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**Rural Industries Research and
Development Corporation**

Asian Foods R&D Plan 2005–2010

Review and Background Paper

**A report for the Rural Industries Research
and Development Corporation**

by Michael Clarke, AgEconPlus Pty Ltd

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Foreword

Within the context of our five year Corporate Plan RIRDC is committed to the development of R&D plans for each of its major Sub-programs.

The first plan for the Asian Foods Sub-program operated from 1999–2004. To assist in developing the next R&D Plan for the Sub-program RIRDC engaged AgEconPlus Pty Ltd to undertake a review of the program's performance over the five years to 2004. During this period the sub-program invested approximately \$3 million in 38 projects. This report discusses the outputs and outcomes achieved and assesses the current situation in the Asian foods industry.

This project was funded from RIRDC Core Funds which are provided by the Australian Government. It is an addition to RIRDC's diverse range of over 1200 research publications and forms part of our Asian Foods R&D program, which aims to foster the development of a viable Asian foods industry in Australia.

Most of RIRDC's publications are available for viewing, downloading or purchasing online through our website:

- downloads at www.rirdc.gov.au/fullreports/index.html
- purchases at www.rirdc.gov.au/eshop

Tony Byrne
Acting Managing Director
Rural Industries Research and
Development Corporation

Abbreviations

IRR	Internal rates of return
HAL	Horticulture Australia Limited
NESB	Non English Speaking Background
RDCs	Research & Development Corporations

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1. INTRODUCTION

Purpose of this Paper

The purpose of this paper was to review RIRDC's Asian Foods Subprogram and provide background information for the next Asian Foods five-year plan.

The paper comprises:

- An overview of the subprogram including a list of all completed and on-going projects over the last five years, covering details of cost and timing and a brief summary of the objectives of each project or groups of related projects with an initial assessment of the outcomes of these projects; and
- A brief summary survey of the industry drawing on the Hassall & Associates (2003) Asian Vegetable Situation Assessment, with updates where this was warranted.

The RIRDC Asian Foods Program Manager reviewed a draft of this document prior to circulation to Asian foods industry stakeholders.

Research Method

Research method included:

- Review and analysis of the subprogram, including activities completed since initiation of RIRDC's Asian Foods activities in July 1993;
- Identification, in consultation with the Program Manager, of an appropriate set of stakeholders to be consulted in the development of the plan;
- Preparation of a draft R&D plan based on subprogram review;
- A plan development workshop held in Canberra on 28 September 2004;
- Finalisation of a five-year R&D Plan drawing of the review and workshop consultation.

It is critical that the R&D Plan is 'owned' by its stakeholders. Additional consultation was therefore completed at a review session at the Asian Foods Researcher Group meeting (8 June 2004) with follow-up surveys and interviews.

The resultant Asian Foods Subprogram R&D Plan 2005 to 2010 is available from RIRDC as a stand-alone document.

2. PROGRAM BACKGROUND

RIRDC's Asian Foods subprogram has been operating since 1993. The Asian foods sector was regarded as part of RIRDC's mandate because it was seen as a new industry that could benefit from Australia's proximity to Asian markets. The Asian Foods subprogram is somewhat unique. Despite RIRDC's best efforts, the subprogram does not generally benefit from input from Asian vegetable growers and the program is a mix of both primary production and processed food.

The Asian foods industry in Australia covers two main areas:

- Asian vegetables
 - Fresh: leafy vegetables, root crops and a range of other vegetables such as bamboo shoots, Japanese ginger and wasabi;
 - Simply processed: fresh cut mixes, pickled, dried or otherwise preserved product;
- Processed Asian food products
 - Food products traditionally sold in Asian markets (including Asian consumers in Australia); and
 - Food products with an 'Asian' taste targeting broader markets (including pickles, sauces and fermented soy products).

Processed food may be made from traditional Australian commodities, which may be combined with traditional Asian ingredients, or made predominantly from Asian ingredients.

The Asian vegetable industry has been growing rapidly. A recent survey estimated that the wholesale value of the industry has more than doubled since 1993-94 as had the number of growers. Rising consumer demand has been the main driving force behind this growth, but R&D has also played a role (Hassall & Associates 2003).

Growth in processed Asian food products has been less spectacular. The manufacture of value added food products in Australia is disadvantaged by high labour costs relative to productivity, the lack of brand name appeal and shortcomings in marketing expertise (CIE 2000).

The Asian Foods subprogram originated with a National Workshop in July 1993 that set initial R&D priorities. In 1999, in accordance with RIRDC practice, a five-year R&D plan was developed for the subprogram following an evaluation of progress to date and a workshop of researchers, marketers, growers and government stakeholders (CIE 2000).

Over the period FY99 to FY04 the subprogram invested approximately \$3 million in 38 projects.

The current plan (RIRDC 2000) is due to finish in FY04 and RIRDC is seeking to develop the next five-year plan.

3. R&D PLAN PERFORMANCE

Description of the Current Plan

The *vision* for the current five-year R&D plan is for:

A prosperous competitive Asian food industry in Australia, exporting to Asian markets and replacing imports in the Australian market.

The *mission* is:

To provide an R&D program that supports industry in its drive to develop new products and markets and to gain competitive advantage through improving productivity in, and achieving price premiums for, Australian production.

The current RIRDC five-year Asian Foods R&D Plan addresses *six objectives*:

Industry development

1. Support industry development through improved information, communication and development of supply chain and marketer networks
2. Develop new products with good market opportunities

Production systems

3. Provide troubleshooting solutions and enhance quality and productivity through research in production systems and plant physiology
4. Ensure chemical use is safe for workers and consumers

Post-harvest treatment and handling

5. Increase shelf life of fresh and semi-processed products; and
6. Improve cool chain management

The plan is also inclusive of strategies to achieve each objective and performance indicators to measure plan success.

Over the five years to FY04 a total of 38 projects have either been completed or commissioned as part of the subprogram. In relation to R&D plan objectives there were:

- Industry Development – information, communication and networks (15 projects)
- New products with good market opportunities (15 projects)
- Production systems and plant physiology (4 projects)
- Chemical use (2 projects)
- Shelf life (2 projects)
- Cool chain management (0 projects)

Additional detail on project by objective is provided below.

Funds Invested

RIRDC funds invested in the Asian Foods program are drawn from its core government funding. Industry funds invested in Asian Foods include cash and in-kind contributions from individual organisations as well as industry funds channelled through Horticulture Australia Limited (HAL).

Following a RIRDC Board level review of funding priorities in 2003, the Asian Foods subprogram budget was adjusted from \$550,000 per annum to \$500,000 per annum. In the current financial year RIRDC will invest \$450,000 and HAL will invest \$50,000 in Asian Foods research. In addition to the funds invested by the two Research and Development Corporations (RDCs), leverage is achieved via contributions from industry research organisations. In the seven years FY93 to FY00, RIRDC contributions of \$3.5 million were leveraged to achieve total research funding of \$9.7 million (See Table 3.1). In the period 1999 to 2004, RIRDC funds of \$4.6 million were leveraged to achieve total Asian Foods research funding of \$10.5 million (see Table 3.2).

Since inception in 1993, the Asian Foods program has received more than \$20 million in funding.

Of note is the fact that RDCs in established industries (such as grains, wool, meat) spend between 0.5% and 1% of gross value on R&D (Hassall & Associates 2003a). RIRDC is currently spending from its own contribution 0.4% of Asian vegetable value on R&D. This estimate of industry gross value does not include the value of processed Asian foods, which contribute \$1 billion to the Australian economy. Ongoing investment by RIRDC is justified by the success of Australian Asian vegetables. The RIRDC investment is not excessive when compared to other RDC investments in established industries.

Tables 3.1 and 3.2 show RIRDC and total funding by vegetable and processed food type.

