



Evaluation of the Agroforestry and Farm Forestry Program

An overview of all projects - stage 1

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

by Marcia Bauer and Jenny Gordon

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Foreword

This report is part of an overall evaluation of the Agroforestry and Farm Forestry Program, a sub-program under the Emerging Industries program. This is the fifth in a series of evaluations and the first at the sub-program level. This report, the first stage of the evaluation, compiles a list of all completed and current projects together with an assessment of their expected impact. The second report, stage 2, provides an in-depth assessment of the impacts of 25 projects in four project sets.

This report provides a brief history of the projects that have been undertaken in the program. Most of these projects have been part of the Joint Venture on Agroforestry (JVAP) which RIRDC chairs. Agroforestry is an emerging industry in Australia for a number of reasons. It offers an opportunity for farmers to diversify into, often complementary, production areas. Perhaps more importantly, returning trees to the landscape is seen as an essential component of better resource management providing significant on and off-site benefits. It is the presence of externalities — benefits that accrue to people other than those making the investment — that stimulates public interest, yet for the industry to thrive it needs commercial returns. The research program described in this report is tackling these issues on a number of fronts. A major focus of the work is on improving profitability by raising productivity and investigating higher value added product opportunities. Attention is also being given to better understanding the potential environmental outcomes and how they might be reflected in market prices to improve investment incentives.

Much of the work (48 per cent of JVAP funding) has been focused on the investigation stage of R&D, particularly on sustainable development. Roughly even shares of funding have been devoted to each of the stages of R&D in the areas under production industry competitiveness. Around half of the projects by funding level are assessed as having a potentially high impact.

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Simon Hearn

Managing Director

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Executive summary

This report forms Stage 1 of a two-part evaluation of RIRDC's Agroforestry and Farm Forestry Program. The purpose of Stage 1 is to provide a record of all projects that have been completed or are being completed in the program. This record is useful in that it:

- identifies areas of past funding, upon which future research may build;
- summarises program managers' assessment of past activities, capturing institutional memory and contributing to the understanding of factors influencing the success of future research; and
- highlights the historical distribution of JVAP funding which may act as a guide to future portfolio investment decisions.

Program funding

The program has supported 157 projects with an expenditure by the Joint Venture on Agroforestry (JVAP) of \$16.98 million since 1990. Of this, \$5.7 million has been provided by RIRDC. This funding has been boosted by additional investment by other research organisations of \$18 million and industry contributions of \$6.3 million.

Project classifications

Projects are classified according to Agriculture, Fisheries and Forestry Australia's (AFFA) Level 1 project classification system. The allocation of JVAP funds across project Level 1 classifications is given in table 1.

It is clear that the lion share of research and development (R&D) expenditure has been on production aspects of agroforestry, with 40 per cent allocated to 'Production – industry competitiveness' and 40 per cent to 'Production – sustainable development'. A relatively small share of expenditure (4 per cent) has been on 'Markets' and 'Processing' R&D.

Table 1 **Overview of portfolio funding**

AFFA Project Classification	JVAP funding	Share of total JVAP funding
	\$	%
Production — industry competitiveness	6 743 489	40
Production — sustainable development	6 770 514	40
Industry training and development	2 412 189	14
Markets	413 013	2
Processing	308 156	2
Communication and technology transfer	175 621	1
Total	16 935 112	100

Note: shares of JVAP funding do not add to 100 due to rounding.

Source: Tables Ch 2–7

Stage of R&D

The report also classifies projects according to the stage of R&D targeted by the project. Stage 1 represents basic or fundamental research. Stage 2 constitutes applied R&D, while Stage 3 categorises those projects at the other end of the research cycle, that are focused on industry development through communication and extension of new information and innovations to potential users.

Table 2 summarises the allocation of funds across each of these stages. Historically, almost half of the Farm Forestry R&D budget has been allocated to projects that represent fundamental research. The other half of expenditure has been split equally between Stage 2 (applied) work and Stage 3 projects (communication and development aspects).

The mix of basic, applied and development work varies across the different AFFA classifications. For example, projects within ‘Markets’ and ‘Communication and Technology Transfer’ are all Stage 3 projects. By contrast, ‘Processing’ contains projects that are mainly characterised as Stage 1. The suite of projects within ‘Production — Industry Competitiveness’ are spread across all three stages.

Table 2 Share of projects by value at different stages of the project cycle

AFFA Project Classification	Stage 1		Stage 2		Stage 3	
	JVAP Share		JVAP Share		JVAP Share	
	\$	%	\$	%	\$	%
Production — industry competitiveness	2 242 795	33	2 138 515	32	2 362 179	35
Production — sustainable development	3 983 895	59	1 882 363	28	904 256	13
Industry training and development	841 626	33	985 881	39	702 812	28
Markets	987 00	24	112 003	27	202 310	49
Processing	250 006	81	58 150	19	0	0
Communication and technology transfer	0	0	0	0	175 621	100
Total	7 417 022	43	5 176 912	31	4 347 178	26

Initial assessment

As part of this evaluation project managers were asked to provide an initial assessment of the impact of each project undertaken by the Farm Forestry Program. Results from this survey are summarised in table 3. The results show that nearly half of the R&D funds have been spent on projects considered as having a high impact. The proportion of investment in low impact work has been fairly small (7 per cent).

The reasons behind each project's impact are varied and are discussed in the body of this report. At the time of writing, it was too early to assess the impact of some projects, and the outcome of other projects was not known.

Table 3 Initial assessment by total JVAP funding

Project impact ranking	JVAP funding	Share
	\$	%
High	7 987 648	47
Medium-high	755 209	4
Medium	2 748 164	16
Low-medium	196 820	1
Low	1 205 152	7
Too early	2 079 111	12
Unknown	2 003 007	12
Total	16 975 112	100

The assessments provide a first-pass guide to the likely impact of each project, but caution should be exercised as they were made by different people with different priors of what constitutes high, medium and low impact. Much of the

value of such assessments lies in the process of making them, as it forces consideration of the impact of the project which depends not only on the success of the research but a host of other factors, such as adoption rates, that influence the magnitude of the impact or benefit.

Many projects have delivered outputs that constitute new information rather than definitive products. In some cases, it is not yet known what impacts will flow from this information — or how big the impact will be. This is because often there is a long time lag between the delivery of project outputs and any measurable change in economic activity. Similarly the social and environmental impacts can be slow to arise and difficult to attribute back to the R&D. This makes the assessment of the value a challenge for project managers, but it is the same challenge they face in assessing proposals. The information in this report and Stage 2 of the evaluation — the benefit cost analyses of a select number of projects — will be a useful base from which to assess future R&D proposals.

1 Introduction

This report was prepared for Rural Industries Research and Development Corporation (RIRDC) as an evaluation of its Agroforestry and Farm Forestry research and development program. The evaluation has two stages. Stage 1 provides a summary and classification of RIRDC's agroforestry R&D projects to date. The projects considered run from 1990 to the present, and include several that are not due to be completed until 2005. It should be noted that most of the projects are conducted under the Joint Venture on Agroforestry (JVAP). This is a partnership of RIRDC, Land and Water Australia, Forest and Wood Products RDC and the Murray Darling Basin Commission. Stage 2 presents a benefit cost analysis of a number of project clusters.

Classification

Projects are classified according to Agriculture, Fisheries and Forestry Australia (AFFA) classifications on the first level, the stage of research and development they consider, and a common subject matter. The classification system is based on classifications required by AFFA.

Each project is classified on three levels:

- Level 1 – AFFA classification. This classifies projects according to the broad area of research impact.
- Level 2 – Topic. This classifies projects according to the subject matter of the research. This is largely determined by where in the value chain R&D is directed.
- Level 3 – Keyword. This gives finer detail on the area of R&D engaged in. A project may have more than one keyword if its research covers more than one area, or if it has more than one output.

Table 1.1 lists the classifications used in this report.

Table 1.1 **Classifications**

Level 1 – AFFA Classification	Level 2 - Topic	Level 3 – Keyword	
Production – Industry Competitiveness	Production Systems	Seed Selection Site Suitability Species Suitability Silviculture	
	Breeding	Seed Selection for Breeding Program Hybrids and Cloning Other Genetics	
	Pests, disease and nutrition	Pests Disease Nutrition	
	Oil mallee	Biomass Viability	
	Cabinet timbers	Nutrition Multiproducts Production Systems	
	Production – Sustainable Development	Salinity	Design principles Extension
		Integrated Farming Systems	Alley farming Phase Farming with Trees Grazing Systems
		Soil Management	Soil Management Design principles
		Windbreaks	Modelling Extension Assessment
		Multiple use of resources	Native forests Biodiversity
Industry Training and Development		New Products	Feasibility studies Extensions
		Planning	R&D Planning Property Management Planning and Design Principles
	Policy and Industry Strategy	Policy Other Industry Strategy	
	Development	Financial management	
	Occupational Health and Safety	Harvesting	
	Human Capital and Community Development	Human Capital and Community Development Master Treegrowers Program	

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Table 1.1 **Classifications** (continued)

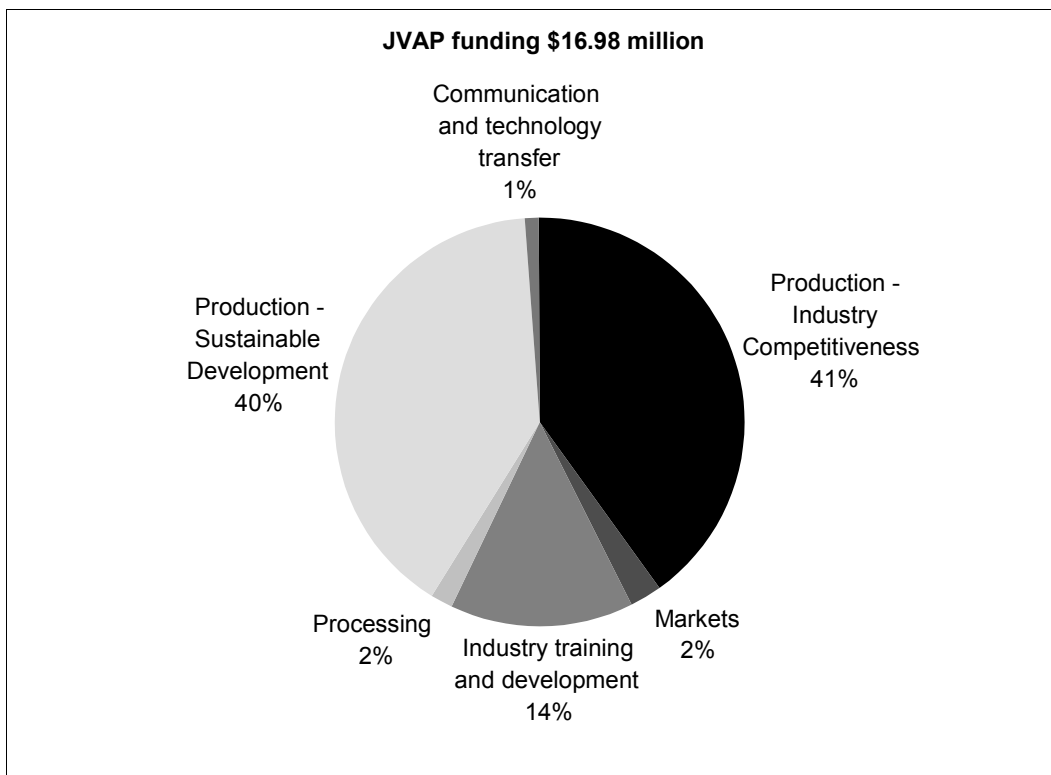
Level 1 – AFFA Classification	Level 2 - Topic	Level 3 - Keyword
Markets	Marketing	Marketing
	Market Information	Market Information
	Environmental Markets	Environmental Markets
Processing	Oil mallee and biomass	Oil mallee
		Biomass
		Alternative uses for wood
	Other products	New Products
		Processing
Communication and Technology Transfer	Conferences	Conferences
	Extension	Extension

Allocation of JVAP resources

Chart 1.1 summarises the allocation of JVAP funds across the AFFA classifications. Most of JVAP funding was provided to projects classified as Production – Industry Competitiveness and Production – Sustainable Development. Note that although the category Communication and Technology Transfer received a small portion of JVAP funding, many communications and transfer projects were classified in other AFFA categories according to the subject matter of the information communicated.

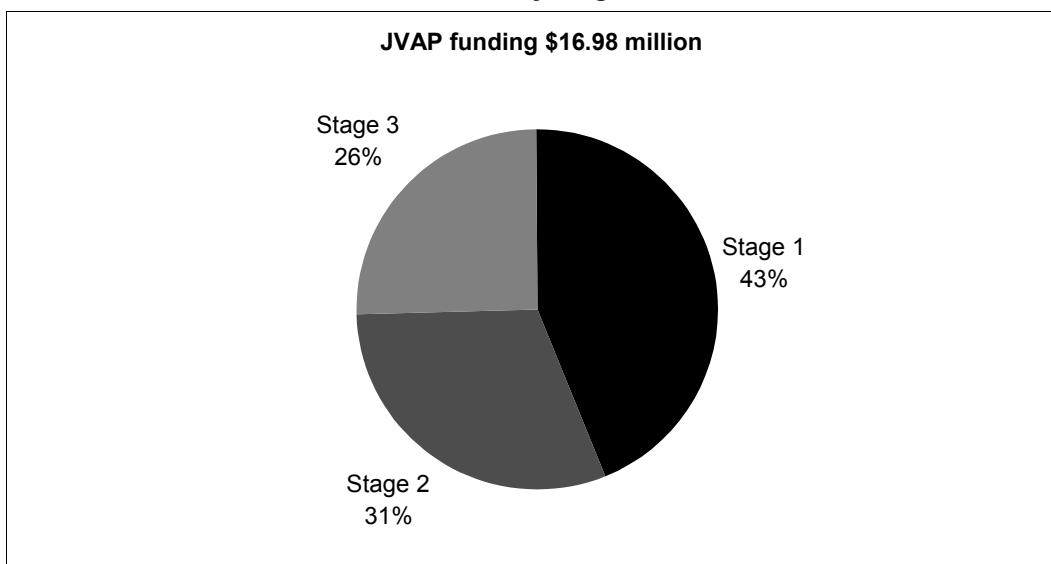
This can be seen in chart 1.2 which shows the stage of the R&D. The majority of the funding is allocated to Stage 1 projects. The areas of Production – sustainable development and Processing have a very high share of Stage 1 projects as they seek to establish new opportunities to support the farm forestry industry.

Chart 1.1 Allocation of JVAP resources via AFFA classification



Data source: RIRDC database, RIRDC and CIE classifications

Chart 1.2 Allocation of JVAP resources by stage of R&D



Data source: Tables chapter 2-6

2 Production – industry competitiveness

Fifty four projects focused on the area of production – industry competitiveness. The projects aimed to increase the productivity of agroforestry by researching the most efficient inputs and methods and providing this information to agroforesters. A total of \$16.766 million was provided for these projects, of which JVAP contributed \$6.743 million, or 40 per cent. Table 2.1 lists the details of funding and timing for each project. It is listed alphabetically by code by the level 2 categories which are:

- production systems
- breeding
- pests, disease and nutrition
- oil mallee, and
- cabinet timbers.

Table 2.1 **Production – industry competitiveness – funding and project timing**

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
					\$	\$	\$
<i>Production systems</i>							
AGT-4A	An assessment of commercial prospects for planted tree species in the low rainfall zones of Australia	1/04/98	31/08/98	63 000	0	0	63 000
CAL-1A	A Farmer Interface for TREEDAT	1/07/92	30/06/93	62 750	62 560		125 310
CAL-4A	(NHT) Development of an Australian 'Farm Forestry Site Selection Manual'	1/02/99	1/02/00	112 722	116 099	0	228 821

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Table 2.1 **Production – industry competitiveness – funding and project timing**
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
					\$	\$	\$
CPF-1A	Predicting tree growth in farm forestry and following thinning	11/01/99	21/12/01	200 938	258 150	42 630	501 718
CSF-41A	Evaluating the Effect of Soils and Climate on Productivity of Eucalyptus Globulus Plantations on Contrasting Sites in the Southwest of Western Australia	1/07/90	30/06/93	77 300	0	209 140	286 440
CSF-44A	Collection of Tree Performance Data	1/07/92	30/06/93	54 800	87 400		142 200
CSF-45A	Seed Production Areas for Direct Seeding Programs	1/07/92	30/06/93	10 000	5 825		15 825
CSF-48A	Tree performance database meeting	31/05/94	31/07/96	15 000	30 500	0	45 500
CSF-56A	Seed and information support for farm forestry	1/01/99	31/12/01	1 339 760	852 947	46 322	2 239 029
CSF-57A	Conifers for the dry country	1/11/98	30/11/99	40 000	65 300	0	105 300
CSF-58A	(NHT) Tree improvement for low rainfall farm forestry in southern Australia	1/04/99	15/12/01	761 342	359 768	0	1 121 110

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Table 2.1 **Production – industry competitiveness – funding and project timing**
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
DAQ-222A	The silvicultural basis for farm forestry in Australia - a national, collaborative review of past and present silvicultural research and proposals for a national network of strategic experiments	1/04/97	30/10/01	344 440	851 400	0	1 195 840
DAV-129A	Forecasting tree growth and yield and financial returns of key agroforestry species across southern Australia	1/04/97	30/09/99	138 800	116 671	15 000	270 471
PIF-1A	Species Selection Database	1/07/93	30/06/96	15 000	10 600	0	25 600
QDN-2A	Joint CRDC/Joint Venture Agroforestry Program trees on cotton farms	1/07/97	30/07/98	35 100	3 000	0	38 100
RST-1A	Aleppo pine dryland forestry	1/08/96	31/03/98	48 000	68 100		116 100
SFN-1A	Wood and fibre properties of dryland conifers	1/09/01	1/07/03	120 008	101 916	17 987	239, 911
UCQ-1A	Management of Trees on Farms in Central Queensland	1/01/92	31/12/94	7 000	7 650	0	14 650
UWS-3A	Direct Seeding Technologies for Farm Tree Establishment	1/06/92	1/06/95	74 570	45 342	51 280	171 192

(Continued on next page)

Table 2.1 **Production – industry competitiveness – funding and project timing**
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
					\$	\$	\$
<i>Pests, disease & nutrition</i>							
CSE-52A	Identification, Life-cycle and Control of Insects Attacking Trees Planted on Farmlands in Southeast Australia	1/07/92	30/06/94	37 506	43 692	0	81 198
CSF-53A	Sustaining the productivity of trees crops on agricultural land in south-western Australia	1/01/97	5/05/00	137 000	379 167	131 000	647 167
DAN-68A	Biological Control of Scarabs Causing Eucalyptus Dieback	1/07/91	30/06/94	72 030	353 378	0	425 408
DAV-68A	An ecological approach to integrating trees with livestock to reduce the need for expensive fencing	1/09/92	28/02/93	4 500			4 500
DAV-80A	An Ecological Approach to Integrating Trees with Livestock Enterprises to Reduce the Need for Expensive, Conv entional Fencing	1/07/93	30/06/96	120 290	150 035	27 000	297 325

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Table 2.1 **Production – industry competitiveness – funding and project timing**
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
					\$	\$	\$
DAN-126A	Establishment of trees on non-arable land to replace weeds	1/07/95	30/03/99	30 000	240 000	0	270 000
UA-51A	An investigation of 'Mundulla Yellows' affecting native Eucalyptus species	1/04/00	31/05/01	40 566	32 512	10 000	83 078
<i>Breeding</i>							
CAL-5A	Eucalypt hybrids in south-west Western Australia	1/12/00	31/03/03	17 300	22 000	0	39 300
CPF-3A	Assessing the risk of genetic pollution from farm forestry using hybrids and improved species	10/06/99	10/09/99	15 000	0	0	15 000
CSE-53A	Production of Eucalypts Resistant to Insect Attack	1/07/92	30/06/95	144 760	159 166	0	303 926
CSE-72A	Impact of insects on eucalypt plantations in the Murray valley	1/07/95	31/07/00	184 078	661 681	125 000	970 759
CSE-78A	Identification of pest resistant eucalypts using near infrared spectroscopy	1/01/97	31/05/00	329 000	710 877	78 433	1 118 310
CSF-46A	Fast growing eucalypts with moderate salt tolerance for agroforestry	1/07/92	30/04/98	146 214	269 140	5 000	420 354

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Table 2.1 **Production – industry competitiveness – funding and project timing**
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
					\$	\$	\$
CSF-61A	Natural durability of Eucalyptus trees from farm forestry and low rainfall areas	1/04/01	30/11/05	85 000	56 250	50 000	191 250
DAQ-261A	(NHT) Commercial eucalypt hybrid plantings for marginal lands in northern Australia	1/08/99	30/11/01	200 000	66 589	383 065	649 654
DCL-1A	Field-testing clonal propagation methods of Eucalyptus globulus	1/07/93	30/06/96	15 852	67498	54 171	137 521
UB-1A	Molecular Biology of Pinus Radiata	1/07/90	30/06/93	190 000	0	196 526	386 526
UMU-19A	Salt tolerant trees with high pulp quality	1/07/96	15/12/01	59 759	41 928	129 299	230 986
<i>Oil mallee</i>							
ANU-39A	Assessment of gain from breeding blue mallee	14/01/00	1/03/03	23 596	6 850	15 000	45 446
DAW-42A	Cineole Production from Acid Sandplain Soils	1/07/92	7/07/97	32 518	22 633	21 500	76 651
EPL-1A	Biomass energy production alternatives in Australia: status, costs and future opportunities for major technologies.	10/06/01	30/11/01	80 000	0	0	80 000

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Table 2.1 **Production – industry competitiveness – funding and project timing**
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
					\$	\$	\$
EPL-2A	Biomass for alcohol fuels- status of technology and cost/ benefit analysis	30/09/01	28/02/02	59 105	0	50 000	109 105
ERD-1A	Biomass for Energy	1/09/93	15/04/94	60 000	60 000	\$100 000	220 000
OIL-4A	Silviculture and water use of short rotation coppicing tree crops	1/07/99	30/09/02	236 900	282 080	20 000	538 980
UA-55A	An electronic atlas of Australian biomass energy resources	1/07/00	1/02/02	197 015	72 036	0	269 051
<i>Cabinet timbers</i>							
CSC-58A	Trees for wood and animal production in northern Australia	1/04/97	31/12/98	119 102	242 232	0	361 334
CSL-6A	(NHT) Novel nutrient management for improved tropical cabinet- timber growth on farms	1/07/98	1/06/99	20 598	18 720	6 000	45 318
CSZ-1A	Assessment of the potential for an agroforestry system for the wet-dry tropics based on trees that support both wood & animal production	1/07/95	31/03/96	9 973	10 847		20 820

(Continued on next page)

Table 2.1 **Production – industry competitiveness – funding and project timing**
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
					\$	\$	\$
DAQ-240A	(NHT) Silviculture of rainforest cabinetwoods	1/07/98	30/07/02	187 670	594 876	0	782 546
QDF-1A	Establishment of Tropical Rainforest Cabinetwood Species using Artificial Tree Shelters	1/07/89	30/06/92	42 700	0	0	42 700
QDN-1A	Production of a book titled 'Commercial timber species for sub-tropical Australia'	30/05/97	30/06/98	11 000	0	0	11 000
UNE-34A	Growth of High Value Trees on Farms	30/06/93	15/06/98	64 431	46 024	51 000	161 455
UQ-18A	Agroforestry with High Value Trees	30/06/91	30/06/94	92 819	49 560	30 000	172 379
UQ-41A	Agroforestry with high value trees	1/07/94	30/06/97	32 900	27 102	35 000	95 002

Source: RIRDC database, RIRDC and CIE classifications

Production systems

Production systems research projects were classified into four subcategories.

