



Information availability and needs in agroforestry

***The Farm Forestry &
Agroforestry Reference Library***

**A report for the RIRDC/Land & Water
Australia/FWPRDC/MDBC
Joint Venture Agroforestry Program**

by Jacki Schirmer

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Information availability and needs in agroforestry: Report of the Farm Forestry and Agroforestry Reference Library project
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Foreword

While considerable research has been undertaken into various aspects of farm forestry and agroforestry in Australia in recent decades, this research is not always easily accessible. This can make it difficult to know what research has been undertaken, and what new research is still needed.

The *Farm Forestry and Agroforestry Reference Library* project has addressed some of these issues through development of a simple database containing citations for a wide range of publications and projects on agroforestry and farm forestry in Australia. The development of the database focused particularly on finding and including citations for research and research related information which might not have been made widely available through publication in arenas with wide distribution.

In addition to development of the *Library* database, a survey of agroforestry and farm forestry professionals was undertaken asking them about information needs and availability of information on agroforestry and farm forestry in Australia.

This publication discusses development and content of the *Farm Forestry and Agroforestry Reference Library* database. It then discusses information availability and needs in agroforestry and farm forestry research based on the search for existing information undertaken for the database, and the survey of professionals, undertaken during this project.

This project was funded by the Joint Venture Agroforestry Program (JVAP), which is supported by three R&D Corporations — Rural Industries Research & Development Corporation, Land & Water Australia and Forest and Wood Products Research & Development Corporation, together with the Murray Darling Basin Commission. These agencies are funded principally by the Federal Government.

This report, a new addition to RIRDC's diverse range of over 1000 research publications, forms part of our Agroforestry and Farm Forestry R&D program, which aims to integrate sustainable and productive agroforestry within Australian farming systems. As well as the *Library* database, another JVAP database called SILVDAT provides a comprehensive bibliography of silvicultural research publications on native species relevant to farm forestry in Australia. This is already available for purchase or download in report form from the RIRDC website (<http://www.rirdc.gov.au/fullreports/aft.html>, *A Bibliography of Plantation Hardwood and Farm Forestry Silviculture Research Trials in Australia* (Publication No. 01/101).

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

- downloads at www.rirdc.gov.au/reports/Index.htm
- purchases at www.rirdc.gov.au/eshop

Simon Hearn

Managing Director

Rural Industries Research and Development Corporation

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- Australian Forest Growers, for contribution of a significant amount of data for the project;
- The producers of *Agroforestry News*, for contribution of publications for inclusion in the database; and
- All the individual practitioners, extension officers and researchers who were willing to give time to the project by sending information on their publications, projects and on their opinions about current needs and directions in agroforestry/farm forestry research in Australia.

Terminology

Throughout this report, the terms ‘agroforestry’ and ‘farm forestry’ are used interchangeably. Both are defined as meaning ‘commercial non-industrial tree growing’.

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Executive Summary

There has been considerable investment by government, industry and farmers seeking to increase adoption of farm forestry in Australia, including development of a large body of research and production of research related information on agroforestry and farm forestry. However, it can be difficult to access the diverse range of research and related information that is available, and this means considerable time can be spent hunting for relevant information. Sometimes existing information may not be found and development of new research can suffer as a result. Lack of access to past research and related information can also make it difficult to identify what has been done and, therefore, what research is most needed currently.

The *Farm Forestry and Agroforestry Reference Library (FFARL)* project had two objectives. The first was to produce a database giving access to citations for a wide range of research and related information on agroforestry and farm forestry in Australia. The second objective was to produce a report reviewing agroforestry and farm forestry information needs and availability, based on the outcomes of searching for citations for inclusion in database and on a small survey of agroforestry and farm forestry professionals.

The completed *FFARL* database contains over 5,000 citations of publications and research projects on agroforestry and farm forestry in Australia. The types of citations included in the database differed from those first envisioned when the project was begun. Initially the database was envisioned to include primarily formal research publications. However, it was found that much of the existing research and research related information on agroforestry and farm forestry was reported in conference papers, non-refereed journal articles and reports, rather than in refereed journals. An initial search also found that existing databases include many refereed journal papers, but often do not include conference papers or non-refereed journal articles and reports. It was therefore decided to focus on including the latter types of citations in the *FFARL* so that it provided a complementary resource to existing databases. Articles from two key non-refereed journals that often report information about and relevant to agroforestry and farm forestry research in Australia – *Agroforestry News* and *Australian Forest Grower* – were included in the database.