Table 3.1 RIRDC Funding by Project 1993 to 2000

	No. of Projects	RIRDC funding	Total funding	RIRDC funds	RIRDC % of total funds
All Industry	2	172,400	198,113	4.9%	87.0%
Asian Vegetables					
Asian Vegetables - general	8	240,430	670,394	6.8%	35.9%
Frozen	1	31,600	49,643	0.9%	63.7%
Bamboo	4	322,800	892,622	9.2%	36.2%
Chinese water chestnut	3	185,000	363,672	5.3%	50.9%
Japanese Ginger	2	182,000	605,424	5.2	30.1
Leafy vegetables	7	759,699	2,321,024	21.6%	32.7%
Lotus	1	122,666	192,861	3.5%	63.6%
Oriental hot chilli	2	99,210	362,350	2.8%	27.4%
Pickled & Dried Veg	1	260,690	957,848	7.4	27.2%
Specialty mushrooms	5	286,565	766,533	8.2%	37.4%
Vegetable green soybean	1	9,947	163,339	0.3%	6.1%
Wasabi	2	219,134	555,618	6.2%	39.4%
Total Vegetables	37	2,719,741	7,901,325	77.5%	34.4%
Asian Foods					
Markets	6	305,860	515,907	8.7%	59.3%
Indian Condiments/Pickles	1	68,650	137,300	2.0%	50.0%
Indian Dairy Desserts	1	15,000	47,080	0.4%	31.9%
Seaweed food	1	10,000	10,000	0.3	100%
Tempeh - based snacks	2	145,800	745,374	4.2%	19.6%
Tropical Fruit Beverages	1	64,897	12,995	1.8%	50%
Vegetable Juice	1	8,000	53,000	0.2%	15.1
Total Food	13	618,204	1,638,456	17.7%	37.7%
Total	52	3,510,348	9,737,894	100.0%	36.0%

Source: CIE 2000 with data from RIRDC database

Table 3.2 RIRDC Funding by Project 1999 to 2004

	Number of Projects	RIRDC funding	Total funding	RIRDC funds	RIRDC % of total funds
All Industry	6	418,000	558,000	9.0%	74.9%
Asian Vegetables					
Asian Vegetables - general	12	1,893,000	4,105,000	40.9%	46.1%
Bamboo	2	251,000	585,000	5.4%	42.9%
Chinese water chestnut	1	172,000	326,000	3.7%	52.8%
Leafy vegetables	3	378,000	975,000	8.2%	38.8%
Lotus	1	123,000	193,000	2.7%	63.7%
Oriental hot chilli	1	96,000	354,000	2.1%	27.1%
Specialty mushrooms	1	179,000	282,000	3.9%	63.5%
Taro	4	361,000	989,000	7.8%	36.5%
Vegetable green soybean	1	150,000	500,000	3.2%	30.0%
Wasabi	2	279,000	634,000	6.0%	44.0%
Total Vegetables	28	3,882,000	8,943,000	83.9%	43.4%
Asian Foods					
Asian Foods - general	1	150,000	360,000	3.2%	41.7%
Tempah	2	59,000	260,000	1.3%	22.7%
Prunus mume	1	120,000	395,000	2.6%	30.4%
Total Food	4	329,000	1,015,000	7.1%	32.4%
Total	38	4,629,000	10,516,000	100.0%	44.0%

Source: RIRDC database

NB: total RIRDC funding of \$4.6 million includes some FY05 project funding and carryover funding from the earlier program period

From the two tables it can be seen that:

- Asian vegetables dominate subprogram investment with 83.9% of expenditure in the current period and 77.5% of expenditure in the historical period.
- 'Asian vegetable – general' R&D dominates Asian vegetable research. In the current period this includes large projects such as:
 - Extension pilot on communication with NESB vegetable growers in the NT;
 - Improved economic sustainability of Vietnamese vegetable growers in the Sydney region;
 - Consolidating the Asian vegetable industry, building on past achievements and action for the future; and
 - Development of integrated management strategies for diseases and pests of Asian vegetables.
- Leafy Asian vegetable projects, bamboo and wasabi have attracted funding in both analysis periods.
- Specialty mushrooms, Japanese ginger and pickled and dried product all received less Asian vegetable funding in the current period. Taro has emerged as a significant area of Asian vegetable funding in the current period.
- Indian condiments, pickles and dairy deserts, seaweed¹, vegetable juice and tropical fruit beverages all missed out on Asian foods funding in the current period. Prunus mume emerged as a new Asian food investment.

¹ Seaweed research is completed by the Fisheries Research and Development Corporation

Classification of Projects

Research in the Asian Foods Subprogram ranges from initial market assessment to agronomic and physiological research, to post harvest systems and industry coordination. A simple classification system developed by CIE and applied to the Asian Foods Program in 2000 is again used here to permit inter temporal comparison.

There are four main classifications relevant to the Asian Foods Subprogram:

- Industry development – investment to build industry capacity to develop through improving communications, establishing networks, developing priorities for R&D and promoting general market access arrangements.
- Production systems – investment to reduce the unit cost of production and/or raise the quality. R&D that focuses on breeding and selection, pest and weed control, agronomy and plant physiology to develop better systems of production, and economic management are included in this category.
- Post-harvest systems – investment to value add to the fresh product by increasing shelf life, and/or processing. Processing may be simple such as prepared salad mixes, or it may be highly complex as in processed foods.
- Market research – investment to identify market opportunities, promote sale volumes and/or increase demand and hence price. Included in this category is information collection such as assessment of market opportunities, assessment of economic viability, development of standards and quality assurance systems, and activities to enhance reputation and awareness of Australian Asian foods.

The motivation for RIRDC involvement in the production and post-harvest categories is relatively clear except in cases where the benefits accrue only to a few of the producers in the industry. For new and emerging industries a case can also be made for RIRDC involvement in industry development as the producers are usually fragmented and there is a need for a catalyst to improve industry communication. In marketing the role of RIRDC is limited to passive activities such as information collection and development of standards (CIE 2000).

Table 3.3 summarises Asian Foods projects for the current and historical periods. Where projects include more than one investment objective the project was classified under its main activity type. Classification was completed in consultation with the Asian Foods Program Manager.

Table 3.3 RIRDC Funding by Classification (percentage)

Objective	1993 to 2000	1999 to 2004
Industry development	13	23
Production	39	26
Production and post harvest	14	29
Post harvest systems/processing	16	14
Markets	18	8
Total	100	100

Analysis for the period 1993 to 2000 is from CIE 2000

Comparison between the two periods shows that a lesser allocation to production research in the current period has been offset with a corresponding increase in production/post harvest research. This change in allocation may be consistent with a maturing industry.

Of note is the additional percentage of funds allocated to industry development and the reduction in allocations to markets. One criticism of the current plan offered by a key stakeholder is its lack of attention to marketing and market research. In defence of the

current plan it is important to note that many 'non-market' projects include an element of market research and that a move away from generic market research was a major point of emphasis at the last R&D planning workshop.

The other useful classification in order to get a feel for where funding has been provided in the past is the stage of the R&D cycle at which R&D funding is targeted. There are three stages (CIE 2000):

- Stage I is identification. This is the first step in developing a product. It may be assessing the existence of a market, identifying genetic stock that is suited, understanding plant physiology, or exploring new products and processes.
- Stage II is development. At this stage there is a distinct objective in terms of developing a better processing technology, breeding for particular characteristics, creating and recommending superior production systems and so on.
- Stage III is adoption. In many cases adoption is a concern only for the industry and additional public funding is not appropriate. However, extension work, particularly where there are external issues such as health and industry reputation and communication of findings to a fragmented producer group, are valid candidates for public funding.

Table 3.4 summarises the allocation of funding across the stages.

Table 3.4 RIRDC Funding by Stage of Development (percentage)

Stage	1993 to 2000	1999 to 2004
Stage I – Identification	57	19
Stage II – Development	39	57
Stage III – Adoption	4	24
Total	100	100

In the period 1993 to 2000 the majority of projects in the Asian Foods program were in Stage 1 of the R&D cycle. In the current program funding has shifted to stage II (development) and stage III (adoption). The consultant believes this is an indication that Asian Foods research is maturing. There are fewer 'brand new' products to explore after ten years of research.

Initial Assessment of Projects

Table 3.5 lists all completed or on-going projects over the last five years grouped in accordance with each of the R&D Plans six key objectives. The table details project cost and timing. A brief summary of the objectives of each project/group of related projects and an initial assessment of project outcomes is provided below. The initial assessment was completed on a subjective basis with the RIRDC Asian Foods Program Manager.

The initial assessment assigns the categories of:

- Input – where the project cannot be evaluated in isolation of following projects;
- Too early- where it is too early to judge the outputs of the project, let alone the outcomes;
- Low – where the benefit flow is thought to be small (under 10%);
- Medium – where the benefit flow is thought to be good (in the range of 10 to 25%);
- High – where the benefit flow is very good (greater than 25% internal rate of return); and
- None – where no benefits are expected.

Once again, the classification is consistent with that used by CIE in 2000.