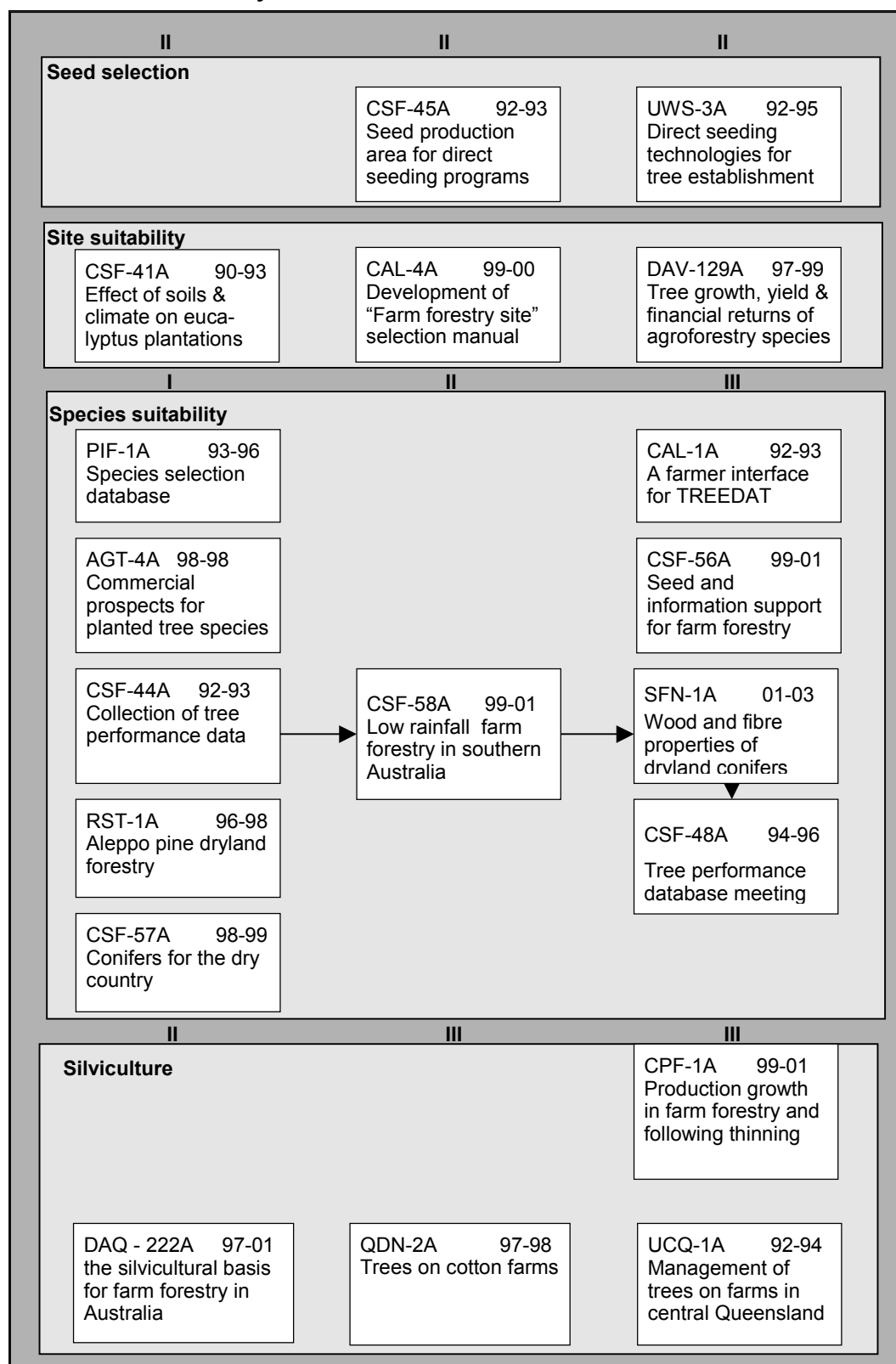
These were:

- seed selection
- species suitability
- site suitability, and
- silviculture.

Nineteen projects fell into these categories. The total cost of research and development in this area is \$6.946 million, with JVAP contributing \$3.521 million of this.

Chart 2.1 summarises the classifications and stages of the projects.

Chart 2.1 **Production systems**



Data source: RIRDC database, RIRDC and CIE classifications

Seed selection

These projects were aimed at providing information assisting farmers in seed selection.

- CSF-45A aimed to provide reliable, high quality seed for four tree species to south-eastern Australia.
- UWS-3A developed seeding technologies for agroforestry and prepared an information booklet on the subject. It is assessed as having a low impact.

Species suitability

These projects assessed the suitability of different tree species for particular sites.

- PIF-1A established a species selection database. This project was assessed as having a low impact.
- CSF-44A collected tree performance data to augment the existing database for the selection of tree species and was a precursor to CSF-56A, which is considered to be a very useful project. This project was assessed as having a high effect as it linked and streamlined the thinking of a number of groups across Australia who had been working in this area.
- AGT-4A assessed the commercial prospects for tree species planted in low rainfall areas. This was the first feasibility study on products in low rainfall areas. It reviewed products and provided economic analysis for agroforestry enterprise, and determined that eucalyptus oil was the most viable enterprise for low rainfall areas. It set the scene for projects funded by the Natural Heritage Trust. This project was assessed as having a high impact in shaping future farming systems options.
- RST-1A tested the profitability of Aleppo pine dryland forestry in low rainfalls using selected plant stock and optimising maintenance regimes. This was a poorly executed project and is considered to have a low impact.
- CSF-57A reviewed trials and plantings of conifers to identify those with the ability to grow in the drier areas of Australia, and identified five species with the best opportunities for commercial growth. Returns will only be positive if wood yields are high or alternative uses are taken into account, for example windbreaks. It is too early to assess the impact of this project.
- CAL-1A developed software to provide farmers easy access to TREEDAT, a database of agroforestry information. A CD was produced entitled REX (Revegetation Expert) which independent commentary suggests was attractive and well used by farmers, suggesting this program had a high impact.

- CSF-56A researched the productivity of various tree species under different conditions, with the aim of using this information and existing information to provide a database of information on farm forestry. This was a multi-faceted project and is considered to have a high impact. It has provided ongoing support in terms of advice to farm forestry practitioners. The benefits of having trials established by other groups using the best available seed will be long-term but substantial.
- CSF-48A brought together organisations involved in the use and development of tree performance databases to discuss and plan the development and use of these systems on a national basis.
- CSF-58A is discussed in the following section on Breeding — Seed selection for breeding program. Its costs are assessed as part of the Production systems section.
- SFN-1A aimed to increase the uptake of farm forestry in dry areas by providing wood quality product information to develop markets for dryland conifers. This project is not due to be completed until 2003, so it is too early to consider its impact.

Site suitability

- CSF-41A will publish a site guide for agroforestry. Characterising a site appropriately will assist farm foresters in optimising designs for their purposes and making realistic assessments of growth and management. The book is due to be released later this year so it is too early to assess its impact, but it is predicted to be high.
- DAV-129A correlated tree growth rates with the height of remnant vegetation and the chemical composition of soil to improve the reliability of tree growth forecasting. This was a poorly implemented farm forestry project and is considered to have had a low impact.
- CAL-4A was an attempt to pull together all the available site selection knowledge and use the data for site selection modeling. It is considered to have had a high impact.

Silviculture

- UCQ-1A reviewed advice from a range of sources regarding the management of trees on farmland in Central Queensland. This was a small project and is assessed as having a low impact.
- QDN-2A issued a publication entitled *Growing Trees on Cotton Farms* which compiled existing knowledge of tree growing relevant to cotton areas. It is considered to have had a high impact.

- CPF-1A developed a system showing the effects of certain silvicultural practices, and from this created a computer package for growers that estimates yield from site descriptions. It is due for release in 2002 and is too early to assess its impact.
- DAQ-222A reviewed silvicultural research in hardwood plantations, compiled a national database of silvicultural trials and guidelines for designing and reporting silvicultural research trials have been developed. The process of networking, reviewing and compiling existing information has improved co-ordination and information flows between various research organisations and the outputs will be invaluable for future R&D planning, thus it is predicted that this project will have a medium to high impact.

Initial assessment

Table 2.2 sets out the classification and initial assessment. The projects were a mix of identification, development of tools and information and communication of the outcomes, including communication tools. Results were mixed.

Table 2.2 Production systems – classification and initial assessment

Code	Project	Stage	Level 3	Assessment
AGT-4A	An assessment of commercial prospects for planted tree species in the low rainfall zones of Australia	1	Species suitability	High
CAL-1A	A Farmer Interface for TREEDAT	3	Species selection	High
CAL-4A	(NHT) Development of an Australian 'Farm Forestry Site Selection Manual'	2	Site selection	High
CPF-1A	Predicting tree growth in farm forestry and following thinning	3	Silviculture	Too early
CSF-41A	Evaluating the Effect of Soils and Climate on Productivity of Eucalyptus Globulus Plantations on Contrasting Sites in the Southwest of Western Australia	2	Site selection	High
CSF-44A	Collection of Tree Performance Data	2	Seed selection	High
CSF-45A	Seed Production Areas for Direct Seeding Programs	2	Seed selection	

(Continued on next page)

Table 2.2 **Production systems – classification and initial assessment** (continued)

Code	Project	Stage	Level 3	Assessment
CSF-48A	Tree performance database meeting	3	Species suitability	
CSF-56A	Seed and information support for farm forestry	3	Species, site and seed selection	High
CSF-57A	Conifers for the dry country	1	Species selection	Too early
CSF-58A	Tree improvement for low rainfall agroforestry in southern Australia	2	Species Selection	Too early
DAQ-222A	The silvicultural basis for farm forestry in Australia - a national, collaborative review of past and present silvicultural research and proposals for a national network of strategic experiments	2	Silviculture	Medium-high
DAV-129A	Forecasting tree growth and yield and financial returns of key agroforestry species across southern Australia	2	Site selection	Low
PIF-1A	Species Selection Database	1	Seed selection	Low
QDN-2A	To produce an information package which provides farmers in cotton growing areas with information on tree growing and management	3	Species suitability	High
RST-1A	Aleppo pine dryland forestry	1	Species suitability	Low
SFN-1A	Wood and fibre properties of dryland conifers	3	Species suitability	
UCQ-1A	Management of Trees on Farms in Central Queensland	3	Silviculture, publication	Low
UWS-3A	Direct Seeding Technologies for Farm Tree Establishment	2	Seed selection	Low

Source: RIRDC database, RIRDC and CIE classifications

Breeding

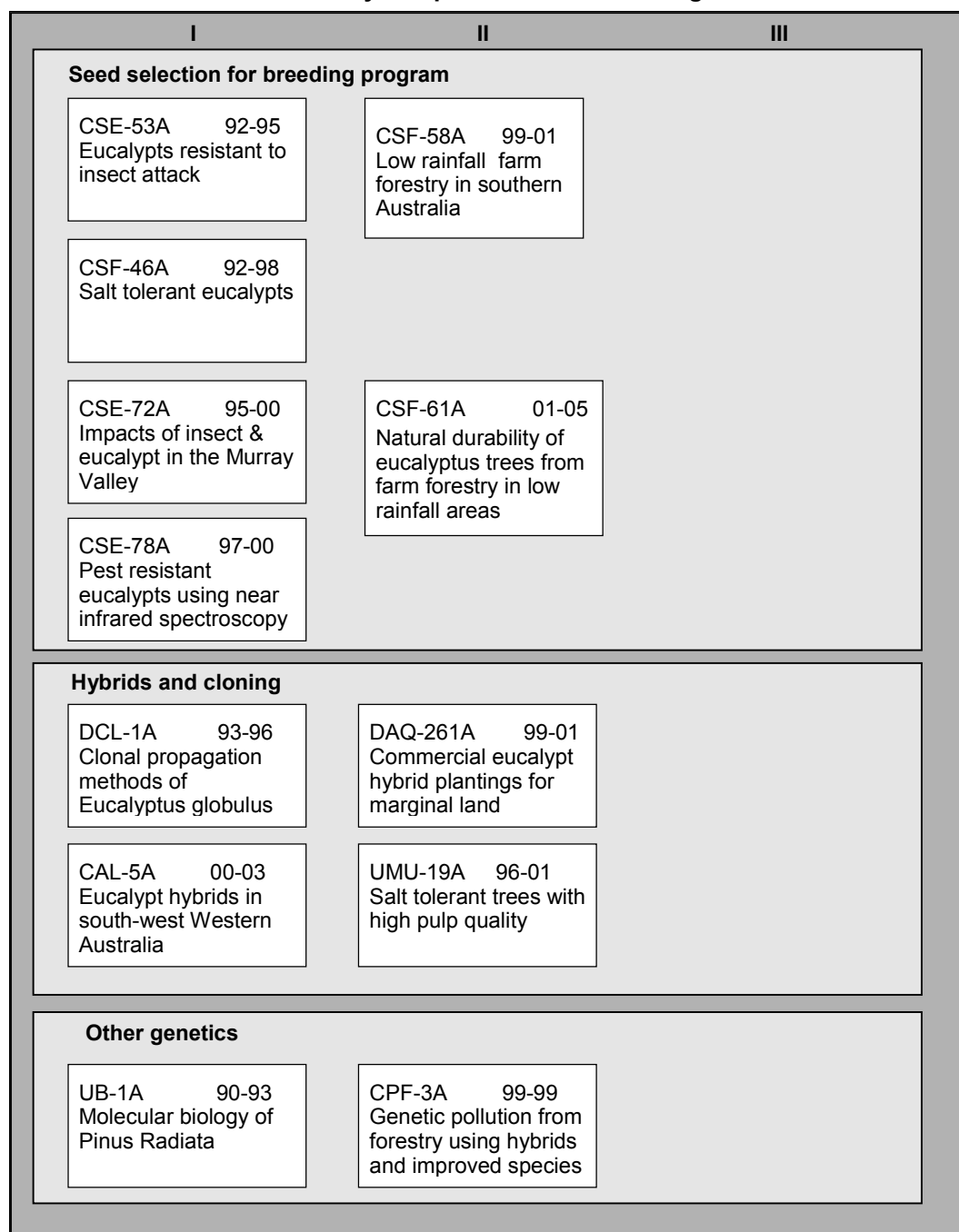
Eleven projects were classified as breeding projects, falling into the categories of:

- seed selection for breeding program
- hybrids and cloning, and
- other genetics.

Total funding of these projects was \$4.464 million, with RIRDC contributing around \$1.387 million.

Chart 2.2 summarises project stages and classifications.

Chart 2.2 **Production – industry competitiveness – breeding**



Data source: RIRDC data, RIRDC and CIE classifications

Seed selection for breeding program

Six projects related to the identification of tree characteristics for seed selection purposes.

- CSE-53A identified and evaluated eucalyptus with high resistance to insect attack.
- CSE-72A incorporated the effects of insect attack into eucalyptus growth models, and determined that pesticides were justified to prevent loss of volume. This project was assessed as having a medium impact.
- CSE-78A developed a method of using near infrared spectroscopy to identify the pest resistance of trees. It is considered to have had a high impact.
- CSF-58A identified the best seed sources and studied the relationship between genotype and the environment as well as the species selection R&D. It is included in the chart and tables in both areas to reflect this multidimensionality of the work. Some of the benefits of better research co-ordination and co-operation, knowledge transfer and national breeding strategy are clearly evident. It is too early to assess the impact of actual breeding programs, since the first lots of improved seed are only available from 2002 onwards. If successful, the project has the potential for widespread adoption and a high impact.
- CSF-46A tested fast-growing eucalyptus species for salt tolerance. It has been assessed as having a low impact.
- CSF-61A determines the natural durability of timber produced from five species established in low rainfall areas of southern Australia. The natural resistance of the timber to termites and decay will be measured, and such species can be marketed as less reliant on chemical preservatives. It is too early to make an assessment of its impact.

Hybrids and cloning

Four projects tested hybrid and cloned trees.

- DCL-1A compared the survival and growth of micropropagation and rooted cuttings of *E. globulus* with seedlings. The outcome of this project is unknown.
- DAQ-261A is testing hybrid eucalyptus species to identify those suitable to high rainfall areas in North Queensland. It is too early to assess the impact of this project.
- UMU-19A was a cloning program for salt and drought tolerant trees. It found that hybrid, high pulp quality trees had a higher survival rate than their parent species. It is too early to assess the impact of this project although it has the potential to have a high impact.

- CAL-5A trialed hybrid species of eucalyptus to attempt to identify a species more productive than *E. globulus*. So far none have surpassed it, though some hybrids show promise. It is too early to assess the impact of this project.

Other genetics

Two projects focused on genetics.

- UB-1A researched the genome organisation of *Pinus radiata*. This was a poorly executed project and is considered to have had a low impact.
- CPF-3A produced a report on the risks of genetic pollution from use of exotic species, hybrids and genetically modified plants. This report has only recently been released and it is too early to assess its impact. It has the potential to have a high impact in the planning of farm forests and trials close to native woodland.

Initial assessment

Results of these projects are mixed, though for it is too early for some projects to be appropriately assessed. The outcomes of the projects are listed in table 2.3.

Table 2.3 **Breeding – classification and initial assessment**

Code	Project	Stage	Level 3	Assessment
CAL-5A	Eucalypt hybrids in south-west Western Australia	1	Hybrids	Too early
CPF-3A	Assessing the risk of genetic pollution from farm forestry using hybrids and improved species	1	Genetics	Too early
CSE-53A	Production of Eucalypts Resistant to Insect Attack	1	Genetics	High
CSE-72A	Impact of insects on eucalypt plantations in the Murray valley	1	Pests, seed selection	Medium
CSE-78A	Identification of pest resistant eucalypts using near infrared spectroscopy	1	Seed selection	High
CSF-46A	Fast growing eucalypts with moderate salt tolerance for agroforestry	1	Seed selection, salinity	Low
CSF-58A	Tree improvement for low rainfall agroforestry in southern Australia	2	Species Selection	Too early
CSF-61A	Natural durability of Eucalyptus trees from farm forestry and low rainfall areas	2	Seed selection, wood quality	Too early

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Table 2.3 **Breeding – classification and initial assessment** (continued)

Code	Project	Stage	Level 3	Assessment
DAQ-261A	(NHT) Commercial eucalypt hybrid plantings for marginal lands in northern Australia	1	Hybrids	Too early
DCL-1A	Field-testing clonal propagation methods of Eucalyptus globulus	1	Cloning	Unknown
UB-1A	Molecular Biology of Pinus Radiata	1	Genetics	Low
UMU-19A	Salt tolerant trees with high pulp quality	2	Cloning	High

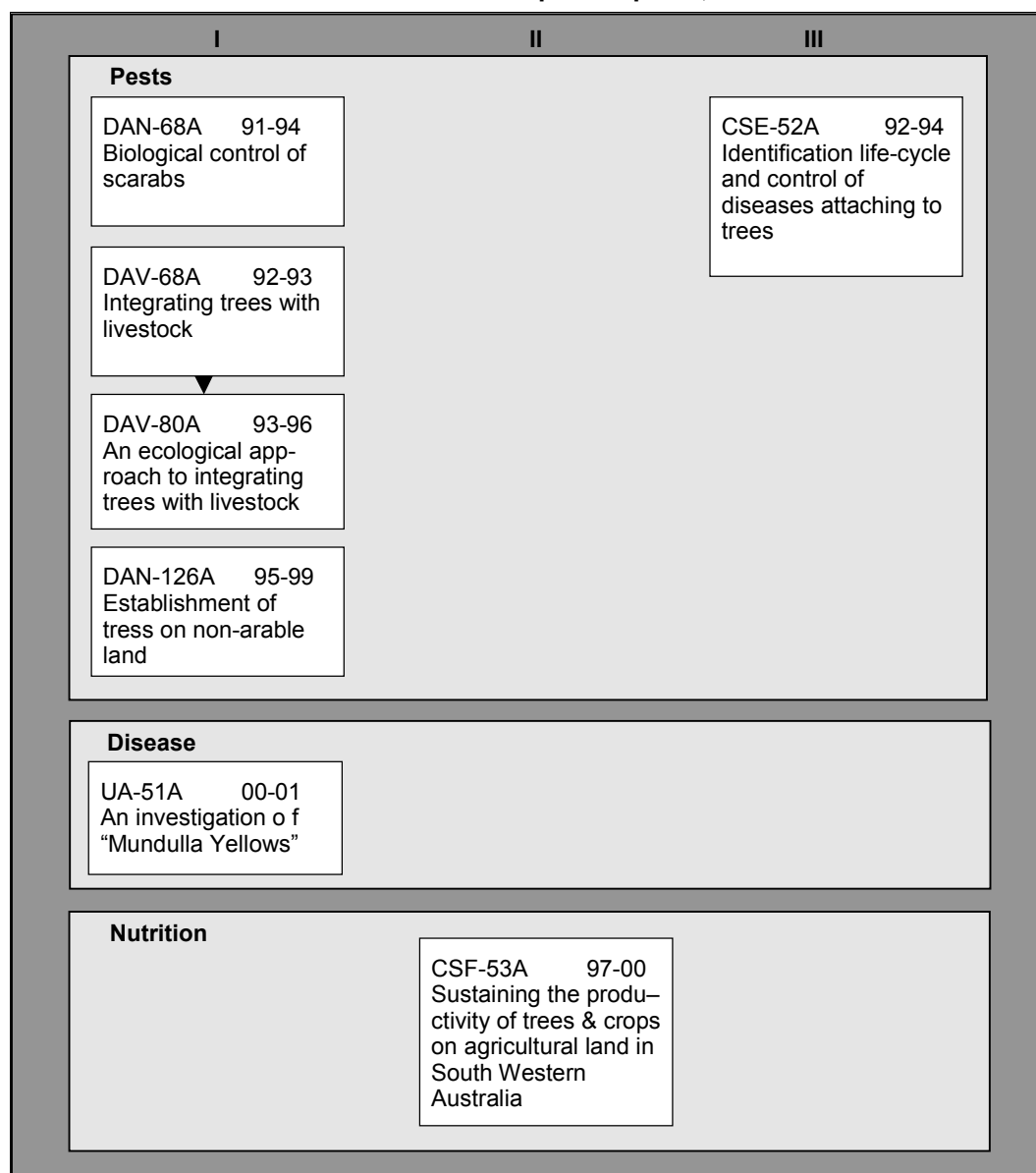
Source: RIRDC data, RIRDC and CIE classifications

Pests, disease and nutrition

There are seven projects relating to pests, disease and nutrition. Total research funding to this area was \$1.808 million, with \$441 892 from JVAP.