The *FFARL* does not represent a comprehensive overview of all research and related information on agroforestry and farm forestry in Australia. There are many gaps in its contents and there is a need for further searches to find information to be included in the database.

The search for citations to include in the database enabled an assessment of the accessibility of current and past research. It was found that the way in which much research and related information is disseminated – through reports and conferences more often than refereed journals – may contribute to a ‘short-term memory syndrome’, in which information about research is easily accessible soon after it is completed, but within a short time may be difficult to access. This can

create difficulties for those undertaking research in future years, as they may not have easy access to relevant past research and related information, and may even have difficulty identifying the existence of some past research. The *FFARL* is a step towards developing improved ‘long-term memory’ for agroforestry and farm forestry research and related information.

There may also be a need to develop improved holdings of agroforestry and farm forestry research and related information, which aim to catalogue and make available for borrowing publications such as conference proceedings and unpublished reports which are often not available from public or depository libraries. In addition, conducting reviews of existing research would help to identify the types of research already undertaken on particular topics. For example, many respondents to the survey on agroforestry and farm forestry information availability and needs undertaken as part of the project, indicated they wanted more information on the economics of agroforestry and farm forestry. There are many citations for this type of research contained in the *FFARL*. A comprehensive review of past research in this area, including an identification of gaps in existing information and needs for new research, would enable extension officers, researchers and practitioners of agroforestry to more easily access information on this topic. A review of silviculture research relevant to farm forestry native species is part of another JVAP project (Lott pers. comm.).

A small survey of agroforestry and farm forestry professionals (practitioners, extension officers and researchers) was undertaken. Survey respondents were asked what information and research is most needed on agroforestry and farm forestry in Australia. Forty six survey responses were received. The responses came from a wide range of regions, although considerably more were received from Victoria and South Australia than any other States. Some regions – particularly Tasmania – were under-represented in the returned surveys. The results, therefore, may not reflect the views of some agroforestry and farm forestry professionals, and may under-represent information needs specific to the regions from which few survey responses were obtained.

The primary information needs identified were:

- A need for improved access to existing research. While not included as a category in the survey, this comment was made by several respondents, indicating it is a significant need;
- A need for more market information on a range of farm forestry options;
- A need for more economic analysis, including analysis of potential for returns from environmental services;
- A need for more research identifying the suitability of a wider range of species, particularly low-rainfall species in southern Australia and cabinet timber species in higher rainfall areas for agroforestry and farm forestry;
- A need for more research on genetic improvement and breeding; and
- A need for more information on wood quality and products, particularly sawn timber, posts and poles.

Respondents also identified areas in which they believed enough information is already available. There were many topics where around 50% of respondents believed enough information is already available, while half believed more information was needed. There were also some where a majority of respondents specified that enough information is already available. These included the following topics:

- Woodchips, nut trees and Christmas trees;
- Many farm level design forms of farm forestry including woodlots, shelterbelts, break of slope planting, wide-spaced and alley farming; and
- Many early age silvicultural aspects including weed control, fire protection, ground preparation, protecting young trees, and watering and irrigation.

However, even for these topics – ie those where a majority of respondents identified that adequate information is available – some needs for new research were identified. In particular, needs for research in regions where agroforestry and farm forestry is not yet well-developed, and research to refine and fill gaps in existing information, were identified.

The main recommendations of this project are to:

- Continue improving accessibility of past research, both through improving and expanding the contents of searchable databases such as the *Farm Forestry and Agroforestry Reference Library*, and through ensuring publications are accessible to those who need them;
- Review and summarise existing research on a range of topics in order to make it easier to access the results of past research, and identify gaps in research;
- Continue, and expand research on species suitable for a wide range of regions and purposes, particularly low-rainfall and cabinet species; and
- Continue and expand research on economic, financial and marketing aspects of agroforestry and farm forestry.

Introduction and Objectives

There has been considerable investment by government, industry and farmers seeking to increase adoption of agroforestry and farm forestry in Australia. This has included considerable investment directed towards improving extension and dissemination of information on agroforestry and farm forestry.