Table 3.5 Projects by Objective and Initial Assessment (FY99 to FY04)

Code	Title	Start	Finish	RIRDC	Total	Initial Assessment
Industry development						
<i>Finished</i>						
CIE-6A	Asian Foods Program - evaluation and five year plan	11/1/98	12/31/99	59,000	59,000	Medium
DAV-133A	National Asian foods newsletter	6/1/97	6/30/00	127,000	153,000	High
DAV-176A	Extension Pilot on communication with NESB vegetable growers	1/1/00	10/31/02	344,000	601,000	High
DAV-179A	National Asian Foods Newsletter	7/1/00	6/30/00	122,000	172,000	High
DAV-206A	National Asian foods newsletter - publication and evaluation	7/1/03	6/30/04	48,000	67,000	High
HAS-10A	Asian Vegetable Situation Assessment	6/20/02	2/1/03	50,000	50,000	High
<i>Current</i>						
CON-7J	Australian and export market study for Asian vegetables from Darwin/NT	4/1/04	11/30/04	45,000	54,000	Too Early
DAN-211A	Improved economic sustainability of Vietnamese vegetable growers in the Sydney region	11/1/02	10/31/05	242,000	327,000	Too Early
DAQ-270A	Industry development for Asian vegetables in north Queensland	7/1/00	8/15/03	14,000	23,000	Too Early
DNT-28A	Improving interaction and communication between RIRDC Asian foods project leaders and industry (stage 1)	3/1/01	7/1/03	42,000	73,000	Medium
DNT-29A	Improving interaction and communication between RIRDC Asian foods leaders and industry (stage 2)	8/1/03	6/30/05	20,000	34,000	Medium
DNT-31A	Product description languages and support material for minor tropical crops in northern Australia	7/1/03	7/1/07	22,000	156,000	Too Early
AFO4-10	Improving the Market Access of Asian Vegetables	7/28/04	7/28/05	106,000	328,000	Too Early
AFO-07	Taro Industry Development - the first step	7/20/04	9/30/06	60,000	218,000	Too Early
UQ-87A	Supply chain management, strategy and industry development for the commercial bamboo industry	3/31/99	11/30/02	142,000	306,000	Medium
New products						
<i>Finished</i>						
DAQ-233A	Development of an efficient technology for the production of Asian-style tempeh-based snack food	4/1/98	10/31/00	56,000	257,000	Low
DAN-125A	Agronomic and physiological studies on Lotus (Nelumbo nucifera) for export to Asia	2/1/97	8/31/00	123,000	193,000	Low
DAT-34A	Evaluation and development of Wasabi production for the East Asian market (continued)	1/1/98	3/31/01	94,000	293,000	Too Early
UA-38A	Oriental hot chilli development in Australia: Growing, post harvest and processing procedures	7/1/96	9/30/99	96,000	354,000	Medium
UCQ-8A	Production and post-harvest systems for the Chinese water chestnut industry	6/1/97	4/30/00	172,000	326,000	Medium

Table 3.5 Projects by Objective and Initial Assessment (FY99 to FY04)
(continued)

<i>Current</i>						
BBI-1A	Proposal to explore the commercialisation of a Tempeh-based snack	4/12/04	5/12/04	3,000	3,000	Medium
CSP-9A	Edamame soybean development in Australia	12/1/03	11/30/06	150,000	500,000	Too Early
DAQ-296A	Commercial taro chip development using agrichain partnerships	9/17/02	11/30/03	55,000	217,000	Medium
DAQ-298A	Development of Prunus mume, a new tree crop for Australia	1/1/03	5/31/06	120,000	395,000	Too Early
DAQ-307A	Anti-cancer properties of Asian crucifers	5/31/03	9/30/06	156,000	313,000	Too Early
DAT-39A	Production and marketing of Tasmanian wasabi	7/1/01	12/31/05	185,000	341,000	Too Early
FSA-2A	Adding value to Asian vegetables through easier meals for households	8/1/01	7/31/04	150,000	360,000	Too Early
UCQ-13A	Development of taro, yam, yam bean and sweet potato exports to Japan and USA	1/1/01	9/30/04	220,000	442,000	Low
AMR 8A	New Asian vegetables for domestic and overseas markets	7/1/02	2/28/03	41,000	51,000	Too Early
UT-30A	Specialty mushroom production systems: Maitake and Morels	2/1/00	12/1/03	179,000	282,000	Low
Production systems						
<i>Finished</i>						
DAV-153A	Diversifying Asian vegetable markets (ii) - Asian vegetables in every household	9/1/98	9/3/00	172,000	305,000	Medium
UCQ-10A	Consolidating the Asian vegetable industry, building on past achievements and action for the future	1/1/98	9/30/02	325,000	709,000	Medium
UCQ-9A	Improved management practices for culinary bamboo shoots - local and export markets	6/1/97	9/29/00	109,000	279,000	Medium
<i>Current</i>						
DAQ-291A	Taro production mechanisation and industry development	8/1/02	12/31/04	26,000	112,000	Too Early
Chemical use						
<i>Current</i>						
UCQ-19J	Asian vegetable pest, disease and weed management strategy	4/1/04	9/30/04	63,000	105,000	Too Early
<i>Pending</i>						
AFO04-05	Developing integrated management strategies for diseases and pests of Asian vegetables	7/20/04	5/31/08	485,000	1,388,000	Too Early
Shelf life						
<i>Finished</i>						
DAQ-239A	Extending shelf-life of minimally-processed leafy Asian vegetables	6/1/98	9/30/01	163,000	581,000	Medium
DAV-189A	MCP for improved quality of leafy Asian vegetables and herbs	7/1/01	7/31/02	43,000	89,000	Low
Cool chain management						
No projects						

Industry Development

This current R&D Plan objective is aimed at supporting industry development through improved information, communication and development of supply chain and marketer networks.

R&D plan/Statistics and Data

CIE-6A developed a background paper (CIE 2000) and five-year plan for the subprogram. Both documents are key inputs into this review. A medium initial assessment is assigned.

HAS-10A updated RIRDC Audit of the Australian Asian Vegetable Industry (CON-1A) and provided an assessment of the industry's future direction. The report is widely quoted and has provided input into industry research direction. A high initial assessment is assigned.

Communication

DAV-133A, DAV-179A and DAV-206A National Asian Foods Newsletter. This group of projects includes two, three-year contracts and a project evaluation. Output is a widely circulated and well-regarded newsletter. This Victoria Department of Primary Industries project has been reviewed and renewed. The project will now run until June 2005. This group of related projects is considered to have a good (i.e. high) outcome.

DNT-28A and DNT29A The objective of these twin projects was to improve communication between researchers/industry leaders and growers. The projects have been delivered via forums and workshops. They have been successful in attracting researchers and industry leaders but less successful in attracting growers. A medium initial assessment is assigned.

Strategies for industry development

DAV-176A Extension project on communication with NESB vegetable growers. Project funded the creation of an Asian vegetables communication officer in the Northern Territory Department of Business, Industry and Resource Development. Very well regarded project leading to the adoption of improved production practices and a superior understanding of southern market requirements. Project has been replicated in NSW (DAN-211A). A high initial assessment is assigned.

DAN-211A is the NSW replication of the successful NT extension project on communication with NESB vegetable growers. Project targets improved economic sustainability of Vietnamese vegetable growers in the Sydney region. It is too early to conclude on project outcomes.

CON-7J is an export and domestic market study with an eventual objective of building supply chain relationships for Northern Territory producers of Asian vegetables. The project incorporates links with transporters and has already excluded some products from export on the basis of price. Project commenced in April 2004 and it is too early to conclude on its outcome.

DAQ-270A targets Asian vegetable industry development in Northern Queensland. Project sought to coordinate and disseminate results of existing R&D in Asian vegetables, improve understanding of practices and prospects for wider adoption, conduct seminars, produce information manuals and establish a north Queensland Asian Vegetable working group. The project has generated interest in taro but not leafy vegetable production. It is too early to conclude on its outcomes.

DNT-31A is concerned with development of a project description language and support material for minor tropical crops in northern Australia. Its commencement has been delayed and it is too early to judge its performance.

AFO4-10 has the objective of improving market access for Asian vegetables through the provision of consumer information, consistent nomenclature and promotion options. The project is to be completed by NSW Department of Primary Industries (NSW Agriculture) and has not yet commenced. It is too early to judge its performance.

AFO-07 is concerned with the 'first step' in taro industry development. The project is yet to commence. Linked projects include DAQ-291A (taro production mechanisation and industry development) and DAQ-296A (commercial taro chip production using agri-chain partnerships). It is understood that limited taro production means that the commercial taro chip factory established as part of DAQ-296A is processing mainly banana and cassava.