Chart 2.3 presents the classifications for these projects.

Chart 2.3 **Production – sustainable development: pests, disease and nutrition**



Data source: RIRDC data, RIRDC and CIE classifications

Pests

The following five projects looked at methods of reducing the impact of pests.

- DAN-126A established a pine plantation in land that was non-arable due to weeds. So far the plantation appears to be choking out the weeds, but the eventual impact is unknown.
- DAV-68A and DAV-80A attempted to train sheep and livestock not to damage trees, negating the need for fencing. They are assessed as having a low-medium impact.

- DAN-68A aimed to determine whether native plants promoted parasites that aid in the control of scarabs. It is assessed as having a low-medium impact.
- CSE-52A produced a series of one-page leaflets on the principal pests attacking eucalypts and wattles in south-eastern Australia for distribution to farmers. It is considered to have had a high impact.

Disease

UA-51A investigated characteristics of Mundulla Yellows, a disease affecting eucalypts. It did not come up with substantial conclusions, because research was poor quality. It is too early to assess the impact of this project. Mundulla Yellows may be a major issue requiring research and this project does point to further research directions but cannot be relied upon because its research is not substantiated.

Nutrition

CSF-53A identified changes to soil fertility on farmland planted with eucalypts, and evaluated strategies to maintain long-term fertility and high productivity. The outcome of this project is unknown.

Initial assessment

Most of these projects were assessed as having a fairly low impact. The projects relating to pests were testing somewhat impractical methods of pest control, although DAN-126A could be promising. The classification and assessment of these projects is shown in table 2.4.

Table 2.4 Pests and disease – classification and initial assessment

Code	Project	Stage	Level 3	Assessment
CSE-52A	Identification, Life-cycle and Control of Insects Attacking Trees Planted on Farmlands in Southeast Australia	3	Publication, pests	High
CSF-53A	Sustaining the productivity of trees crops on agricultural land in south-western Australia	2	Soil management, nutrition	Unknown

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Table 2.4 **Pests and disease – classification and initial assessment** (continued)

Code	Project	Stage	Level 3	Assessment
DAN-68A	Biological Control of Scarabs Causing Eucalyptus Dieback	1	Pests	Low-medium
DAV-68A	An ecological approach to integrating trees with livestock to reduce the need for expensive fencing	1	Pests	Low-medium
DAV-80A	An Ecological Approach to Integrating Trees with Livestock Enterprises to Reduce the Need for Expensive, Conventional Fencing	1	Pests	Low-medium
UA-51A	An investigation of 'Mundulla Yellows' affecting native Eucalyptus species	1	Disease	Too early
DAN-126A	Establishment of trees on non-arable land to replace weeds	1	Pests	Unknown

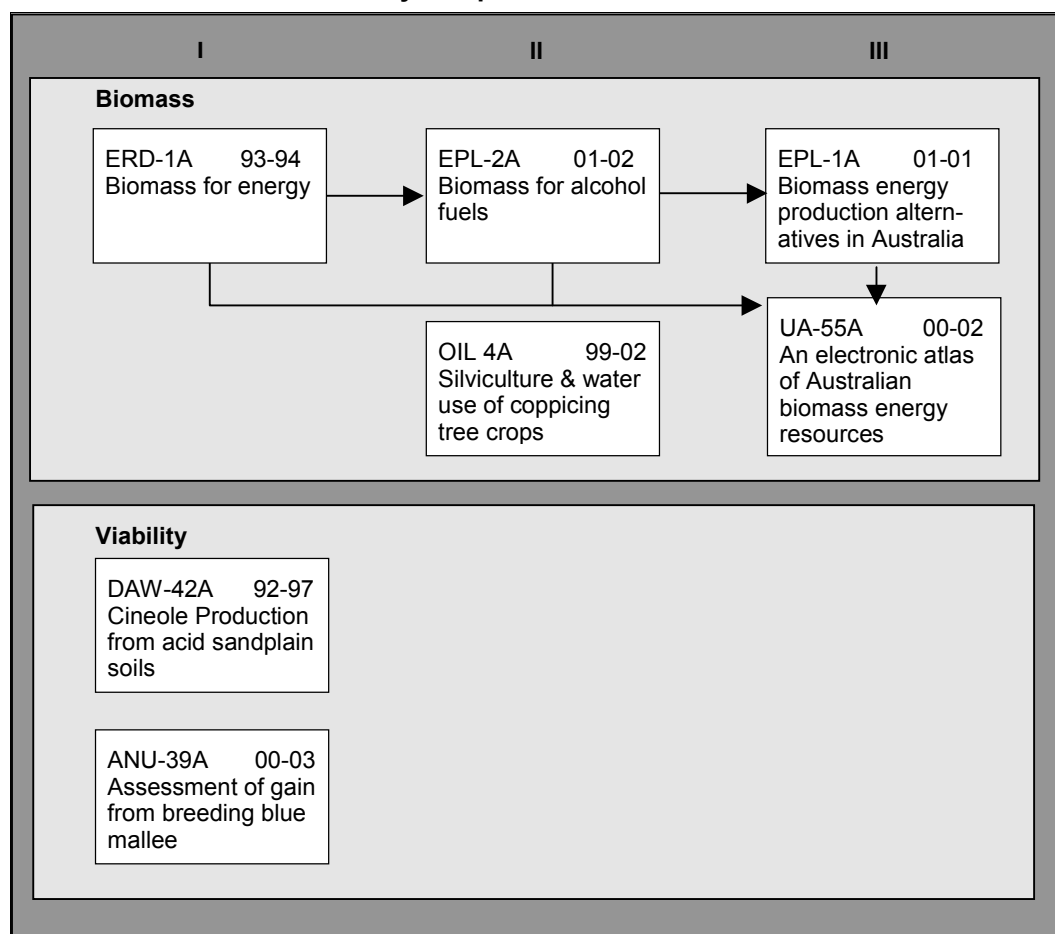
Source: RIRDC data, RIRDC and CIE classifications

Oil mallee

The oil mallee is a species of eucalyptus that can be used for the production of eucalyptus oil and biomass for energy generation, as well as the more common uses of wood. A major constraint to changing to more sustainable land use in Australia is the lack of appropriate farming systems, products, processing options and markets. This group of projects is particularly important because they represent new production systems which could be incorporated into existing farming systems, providing some realistic options for more sustainable land use and diversified farming enterprises. Seven projects relate to the enhancement of the quality, quantity or cost of production for oil mallee and oil mallee products. The total funding for this area was \$1.339 million, and RIRDC contributed \$689,134 of this amount.

Chart 2.4 summarises the classifications.

Chart 2.4 **Production – industry competitiveness – oil mallee**



Data source: RIRDC database, RIRDC and CIE classifications

Biomass

- ERD-1A was a feasibility study into oil mallee systems for energy-producing biomass. The study showed that an integrated tree processing system which took whole tree feedstock to produce cineole, high value activated charcoal and electricity, was indeed a feasible option. This study provided sufficient confidence for investors to commence the building of a pilot plant in Narrogin, WA. In combination with the project funding on the farming system and hydrology, this project could have a very high impact in underpinning a new industry.
- OIL-4A is researching biomass productivity for short rotation coppicing trees, alley farmed trees and oil mallees. It is not yet complete, but it is predicted to have a high impact for the same reasons as ERD-1A.
- EPL-2A reported on the current status of using biomass to produce ethanol and methanol, and a cost/benefit analysis for farm foresters. It is too early to assess the impact of this project, but along with the other projects in this

group it has the potential to underpin development of new and more sustainable industry.

- EPL-1A wrote a handbook of guidelines for the development of biomass for energy. It is too early to assess the impact of this project but it has the potential to be successful for the same reasons as EPL-2A.
- UA-55A developed an online atlas with national databases including biomass resources, transport and processing infrastructure which will assist in planning a bioenergy industry. It also has two regional case studies with finer resolution datasets and a decision support system to demonstrate more detailed planning and feasibility studies. It is too early to assess its impact but it has the potential to be high depending on the uptake.

Viability

- DAW-42A assessed the viability of a eucalyptus oil enterprise on acid soils in need of revegetation. It has been assessed as having a high impact.
- ANU-39A is studying potential gains from breeding blue mallee. As this project will not be completed until 2003, is too early to assess its impact, but it will help underpin the oil mallee industry.

Initial assessment

It is too early to assess the impact of most of the projects researching opportunities from biomass and oil mallee, but they have the potential to have a high impact. Details are laid out in table 2.5.

Table 2.5 Oil mallee – classification and initial assessment

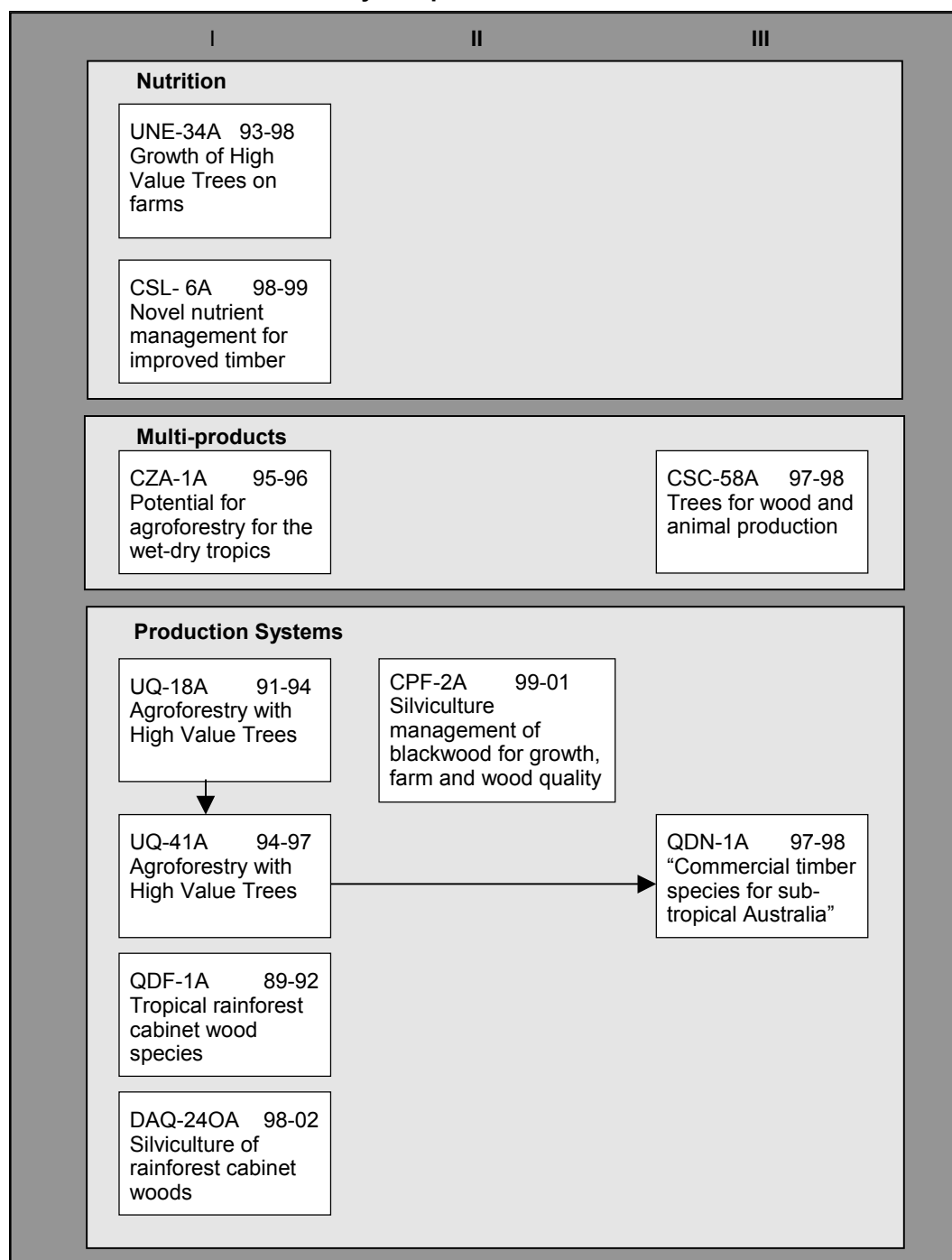
Code	Project	Stage	Level 3	Assessment
ANU-39A	Assessment of gain from breeding blue mallee	1	Oil mallee	Too early
DAW-42A	Cineole Production from Acid Sandplain Soils	1	Oil mallee	High
EPL-1A	Biomass energy production alternatives in Australia: status, costs and future opportunities for major technologies.	3	Biomass, design principles	Too early
EPL-2A	Biomass for alcohol fuels- status of technology and cost/ benefit analysis	2	Biomass	Too early
ERD-1A	Biomass for energy	1	Biomass	High
OIL-4A	Silviculture and water use of short rotation coppicing tree crops (combined with AFT99-08)	2	Oil mallee	High
UA-55A	An electronic atlas of Australian biomass energy resources	3	Publication, biomass	Too early

Source: RIRDC data, RIRDC and CIE classifications

Cabinet timbers

Ten projects focused on the competitiveness of cabinet timbers. Total funding for these projects was \$2.208 million, with JVAP contributing \$709 970. The main focus of these projects was developing approaches to maximise the growth of cabinet timbers. Some considered non-wood uses for stands of cabinet timber to establish if multiple products were possible. Chart 2.5 summarises these classifications for each project.

Chart 2.5 **Production – industry competitiveness – cabinet timbers**



Data source: RIRDC data, RIRDC and CIE classifications

Nutrition

- CSL-6A tested a nursery fertiliser delivery system that increases tree productivity in humid tropical areas. Species tested show much faster growth rates than those developed in normal media.
- UNE-34A identified conditions under which cabinet timber species flourish best in the subtropics.

These two projects were assessed as having a medium-high impact.

Multiproducts

- CSC-58A tested fallen leaves, flowers and pods from various species of cabinet timber for their suitability as animal fodder.
- CSZ-1A researched the feasibility and uptake of dual-purpose tree species for plantations in wet/dry areas of Australia.

These two projects were also assessed as having a medium-high impact.

Production systems

- DAQ-240A found that even cabinet timbers protected by insecticide were still badly damaged by insects, and determined appropriate sites and silvicultural practices for plantations of high-value tropical timber. A silvicultural manual for cabinet timbers is being produced and a new project to extend the science from this project will be funded in 02/03. It is predicted that the impact will be high once the extension phase happens in earnest.
- CPF-2A is testing the effects of silvicultural management on blackwood and the effect of a nurse crop species on blackwood to assist blackwood growers in producing high value plantation wood. As the blackwood industry is very small, it is likely this project's impact will be low, although it is currently too early to tell.
- QDF-1A tested the early growth of rainforest cabinetwood species in artificial tree shelters. It has been assessed as having a medium to high impact.
- UQ-18A assessed the growth potential of several cabinetwood species in southern Queensland, and the appropriate spacing for these plantations. It is considered to have had a medium-high impact.
- UQ-41A identified cabinet timber species worthy of plantation development and developed systems in which both pasture and plantation could flourish. This knowledge was summarised by QDN-1A, which produced a reference book with information on the top 50 cabinetwood species. The former project is assessed as having a medium-high impact, and the latter a medium impact.

Initial assessment

These projects were assessed as having medium to medium-high impact. Table 2.6 sets out their classification and impact.

Table 2.6 Cabinet timbers – classification and initial assessment

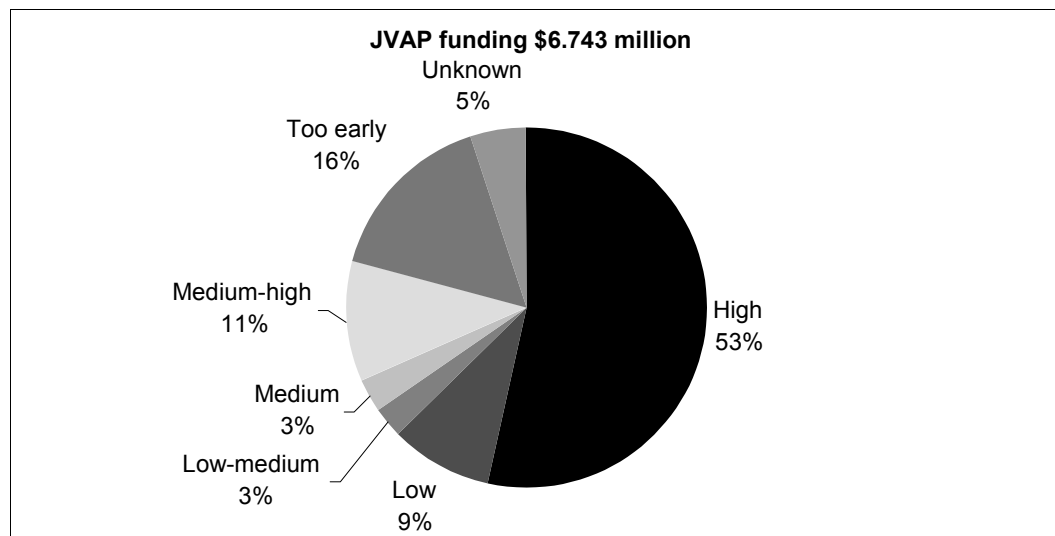
Code	Project	Stage	Level 3	Assessment
CPF-2A	Silvicultural management of blackwood for growth, farm and wood quality	2	Production systems	Too early
CSC-58A	Trees for wood and animal production in northern Australia	3	Multi-products	Medium-high
CSL-6A	(NHT) Novel nutrient management for improved tropical cabinet-timber growth on farms	1	Nutrition	Medium-high
CSZ-1A	Assessment of the potential for an agroforestry system for the wet-dry tropics based on trees that support both wood & animal production	1	Multi-products	Medium-high
DAQ-240A	(NHT) Silviculture of rainforest cabinetwoods	1	Production Systems	High
QDF-1A	Establishment of Tropical Rainforest Cabinetwood Species using Artificial Tree Shelters	1	Production Systems	Medium-high
QDN-1A	Production of a book titled 'Commercial timber species for sub-tropical Australia'	3	Production Systems	Medium
UNE-34A	Growth of High Value Trees on Farms	1	Nutrition	Medium-high
UQ-18A	Agroforestry with High Value Trees	1	Production Systems	Medium-high
UQ-41A	Agroforestry with high value trees	1	Production Systems	Medium-high

Source: RIRDC data, RIRDC and CIE classifications

Production – industry competitiveness – initial assessment

The majority of JVAP funds, 53 per cent, provided to this area of research went towards high impact projects. Chart 2.6 summarises the proportion of funds directed towards projects of different impacts.

Chart 2.6 Production – industry competitiveness – initial assessment



Data source: Tables 2.1–2.6

3 Production – sustainable development

Forty six projects researched aspects of the sustainable development of production. A total of \$15.666 million was provided to these projects, with JVAP contributing \$6.771 million (43 per cent). The projects focused on either the use of agroforestry for environmental benefits as well as profit, or methods of ensuring agroforestry is sustainable in the long term through integration with other farming systems and development of multiple products. These projects have been sorted into the following level 2 categories:

- salinity
- integrated farming systems
- soil management
- windbreaks, and
- multiple use of resources.

The funding and timing of these projects is presented in table 3.1.

Table 3.1 **Production – sustainable development –funding and project timing**

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
<i>Salinity</i>							
CSF-49A	Trees for salt-affected land	1/01/95	31/05/95	7 000			7 000
CSF-54A	Irrigation management in young eucalypt plantations growing over high water tables	1/07/97	30/09/00	187 000	377 000	0	564 000
CSI-3A	Sustainable hardwood production in shallow watertable areas	4/10/93	31/10/98	503 382	377 318	0	880 700

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Table 3.1 **Production – sustainable development – funding and project timing**
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
CSL-9A	A manual for irrigated eucalypts, incorporating salinity impacts	1/03/99	31/05/02	346 477	321 941	0	668 418
CSM-4A	Agroforestry design guidelines to balance catchment health with primary production	1/07/96	22/12/00	757 385	543 088	150 000	1 450 473
DAV-131A	Demonstration and development of fast growing irrigated eucalypt plantations in northern Victoria	1/03/97	31/07/00	187 500	0	0	187 500
UM-18A	The effect of salt on wood and fibre formation in Eucalypts	1/04/94	30/06/98	79 888	72 354	0	152 242
WS967-7	Trees over shallow water tables	1/01/97	10/12/97	15 650			15 650
<i>Integra- ted farming systems</i>							
CAL-3A	Ultra-short duration agroforestry rotations for low rainfall areas	1/10/98	31/03/99	25 000	136 338	0	161 338
CAL-6A	Phase farming with trees - field validation and extension	1/10/00	30/05/05	133 200	163 708	0	296 908

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Table 3.1 Production – sustainable development –funding and project timing
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
DAW-70A	Optimising the distribution of commercial timber and pulpwood species in alley farming	31/03/99	1998/99	123 192	117 711	0	240 903
UCA-2A	The Effects of Trees on Native Pastures on the Southern Tablelands	30/07/94	30/06/95	3 155	43 124		46 279
UCA-3A	The effects of trees on native pastures on the tablelands	1/07/95	31/03/98	68 466	63 029	0	131 495
UJC-6A	Optimising nutrition for productivity and sustainability of farm forestry systems	1/01/99	31/07/02	132 778	136 990	15 340	285 108
UWA-36A	Alley farming for improved water management and nutrient cycling in sandplain cropping	1/07/96	1/07/00	20 250	170 000	0	190 250
UWA-38A	Workshop on agriculture as a mimic of natural ecosystems	1/07/97	31/10/97	20 000	5 000		25 000
UWA-53A	(NHT) consultancy - fodder species-commercial and environmental options	15/02/00	28/07/00	45 000	0	0	45 000
UWA-64A	Integrate, segregate or rotate trees with crops?	30/09/03	2003/04	206 951	174 497	0	381 448

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Table 3.1 **Production – sustainable development –funding and project timing**
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
<i>Soil Manage- ment</i>							
CSL-3A	Consultancy: Review the effects of agroforestry on soil amelioration	11/07/94	1/05/95	15 000	0	0	15 000
CSP-4A	The use of trees and fodder shrubs in reducing the rate of soil acidification	1/07/94	31/03/98	135 738	245 219	36 819	417 776
KDI-4A	A Guide to Tree Planting	1/07/92	3/06/93	25 000	25 000	25 000	75 000
<i>Wind- breaks</i>							
AAC-3A	Design principles - editing and production of a manual	25/11/96	28/02/97	17 825			17 825
CSC- 52A	Modelling crop growth and yield under the environmental changes induced by windbreaks	1/07/93	31/12/98	300 000	125 510	0	425 510
CSL-10A	Using windbreaks to protect soil, crops and livestock	1/07/99	3/12/01	206 319	201 304	0	407 623
CSL-7A	Trees for shelter: a guide to using windbreaks on Australian farms	1/03/99	31/07/00	68 500	54 192	0	122 692

