms, it seems that a considerable increase in activity would be required before export developments could exercise a significant effect on the trends of production of Australian vegetables.

(b) Policy indications

Some pressure on domestic producers from imports (mostly processed) seems likely. It is not clear whether, in overall terms, this trend will be significant or will be affected by liberalisation of trade between Australia and New Zealand under the closer economic relations agreements. Adjustment has occurred in the sector (in response to import competition, but also in accordance with more general agricultural trends), and will continue to do so. There would not appear to be any general measures that need to be taken by the Federal Government in this area. However, a close
monitoring of trends in domestic and overseas processing appears warranted, for two reasons. First, it seems likely that the number of anti-dumping claims for protection on the part of local industry will increase (at least for certain types of product), and the Government will need to be aware of general trends in order to make effective judgments on these matters. Second, the efficiency of domestic processors and trends in the nature of their purchasing relationships with vegetable growers will be important determinants of the future profitability of vegetable growing, and of where they should be grown.

Although the domestic production base of the vegetable growing industry is large, it is probably valid to suggest that any major export developments in the vegetable area would possess the same characteristics as the new fruits developments. For example, it seems more likely that new regional vegetable industries, based on new transport, handling and marketing infrastructure, would be needed to make extensive gains in the export sector. In this respect, issues of marketing and promotion as canvassed in subsection 4.1 for new fruits may be similarly applicable to the development of new export-oriented vegetable industries.

4.3 The Nursery Group

The nursery industries form a very significant proportion of the Australian horticulture sector. Moreover, their role in terms of development and supply of plant stock is fundamentally important to other industries in the group. Important export opportunities seem to exist, especially in the cut flowers area.

It has not been possible in this report to collect sufficient information on a systematic basis to identify problems and opportunities for policy design in the nursery sector. This is partly because of the highly diverse nature of the sector. It might be hypothesised that, if major problems or opportunities have not been represented to the Government, they either do not exist or are being managed autonomously by the industry itself. However, even to establish whether or not this is in fact the case would require considerably more investigation than has been possible under this project.
REFERENCES


BAE (1982), Second submission to the IAC inquiry into the canning fruit industry. Canberra.