UQ-87A this projects objectives were supply chain management, industry strategy and industry development for commercial bamboo. Bamboo exports encouraged under this project failed. Local bamboo sales have been modest (approximately \$100,000 per annum). However, the project has resulted in the formation of a cohesive and well-directed grower group who are responsible for 80% of Australian industry plantings. A medium initial assessment is assigned to this project.

Comments/Conclusions on the delivery of the industry development objective:

- For six of fifteen industry development projects it is too early to make an initial assessment of success. Four projects have achieved medium initial outcomes and five have achieved high outcomes. Three of the five high initial outcome projects are linked to the National Asian Foods Newsletter. The others are the Asian Vegetables Situation Assessment (HAS-10A) and the NT Vietnamese-speaking liaison officer (DAV-176A).
- Effective engagement with growers has been achieved through the NT Vietnamese-speaking industry development/extension officer (DAV-176A). RIRDC's decision to support this projects replication in NSW (DAN-211A) is therefore appropriate. These two projects are major investments for RIRDC and go a long way towards explaining the increase in overall program expenditure allocated to industry development.

New Products

The second R&D Plan objective is aimed at developing new products with good market prospects.

DAQ-233A was concerned with the development of commercial technology for the production of fermented soybean snacks (tempeh) and followed on from DAQ-174A (initial assessment of tempeh product options). Two snack products were developed. They were a snack bar and a cracker. The original commercial partner on the project was very active and one output from the project was a business plan that won an RIRDC award. The award included handover to the company of RIRDC's share of project intellectual property. Unfortunately the commercial partner company was sold and the new owner has no interest in pursuing the tempeh-based products. A small follow-up project (BBI-1A) has been initiated by RIRDC to try to find further commercial opportunities. At this stage a low initial assessment is assigned to the project.

DAN-125A completed agronomic and physiological studies of lotus for export to Asia. The crop was subsequently viewed as high risk and project outputs have not been used. The project failed to dedicate time to whole supply chain development. Market research effort and skill was missing from the project. A low initial assessment is assigned.

DAT-34A and DAT-39A are concerned with the development of a wasabi industry in Tasmania. They follow on from DAT-25A that undertook exploratory research. DAT-34A has a focus on lifting product quality and chemical residue freedom. DAT-39A is concerned with further production and marketing research. Two Tasmanian growers have adopted research findings and commenced wasabi production. The overall suit of projects is incomplete and it is too early to assign an initial finding.

UA-38A this project was designed to make chilli spice production economically feasible by addressing production, harvesting and processing constraints. Imported chilli powder was found to have a number of chemical contaminants and a better quality domestic product was proposed. The report addressed a number of improvements to the chilli production system that reduce the cost of production of chilli spice, improve the quality of the final product and make the industry more internationally competitive. The project forged good links with industry but profitable production is likely to be dependent on development of a mechanical harvester. A medium initial assessment is assigned.

UCQ-8A is concerned with Chinese water chestnut production and follows on from UCQ-6A (industry situation assessment and strategy). LOD-1A and UCQ-8A focus on improving product quality i.e. the size and sweetness of the corms. UCQ-8A specifically addresses plant nutrition. A small number of growers in southern Queensland and northern NSW have commenced production and the project is assigned a medium initial assessment.

CSP-9A is an edamame soybean industry development project. Edamame is eaten as a snack food in Japan. Edamame is also known as vegetable green soybean. Significant Australian imports of edamame are via Taiwanese owned firms and the product is currently grown in Thailand. An opportunity exists for import replacement. It is too early to assess project outcomes.

DAQ-298A is development of the tree crop *Prunus mume*. *Prunus mume* products are always eaten processed and include salt plumb, pickled plumb, plumb sauce and plumb wine. Salt plumb is eaten as a snack and around 30 tonne are imported annually into Australia. Some 86,000 tonne of pickled plum is eaten in Japan with rice. Half this amount is imported. Plumb wine is a fermented spirit like sake and 6000 litres are imported annually into Australia. *Prunus mume* genes may also be useful in semi-tropical apricot production. *Prunus mume* is a low input crop that does not require pruning or spraying, is

bash harvested' and appears to be highly drought tolerant. The RIRDC project has had genuine cash support from industry. The original project proposal was improved with the addition of a preliminary market assessment. It is too early to assess project outcomes.

DAQ-307A is research to identify anti-cancer properties in Asian leafy vegetables. The research is directed at preventatives rather than cures. Use of research outputs will need to be mindful of legal issues in making claims and the need for very expensive clinical trials to 'prove' findings. It is too early to assess project outcomes.

FSA-2A is concerned with value adding to Asian vegetables to create easier household meals. Food Sciences Australia is a joint venture between CSIRO and the Victorian government. The project has a number of commercial partners. It is too early to assess project outcomes.

UCQ-13A. This project was concerned with market opportunities, supply chains, production and grower organisation for three root crops – yam, taro and sweet potato. Markets investigated included Japan, USA and domestic opportunities. Best opportunities were revealed for yam into Japan. A trial shipment was made to Japan without follow-up success. A low initial assessment is assigned to this project.

AMR-8A research addressed new Asian vegetables for domestic and overseas markets. New vegetables to be addressed in this project include garland chrysanthemum, convolvulus, Ceylon spinach, the mustards, yams, gobo, sweet potato and others. It is too early to assess project outcomes.

UT-30A Addressed commercial opportunities for specialty mushrooms - mitake and morels. The project's commercial partner withdrew from the research mid project stating that the project was not doing what it was expected to do. A low initial assessment is assigned to this project.

Comments/Conclusions on the delivery of the new product objective:

- For seven of fifteen new product projects it is too early to provide an initial assessment. In most instances project research is incomplete.
- For four of fifteen projects a low initial assessment is provided. Common reasons include loss of a commercial partner (tempeh and mushrooms), failure of the project to achieve supply and demand alignment at acceptable product prices (yam, taro and sweet potato) and not enough attention to market research (lotus).
- Four projects achieved a medium result. These included oriental chilli spice, water chestnut, tempeh (first project) and taro (project success linked to processing of other crops).
- New product research is difficult and high risk but a core component of the RIRDC mandate. It is important that commercial partners have a clear understanding of what the project is going to deliver. It is also important that research address 'proof of market' before production research is commissioned.
- Two projects have addressed industry supply chains. This work is very important but difficult to execute successfully. Future R&D must address success factors in supply chain research.

Production Systems – Enhance Quality and Productivity

The third R&D Plan objective is aimed at providing troubleshooting solutions and enhancements to quality and productivity through research in production systems and plant physiology.

DAV-153A targeted development of product descriptors, optimum post-harvest handling and packaging protocols, reduction in waste, improvement in product quality and chemical management for leafy Asian vegetables. DAV-153A followed on from DAV-128A (Diversifying Asian Vegetable Markets). The Victorian Department of Primary Industries indicate a highly successful commercial outcome. The 2000 review of the Asian Foods Program (CIE 2000) indicated that the project, although unfinished, was likely to produce a medium initial assessment.

UCQ-10A was directed towards consolidating the Asian vegetable industry, all types, and building on past achievements for future success. A medium initial assessment is assigned to this project.

UCQ-9A was concerned with management practices for culinary bamboo shoots. The project produced a competent report. Uptake of findings is as yet unclear. A medium initial assessment is assigned to this project.

Production Systems – Chemical Use

The fourth R&D Plan objective is to ensure chemical use is safe for workers and consumers.

UCQ-19J is an Asian vegetable pest, disease and weed management strategy. This project commenced in April 2004. It is too early to make a preliminary assessment.

AF004-05 Developing integrated management systems for diseases and pests of Asian vegetables. This project is pending and has not commenced. It is too early to make a preliminary assessment.

Post Harvest Treatment and Handling – Shelf Life

The fifth R&D Plan objective is increase shelf life of fresh and semi processed products.

DAQ –239A is extending the shelf life of minimally processed leafy Asian vegetables. Competent work delivered by the researcher. Uptake to date somewhat limited. A medium initial assessment is assigned to this project.

DAV-189A Use of 1-MCP for improved quality of leafy Asian vegetables and herbs. 1-MCP is a chemical that slows production of ethylene in packaged vegetables. At this stage 1-MCP is only registered for experimental use and this limits the commercial uptake of project results. A low initial assessment is made.

Post Harvest Treatment and Handling – Cool Chain Management

The final R&D Plan objective is to improve cool chain management. No projects were commissioned in this area.

Summary of Initial Outcomes

Table 3.6 provides a summary of initial outcomes from subprogram investment for both the current period and the historical period.