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Table 3.1 Production – sustainable development – funding and project timing
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
CSM-1A	The impact of trees on winds, temperature and evaporation rates in farmlands	1/07/93	30/04/99	502 784	713 913	431 506	1 648 203
CST-6A	(NHT) Quantifying the tradeoffs between tree and crop productivity on farms	1/01/99	30/11/01	250 037	567 768	0	817 805
DAQ-147A	The effect of windbreaks on crop growth in the Atherton tablelands of north Queensland	1/07/93	30/06/98	214 427	283 641	0	498 068
DAV-69A	Assessment of the effects of shelterbelts on pasture and crop production in Victoria	1/07/93	30/06/98	228 686	206 670	10 000	445 356
DAW-49A	The impact of trees on the physical environment and productivity of farmlands	2/01/94	21/12/98	267 747	477 930	151 401	897 078
DAW-93A	Characterisation of tree root morphology in alley systems	1/01/99	30/11/01	28 469	386 322	297 449	712 240
SAR-19A	Integrating agroforestry into low rainfall farming systems	4/01/99	31/12/01	258 158	384 784	0	642 942
UA-25A	Effect of windbreaks on crop and pasture productivity in South Australia	1/07/93	30/06/98	258 358	162 500	250 000	670 858

(Continued on next page)

Table 3.1 **Production – sustainable development – funding and project timing**
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
					\$	\$	\$
WS967-13	1997 Windbreaks Workshop	1/02/97	31/03/97	16 389			16 389
WS978-02	1998 National Windbreaks Program Workshop, Esperance	15/03/98	20/03/98	15 776			15 776
WS989-03	1999 National Windbreak Workshop						
<i>Multiple use of resources</i>							
AAC-2A	Productive farm forestry through sustainable management of native forests on farms	1/01/97	30/04/98	31 000			31 000
AAC-4A	Farm forestry and biodiversity - reconciliation	1/02/97	30/06/98	39 950			39 950
ANU-20A	Investigating the conservation characteristics of native trees planted on agricultural land	1/05/94	2/08/99	27 730	31 700	0	59 430
ANU-33A	(NHT) Plantation design and biodiversity conservation	1/07/98	1/08/01	239 454	250 272	75 000	564 726
CSF-59A	Technologies for managing native forest on farms	1/05/99	28/02/02	200 000	269 387	20 000	489 387

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Table 3.1 Production – sustainable development – funding and project timing
(continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
CSW-32A	(NHT) Farm forestry: Quantifying conservation and environmental service benefits	1/02/99	30/04/02	347 987	199 461	0	547 448
MS967-43	Effectiveness of vegetation management programs - consultancy managed by EA			50 000			50 000
MS989.18	Biodiversity meetings, 7 September 1998, 19 October 1998			10 421	0	0	10 421
QDN-6A	(NHT) Measurement and integration of fauna biodiversity values in Queensland agroforestry systems	1/02/99	31/07/01	83 082	145 722	0	228 804
ULA-5A	Regeneration of Arid Zone Trees in the Belah-Rosewood Country of Western New South Wales	1/07/90	30/06/94	69 402	0	0	69 402

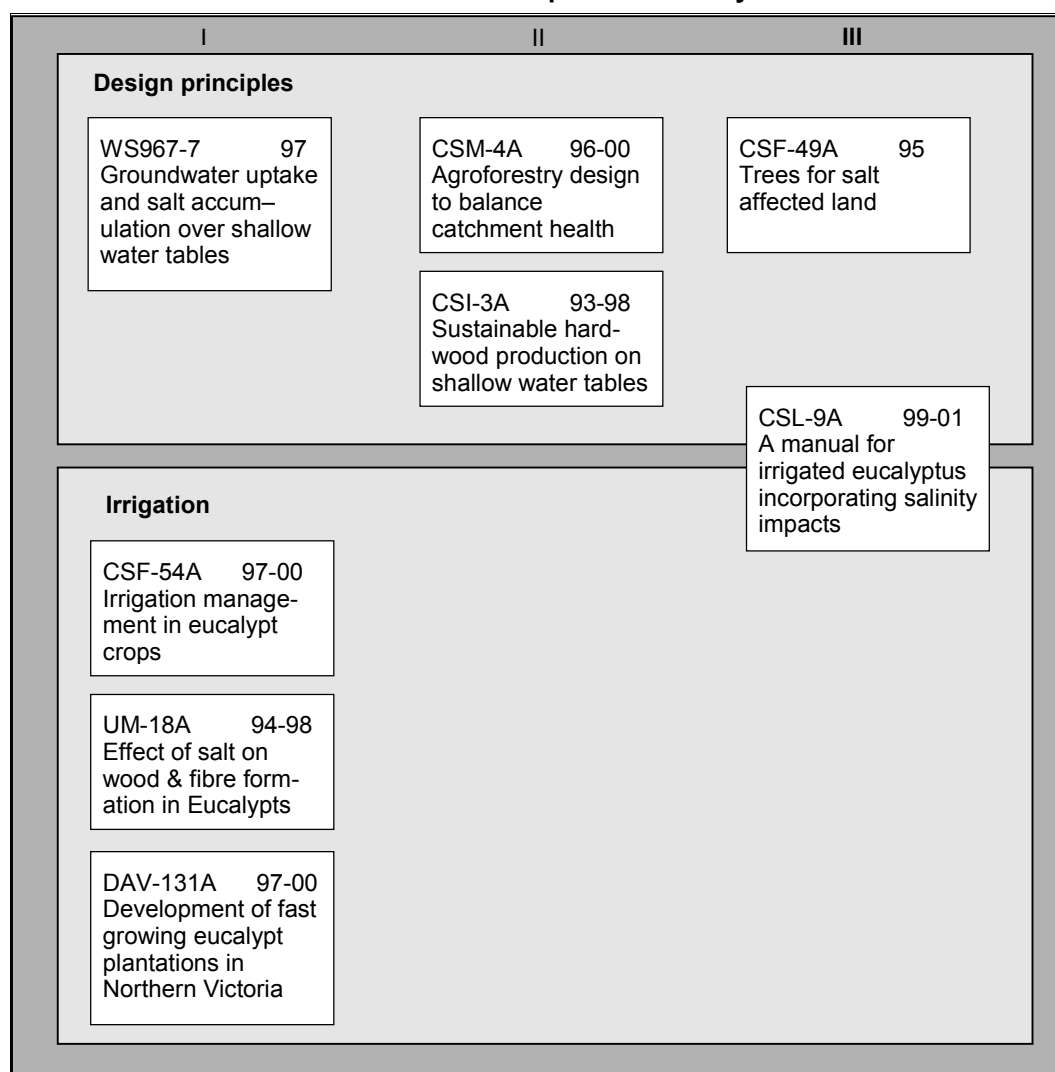
Source: RIRDC database

Salinity

Eight projects focused on sustainable development and salinity. Four projects considered salinity reducing design principles, three considered the impact of irrigation and one falls into both categories. JVAP contributed \$2.084 million of the \$3.926 million spent on these projects.

The classification of these projects are presented in chart 3.1.

Chart 3.1 **Production – sustainable development – salinity**



Data source: RIRDC data, RIRDC and CIE classifications

Design principles

These projects created or published design principles using trees as a tool to reduce salinity.

- CSF-49A drew information from a variety of sources to produce a book *Trees for salt-affected land*. This project was assessed as having a high impact as it is well used as a reference by farmers and extension agents.
- CSM-4A produced a book on using trees to manage water tables and salinity entitled *Trees, water and salt*. This book has been a major output, drawing together much of the research conducted by JVAP and CSIRO into design principles of using trees to manage salinity. The book was released in March 2002, has been acclaimed by many and has experienced high demand. It is too early yet to assess the future impact of the book but it is expected to be very high due to its quality research, excellent presentation and good writing.
- CSI-3A developed a model describing the effect of plantations on salt and the water table. The project clearly demonstrates for the first time that although trees can grow over a shallow saline watertable and lower it, salt accumulates under the plantation which limits production and sustainability. This work had a high impact because it has dismissed the idea of plantations over saline water tables to reduce salinity.
- WS967-7 was a workshop of twenty researchers which identified areas of salinity control in which little information was available, including methods for removing salt from the root zone and well-documented and reviewed models on salt dynamics and plant growth. Guidelines were developed to rectify this shortage of information.
- CSL-9A is producing a manual for commercial irrigated eucalypt plantations, incorporating new analysis of the productivity of such plantations in saline water areas. It is too early to assess impact of this project. Note that this project falls into both Level 3 classifications of Design principles and Irrigation.

Irrigation

These projects considered different aspects of irrigation, agroforestry and salinity.

- CSF-54A aimed to develop strategies that minimise the need for irrigation, which has caused saline water tables to rise. It is suggested that these strategies will have a medium impact, but as the report is not yet released it is too early to tell.
- DAV-131A tested the relationship between the level of nutrients and salt in groundwater, irrigation water, tree nutrition and tree growth. The study showed that eucalypts planted in saline areas had high foliage salinity levels, that irrigation with saline groundwater produced low growth rates and that irrigation with nutrient-rich effluent appears to be the best option to achieve high productivity plantations. This project was assessed as having a low impact.
- UM-18A tested the effect of irrigation with saline groundwater on *Eucalyptus globulus*, and determined that while tree growth was slower, the wood quality was not affected. This project is assessed as having a medium impact.

Initial assessment

These projects were well designed and relevant to farmers, and have been assessed as having a medium to high impact. The initial assessments are presented in table 3.2.

Table 3.2 **Salinity – classification and initial assessment**

Code	Project	Stage	Level 3	Assessment
CSF-49A	Trees for salt-affected land	3	Design principles – salinity	High
CSF-54A	Irrigation management in young eucalypt plantations growing over high water tables	1	Irrigation, salinity	Medium
CSI-3A	Sustainable hardwood production in shallow watertable areas	2	Design principles, salinity	High
CSL-9A	A manual for irrigated eucalypts, incorporating salinity impacts	3	Design principles - irrigation	Too early
CSM-4A	Agroforestry design guidelines to balance catchment health with primary production	2	Design principles, salinity	High
DAV-131A	Demonstration and development of fast growing irrigated eucalypt plantations in northern Victoria	1	Irrigation	Low
UM-18A	The effect of salt on wood and fibre formation in Eucalypts	1	Irrigation with saline water, wood quality	Medium
WS967-7	Trees over shallow water tables	2	Design principles	Unknown

Source: RIRDC data, RIRDC and CIE classifications

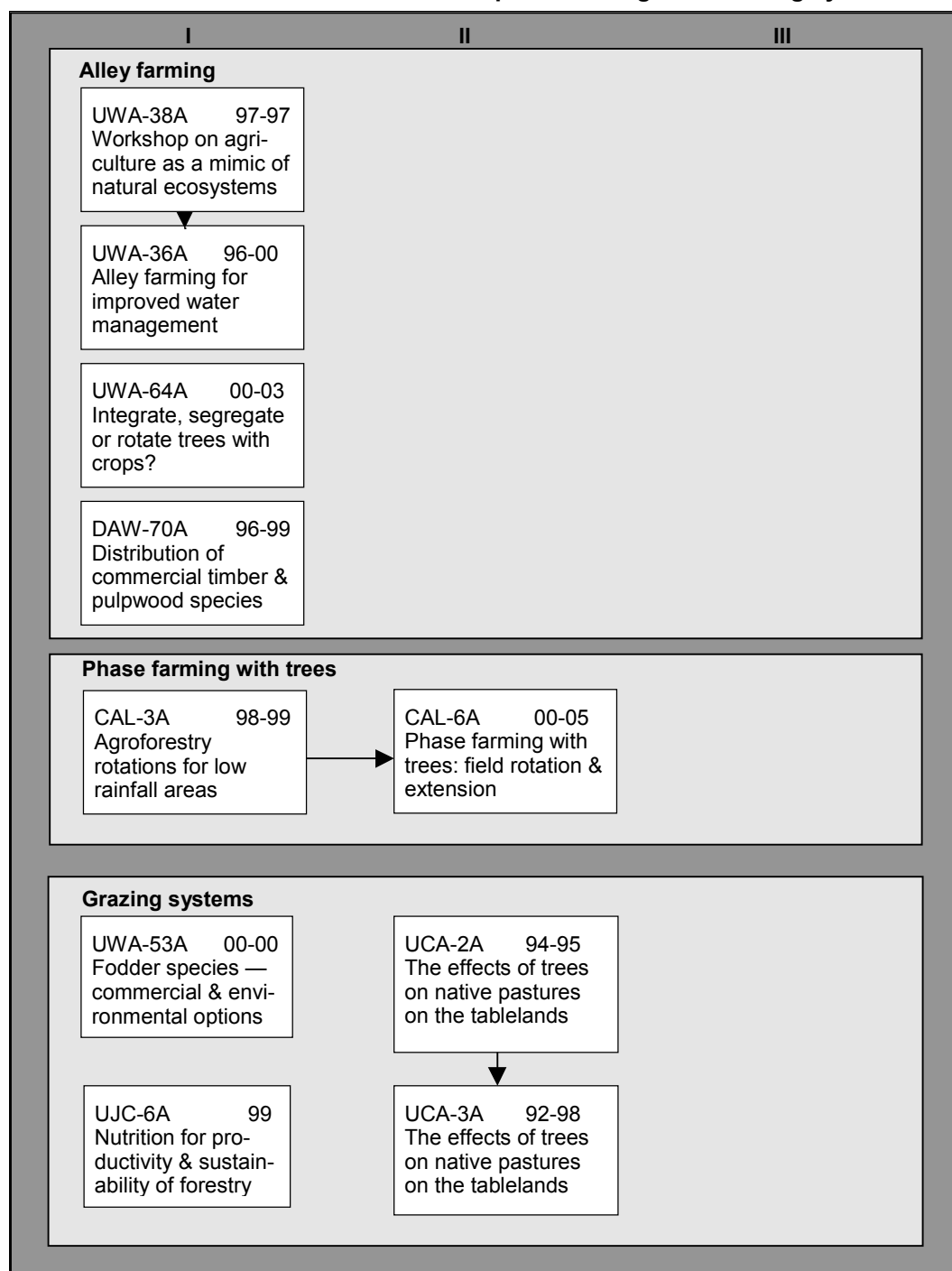
Integrated farming systems

These projects consider the applications and effects of methods of integration of agroforestry with farming systems. JVAP contributed \$777 992 to these projects to a total of \$1.804 million. Three types of integrated farming systems are considered.

- alley farming
- phase farming with trees, and
- grazing systems.

The stages and classification of these projects is presented in chart 3.2.

Chart 3.2 **Production – sustainable development – integrated farming systems**



Data source: RIRDC data, RIRDC and CIE classifications

Alley farming

Four projects related to alley farming.

- UWA-36A assessed the extent to which trees and leguminous shrubs in an alley farming system can intercept water and nutrients. It found that plantations are a more appropriate strategy than alley cropping. It was assessed as having a high impact.
- UWA-38A explored the concept of agricultural systems based on natural ecosystems to eventually replace the current unsustainable agricultural systems. Key steps required for the development of natural ecosystems were developed. It is too early to assess the impact of this workshop, but it has the potential to lead to future discussion and implementation of sustainable agricultural systems.
- UWA-64A will measure the tradeoff between recharge control and agricultural productivity in WA and is likely to have a high impact, though it is too early to tell.
- DAW-70A established several plantation sites to assess the relationship between bluegums and pasture and model the relationships to assess appropriate alley farming methods. It is considered to have had a high impact.

Phase farming with trees

Phase farming with trees is the practice of planting short-rotation trees and harvesting within a relatively short time. Two projects researched the effects of this practice on salinity.

- CAL-3A investigated the feasibility of phase farming with trees to rapidly de-water potentially saline areas and found that when environmental benefits were taken into account, phase farming with trees was usually profitable. This project is considered to have had a high impact on shaping the thinking and planning sustainable farming systems
- CAL-6A was designed to test the ideas put forward in the study CAL-3A. A single cycle of phase farming with trees in low rainfall areas will be tested. It is too early to assess the impact of this project but there is the potential for it to have a high impact.

Grazing systems

Four projects related to the integration of grazing systems with farm forestry.

Fodder

- UWA-53A considered the current status of fodder species and potential new fodder species, regions suited to fodder production and the feasibility of a national fodder R&D program. The report recommended against a large investment in developing fodder species, and instead suggests examining the ability of existing species to generate fodder. This project is considered to have had a high impact.
- UJC-6A identified shade tolerant legumes suited to wet tropical areas that would best coexist with agroforestry. It is too early to assess the impact of this project.

Industry development

- UCA-2A researched the effect of trees on native pasture, and UCA-3A followed on from this by estimating costs and benefits of promoting natural vegetation alongside agroforestry. Both projects have been assessed as having a medium impact.

Initial assessment

These projects are assessed as having medium to high impact, although it is too early to assess the impact of UJC-6A. The results are summarised in table 3.3.

Table 3.3 **Integrated farming systems – classification and initial assessment**

Code	Project	Stage	Level 3	Assessment
CAL-3A	Ultra-short duration agroforestry rotations for low rainfall areas	1	Phase farming, salinity	High
CAL-6A	Phase farming with trees - field validation and extension	2	Phase farming, salinity	High
DAW-70A	Optimising the distribution of commercial timber and pulpwood species in alley farming	1	Alley farming design principles	High
UCA-2A	The Effects of Trees on Native Pastures on the Southern Tablelands	2	Grazing systems	Medium
UCA-3A	The effects of trees on native pastures on the tablelands	2	Grazing systems	Medium
UJC-6A	Optimising nutrition for productivity and sustainability of farm forestry systems	1	Grazing systems	Too early
UWA-36A	Alley farming for improved water management and nutrient cycling in sandplain cropping	1	Alley farming	High
UWA-38A	Alley farming for improved water management and nutrient cycling in sandplain cropping	1	Alley farming	Too early

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Table 3.3 **Integrated farming systems – classification and initial assessment**
(continued)

Code	Project	Stage	Level 3	Assessment
UWA-53A	(NHT) consultancy - fodder species-commercial and environmental options	1	Grazing systems	High
UWA-64A	Integrate, segregate or rotate trees with crops?	1	Alley farming design principles	Too early

Source: RIRDC data, RIRDC and CIE classifications

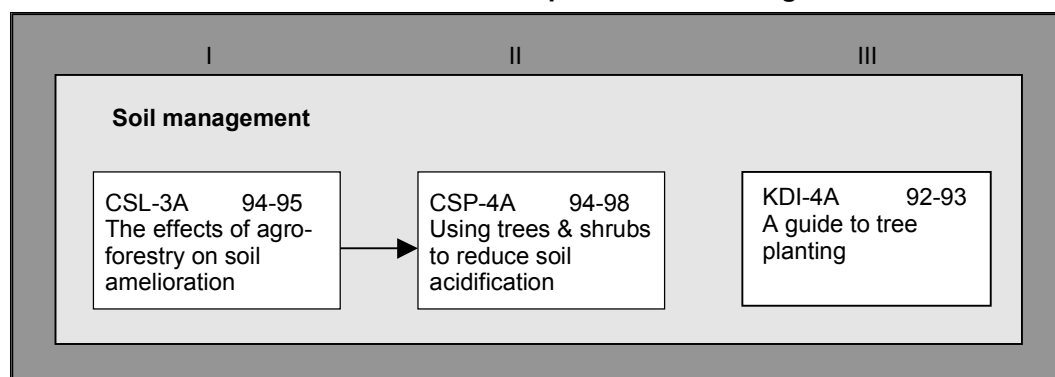
Soil management

Three projects focus on the issue of soil management. These projects received a total of \$507 776 in funding, with JVAP contributing \$175 738.

- CSL-3A considered the effects of agroforestry on soil amelioration, and is assessed as having a medium impact. Following on from this, CSP-4A evaluated the effectiveness of using trees and shrubs to remove nutrients contributing to soil acidification. The impact of this project is unknown.
- KDI-4A provided farmers with a reference tool to use when planting trees for landcare and soil conservation. It is assessed as having a low impact.

The classification of these projects is presented in chart 3.3.

Chart 3.3 **Production – sustainable development – soil management**



Data source: RIRDC data, RIRDC and CIE classifications

Initial assessment

These projects produced mixed results, though overall were assessed as having a relatively low impact. This is reflected in the fact that no further work has been done in this area since 1998. The impact of windbreaks on production, however includes the soil management effects. Classifications and impact are presented in table 3.4.

Table 3.4 **Soil management – classification and initial assessment**

Code	Project	Stage	Level 3	Assessment
CSL-3A	Consultancy: Review the effects of agroforestry on soil amelioration	1	Soil management	Medium
CSP-4A	The use of trees and fodder shrubs in reducing the rate of soil acidification	2	Soil management	Unknown
KDI-4A	A Guide to Tree Planting	3	Design principles	Low

Source: RIRDC data, RIRDC and CIE classifications

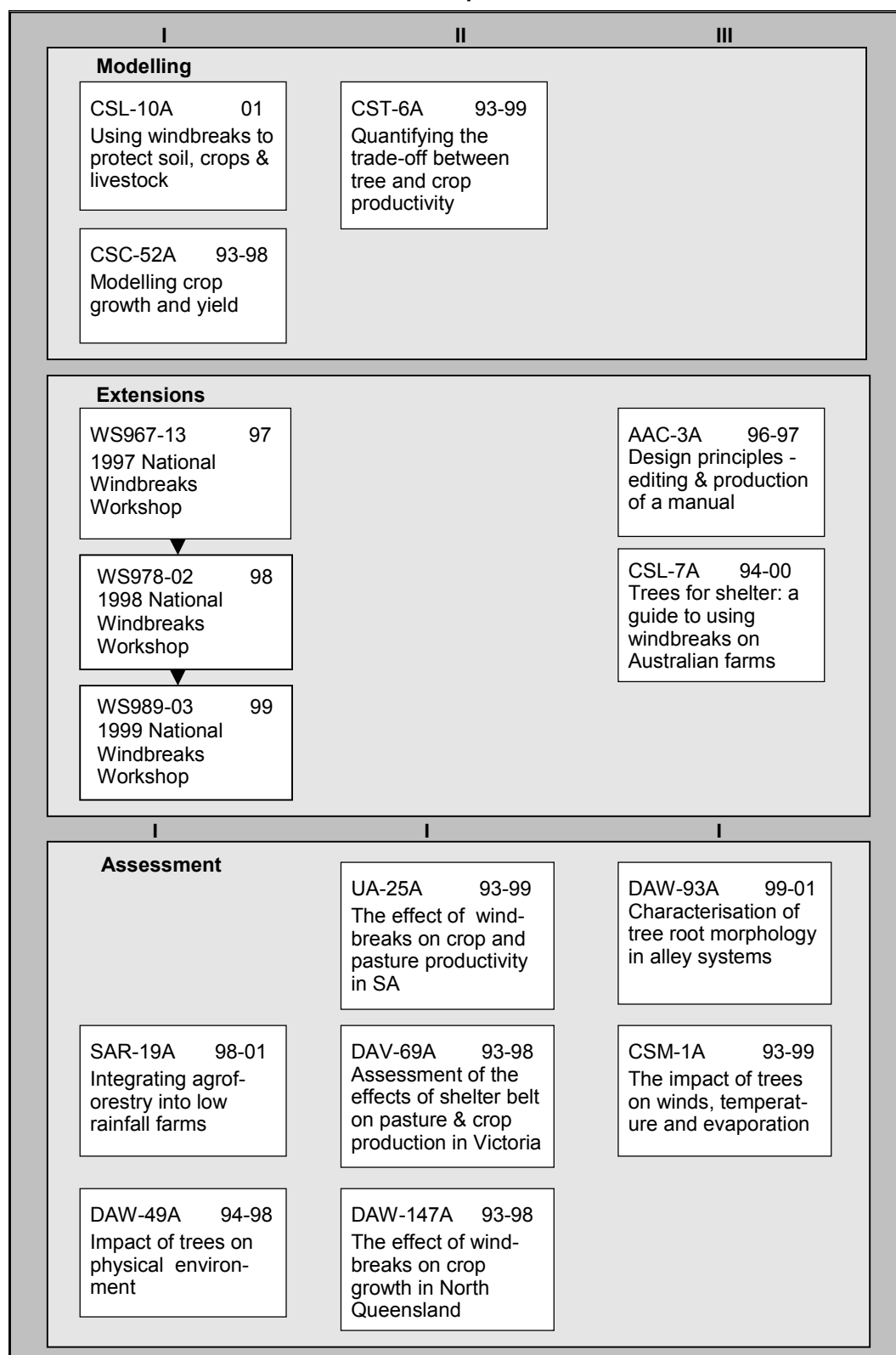
Windbreaks

Fifteen projects researched the use of trees as windbreaks on farms to prevent crop damage, soil erosion and animal loss. JVAP contributed \$2.633 million to a total of \$7.338 million in research funding for these projects. These projects have been classified into three areas:

- modelling
- extension, and
- assessment.