Table 3.6 Summary of Initial Outcomes (percentage)

Stage	1993 to 2000	1999 to 2004
Too early	29	45
Input	10	0
Low	18	11
Medium	35	30
High	0	14
None	8	0
Total	100	100

NB: 1993 to 2000 is from CIE 2000 and 1999 to 2004 was completed from the RIRDC database. Both analyses were prepared with the assistance of the Asian Foods Program Manager.

In the current period, 'too early' dominates findings for the initial assessment. Medium and high returns combine to account for a similar overall percentage. There were a limited number of low return projects.

Project Cycle/Project Progression

To provide further insights into Asian Foods subprogram Table 3.7 summarises commodity development using a 'project cycle' approach. Not all projects are included in Table 3.7, only projects addressing a specific crop, group of crops or Asian Food are included (i.e. the table does not include many industry development activities).

Table 3.7 shows there are gaps in current program coverage. It also shows limited initial 'stand alone' market research for specific crops and the need to follow up with industry strategic planning.

Table 3.7 Project cycle Approach to Project Classification (Selected commodities)

	Market	Production	Post Harvest	Industry Development Strategies
Asian Vegetables				
Bamboo		DAQ-176A and UCQ-9A management practices for culinary bamboo shoots	ZUQ-87A supply chain management, industry strategy and development	UQ-87A Strategic plan for the bamboo industry
Chinese water chestnut		LOD-1A and UCQ-8A Chinese water chestnut production and quality	LOD-1A grower to processor systems	UCQ-6A Industry situation assessment and strategy
Japanese ginger - myoga	UT-9A and UT-17A marketing and production of myoga in Tasmania	UT-9A and UT-17A marketing and production of myoga in Tasmania		
Lotus		DAN-125A Agronomic and physiological studies of lotus		
Specialty mushroom	AMG-1A Market for specialty mushrooms	UT-30A Opportunities for mitake and morels CSF-50A Matsutaki production		
Oriental hot chilli	DAQ-154A Production and market opportunities for hot chilli products	UA-38A Production, harvesting and processing constraints for chilli	UA-38A Production, harvesting and processing constraints for chilli	
Taro	UCQ-13A Market opportunities, supply chains and production taro, yam, sweet potato	DAQ291A Production mechanisation and industry development	DAQ296A Taro chip production using agri-chain partnerships	AFO-07 'First Step' industry development
Vegetable green soybean		UCQ-8A production and industry development		UCQ-8A production and industry development
Wasabi	DAT-25A market opportunities and production research for Wasabi	DAT-34A continues the production research initiated in DAT-25Afor Wasabi		
Asian Foods				
Tempah		DAQ-174A Initial assessment of tempah product options	DAQ-233A Commercial technology for tempah product snacks	
Prunus mume		DAQ-298A Prunus mume production		

Performance Indicators

The current five-year R&D plan for the Asian Foods subprogram is inclusive of key performance indicators (KPIs) for each of its six objectives. The KPIs for each objective along with an assessment of the level of achievement realised is presented in the tables below.

Table 3.8a KPIs for Objective One (Industry Development)

Performance Indicators	Level of Achievement
Number of active networks for each of the industries falling into the 'new', 'emerging' and established categories	<p>Active networks and key contacts in groups established since 1999 include:</p> <ul style="list-style-type: none"> • Taro Growers Australia (Philippe Petinaud, North Qld) • NORADA Taro Growers Group (David Hicks/Peter McLaughlin, North NSW) • Aust Commercial Bamboo Corporation (Victor Cusack, North NSW – South Qld) • Asian Foods Researcher Group (Geoff Walduck, NT DBIRD) • Vietnamese Growers Group, NT (Kim Bui, NT DBIRD) • Group strengthening - NSW Vietnamese Growers (Ho Dang, NSW DPI)
Sales of publications on market information and production supply chain protocols. Numbers of subscribers to newsletters and hits on websites	<ul style="list-style-type: none"> • RIRDC has sold 760 Asian Foods publications in 5 years to end of 2003 (only limited 2004 data available). Trend has been for declining sales over this time (rising use of the internet?). Table of publication sales by title and year is included as Appendix 1 • Circulation of the Asian Foods Newsletter has increased from 700 in 1999 to over 900 in 2004. Translations include Chinese, Vietnamese and Cambodian. • There are currently 37 full Asian Foods project reports available for download on the RIRDC webpage.
Increase in volume into existing markets	<ul style="list-style-type: none"> • Volume data not readily available. • However Hassall 2003 shows value has increased from \$50.4 M in 1993/94 to \$135.8 M in 2000/01. • Grower numbers have increased from 679 to 1,675 over the same period.
Number of new markets for Australian production	<ul style="list-style-type: none"> • Program has not performed well here. Targeted new markets, such as Japan for taro and bamboo, have not been successful.

The industry development objective has scored well for networks, interest in publications and sales volume into existing markets. It has not performed well in establishing new markets.

Table 3.8b KPIs for Objective Two (New Products)

Performance Indicators	Level of Achievement
Number of new products with high prospectivity identified	<p>New products with high prospectivity identified include:</p> <ul style="list-style-type: none"> • Taro • Bamboo shoots • Lotus • Chinese water chestnut • Prunus mume • Edamame (vegetable green soybean) • Wasabi • Bitter melon <p>Bitter melon has already become a major crop in the NT</p>
Proposals for funding reflect the criteria for prospectivity	<p>Criteria for prospectivity have not been formalised. However the Asian Foods Advisory Panel considers all proposals for funding on the basis of:</p> <ul style="list-style-type: none"> • Existence of a viable market • Evidence that the crop can be grown • Prospect of establishing a supply chain
Availability of production protocols for value added products	<p>Production protocols were produced for:</p> <ul style="list-style-type: none"> • Taro • Bamboo shoots • Lotus • Water chestnut • Wasabi • Chilli • Tempeh <p>Production protocols for tempeh are commercial in confidence and have not been posted on the web.</p>

The new products objective has scored well for identification of new products (eight products identified), use of criteria to reflect prospectivity and availability of production protocols (seven products). This objective has been met.

Table 3.8c KPIs for Objective Three (Sustainable Production Systems)

Performance Indicators	Level of Achievement
Availability of production information in a range of products across major regions.	<p>Production information made available for:</p> <ul style="list-style-type: none"> • Taro • Bamboo shoots • Lotus • Water chestnut • Prunus Mume • Edamame • Wasabi • Bitter melon <p>In addition UCQ-10A specifically addressed across region production for each of:</p> <ul style="list-style-type: none"> • Daikon • Kabocha and Japanese pumpkin • Chinese broccoli • Bitter melon
Internal rates of return (IRR) on development stage projects. Target to exceed 25%	IRRs have not been calculated since the previous CIE assessment

The sustainable production system objective has been addressed through the availability of production information. IRRs have not been calculated.

Table 3.8d KPIs for Objective Four (Application of Chemicals)

Performance Indicators	Level of Achievement
Information on appropriate use of chemicals for the main chemicals commonly used on Asian vegetables. Inclusion in labeling of chemicals of application information for use on Asian vegetables and labeling in relevant languages for commonly used chemicals as an indicator.	<p>To be addressed in 2004 through:</p> <ul style="list-style-type: none"> • UCQ-19J Asian vegetable pest disease and weed management strategy • AFO04-05 Developing integrated management strategies for diseases and pests of Asian vegetables
Published guidelines for chemical applications to different Asian vegetables. Uptake of publications.	No progress
Inclusions of Asian foods in the chemical register	No progress

Objective four has not been achieved although two current projects will partially contribute to realisation.

Table 3.8e KPIs for Objective Five (Shelf Life)

Performance Indicators	Level of Achievement
Availability of handling protocols in formats accessible to growers	Performance indicator met through two projects: <ul style="list-style-type: none"> • DAQ 239A Extending the shelf life of minimally processed leafy Asian vegetables • DAV 189A 1-MCP for improved quality of leafy Asian vegetables and herbs
Measures of awareness of production and handling protocols among vegetable grower (target 80%)	Data not available to measure awareness but unlikely to be 80%
Optimal handling and packaging protocols available for the major Asian vegetables	Not addressed.
Increase in number of days shelf life of fresh products and lightly processed products (target 100% increase)	Not addressed.

Objective five has been part achieved.