The project classifications are presented in chart 3.4.

Chart 3.4 **Production – sustainable development – windbreaks**



Data source: RIRDC data, RIRDC and CIE classifications

Modelling

These projects modelled the effects of windbreaks and developed tools to assist farmers in incorporating windbreaks into their farm design and budget.

- CST-6A designed an APSIM model to simulate competition between trees and crops, quantify the benefits and risks of planting trees and help assess the viability of agroforestry on farms. The project is not yet complete thus its impact cannot be assessed.
- CSL-10A modelled the effects of wind and chill on soil, crops and livestock, and with the historical wind climate record will predict the probability of damage from wind and calculate the reduction in risk from using windbreaks. This project is considered to have a high impact.
- CSC-52A created a model that simulated the effects of windbreaks on farms in South Australia, and determined that the yield benefits from windbreaks could only partially offset the costs of establishing them. It is considered to have a high impact.

Extension

- Three workshops, WS967-13, WS978-02 and WS989-03 focus on the use of windbreaks on Australian farms to increase productivity of crops and livestock. They supported projects in the National Windbreaks Program.
- AAC-3A produced a book on design principles for farm forestry, outlining the costs and benefits of using trees for windbreaks, salinity control, and fodder, amongst other things. Impact is considered to be high in light of the few publications giving practical design advice and attempting to help with tree design for multiple objectives.
- CSL-7A used research and results from the National Windbreaks Program to write a guide on using trees for shelter on Australian farms. This project is assessed as having a high impact.

Assessment

A number of projects conducted trials and measurements to provide input into the modelling.

- SAR-19A tested the effects of windblasting on crops and the yield response of crops to windbreaks of certain heights and is assessed as having a high impact.
- DAW-49A conducted a similar assessment in Western Australia, and was the most successful of the windbreak site tests. This project is assessed as having a high impact.

- DAV-69A measured the effects of shelterbelts on crop production in north east Victoria. Results from one area were too variable to draw any conclusions, and the other did not experience high enough windspeeds for the windbreaks to have significant benefit, so it is assessed as having a low impact.
- DAQ-147A measured the effects of windbreaks on crops, and determined that young windbreaks will increase the yield of peanuts and potatoes, and have no significant effect on maize. It is considered to have a medium impact.
- CSM-1A assessed the effect of trees on farm microclimates to test models for effects of windbreaks. It is considered to have a high impact.
- UA-25A tested the effects of windbreaks on crop yield in South Australia, and discovered that windbreaks have subtle effects on wheat yield, and enhances biomass production of wheat. It is assessed as having a medium impact.

Management systems

One project undertook research aimed at developing better management system through understanding the biological systems at work.

- DAW-93A researched tree root morphology in alley and windbreak systems to improve pasture and crop growth by developing competition management strategies. It is assessed as having a high impact.

Initial assessment

Overall, the impact of these projects is considered to be high. The classifications and assessment of each project are shown in table 3.5.

Table 3.5 **Windbreaks – classification and initial assessment**

Code	Project	Stage	Level 3	Assessment
AAC-3A	Design principles - editing and production of a manual	3	Extension	High
CSC-52A	Modelling crop growth and yield under the environmental changes induced by windbreaks	1	Modelling	High
CSL-10A	Using windbreaks to protect soil, crops and livestock	1	Design principles, modelling	High
CSL-7A	Trees for shelter: a guide to using windbreaks on Australian farms	3	Design principles, extension	High

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Table 3.5 **Windbreaks – classification and initial assessment** (continued)

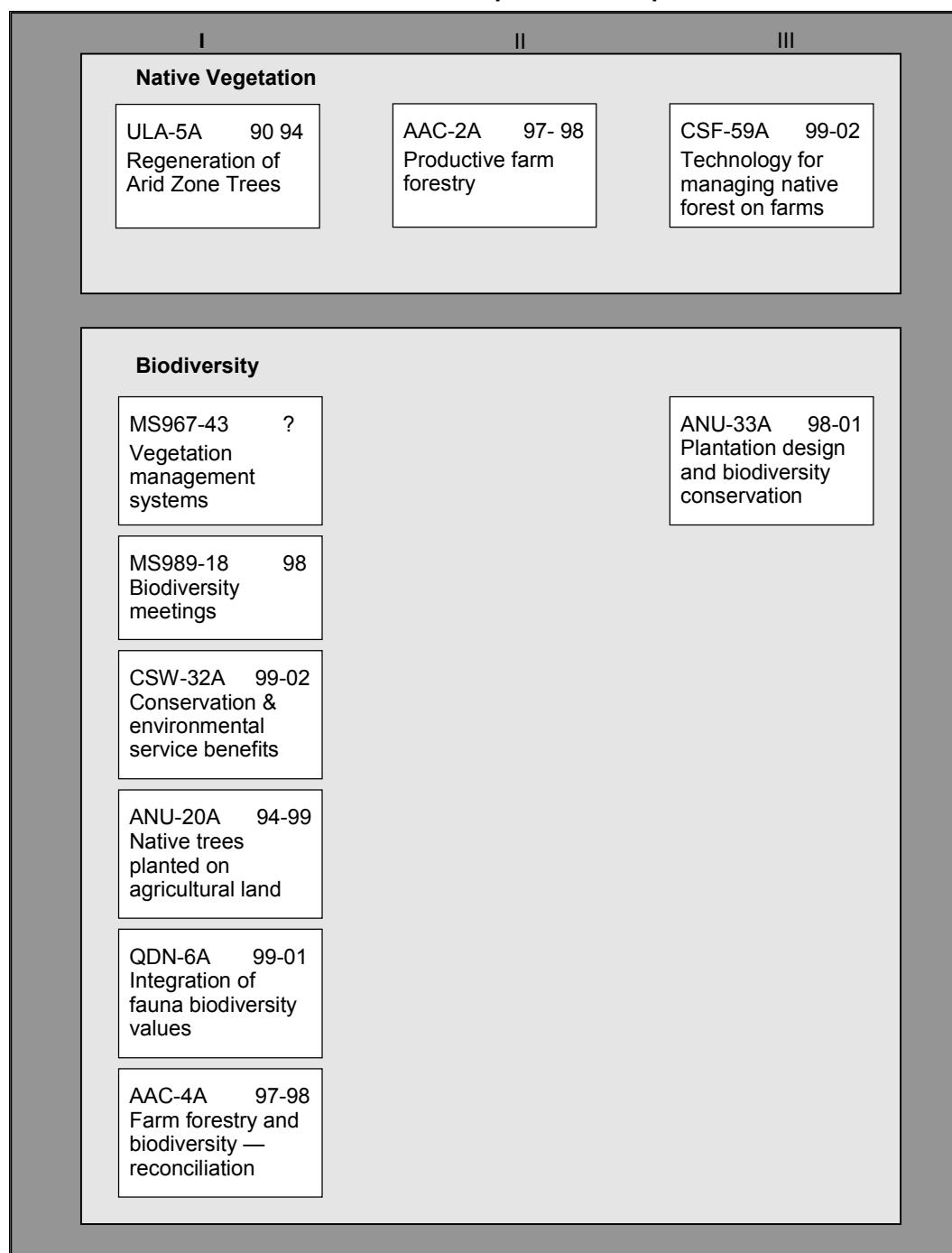
Code	Project	Stage	Level 3	Assessment
CSM-1A	The impact of trees on winds, temperature and evaporation rates in farmlands	1	Design principles, assessment	High
CST-6A	(NHT) Quantifying the tradeoffs between tree and crop productivity on farms	2	Design principles, modelling	Medium
DAQ-147A	The effect of windbreaks on crop growth in the Atherton tablelands of north Queensland	1	Assessment	Medium
DAV-69A	Assessment of the effects of shelterbelts on pasture and crop production in Victoria	1	Assessment	Low
DAW-49A	The impact of trees on the physical environment and productivity of farmlands	1	Assessment	High
DAW-93A	Characterisation of tree root morphology in alley and windbreak systems	1	Management systems	High
SAR-19A	Integrating agroforestry into low rainfall farming systems	1	Assessment	High
UA-25A	Effect of windbreaks on crop and pasture productivity in South Australia	1	Assessment	Medium
WS967-13	1997 Windbreaks Workshop	1	Workshop	Unknown
WS978-02	1998 National Windbreaks Program Workshop, Esperance	1	Workshop	Unknown
WS989-03	1999 National Windbreaks Workshop	1	Workshop	Unknown

Multiple use of resources

Ten projects researched the use of agroforestry incorporating the management of native forest and biodiversity into a farming system. A total of \$2.091 million was provided for these projects, with JVAP contributing \$1.099 million.

The classification of these projects is presented in chart 3.5.

Chart 3.5 **Production – sustainable development – multiple use of resources**



Data source: RIRDC data, RIRDC and CIE classifications

Native vegetation

The three projects in this category relate to the use of native vegetation on farms.

- ULA-5A attempted to establish the reasons for the failure of trees to regenerate in the belah-rosewood country of NSW. The outcome of this project is not known.
- AAC-2A canvassed information on private native forests in Australia with the intent of developing a strategy for the maintenance of private native forests. This project was hampered by lack of basic information on the extent and nature of forest resources. This project is assessed as having a low impact.
- CSF-59A intends to identify research and development needs and introduce technologies relevant to small scale farms, with emphasis on the management of native forests. So far it has developed a model framework for private forest management planning and trialed the effectiveness of co-operatives for market timber. It is too early to assess the impact of this project.

Biodiversity

These projects considered the effect that farm forestry can have on biodiversity.

- AAC-4A reviewed legislation, literature and farmer experience about the effects of farm forestry on biodiversity. There is little information on the effects on biodiversity of plantations as opposed to other agriculture, and there is mixed information on its benefits. This project is considered to provide useful information on making farm forestry bio-friendly, and thus is assessed as having a high impact.
- QDN-6A has surveyed fauna in farm forestry, cleared grazing land and native forests in subtropical eastern Australia and a database is being created. It is predicted to have a medium impact.
- ANU-20A sampled agroforestry plantings to determine revegetation characteristics that maximise conservation value. Remnant vegetation provides a less than adequate habitat for many bird species. Tree plantings will only be appropriate bird habitats if certain conditions are met. This project was a supplement to a PhD project and considered to be poorly executed, and so is assessed as having a low impact.
- CSW-32A considered and quantified the relationship between native hardwood farm forestry and biological conservation goals. Vertebrate fauna use has been evaluated at several plantations. It is too early to assess the impact of this project.
- MS967-43 produced indicators on vegetation management performance. It is considered to have a medium impact.

- MS989-18 developed guidelines to optimise biodiversity in agroforestry systems, and is considered to have a medium to high impact.
- ANU-33A researched methods in which plantations could retain some value for biodiversity conservation and are sharing this information with forestry groups. It has been assessed as having a high impact.

Initial assessment

Results from these projects were mixed, however most of the project assessments ranged from medium to high. This is presented in table 3.6.

Table 3.6 Multiple use of resources – classification and initial assessment

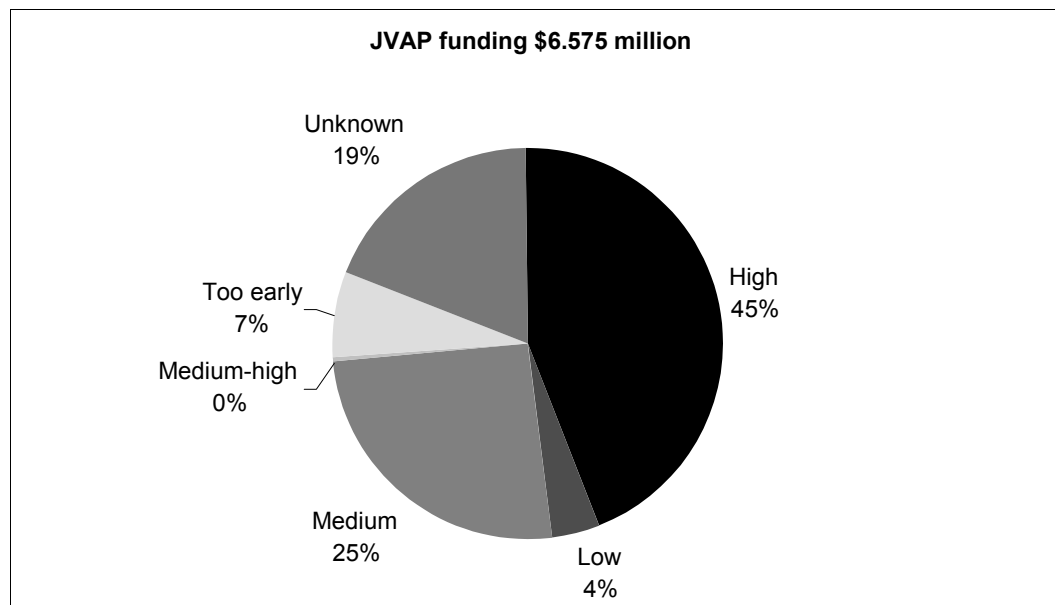
Code	Project	Stage	Level 3	Assessment
AAC-2A	Productive farm forestry through sustainable management of native forests on farms	2	Native vegetation	Low
AAC-4A	Farm forestry and biodiversity - reconciliation	1	Design principles, biodiversity	High
ANU-20A	Investigating the conservation characteristics of native trees planted on agricultural land	1	Biodiversity	Low
ANU-33A	(NHT) Plantation design and biodiversity conservation	3	Design principles biodiversity	High
CSF-59A	Technologies for managing native forest on farms	3	Native vegetation	Too early
CSW-32A	(NHT) Farm forestry: Quantifying conservation and environmental service benefits	1	Biodiversity	Too early
MS967-43	Effectiveness of vegetation management programs - consultancy managed by EA	1	Biodiversity	Medium
MS989-18	Biodiversity meetings, 7 September 1998, 19 October 1998	1	Biodiversity	Medium-high
QDN-6A	(NHT) Measurement and integration of fauna biodiversity values in Queensland agroforestry systems	1	Biodiversity	Medium
ULA-5A	Regeneration of Arid Zone Trees in the Belah-Rosewood Country of Western New South Wales	1	Native vegetation	Unknown

Source: RIRDC data, RIRDC and CIE classifications

Production – sustainable development – initial assessment

The majority of JVAP funds were allocated to projects assessed as having a high impact. Chart 3.6 summarises the proportion of RIRDC funds allocated by the assessed project impact.

Chart 3.6 Production – sustainable development – classification



Data source: RIRDC data, RIRDC and CIE classifications

4 Industry training and development

Thirty-four projects fall into the category of industry training and development. These projects focus on policies and programs designed to promote agroforestry and its social and economic benefits. A total of \$6.949 million funded these projects, of which JVAP provided \$2.412 million. Table 4.1 groups the projects into their classifications in alphabetical order and presents the funding for each project.

Table 4.1 Industry training and development – funding and project timing

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
<i>New products</i>							
AGT-6A	Neem study	13/03/00	12/05/00	5 000	0	0	5 000
AGT-7A	Wattle seed production in low rainfall areas	13/03/00	14/07/00	15 000	0	0	15 000
CSF-38A	Plantation Production of Australian Hardwood Timber for Use in Scrimber and Assessment of the Quality of this for Scrimber Production	1/07/90	30/06/95	49 878	0	10 959	60 837
CSF-52A	Preparation of an English version of 'Black wattle and its utilisation'	1/01/96	31/03/96	5 000			5 000
DCL-3A	Potential production of tannin and fuel wood from plantation bipinnate acacias	1/10/97	30/09/98	57 956	63 504	15 000	136 460
OIL-2A	Video - money in the mallee	1/07/99	31/08/00	5 500	10 000	10 000	25 500
UCS-14A	Market, economic and social assessment of low rainfall carob agroforestry in the Murray valley	15/08/96	15/03/97	36 500	13 250	15 500	65 250

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Table 4.1 **Industry training and development – funding and project timing** (continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
UNT-6A	(NHT)Feasibility of local, small scale native plant harvests for indigenous communities	1/02/99	30/12/01	88 520	43 344	44 187	176 051
WHP-4A	Preparation of a Scoping Paper on the Potential for Australian Agriculture to Produce New Pharmaceutical, Nutraceutical and Industrial Products in the Period 2000-2010	2/01/00	1/10/00	82 860	0	0	82 860
WS967-2	Growing Australian Blackwood (Acacia Melanoxylon) for timber - a national strategic workshop	1/10/96	28/02/97	10 000			10 000
<i>Planning</i>							
AAC-1A	National farm forestry strategy	1/08/95	30/06/98	129 000	0	0	129 000
AAC-5A	Priority setting for the Joint Venture Agroforestry Program	1/03/97	15/06/97	46 650	0	0	46 650
ABA-1A	Survey of the costs and benefits of planting trees on Australian farms	1/01/94	30/06/95	51 286	29 217	0	80 503
CAL-2A	Development of computer software to evaluate the visual impact of farm forestry layouts	1/07/98	31/08/99	21 200	10 000	5 000	36 200
CSM-2A	Alley farming in Australia: current research and future directions	20/06/95	28/02/96	20 000			20 000
CSM-3A	Agroforestry and hydrology workshop	1/07/96	31/10/96	6 000			6 000
DAW-84A	Decision support for adoption of agroforestry	1/04/97	1/04/98	37 000	21 030	2 000	60 030

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Table 4.1 **Industry training and development – funding and project timing** (continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
DPI-9A	An Overview of Agroforestry Trees on Farms in Australia	27/11/90	31/08/91	17 400			17 400
GRE-1A	Identification of R & D priorities for northern Australia (Northern Australia consultancy)	19/02/01	1/05/01	31 598	0	0	31 598
QDN-4A	A whole-farm and regional agroforestry decision making system	1/01/99	1/08/01	300 633	392 292	16 900	709 825
SAR-17A	National farm tree improvement program	1/09/98	1/02/99	10 000	0	0	10 000
<i>Policy and industry strategy</i>							
AGS-1A	National Catchment Groundwater Classification Workshop (previously WS967-11)	1/03/97	30/04/98	32 000	0	0	32 000
AHM-1A	Policy reforms for agroforestry post NPAC - an investigation of reforms to overcome impediments to agroforestry	1/07/95	31/03/98	77 000	0	0	77 000
CSF-60A	'Best bet' products from agroforestry biomass	29/12/00	14/12/01	147 368	87 757	10 000	245 125
ECU-8A	Assessment of the socio-economic implications of farm forestry	30/05/00	30/09/00	45 994	4 000	0	49 994
MS990-32	Publication of synthesis paper from Water Resources and Farm Forestry Conference.			1 878	0	0	1 878
QDN-3A	Estimating the productivity of forestry systems in southeast Queensland	1/01/99	30/09/01	205 183	604 813	0	809 996

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Table 4.1 **Industry training and development – funding and project timing** (continued)

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
SSC-2A	Australian participation in the International Energy Agency's bioenergy program	1/11/98	30/04/01	44 662	48 888	926 534	1 020 084
UCS-10A	Strategies to optimise farm forestry in regional Australia	1/07/95	31/01/98	155 200	63 720	37 500	256 420
UWA-63A	Profitability of medium to low rainfall agroforestry in the southern Australian cropping zone	1/12/00	30/07/02	162 155	114 604	0	276 759
<i>Development</i>							
BCL-1A	Landcare loan fund project development	1/11/98	1/11/01	39 750	6 950	10 150	56 850
<i>Occupational Health and Safety</i>							
CSF-51A	Harvesting trees on Australian farms	1/01/96	30/06/98	50 000	94 200	9 000	153 200
<i>Human Capital and Community Development</i>							
UM-34A	The Australian Master Treegrower Program	1/07/97	30/06/99	143 860	36 200	252 340	432 400
UM-44A	Continuation and expansion of the Australian Master Treegrower R&D Program	10/02/99	30/09/01	280 158	209 026	864 000	1 353 184

Projects in this category have been divided into six sub-groups:

- new products
- planning
- policy and industry strategy
- development
- occupational health and safety, and
- human capital development.