Table 3.8f KPIs for Objective Six (Cool Chain Management)

Performance Indicators	Level of Achievement
Awareness by major transporters and supermarkets of cool chain management procedures and potential costs of lapses – (target 100%)	<ul style="list-style-type: none"> • Some NESB communication has centred on this and improved arrival quality has occurred in relation to NT product (DAV-176A)
Retailer/wholesaler agreement that arrival quality has improved	<ul style="list-style-type: none"> • Some NESB communication has centred on this and improved arrival quality has occurred in relation to NT product (DAV-176A)
Comprehensive listing of product compatibility and temperature requirements for shipment. Sales of publications on this information. Exposure of issue in trade literature	<ul style="list-style-type: none"> • This has not been completed

Objective six has been part achieved through DAV-176A. No projects were specifically commissioned to address this objective.

Features of Success

This section draws together features of successful Asian Foods R&D projects. It includes a summary from CIE 2000 as well as a summary of features of successful projects from the current five-year plan.

Features of Successful Projects (1993 to 2000)

CIE 2000 found a correlation between projects that are judged to be likely to have a good outcome and the approach taken to the R&D. Characteristics are:

- Initial investigation of the market conditions and, in particular, the quality required by the purchasers;
- Strong focus on the genotype that is acceptable to the targeted market;
- Strong focus on quality – in production and in post harvest handling;
- Regardless of the market focus, the formation of partnerships with commercial partners who have market connections. The exception is with Chinese cabbage in Victoria². This may be because Australia is already an accepted supplier;
- Involvement of the producer and/or partners in all parts of the supply chain; and
- Again with the exception of Chinese cabbage, relatively small production volumes and small number of producers.

In addition the following issues were important:

- Market overviews were less successful. The most likely success stories are highly boutique products that were not identified in such studies;
- The Australian market offers substantial opportunities for growth in fresh and semi processed products;
- The export market has potential for highly specified products;
- Exports that target delivered quality offer opportunities. Out of season price advantages create windows of profitable opportunity but connections with local markets are viewed as essential to exploit these;
- Cool chain management is the key to fresh product quality; and
- Supply chain analysis suggests that only a small proportion of the retail price is returned to the grower.

• ² The success of Chinese cabbage exports from Victoria has since been tempered by the growth of exports from China.

Features of Successful Projects (1999 to 2004)

This broad review of the current program would tend to confirm the characteristics of R&D projects that have a good outcome. To the characteristics identified by CIE 2000 the following comments are added:

- While production research has often included an initial assessment of market conditions, market research has been under represented in projects funded in the period FY99 to FY04;
- Commercial partners are an excellent means of increasing the likelihood of project success. However, a number of current R&D projects have failed when the commercial partner has failed. Processed food products are particularly susceptible to failure of a commercial partner;
- While fresh and semi perishable products are consistent with Australia's comparative advantage, domestic opportunities for fresh product are more constrained than in 2000. Some products, especially leafy vegetables, are reaching market saturation point.
- Cool chain management is still as vital as in 2000. However, industry consensus is that this is an adoption issue rather than a research priority.
- Engaging growers, especially growers from an NESB, is difficult but success has been achieved through the National Asian Foods Newsletter and the Northern Territory grower extension project.

4. SITUATION ASSESSMENT

This chapter provides a current Asian vegetable and processed Asian food situation assessment. The Asian vegetable situation assessment draws heavily on Hassall & Associates (2003). The chapter also includes a situation assessment for mainstream vegetable R&D and survey results on Asian Foods R&D issues.

Asian Vegetable Industry Situation Assessment

Structure and Production

The Australian Asian vegetable industry is a dynamic, growing horticultural sector whose products appeal to Australian consumers. Australian Asian vegetable production value and grower numbers more than doubled in the period 1994 to 2001. Asian vegetables have also doubled their share of total Australian horticultural production.

The domestic market accommodates more than 80 Asian vegetable types. However, most demand centres around a limited number of major lines. These include leafy vegetables such as bok choy (white cabbage), kai laan (Chinese broccoli), choy sum (Chinese flowering cabbage) and bor choy (Chinese spinach) as well as Chinese cabbage, spring onion/shallot, taro, daikon, kabocha and herbs such as coriander and Chinese chives.

One half of the Australian Asian vegetable industry (by value and grower numbers) is located in NSW. The industry has a presence in all Australian states and territories. As a general rule small-scale market gardens operate within the metropolitan area (group 1) while larger commercial holdings operate in the regions (group 2). Key features of both groups are summarised in Table 4.1 below.

Table 4.1 Asian Vegetable Industry Profile – An Industry with Two Types of Grower

Group 1 – Market Gardeners	Group 2 – Scale Producers
Recent migrants	Second generation Australians
Small scale market gardens (1/4 to 5 ha)	Larger commercial operations (5 to 50 ha)
Small volume production and a large number of different vegetable types	Fewer high volume products such as Chinese cabbage
Some seed saved for next year's crop	Commercial seed including hybrid seed
Supply fresh produce, especially leafy bunch lines to the domestic market	Producers of boxed product that requires less labour. More likely to be involved in exporting
Traditional practice	Best practice
Members of ethnic based growers groups	Members of broadly based grower groups. Grow Asian and conventional vegetables
Difficulty with communication	Actively seek information
More likely to experience cool chain breakdown. Poor profitability hampers capacity to invest in refrigeration	Use of specialty refrigerated storage and transport, new packing cases, adherence to cool chain management and QA
Market to restaurants and smaller scale greengrocers.	Market to larger scale retail (Western and Asian) and exports
More likely to bypass the central market system. Make use of aggregators	Market through central market system and some have sufficient volume to market direct to retailers

Source: Hassall & Associates 2003

The combination of short growing times, multiple harvests and intensive landuse make Asian vegetables a high yielding horticultural activity. Harvests of 60 tonnes per ha for crops such as Chinese cabbage and daikon are not atypical.

Trends and Innovations Since Subprogram Inception

Since commencement of the RIRDC Asian Foods program in 1993 the industry has become more sophisticated and organised. This trend is particularly apparent amongst group 2 growers. Key trends and innovations include:

- Improved chemical management, agronomy, superior hybrid seeds and yields;
- Larger farms in more remote locations;
- Adoption of QA/HACCP where this is required;
- Linkages between grower groups, government and research;
- More sophisticated supply chains and cold chain management;
- Emergence of medium and large growers that seek to manage the supply of a particular product line;
- Alternative market outlets and wider product availability;
- New crops; and
- Consolidation of production lines.

Market Situation

Since 1993, the domestic consumption of Asian vegetables has increased and the product range, quality and availability have substantially improved.

By far and away the majority of Australian grown Asian vegetables are sold fresh in boxes and bunched form. Pre-packed retail ready salad mixes containing Asian vegetables continue to grow in popularity. Other forms of processing, such as pickling, have had limited success. Modified Atmosphere Packaging is expected to play a greater role in the industry in the future.

Most growers sell on spot markets and there is a low level of forward contracting. Vertical integration has not yet emerged. Grower packing cooperatives are being explored in the NT. Cooperatives have met with little success in Victoria and NSW. A trend is emerging for single growers to specialise in a crop and dominate production and market activity.

Since 1993 a role has emerged for Asian vegetable aggregators who consolidate large tightly specified orders for supermarkets. Farmer markets have also emerged in NSW and Queensland. These markets serve as an important outlet for Asian vegetables that fail to meet supermarket specifications. The development of these markets in other states may have important benefits for producers.

Exporting of Australian Asian vegetables has stagnated since 1995. Export volume and value has been adversely impacted by competition from China. Future competition is expected from Vietnam. Australia currently exports around 16% of Asian vegetable production by volume. Queensland and WA dominate Australian export sales. It remains to be seen whether current interest from Japan and Singapore in guaranteed low chemical residue Australian vegetables translates into sales with acceptable margins³. Market research is required to investigate this opportunity and grower visits to export markets are suggested. Export marketing plans need to be founded on the back of sound domestic marketing practice.

³ RIRDC project CON-7J is currently exploring market and supply chain opportunities in Singapore.

Fresh Asian vegetable imports are a very small proportion of consumption. A small amount of taro is imported from the Pacific. Processed product is sourced from Asian countries that enjoy a labour cost advantage and a large domestic market.

Market outlook varies by state. In states with a small Asian population the industry is stagnating (South Australia and Tasmania). Western Australia will also stagnate unless new and profitable export markets are identified. Exports of Chinese cabbage from this state have faltered. Growth is forecast in Queensland and the Northern Territory and increasing sales through supermarkets is expected to drive demand in Victoria and NSW.

Supermarket Retailing

Given the importance of supermarkets to Australian fresh produce retailing, the following points are offered to provide insight into current situation and trends:

- The major supermarket chains are very pleased with Asian vegetables as a category. The category has provided strong growth and is profitable.
- However after an initial period of experimentation, supermarkets are contracting their offering around more popular/high turnover lines.
- Problems with Asian vegetables include inconsistency of supply and price, variable product quality, poor or even 'off flavours' and packed product that is underweight by the time it reaches consumers.
- The supermarket retailing environment is getting more competitive. R&D will be required to lower vegetable production costs and ensure the category remains competitive.
- Flavour will set the agenda for new product lines. An excellent visual appearance is taken for granted.
- Future emphasis will also include improvements in product quality, cleanliness, packaging, shelf life, bio-terrorism prevention and temper-proof packaging and consistent terminology/nomenclature.
- Consumers of Asian vegetables fall into two categories – traditional Asian consumers who purchase on the basis of freshness, price and quality and Western consumers who often have little idea of how to use the product.
- The health benefits of the product need to be able to be demonstrated. Asian vegetable consumption is increasing but more needs to be done to appeal to Western customers and product branding would assist.
- A precondition of supermarket supply will be HACCP certification.

Other Supply Chain Issues

Much has been done to improve domestic supply chain management and establish and implement appropriate cool chain management protocols since inception of the Asian Foods subprogram in 1993. Cool chain management is critically important to the delivery of product acceptable to consumers and remains an on going and potentially profitable area for adoption and extension. Enough pure research has been completed in this area.

RIRDC's initiatives in the NT in relation to a Vietnamese-speaking liaison officer and group-based activities provide useful lessons for the uptake of Asian vegetable R&D. The second RIRDC initiative with Vietnamese growers will address similar issues in NSW. The importance of R&D message repetition to achieve uptake by growers is critical. Liaison officers are one way of achieving message repetition and uptake. Given the overall size of

the Asian Foods program and the expense associated with liaison officers, it would be difficult to justify additional short-term R&D investment in this area.

A dichotomy exists between exporters of Asian origin and established mainstream horticultural exporters. Exporters of Asian origin tend to operate on spot markets and are penalised for the absence of a through chain approach. This finding may be important for directing future supply chain research efforts.

Industry Future Directions

With consistent nomenclature, dietary and functional food quality research and product promotion, Asian vegetables have the capacity to be recognised by the Australian population as a major fresh produce retail category.

In particular, the future lies with group 2 commercial producers. The near mainstream lines they produce, will merge into the mainstream and lose their status as exotics. Group 2 growers will continue to adopt best practice production and supply chain delivery systems.

Group 1 producers will occupy relatively limited niches from which new mainstream products will sporadically emerge. Group 1 growers will face pressure to close their operations as their market gardens are affected by urban expansion. This will trigger investment in either group 2 style operations or fund entry into another sector.

Group 2 growers will organise by vegetable type or production method rather than along production lines. Single growers will seek to dominate a category and protected crop production systems will be increasingly important.

Supermarkets will continue to set the domestic market agenda and their increasingly stringent requirements for cleanliness, packaging and shelf life will need to be met by growers. R&D will be required to contain these additional costs and deliver cost saving innovation. Grower markets, and potentially the food service sector and restaurants, will provide alternative domestic outlets for group 1 growers.

Exporting of fresh Asian vegetables will continue to be very competitive and best returns will be achieved by a whole chain approach for boutique products that bypasses Asian central markets.

Asian Processed Food Situation Assessment

In contrast to Asian vegetables, the growth of Australian Asian processed food production has been less successful.

Growth in Australian Asian processed food production has been hampered by:

- High labour costs relative to productivity;
- A small domestic market in which to establish products and achieve threshold production volumes;
- Few well recognised brands with the capacity or interest in producing Asian food products for the domestic, let alone export, markets;
- High entry costs for new players e.g. factories requiring capital equipment and a sterile production environment; and
- A lack of marketing expertise.

In addition, from an R&D perspective:

- Prudent R&D for processed food production is reliant on a commercial partner and in many instances a single firm will capture the benefits of success. In this event RIRDC would want to share any intellectual property benefits with the firm.
- Furthermore, as the review of the current research program demonstrated, when a commercial partners situation changes (e.g. buyout or change in management priorities), commitment to the project may falter.

This is not to say that Asian processed food is not important or that it will not grow significantly over the next few years. Over the life of the RIRDC Asian Foods subprogram the domestic market for processed Asian foods has increased in value from \$1 billion in 1994 (INSTATE 1994 in CIE 2000) to an estimated \$2 billion in 2004 (consultants estimate based on an annual growth of 7%). Australian producers capture an estimated 20% of this market (INSTATE 1994 in CIE 2000).

Products included in this sector, that are currently dominated by imports, include:

- Noodles and rice – instant noodles, cup noodles, vermicelli, rice noodles;
- Processed fresh foods – tofu, fish balls/sausages;
- Sauces and pastes – soy sauce, fish sauce, oyster sauce;
- Condiments and spices – shrimp seasoning, seaweed, dried mushroom;
- Snacks and sweets – biscuits, fried shrimp crackers, rice cracker snacks;
- Beverages and drinks – soy drinks, coconut milk, jasmine tea, plumb wine; and
- Canned goods and soups – fruit such as lychee, champignons, vegetable soups.

Future directions for this sector are expected to include further growth in retail 'meal ready' ingredients and sauces/high quality semi processed products suitable for the hotel, restaurant and institution sales.

Opportunities Australian producers might like to consider include:

- Semi processed products where Australian producers have a natural comparative advantage (i.e. products based around Asian vegetables); and
- Sea based products that might be extracted and processed from Australia's large coastline and unique biota e.g. seaweeds and sea cucumbers.

Mainstream Vegetable R&D

The mainstream Australian vegetable industry is referenced to provide insight into issues and R&D priorities facing the broader industry and potentially inform the revised Asian Foods R&D plan. Material was sourced from the current Australian Vegetable Industry Strategic Investment Plan 2003 – 2008 (Australian Business Ltd 2003). The plan is to be revised (Jonathon Eccles, HAL pers comm.)

The five most important issues facing the Australian vegetable industry, according to the plan, which was informed by industry consultation, are:

- The requirement for more development and less research. The R&D program should be run from the perspective of customer requirements not researcher interest.
- There is a requirement for improved understanding and engagement with the supply chain. Customer needs refers to understanding the requirements of all supply chain partners (including input suppliers) and not just end customers.

- Grower collaboration. While much has been achieved through Industry Development Officers more work is required unifying growers and forming export networks. Dissemination of research findings in a grower friendly format was also a priority.
- Grower and farm sustainability especially in relation to water resource management and profitability. Profitability issues included reduction in unit costs, grasping the benefits of scale, achieving higher prices and facilitating efficient supply chains.
- China as a competitor in North East and South East Asia as well as a competitor on domestic markets.

Just missing the 'top 5' issues list was support for work in understanding consumer needs/domestic market promotion. All of these issues are relevant to Asian vegetables.

R&D priorities formulated in response to these issues were:

- Product development
 - Seed/variatal research
 - Pest/disease research (including minor chemical use)
 - New and value added products
 - New technology and its application
- Domestic market development
 - Understanding 'customer' needs (consumer/retailer/wholesaler/processor)
 - Opportunity identification
 - Product promotion
 - Import replacement
- Export market development
 - Understanding 'customer' needs (foreign consumer/foreign retailer/foreign wholesaler/foreign importer/Australian exporter)
 - Opportunity identification
 - Product promotion
 - Competitor analysis
 - Market opening initiatives
- Sustainability
 - Skilling/learning – good agricultural practice, financial/business management
 - Profitability
 - Environmental management
 - Resources – water, soil, labour
 - Biosecurity
- Supply chain competitiveness
 - On-farm practices/efficiencies
 - Product safety
 - Product integrity/quality assurance
 - Post harvest practices/efficiencies
 - Post farm gate efficiencies
 - Cold chain integrity
 - New packaging
 - Alternative supply chain/consumer channels

- Industry communication and collaboration
 - Communication/collaboration between stakeholders
 - Opportunity dissemination and implementation

Again, these R&D priorities are relevant to Asian vegetable plan development. In addition, it would seem that the current mainstream vegetable industry R&D plan has more emphasis on 'the market' and 'supply chains' than the current Asian Foods plan.

Survey Results - Asian Foods R&D Needs

A short informal questionnaire was prepared and circulated by the consultant to assist with Asian foods R&D priority setting. Results of the survey are summarised below.