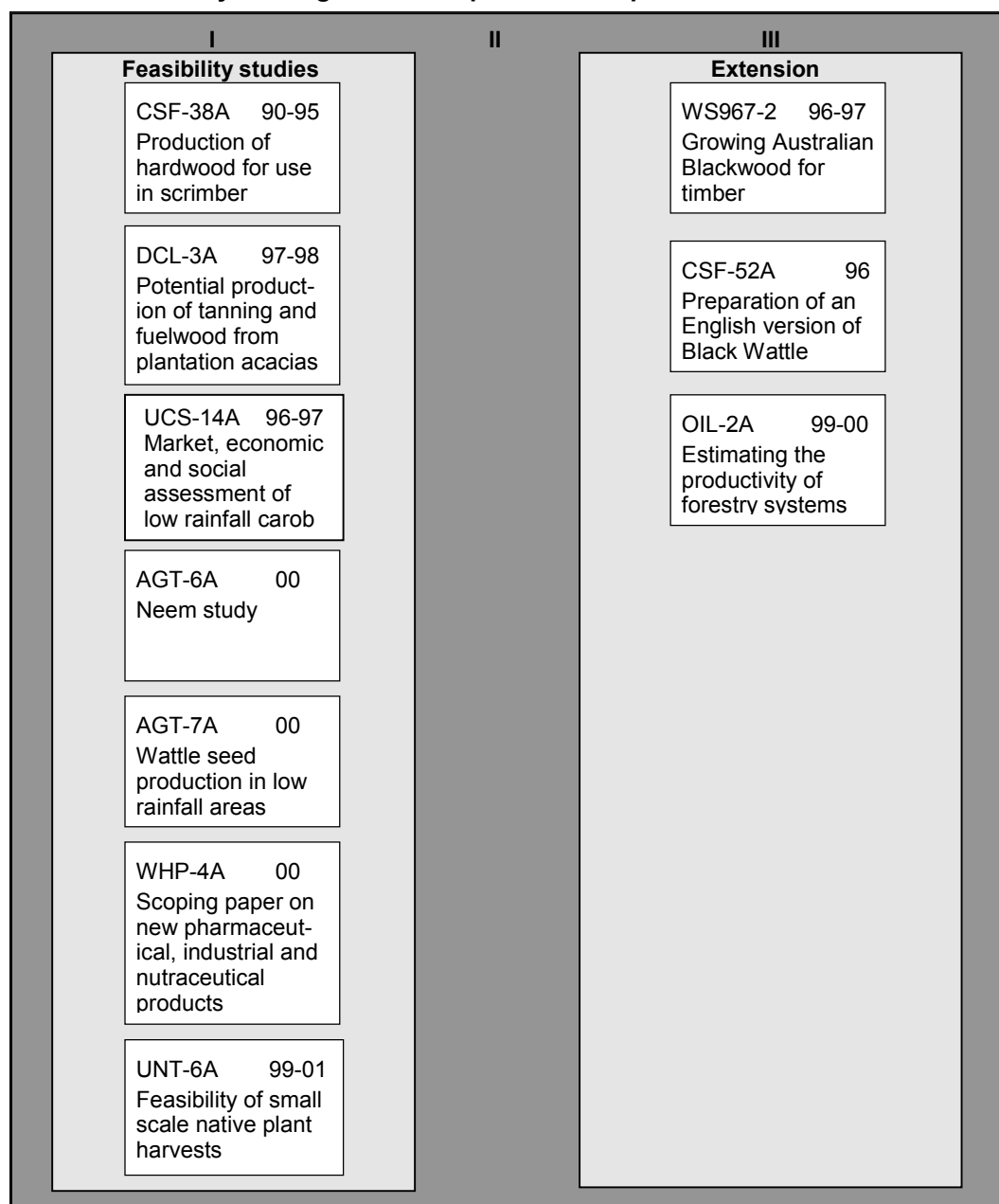
New products

These projects researched the feasibility of potential new products and provided farmers with information on investing in these products. Total funding for this research was \$581 958, with JVAP contributing \$356 214. There are two areas that projects in this classification cover:

- feasibility studies, and
- extension to inform farmers about new product potential.

Chart 4.1 shows the classifications of these projects.

Chart 4.1 Industry training and development – new products



Data source: RIRDC data, RIRDC and CIE classifications

Feasibility studies

Seven projects researched the technical, social and economic feasibility of potential new products. Potential products considered include neem, wattle seed as a flour substitute, acacias for adhesive, low rainfall carob and scrimber.

- WHP-4A produced a paper on the potential of Australian agriculture to develop new pharmaceuticals and industrial products over the next decade. This project is assessed of having a low impact.

- AGT-6A researched the technical and economic viability of neem tree production in low rainfall areas and the domestic and export market for neem oil, an insecticide. The market is small and a neem industry would more likely be successful in the far north of Australia, and is unlikely to succeed in low rainfall areas. This project is assessed as having a high impact as it discourages further investment in an unprofitable product.
- AGT-7A considered the feasibility of farming broadacre wattle seed in the medium to low rainfall areas of southern Australia for bread and biscuit making. The study concluded that the viability of wattle seed is worth further study. In the last couple of years wattleseed has gained some interest from growers and prospectus groups, and this is one of the few published papers on the subject. It has been followed up by a workshop on the feasibility of broadacre production of wattleseed in 2002. At present it is too early to assess the impact of this project.
- DCL-3A assessed plantation acacias for adhesive properties. The tannin extracts made a satisfactory adhesive and timber produced had a high enough wood density to make good short rotation fuelwood species. It is too early to assess the impact of this project.
- UCS-14A was a market, social and economic assessment of the feasibility of development of a carob industry in the low rainfall areas of the Murray Valley. The outcome of this project is unknown.
- CSF-38A examined six species of Australian hardwoods to establish rates of production and assessed the quality of the wood for use in scrimber. This project was considered to have a low impact.
- UNT-6A is researching the feasibility of establishing small scale native plant harvests, maintained by indigenous communities. Market prices are too low to generate reasonable incomes for native foods, but potential markets exist for nursery plants and novelty tourism foods. This project has identified a strategy for indigenous communities to harvest, value-add and market native plants to tourists in a manner which keeps control of the product within the community. It is too early to assess but while this project will not have a wide impact, it has the capacity to be successful and have a high impact in a small number of communities.

Extension

These three research projects provided information to agroforesters about new agroforestry products.

- CSF-52A translated a book on the growth and applications of Black Wattle from Chinese into English. It is considered to have a medium impact.

- OIL-2A produced a video entitled *Money in the Mallee* about the integration of mallee planting with existing enterprises for profit and reducing waterlogging, excess nutrients and salinity. The video has not been released, so it is too early to assess its impact.
- WS967-2 was a strategic workshop on growing Australian blackwood for timber. Australian blackwood is relatively small industry, so this project was assessed as having a low impact.

Initial assessment

These projects showed mixed results. This does not mean that feasible new products were identified, for example AGT-6A had a high impact as it concluded that neem production was not economically feasible, ensuring that funds were not wasted on research and investment in this product. Only two feasibility studies, AGT-7A, OIL-2A and UNT-6A, produced results suggesting that a product was worth further investigation. Classification of these projects and the assessment of their impact is presented in table 4.2.

Table 4.2 New products – classification and initial assessment

Code	Project	Stage	Level 3	Assessment
AGT-6A	Neem study	1	Feasibility studies	High
AGT-7A	Wattle seed production in low rainfall areas	1	Feasibility studies	Too early
CSF-38A	Plantation Production of Australian Hardwood Timber for Use in Scrimber and Assessment of the Quality of this for Scrimber Production	1	Feasibility studies	Low
CSF-52A	Preparation of an English version of 'Black wattle and its utilisation'	3	Extension, publication	High
DCL-3A	Potential production of tannin and fuel wood from plantation bipinnate acacias	1	Feasibility studies	Too early
OIL-2A	Video - money in the mallee	3	Extension, oil mallee, publication	Too early

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Table 4.2 **New products – classification and initial assessment** (continued)

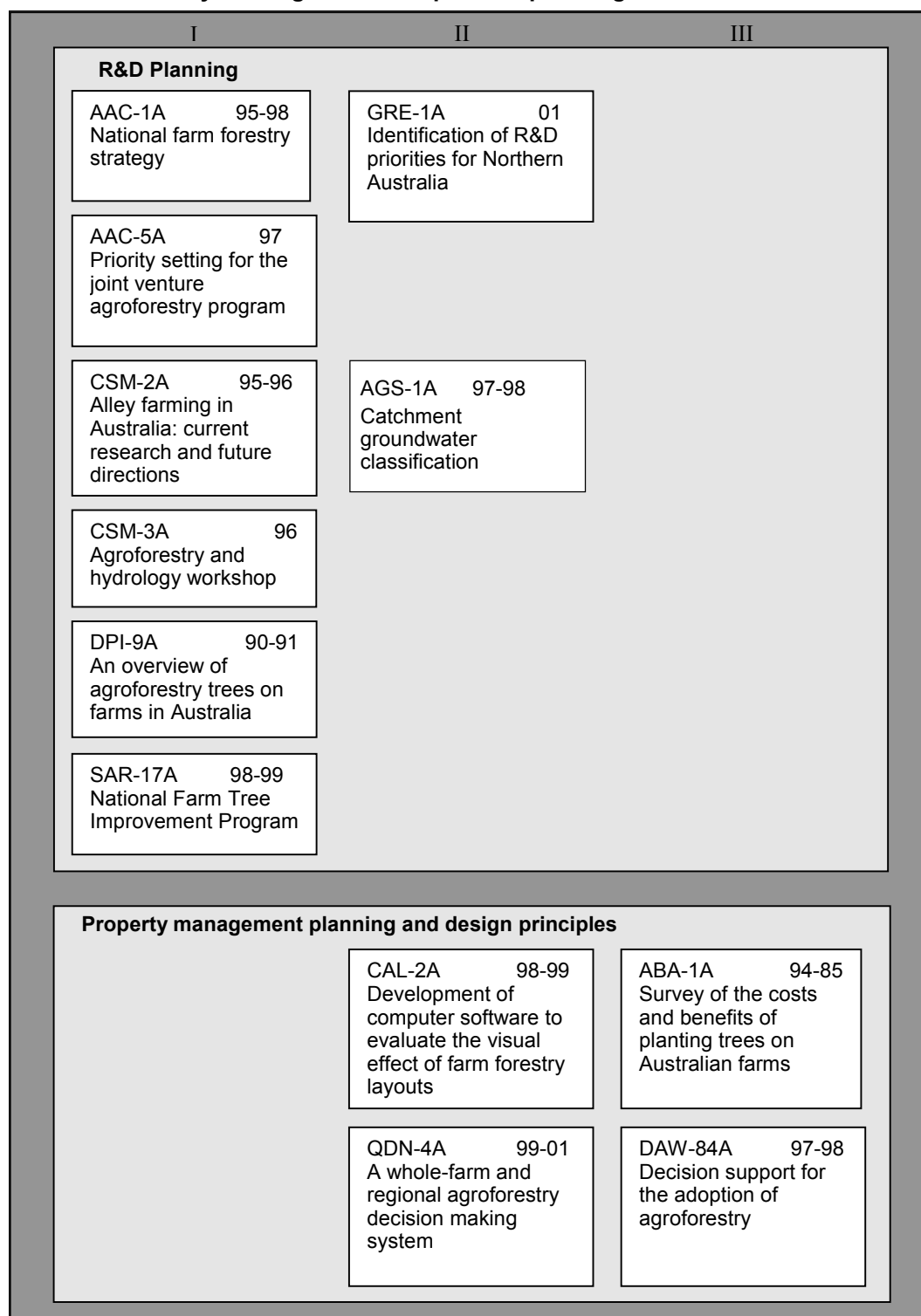
Code	Project	Stage	Level 3	Assessment
UCS-14A	Market, economic and social assessment of low rainfall carob agroforestry in the Murray valley	1	Feasibility studies	Unknown
UNT-6A	(NHT)Feasibility of local, small scale native plant harvests for indigenous communitites	1	Indigenous communities, feasibility studies	Too early
WHP-4A	Preparation of a Scoping Paper on the Potential for Australian Agriculture to Produce New Pharmaceutical, Nutraceutical and Industrial Products in the Period 2000-2010	1	Feasibility studies	Low
WS967-2	Growing Australian Blackwood (Acacia Melanoxylon) for timber - a national strategic workshop	3	Extension	Low

Source: RIRDC data, RIRDC and CIE classifications

Planning

These projects examine farm forestry R&D strategies, property management principles and farm design. A total of \$1.147 million was provided for these projects, with JVAP contributing \$670 767.

Chart 4.2 Industry training and development – planning



Data source: RIRDC data, RIRDC and CIE classifications

R&D planning

Eight projects examined the history, position and future direction of Australian agroforestry research.

- AAC-1A designed a national strategy for farm forestry, considering future directions for industry development, R&D planning and socioeconomic policies. AAC-5A set priorities for the JVAP R&D research program. Both of these projects are considered to have a high impact.
- AGS-1A was the National Catchment Groundwater Classification Workshop, which provided a consensus on models of water and solute movement within Australia, unifying R&D. A consistent set of conceptual models of how catchments and groundwater intersected was developed and agreed upon. This was the first step in the major task of mapping out the various catchment types in Australia. It is assessed as a high impact project.
- DPI-9A prepared an overview of agroforestry research being carried out in Australia on the basis of agroecological zones. This project is assessed as having a high impact.
- GRE-1A identified the five highest R&D priorities for agroforestry, leading to improved efficiency of expenditure on agroforestry, better targeted R&D and collaboration between research groups in Northern Australia. It is too early to assess the impact of this project but it should have a medium impact in northern Australia because it provides a strong framework for investment in R&D in the region.
- CSM-2A reviewed current Australian and international research on alley farming and provided a framework for determining promising future research areas in alley farming. It is assessed as having a high impact because it has underpinned many of the following projects.
- CSM-3A was a workshop identifying areas in need of research on the effect of agroforestry on water tables. It is assessed as having a high impact.
- SAR-17A was a workshop discussing the improving co-ordination of farm forestry trials and sharing information and resources regarding low rainfall farm forestry. Information gaps have been identified and the Australian Low Rainfall Tree Improvement Group was established. Although it is a little early to tell, this project is considered to have a high impact because it addresses as a high priority the lack of suitable information for farm forestry in low rainfall areas. Depending on the success of breeding and uptake, this project could have a very substantial impact on a large area of South Australia.

Property management planning and design principles

These four projects considered the incorporation of agroforestry into farm design.

- ABA-1A was a publication of the costs and benefits of planting trees on Australian farms. It is quoted frequently and is considered to have a high impact.
- DAW-84A provided decision aids to farmers to quantify the impact of farm forestry on their business. A linear spreadsheet was designed and information on the region is entered by an agroforestry professional, and the farmer can receive advice specific to his or her own farm. It is assessed as having a medium impact.
- CAL-2A works on software and documentation necessary to simulate the visual effect on farm forestry layouts over time. This project is assessed as having a high impact.
- QDN-4A developed a software package, the Australian Farm Forestry Financial Model (AFFFM) to evaluate the range of whole farm agroforestry options, as well as evaluating landholder perceptions and attitudes to farm forestry and decision support software. It has had immediate benefit in drawing together four major research groups previously working disparately. It has not yet been published, so it is too early to assess its impact, but it has the potential to have a high impact in the region.

Initial assessment

Overall, these projects were assessed as having a medium to high impact. Classifications and assessment for these projects are summarised in table 4.3.

Table 4.3 **Planning – classification and initial assessment**

Code	Project	Stage	Level 3	Assessment
AAC-1A	National farm forestry strategy	1	R&D planning	High
AAC-5A	Priority setting for the Joint Venture Agroforestry Program	1	R&D planning	High
ABA-1A	Survey of the costs and benefits of planting trees on Australian farms	3	Publication, policy	High
AGS-1A	National Catchment Groundwater Classification Workshop (previously WS967-11)	2	Policy	High
CAL-2A	Development of computer software to evaluate the visual impact of farm forestry layouts	2	Property management	High

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Table 4.3 **Planning – classification and initial assessment** (continued)

Code	Project	Stage	Level 3	Assessment
CSM-2A	Alley farming in Australia: current research and future directions	1	Alley farming & R&D planning	High
CSM-3A	Agroforestry and hydrology workshop	1	R&D planning	High
DAW-84A	Decision support for adoption of agroforestry	3	Design principles	Medium
DPI-9A	An Overview of Agroforestry Trees on Farms in Australia	1	R&D planning	High
GRE-1A	Identification of R & D priorities for northern Australia (Northern Australia consultancy)	2	R&D planning	Too early
QDN-4A	A whole-farm and regional agroforestry decision making system	2	Property management	Too early
SAR-17A	National farm tree improvement program	1	R&D planning, genetics	High

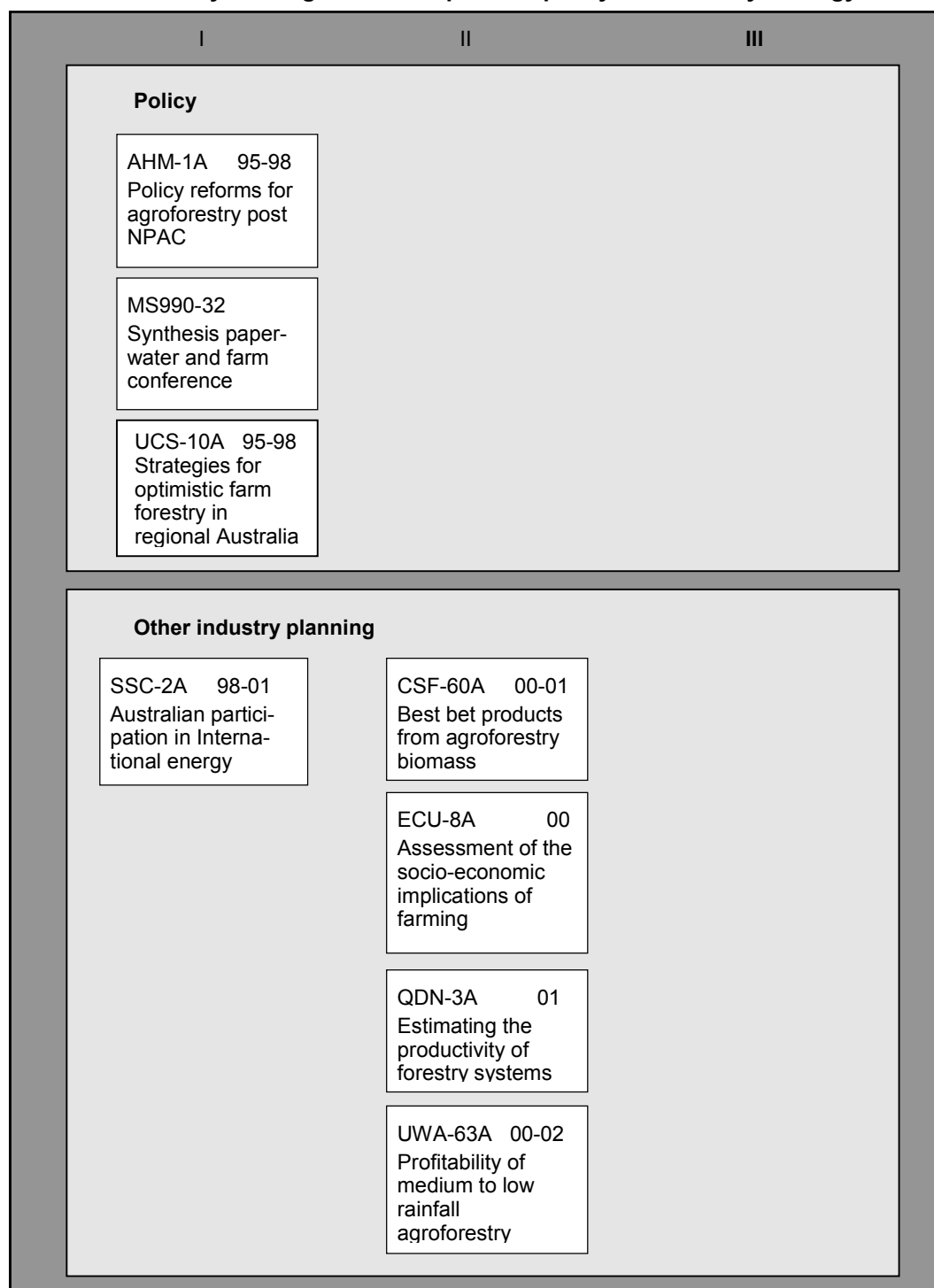
Source: RIRDC data, RIRDC and CIE classifications

Policy and industry strategy

Eight projects relate to policy and industry strategy. These projects consider industry policy and strategies. A total of \$2.769 million funded these projects, with JVAP contributing \$871 440.

The classification of these projects is presented in chart 4.3.

Chart 4.3 **Industry training and development – policy and industry strategy**



Data source: RIRDC data, RIRDC and CIE classifications

Policy

- MS990-32 published a paper from the Water Resources and Farm Forestry Conference. It highlights the tradeoff between surface water runoff, trees and salinity, and has been influential in policy debate. It is considered to be a high impact project.
- AHM-1A investigated reforms to overcome impediments to agroforestry. It was incisive and reasonably comprehensive and has been quoted extensively, therefore is considered to have a high impact.
- UCS-10A developed farm forestry strategies in four regions to advance farm forestry as an important enterprise. It is assessed as having a high impact.

Other industry planning

- ECU-8A considered case studies on the socio-economic impacts of farm forestry and developed guidelines to minimise the negative effects and maximise the positive effects. It is considered to have a high impact.
- QDN-3A researched modelling frameworks needed to deliver reliable estimates of forest productivity for addressing land use planning issues linked to forest resource sustainability in Queensland. It is too early to assess the impact of this project.
- CSF-60A has researched current technologies using biomass as feedstock with the intent of discovering methods of selecting target products for biomass systems. It is too early to assess the impact of this project.
- UWA-63A analysed agroforestry in low to medium rainfall zones of Western Australia and New South Wales to assess the profitability of agroforestry systems over a range of yields, costs, prices, investment strategies and on site benefits. It is too early to assess the full impact of this project but it is already being used in other major industry development projects to assist in screening potential species which may have some feasibility.
- SSC-2A was Australia's participation in the International Energy Agency's bioenergy program, which was a series of workshops, providing first-hand knowledge of the market for renewable energy. This project is assessed as having a medium impact.

Initial assessment

Overall, these projects were assessed as having a medium to high impact. The classifications and impact of these projects is presented in table 4.4.

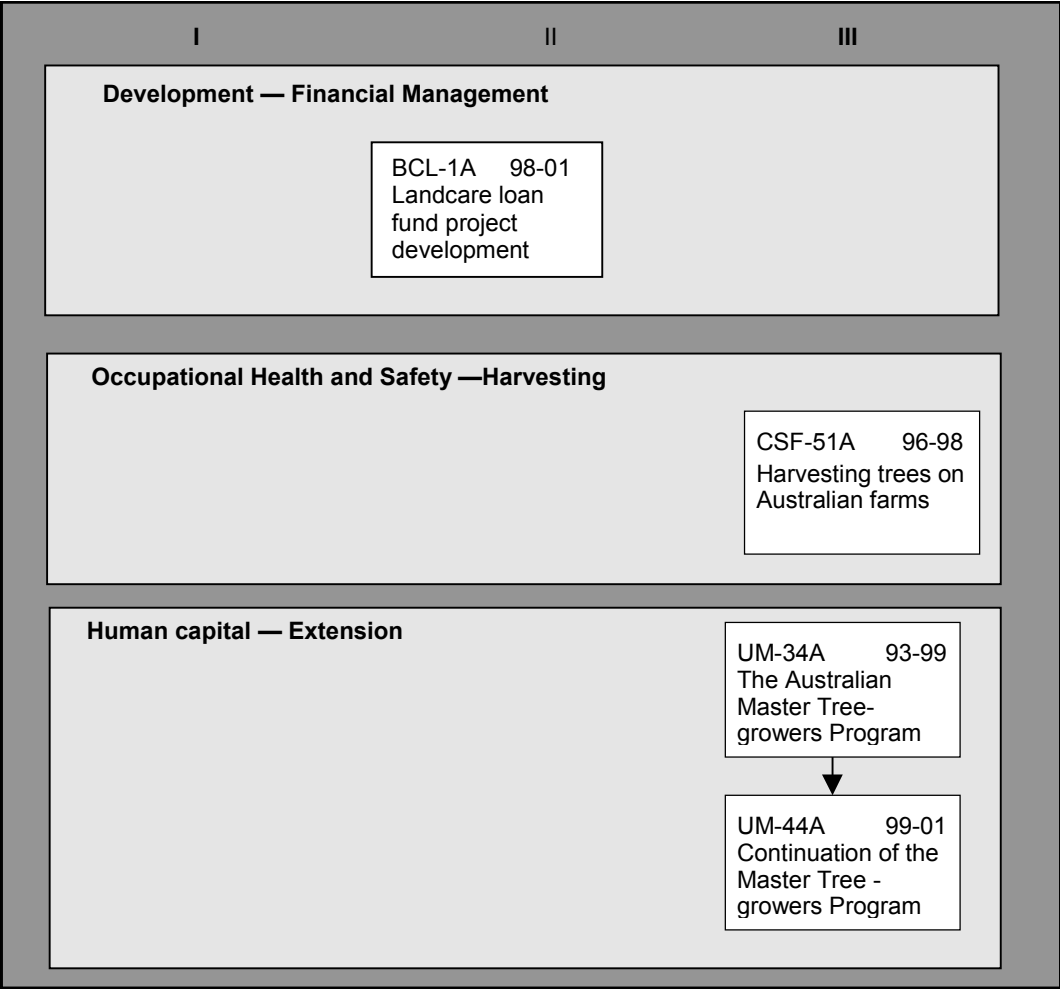
Table 4.4 Policy and industry strategy – classifications and initial assessment

Code	Project	Stage	Level 3	Assessment
AHM-1A	Policy reforms for agroforestry post NPAC - an investigation of reforms to overcome impediments to agroforestry	1	Policy	High
CSF-60A	'Best bet' products from agroforestry biomass	2	New products	Too early
ECU-8A	Assessment of the socio-economic implications of farm forestry	2	Design principles	High
MS990-32	Publication of synthesis paper from Water Resources and Farm Forestry Conference.	1	Policy, design principles	Medium
QDN-3A	Estimating the productivity of forestry systems in southeast Queensland	2	Site selection	Too early
UCS-10A	Strategies to optimise farm forestry in regional Australia	1	Partnerships	High
SSC-2A	Australian participation in the International Energy Agency's bioenergy program	1	Biomass	Medium
UWA-63A	Profitability of medium to low rainfall agroforestry in the southern Australian cropping zone	2	Industry planning	Too early

Source: RIRDC data, RIRDC and CIE classifications

The final three level 2 classifications in industry training and development only have four projects between them. Chart 4.4 shows the classifications for these three topics.

Chart 4.4 **Industry training and development – occupational health and safety and human capital**



Data source: RIRDC data, RIRDC and CIE classifications

Development

The project in this category received total funding of \$56 850, of which JVAP contributed \$39 750.

Financial management

BCL-1A attempted to create a cost sharing structure for farm forestry and landcare by creating a low interest loan fund. The Principal Investigator on this project resigned and the Broken Catchment Landcare Network is attempting to find a replacement. These administrative difficulties suggest that this project has a low impact.

Occupational health and safety

One project researched occupational health and safety issues in farm forestry. RIRDC provided \$50 000 for this research. Total funding came to \$153 000.

Harvesting

CSF-51A identified the equipment that a farmer can safely use for harvesting, and is considered to have a medium impact.

Human capital and community development

Two projects fall into the classification of human capital and community development. A total of \$1.786 million funded these projects, with RIRDC contributing \$424 018.

Master treegrowers program

- UM-34A established Master Treegrowers courses, encouraged farmers to establish tree growing programs and established Master Treegrowers in each region who can play an active role in extension and development programs. These courses are designed as inexpensive adult learning programs to provide farmers with the information and research tools to better understand the ways that trees can benefit their agricultural system and the best methods of reaching farm forestry goals. The program initially was aimed at farmers who were already planting trees, but later programs included people with a more diverse range of experience. The popularity of the program encouraged a follow-up.
- UM-44A continued on with the Master Treegrowers program, promoting involvement in tree products and encouraging greater participation in farm forestry research. Thirty-five Master Treegrowers programs were completed in 2001. The Master Treegrowers courses have been well patronised and both of these projects were assessed as having a high impact.

Initial assessment

These projects have been assessed as having a medium to high impact, except for BCL-1A, which suffered from administrative problems.

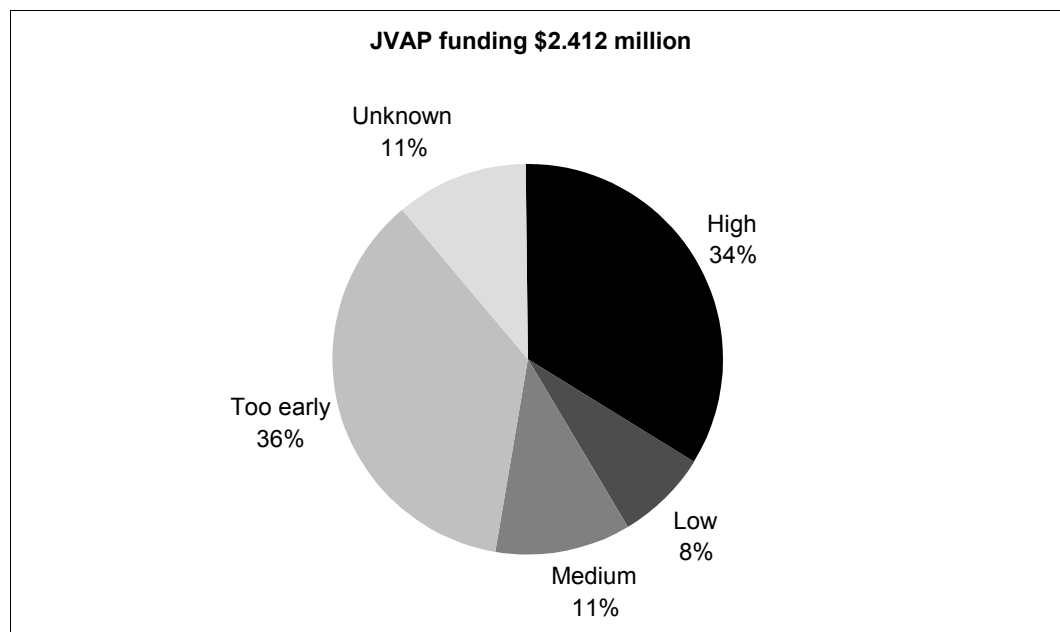
Table 4.5 Development, occupational health and safety, human capital and community development – classification and initial assessment

Code	Project	Stage	Level 3	Assessment
BCL-1A	Landcare loan fund project development	2	Financial Management	Low
CSF-51A	Harvesting trees on Australian farms	3	Harvesting	Medium
UM-34A	The Australian Master Treegrower Program	3	Extension	High
UM-44A	Continuation and expansion of the Australian Master Treegrower R&D Program	3	Extension	High

Source: RIRDC data, RIRDC and CIE classifications

A large proportion of JVAP funding to this area (36 per cent) was contributed to projects considered to have a high impact, but a considerable proportion of funding went to projects whose impact was too early to assess (39 per cent). This data is presented in chart 4.5.

Chart 4.5 Industry training and development – classification



Data source: RIRDC data, RIRDC and CIE classifications

5 Markets

Eleven projects focusing on markets were undertaken. These projects researched existing markets, potential markets, marketing methods and informed agroforesters of marketing techniques. A total of \$1.015 million was invested in these projects, with JVAP contributing \$413 103. Table 5.1 lists the projects in alphabetical order in level 2 groupings.

Table 5.1 **Markets – funding and project timing**

Code	Project	Start	Finish	JVAP funding	Industry	Research Organis- ation	Total
					\$	\$	\$
<i>Marketing</i>							
ANU-49A	Marketing successfully: Effective strategies for marketing farm forestry products	1/02/01	30/03/02	35 700	12 500	16 600	64 800
TFG-1A	Farmwood Australia market development	1/07/99	30/08/01	48 000	273 600	0	321 600
<i>Market information</i>							
ANU-32A	ANU Forestry market report	1/07/98	30/06/99	31 325	30 910	19 800	82 035
ANU-38A	ANU Forestry Market Report	1/07/99	31/07/00	42 100	28 910	19 800	90 810
ANU-44A	Defining the product: Documenting log grades and specifications in Australia	1/07/00	1/03/01	13 885	17 162	0	31 047
ANU-45A	ANU Farm Forestry Market Report	1/08/00	31/07/03	115 000	88 573	44 280	247 853
CAR-1A	Agroforestry from existing timber resources on the Northern Tablelands	1/08/97	31/05/98	34 800	10 040	30 000	74 840
DAW-86A	Farm forestry market information service	1/07/97	31/08/98	29 500	7 880	2 000	39 380
<i>Environmental markets</i>							
CIE-12A	Emerging markets for environmental services						
CSW-32A	(NHT) Farm forestry: Quantifying conservation and environmental service benefits	1/02/99	30/04/02	15 000	0	0	15 000
HAS-8A	Development and demonstration of 'The Carbon Farmer' Workbook	1/04/00	31/08/00	47 703	0	0	47 703

Source: RIRDC data, RIRDC and CIE classifications

These projects were classified into three subcategories:

- marketing,
- market information, and
- environmental markets.

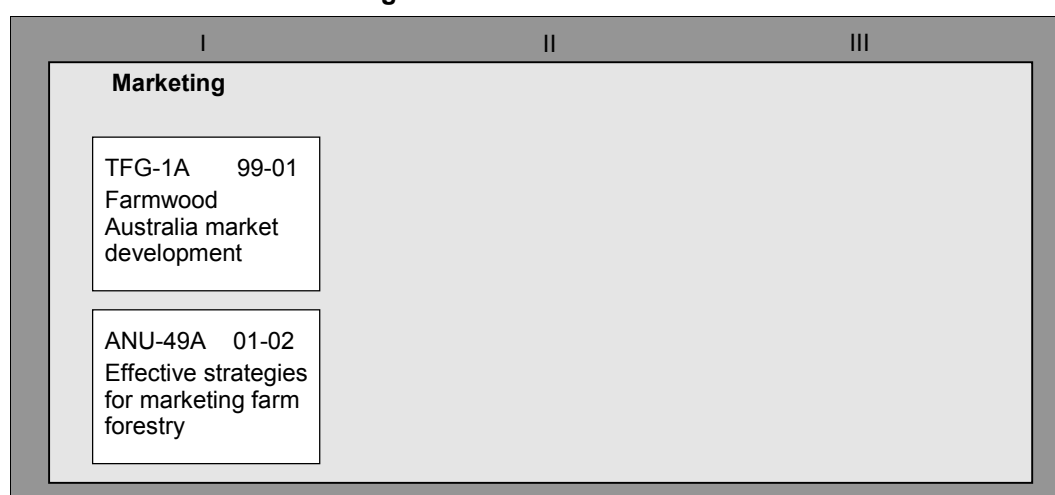
Marketing

Two projects researched marketing strategies. JVAP provided \$83 700 towards these projects. Total funding came to \$386 400.

The classifications for these projects are presented in chart 5.1.

- TFG-1A has researched niche markets, especially in China, established co-operative workshops for economies of scale and aims to disseminate user friendly information on niche markets for wood products. It has not been released yet so it is really too early to assess its impact, but it potentially has a low-medium impact because it has had some administrative problems.
- ANU-49A aims to raise awareness among farm foresters of effective marketing strategies, and is researching case studies of effective marketing. It is considered to have a low impact, as it focused on unusual marketing ideas that worked in their specific setting, but were not necessarily applicable to other settings.

Chart 5.1 **Markets – marketing**



Data source: RIRDC data, RIRDC and CIE classifications

Initial assessment

The impact of these projects was relatively low. Classification and project assessments are presented in table 5.2.

Table 5.2 **Marketing – classification and initial assessment**

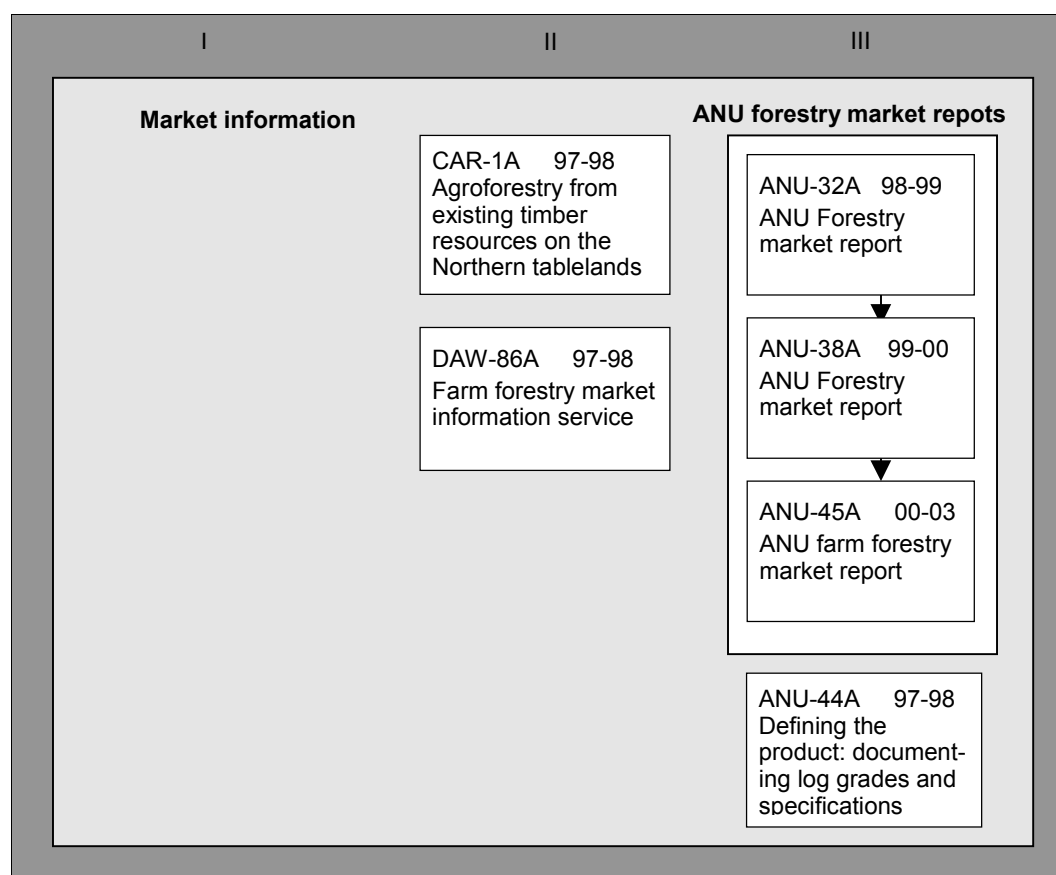
Code	Project	Stage	Level 3	Assessment
ANU-49A	Marketing successfully: Effective strategies for marketing farm forestry products	1	Techniques	Low
TFG-1A	Farmwood Australia market development	1	Groups	Low-medium

Source: RIRDC data, RIRDC and CIE classifications

Market information

These projects focused on the research and distribution of market information. The classification of these projects is presented in chart 5.2.

Chart 5.2 **Markets – market information**



Data source: RIRDC data, RIRDC and CIE classifications

- DAW-86A contributed to the design of a Farm Forestry Market Information Service (FFMIS). It analyses market information services relevant to Australia, describes potential users and recommends the structure, design and functioning of such a service. This project is considered to have a low impact.
- CAR-1A provided private landholders with information on the market potential of existing tree resources on their land. It is considered to have a medium impact.
- ANU-44A researched log specifications in all States and the ACT, and explained the grading of logs in lay terms. Private growers can design their silviculture to produce the most valuable log grades. It is too early to assess the impact of these projects.

ANU forestry market reports

ANU-32A, ANU-38A and ANU-45A are national market reports on forest products for Australian growers, with an emphasis on smaller growers. The intention is to create more informed forest product and input markets. These reports are considered to have a high impact. They are eagerly read by growers, but their impact is limited by the difficulty in obtaining information on stumpages.

Initial assessment

Overall, these projects had a high impact. The classification and impact of these projects is shown in table 5.3.

Table 5.3 Market information – classification and initial assessment

Code	Project	Stage	Level 3	Assessment
ANU-32A	ANU Forestry Market Report	3	Markets	High
ANU-38A	ANU Forestry Market Report	3	Markets	High
ANU-44A	Defining the product: Documenting log grades and specifications in Australia	3	Wood quality	Too early
ANU-45A	ANU Farm Forestry Market Report	3	Markets	High
CAR-1A	Agroforestry from existing timber resources on the Northern Tablelands	2	Native vegetation	Medium
DAW-86A	Farm forestry market information service	2	New products	Low
TA001-44	Dr Paul Fung to visit meetings	1	Alternative uses for wood	High

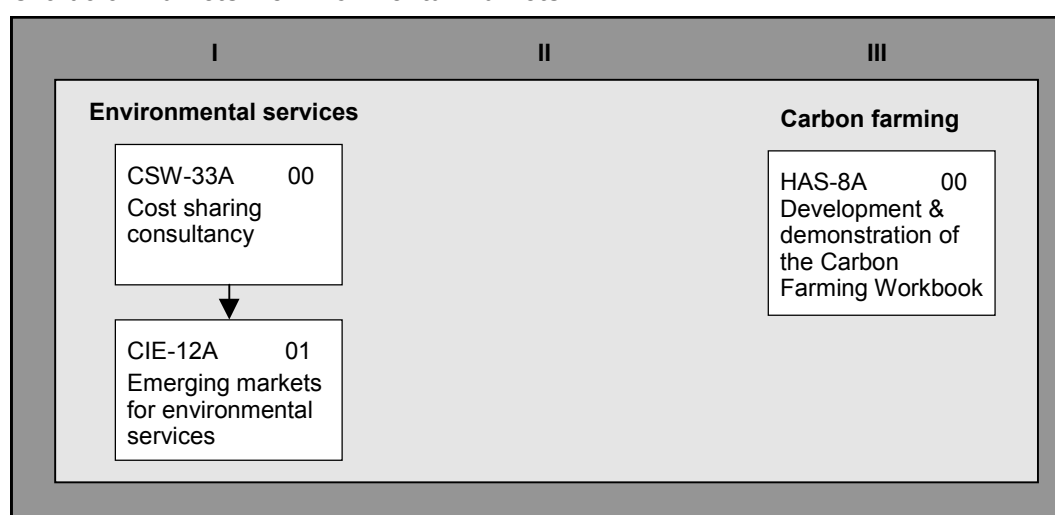
Source: RIRDC data, RIRDC and CIE classifications

Environmental markets

Three projects researched existing and potential markets for environmental byproducts of agroforestry. The classification of these projects is presented in chart 5.3.

- CSW-33A conducted a literature review of market based instruments, environmental services and agroforestry, with the intent of identifying methods of creating markets for the environmental benefits of agroforestry, such as biodiversity and carbon sequestration. It has only recently been released and therefore it is too early to assess its impact, but given that the environmental services currently attract much interest and attention, the work is well founded and has the potential to have a high impact.
- CIE-12A followed on from this, reviewing markets for environmental services and their applications to natural resource management. It is also too early to really assess the project's impact, but it has the potential to have a high impact for the same reasons as CSW-33A.
- HAS-8A designed a model that would allow farmers to assess whether carbon farming (the practice of farming trees to store carbon dioxide, the rights to which can be sold) was worth engaging in, and trained consultants to assist farmers in their decision to engage in carbon farming. The model concluded that it is only worth engaging in if there is profitable timber activity. It is assessed as having a high impact for the same reasons as the previous two projects.

Chart 5.3 **Markets – environmental markets**



Data source: RIRDC data, RIRDC and CIE classifications

Initial assessment

All of these projects were assessed as having a high impact. The classification and assessment of these projects is presented in table 5.4.

Table 5.4 **Environmental markets – classification and initial assessment**

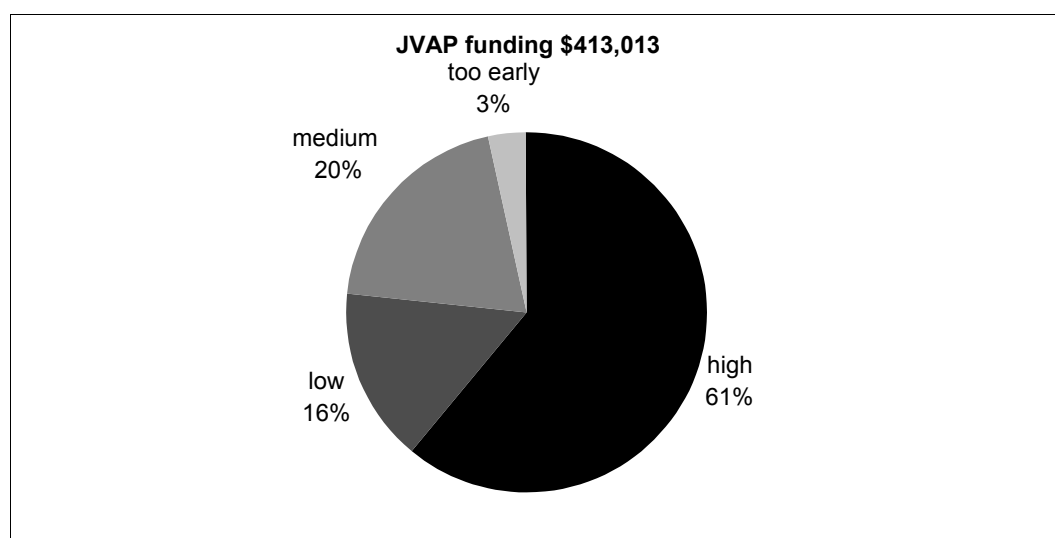
Code	Project	Stage	Level 3	Assessment
CIE-12A	Emerging markets for environmental servcies	1	Environmental markets	High
CSW-33A	(NHT) Farm forestry: Quantifying conservation and environmental service benefits	1	Environmental markets	High
HAS-8A	Development and demonstration of 'The Carbon Farmer' Workbook	3	Environmental Markets	High

Source: RIRDC data, RIRDC and CIE classifications

Overall initial assessment – markets

The vast majority of funding provided to these projects went towards projects assessed as having a high impact. The allocation of funds to projects according to the assessment of their impact is summarised in chart 5.4.

Chart 5.4 **Markets – classification**



Data source: Tables 5.1 – 5.4

6 Processing

Eight projects fall into the processing category. These projects researched methods of processing wood and wood products. They received \$909 831 in funding, of which JVAP contributed \$308 156.