Gaps in the last five-year R&D Plan

- More export market R&D required
- Develop an extension strategy with agricultural suppliers
- Seaweed and aquaculture research needed
- Last plan was driven by too much focus on the production side. Emphasis was from researchers looking at varieties. Not enough on market focus/market driven R&D. Market trend information that would provide growers with the confidence to plant. What is happening in the Food Service Sector, Restaurants etc? Traditional researchers are dictating the pathway for R&D not the market.

Major new thrusts required in the next five-year R&D plan

- Focus on leafy vegetables has been at the expense of just about everything else
- Strategies for shifting group 1 growers to group 2
- Health properties of Asian vegetables
- Functional foods is a new area
- Functional foods and aquaculture including functional food links with Chinese medicines
- The plan should take a sequential approach to projects, put all effort into one crop, see how far it can be taken then move onto the next

Have processed foods received sufficient R&D

- Import replacement potential bit limited by high labour costs, but what about high quality/high priced products like fermented soy sauce?
- Processed foods have not received enough funding – look at pickling of leafy brassica/mango – kimchi for import replacement. Asian Australians are interested in starting these types of small businesses
- Some potential but the area has to compete against cheap foreign processed imports

Appropriateness of the mix between Research, Development and Extension

- Too much extension type material not enough research and development
- Need more development work

Use of supermarket requirements to influence R&D setting

- A supermarket led focus would assist in developing professionalism but given export potential of Asian Foods it should not dominate

- Yes
- Yes, but R&D should not just be to please supermarkets
- Were proactive in the development of the fresh cut area and should be involved in the future
- Yes they can be a component but should not be allowed to dominate

Sufficient export market R&D

- No, more is required but it is expensive so needs to be well focused
- No, need to focus on those states with export potential (i.e. NT/Qld)
- No, but need to leverage off Austrade, state organisations
- No
- Difficult question, but generic export research is not much use to anyone

Sufficient attention to chemical use

- Yes
- No, especially for minor chemicals. Need to investigate use of non-permit chemicals and do trial work. Follow up on David Midmore/Jannine Clark project.
- Yes
- Yes, but needs ongoing attention

Cool chain management research versus extension

- No more research, requirement is implementation of existing knowledge
- Cool chain is understood
- Just an extension issue now
- Extension – temperature abuse and chilling injury
- Extension – but benchmark data on industry performance could be useful

Industry development activities

- Less attention now the program is ten years old
- Still very important
- Less attention now
- No because the crops keep changing
- Yes, less emphasis

Intensification versus scale production

- Professionalism will come from scale production
- Both are the future but have socio-political responsibilities for Group 1 growers
- Future is scale production in more remote locations
- Not sure how this fits in with RIRDC priorities

Availability of genetic material

- Yes there are limitations with the current genetic material
- Yes
- I can see this is a potentially important issues, if a specific cultivar is wanted but difficult to get
- No real barriers, appropriate quarantine procedures and a willing supplier is all that is required

Social research in the Asian Foods program

- The relative importance of NESB is likely to decline over the next 10 years
- Yes but work in with other agencies
- No, I think it simply confuses the issue of what the Asian Foods program is about
- Program already contains an element of social research
- Stop thinking it is a program for Asian people start thinking all growers and consumers

5. INDUSTRY SWOT

An industry strengths, weaknesses, opportunities and threats analysis, informed by the situation assessment, the stakeholder survey and industry workshop is presented below. Emphasis has been placed on those elements that can be addressed through R&D.

Asian Foods Strengths Weaknesses Opportunities and Threats Analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> ▪ Strong domestic demand for Asian vegetables ▪ Suitable natural resources ▪ Overseas and domestic perception of a clean production base ▪ Seasonal supply advantages – northern hemisphere and latitudinal growing season ▪ Continued emergence of new products/varieties ▪ Asian vegetables are beneficial to human health ▪ Research infrastructure 	<ul style="list-style-type: none"> ▪ Majority of growers do not understand production and market requirements ▪ Non-compliance by many Group 1 growers with quality requirements ▪ Consumers unsure how to use more exotic vegetables ▪ Lack of low cost labour for crop and processed food production ▪ High priced land/water and no scale economies for Group 1 growers ▪ Small domestic market limits opportunities for processed foods ▪ Lack of market research and market data ▪ Plateau in demand through some outlets with resultant downward pressure on price ▪ Lack of standardised nomenclature ▪ High costs associated with packaging and transport ▪ Lack of ‘through chain’ approach to marketing ▪ Expensive/inappropriate packaging
Opportunities	Threats
<ul style="list-style-type: none"> ▪ Clean exports to Asia (Japan and Singapore concerned by chemical residues in Chinese product) ▪ Products for growing food services sector (both fresh and semi processed) ▪ Target opinion leading chefs/restaurateurs with new products to grow domestic demand ▪ Farmer markets ▪ Semi processed convenience foods ▪ Mechanisation of production ▪ Benefits can be achieved through grower collaboration ▪ Recognise the existence of different groups of growers with different skills, adjust R&D to their particular needs 	<ul style="list-style-type: none"> ▪ Competition from China in export markets (also Vietnam, Malaysia and NZ) ▪ Rationalisation of domestic supply chains and potential exclusion of some growers ▪ Poor chemical management damaging industry reputation ▪ Declining traditional vegetable consumption in Asia

6. STUDY REFERENCES

Australian Business Ltd (2003) Review of the Australian Vegetable Industry 5 year Strategic Investment Plan

CIE (2000) Asian Foods Program Background Paper, A report for the Rural Industries Research and Development Corporation.

Hassall & Associates (2003) Asian Vegetable Industry, A Situation Assessment. A Report Prepared for the Rural Industries Research and Development Corporation

Hassall & Associates (2003a) Live Export R&D Strategic Plan (“Investment for Excellence”). A Report Prepared for meat & Livestock Australia and LiveCorp

RIRDC (2000) R&D Plan for the Asian Foods Program 2000-2004

RIRDC (2001) R&D Plan for Essential Oils and Plant Extracts 2002-2006

Appendix 1 – Sales of Publications

Asian Foods Publication Sales		1999	2000	2001	2002	2003	2004	Total
1	Chilli Spice		1	16	5	2		24
2	Pickled Asian Veg			20	3	3		26
3	Asian Foods RIP 2000				2			2
4	Jap Ginger			8	4			12
5	Background paper			2	2	1		5
6	National Newsletter			5				5
7	Water chestnut				11	12		23
8	Diversifying Markets 1			2	2			4
9	Diversifying Markets 2			1	2			3
10	Lotus Export			1	3	1		5
11	Asian Foods RIP 2001						1	1
12	Wasabi					1		1
13	Culinary Bamboo					5		5
14	Processed Asian Foods					1		1
15	Bitter Melon					1		1
16	Asian Veg industry					1		1
17	Agribusiness & Processed Food	3	4	2				9
18	National Workshop	4		1	1			6
19	Asian Food Bigger Bite	7	1	4	1			13
20	Food Distribution China & HK	4	3	2				9
21	Market Processed Food & Bev	7		3	1			11
22	Indian Dairy Desserts	3		2	1			6
23	Food Retailing South East Asia	10	6	3				19
24	Market Compendium Asian Veg	14	11	3				28
25	Audit Asian Vegetables	6	3	2	1			12
26	Market Opport Fresh & Processed Veg	10	8	2	2			22
27	Feeding Dragon Processed Food	6	1	1	1			9
28	Aust Asian Veg - An Assessment	17	10	3	2			32
29	Asian Veg Industry Conference	7	1	2	1			11
30	Prod & Post Harvest Handling Chinese	13	6	1	1	2		23
31	Prod Vegetable Green Soybean	13	4	3	2			22
32	Aust Seaweed Industry	34	10	6	1			51
33	Wholesale Demand for Food in China	24	5	2	1			32
34	Bamboo for Shoots and Timber	40	16	12	7	1		76
35	Chinese Water Chestnut Industry	28	11	2		1		42
36	Culinary Bamboo Shoots in Australia	25	12	5	1			43
37	Potential Opp for Increased Production	19	5	3				27
38	Asian Foods RIP			1				1
39	Selected Australian Asian Vegetables		14	24	1			39
40	Bamboo for Asian Sir-fry		9	7	3			19
41	Chinese Cabbage Cultivar Evaluation	10		9		1		20
42	Indian Condiments & Pickles		13		2	3		18
43	Leafy Asian Vegetables		3	3	1	1		8
44	Aust well positioned to export pickled &		3	1	1			5
45	Asian Veg Industry in East Gippsland	8	2	1				11
46	Indonesia's Agri. Policies & Opps	5	3	2	2			12
47	Asian Festivals & Customs		2	3	1			6
	Total	317	167	170	69	37	1	761