Table 6.1 **Processing – funding and project timing**

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisa- tion	Total
				\$	\$	\$	\$
<i>Oil mallee & biomass</i>							
CSI-8A	Biomass Fuel Characterisation Study	1/04/01	1/04/02	10 000	90 000	0	100 000
OIL-1A	Evaporation cell techniques to replace steam for the extraction of eucalyptus oil	1/06/98	31/07/00	58 150	85 406	50 535	194 091
OIL-3A	(NHT) Integrated mallee processing for carbon products, eucalyptus oil and electricity	1/03/99	22/02/00	113 758	0	145 759	259 517
RMI-4A	Investigating the microwave properties of Eucalyptus oil and leaves	25/05/95	30/09/95	8 500			8 500
<i>Other products</i>							
ANU-35A	Inorganic-bonded wood-composites manufactured from mallee eucalypt and melaleuca species	1/02/99	30/11/01	46 157	111 213	39 099	196 469
CSF-47A	Sawing, Drying, Preserving the Wood from Tree Species Planted for Land and Water Care	1/09/92	30/06/93	41 591	34 663		76 254
UM-22A	Utilisation practices for the farm forester	1/07/95	31/03/98	30 000	45 000	0	75 000
WTC-1A	Substitution of farm grown pine for native jarrah						

Source: RIRDC data, RIRDC and CIE classifications

These projects have been divided into two subcategories:

- oil mallee and biomass, and
- other products.

Oil mallee and biomass

Oil mallee cineole production, carbon products and biomass for liquid fuel and energy has been popular. Four projects have considered the processing of oil mallee and biomass. JVAP provided \$190 408 to these projects. A total of \$562 108 was contributed.

Oil mallee

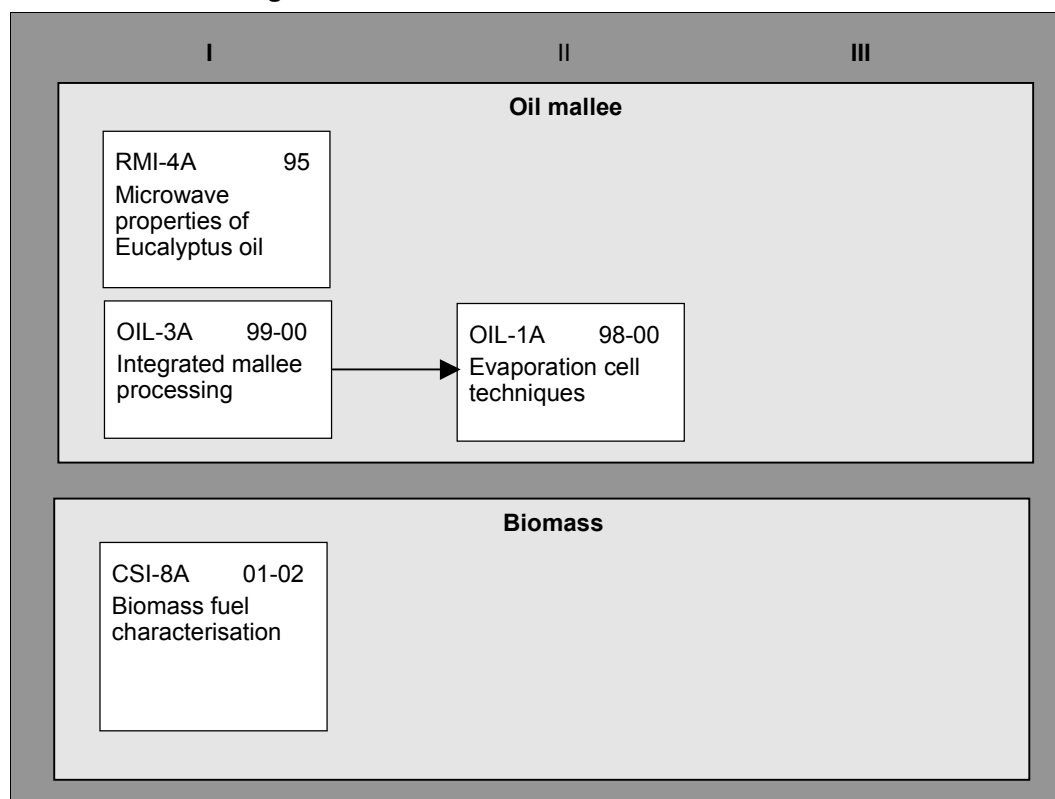
- RMI-4A determines the dielectric properties of eucalyptus oil and leaves over a frequency range to see if a loss peak does exist. This was a poorly executed project and is considered to have had a low impact.
- OIL-1A tests extraction techniques for removing eucalyptus oil from oil mallees. This project has had some administrative difficulties and is considered to have a low impact.
- OIL-3A assesses the feasibility of processing oil mallees for carbon products, eucalyptus oil and biomass for electricity, and concluded that such processing is financially viable. As a result, money has been committed to building a processing plant, and this project is considered to have a high impact. Depending on the success of the pilot plant, this project could have an extremely high and widespread impact on sustainability of Australian farming systems.

Biomass

- CSI-8A developed a package containing bioenergy fuel characteristics for a range of biomass materials for incorporation into the national bioenergy atlas. This will aid in predicting energy outputs for biomass energy conversion technologies. It has been assessed as having a medium impact. A project has been approved to follow on from this, focusing on low rainfall species. It will consider trees and other biomass wastes.

The classification of these projects is laid out in chart 6.1.

Chart 6.1 **Processing – oil mallee and biomass**



Data source: RIRDC data, RIRDC and CIE classifications

Initial assessment

These projects had mixed results. No particular subcategory had a higher overall impact than the other; rather each project's impact related to the usefulness of the project and the manner in which it was executed. The results are laid out in table 6.2.

Table 6.2 **Oil mallee and biomass – classification and initial assessment**

Code	Project	Stage	Level 3	Assessment
CSI-8A	Biomass Fuel Characterisation Study	1	Biomass	High
OIL-1A	Evaporation cell techniques to replace steam for the extraction of eucalyptus oil	2	Oil mallee	Low
RMI-4A	Investigating the microwave properties of Eucalyptus oil and leaves	1	Oil mallee	Low
OIL-3A	Framework for integrating plantation- based bioenergy systems into rural areas (with AFT01-27)	1	Oil mallee	Too early

Source: RIRDC data, RIRDC and CIE classifications

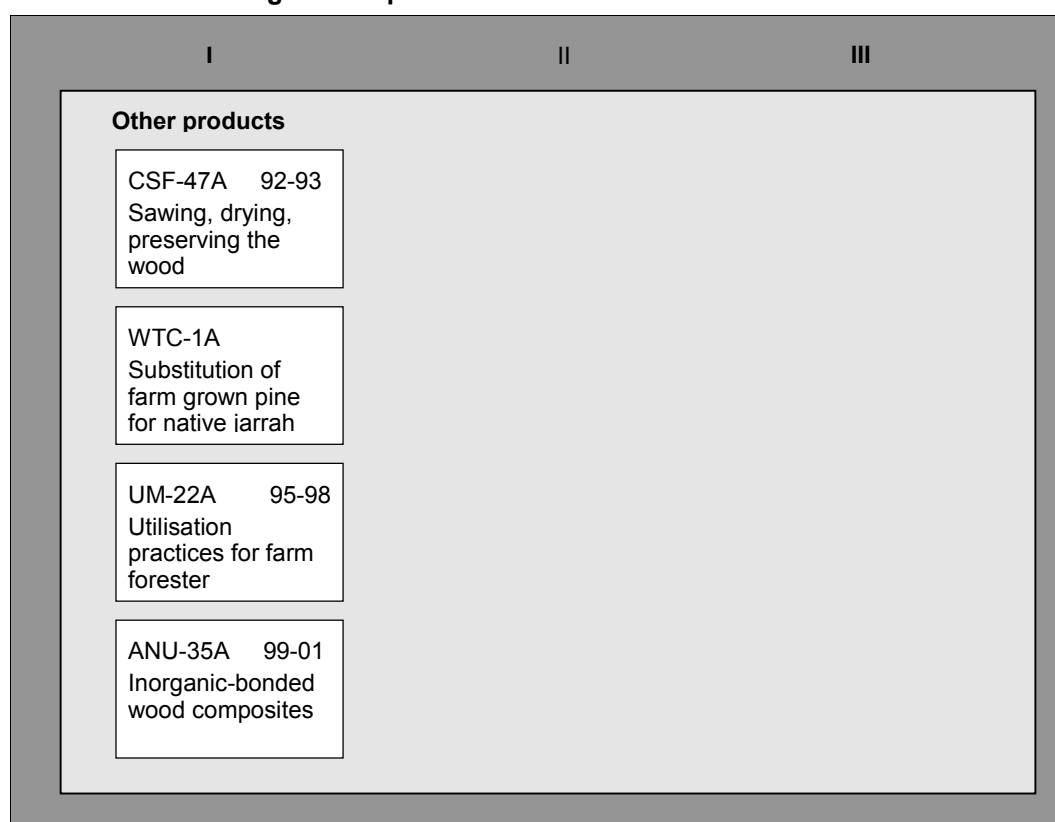
Other products

Four projects relate to new or alternative processing methods and compare them with existing methods.

- CSF-47A assesses the suitability of trees, planted for land and water care, for forest products and the methods of adding value to the wood. This was assessed as having a high impact.
- WTC-1A considered the feasibility of substituting farm grown pine for native jarrah in silicon smelters.
- UM-22A compares on-site relative to centralised log processing for the farm forester. This project is considered to have a high impact.
- ANU-35A aimed to improve the compatibility of mallee and melaleuca with Portland cement and develop processing techniques to facilitate the development of an inorganic wood bonded composite industry. The composites tested were found to not be as strong as radiata pine boards. It is not yet complete so its impact cannot be assessed.

The classification of these projects is presented in chart 6.2.

Chart 6.2 **Processing – other products**



Data source: RIRDC data, RIRDC and CIE classifications

Initial assessment

These projects had a high impact, either discovering new, viable processing methods or eliminating techniques that were not efficient or effective. The results are laid out in table 6.3.

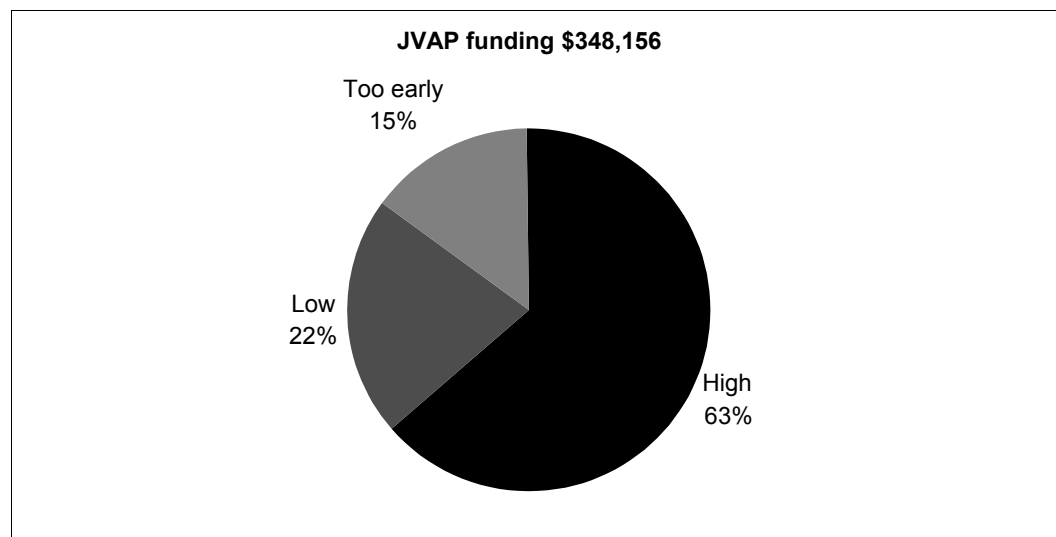
Table 6.3 **Other products – classification and assessment**

Code	Project	Stage	Level 3	Assessment
ANU-35A	Inorganic-bonded wood-composites manufactured from mallee eucalypt and melaleuca species	1	Alternative uses for wood	Too early
CSF-47A	Sawing, Drying, Preserving the Wood from Tree Species Planted for Land and Water Care	1	New products	High
UM-22A	Utilisation practices for the farm forester	1	Processing	High
WTC-1A	Substitution of farm grown pine for native jarrah	1	Alternative uses for wood	Unknown

Source: RIRDC data, RIRDC and CIE classifications

Most of the JVAP funding provided to processing projects was allocated to projects assessed as having a high impact. Allocation of RIRDC funding according to assessed impact is presented in chart 6.3.

Chart 6.3 **Processing – initial assessment**



Data source: Tables 6.1–6.3

7 Communication and technology transfer

Many projects considered in this report have involved the communication of information and technology to agroforesters, however this report classifies projects based on their subject matter. The projects considered here deal purely with communication and technology transfer, rather than communication of information that falls into a different category.

Five projects are classified as communication and technology transfer, which consider research relating to the provision of information to agroforesters. These projects received \$281 907 in funding, of which JVAP contributed \$175 621.

Table 7.1 Communication and technology transfer – timing and project funding

Code	Project	Start	Finish	JVAP funding	Industry	Research Organisation	Total
				\$	\$	\$	\$
<i>Conferences</i>							
DPI-10A	The role of trees in sustainable agriculture - conference	1/01/91	30/06/92	20 000		20 000	40 000
GAL-1A	Trees on farms conference	1/07/93	30/11/93	28 000		25 000	53 000
<i>Extension</i>							
ECU-2A	Developing effective and efficient extension and advisory strategies for agroforestry	1/09/97	31/08/98	58 886	28 000	0	86 886
ECU-3A	Practical farm forestry economics: whole farm case studies and research report	1/11/98	30/08/99	62 735	33 286	0	96 021
MS978-32	Publication of 'Farm Forestry Success Stories'	2/02/98	3/04/98	6 000			6 000

Source: RIRDC data, RIRDC and CIE classifications

These projects are classified into two subcategories:

- conferences, and
- extension.

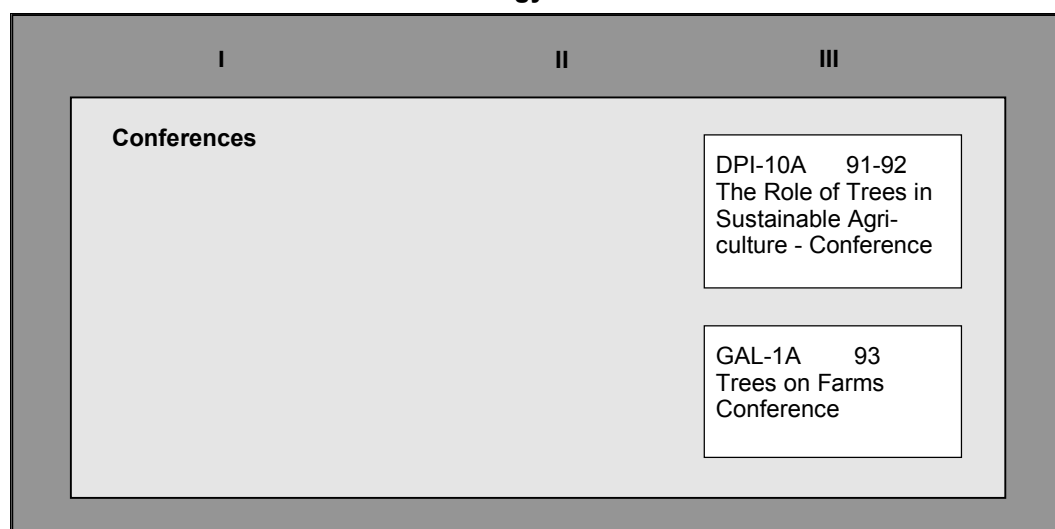
Conferences

These conferences discussed farm forestry information and its distribution. A total of \$93 000 funded these conferences, with JVAP contributing \$48 000.

- GAL-1A was a conference which discussed reformatting the Albury ‘Trees on Farms’ conference proceedings into a more useful, easily distributed reference to the farming community. This was considered to be a useful, high impact conference.
- DPI-10A was a conference designed to bring together and review the most recent information on agroforestry. This conference was considered to have a high impact

Chart 7.1 shows the classification of these projects.

Chart 7.1 **Communication and technology transfer – conferences**



Source: RIRDC data, RIRDC and CIE classifications

Both projects were assessed as having a high impact.

Table 7.2 **Conferences – classification and initial impact**

Code	Project	Stage	Level 3	Assessment
DPI-10A	The Role of Trees in Sustainable Agriculture - Conference	3	Conference	High
GAL-1A	Trees on Farms Conference	3	Conference, design principles	High

Source: RIRDC data, RIRDC and CIE classifications

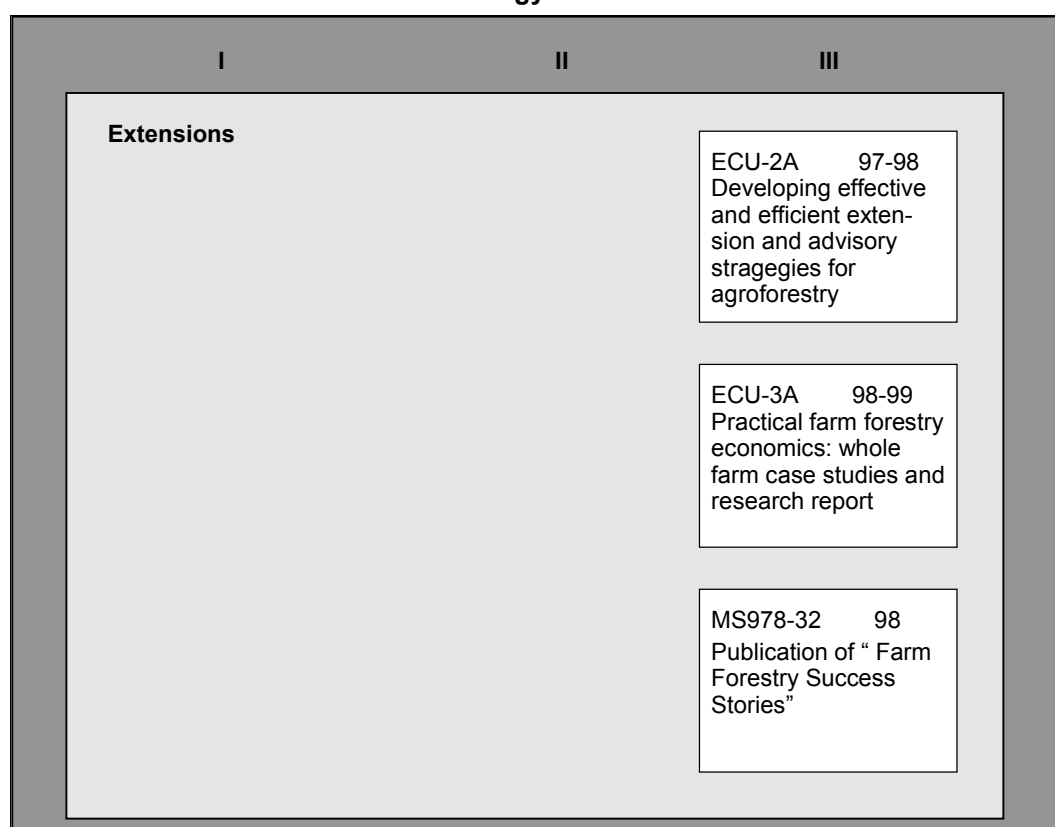
Extension

Three projects focused specifically on the transfer of agroforestry information to farmers for the promotion of farm forestry. Total funding for these projects was \$188 907, of which JVAP supplied \$127 621.

- ECU-2A recommended information exchange and advisory strategies to assist agroforestry and to publicise findings and recommendations. This project was assessed as having a medium impact.
- ECU-3A published a research report that focused on 10 case studies of successful integration of farm forestry into farming businesses and information from previous literature reviews. It is considered to have had a high impact.
- MS978-32 published a document on farm forestry success stories and is considered to be a high-impact project.

The classifications of these projects are laid out in chart 7.2.

Chart 7.2 **Communication and technology transfer – extension**



Data source: RIRDC data, RIRDC and CIE classifications

Initial assessment

These projects had a fairly high impact overall, especially those that published examples of successful farm forestry; suggesting that such documents are informative and inspiring.

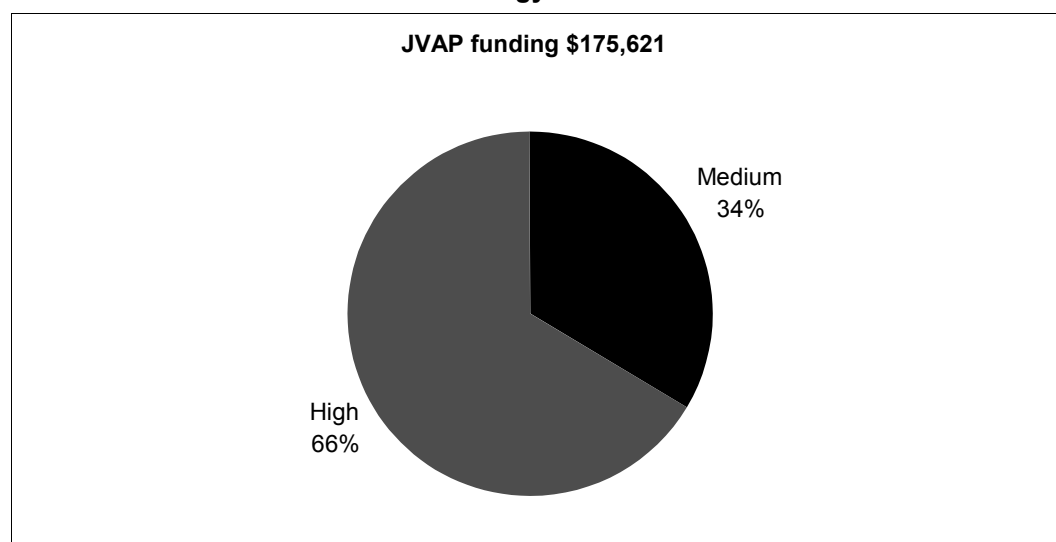
Table 7.3 **Extension – classification and initial impact**

Code	Project	Stage	Level 3	Assessment
ECU-2A	Developing effective and efficient extension and advisory strategies for agroforestry	3	Extension	Medium
ECU-3A	Practical farm forestry economics: whole farm case studies and research report	3	Design principles, extension	High
MS978-32	Publication of 'Farm Forestry Success Stories'	3	Publication, extension	High

Source: RIRDC data, RIRDC and CIE classifications

Chart 7.3 shows the allocation of JVAP funding to communication and technology transfer projects according to their impact. One-third of JVAP's funding went to medium impact projects, and two thirds was allocated to high impact projects.

Chart 7.3 **Communication and technology transfer – classification**



Source: Tables 7.1 — 7.3

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