For extension and information dissemination to be most effective, extension officers need access to the research and research related information that has been, and is being, undertaken on agroforestry and farm forestry. Currently, it can be difficult to access the diverse range of research that has been carried out, or to locate relevant papers and conference proceedings, or information produced based on particular research. This means that considerable time is spent hunting for relevant information. Sometimes relevant information is not found and the development of agroforestry and farm forestry systems and extension materials may suffer as a result. The time spent trying to track down relevant research and related information can be reduced through providing access to existing databases on agroforestry and farm forestry, and by developing a new, simple, accessible database and overview of research and related information on agroforestry and farm forestry in Australia.

The project reported here had two objectives. The primary objective was to produce a database giving access to citations for a wide range of research on agroforestry and farm forestry in Australia. This was broadened to include both research and research related publications. The second objective was to produce a report reviewing the current availability of research and related information on agroforestry and farm forestry in Australia. This was based on the outcomes of searching for citations for inclusion in the database, and on a small survey of agroforestry and farm forestry professionals.

The project ultimately aims to improve uptake of agroforestry and farm forestry in Australia, by providing easier access to research and related information that assists development and improvement of agroforestry and farm forestry systems.

This report gives an overview of outcomes of the *Farm Forestry and Agroforestry Reference Library* (FFARL) project. The first part of the report reviews development of the *Farm Forestry and Agroforestry Reference Library* database, which is available separately to this report and contains over 5,000 citations of publications and projects on agroforestry and farm forestry in Australia. The second part presents and discusses results of investigations into information availability and needs for Australian agroforestry and farm forestry.

Part 1: Development of the Farm Forestry and Agroforestry Reference Library database

Objectives

The objectives of the *FFARL* database were to develop a database of research and research related information on agroforestry and farm forestry in Australia that is:

- Freely available;
- Easily searchable; and
- Contains citations for publications and projects not included in other relevant databases.

Methodology

This section gives a brief outline of the methods used to develop and operationalise the *FFARL* database. Three aspects are described:

- Designing the database software;
- Scope of the information included in the database; and
- Locating information for inclusion in the database.

Designing the database

The database was designed so that it could be easily searched, and accessible to a wide range of people. The anticipated end-users of the database included farm forestry practitioners, extension officers and researchers. Many of these live in rural areas, and often have slow internet access and/or software and computing resources that do not support high memory applications. This meant the database needed to be designed to run relatively easily on a range of computers.

It was decided that it was more important to make the database available on CD or as a downloadable file on the internet than to make the database directly searchable on the internet: the low-speed connections available to many of the intended users would make it difficult to search the database directly on the internet. A downloadable form also made available on CD would be more easily accessible for a wide range of users.

Given these factors, it was decided to design the database in Microsoft Access, as:

- Microsoft Access can run on most computers with relatively low memory;
- Microsoft Access can be developed into a 'stand-alone' application using Microsoft Office Developer, which means copies of the database can be provided to users who do not already have Microsoft Access installed on their computer;
- Microsoft Access databases can be developed into web-searchable databases relatively easily if desired; and
- Microsoft Access is easily convertible to other formats to suit a wider range of purposes or audiences, which will be important in the future the database is expanded or converted.

The database itself is a simple flatfield database, designed so that it can in the future be converted to a more complex relational database if desired. Simple citation fields have been used to enter data, designed to make searching the database simple, to reduce the size of the database as far as possible, and to allow future conversion of the database into a more sophisticated form.

The database contains information in the form of simple, Harvard-based citations for publications and projects on agroforestry and farm forestry. The fields included are:

Author/s: Surnames and first initials or first names of author/s. First names were included where possible as there were some different authors who had the same surname and first initials.

Year: Year of project/publication

Title: Title of project/publication

Type of publication/project: This field enabled identification of the type of citation being entered. It is included so that the database can in the future be converted into a relational database that, for example, separates journal and book references into separate tables.

Rest of reference: Contains rest of reference cited in a Harvard format according to the type of publication/project being cited. For example, a journal reference would include the journal name, volume, number and page numbers in the 'Rest of reference' field; while a book reference would include the edition (where relevant), volume (where relevant), publisher and place of publication.

Keywords: Keywords were included in the database for most citations.

Abstract/summary: Where possible, an abstract/summary was reproduced from publications cited in the database. However, this required permission from the copyright holder of the publication. It was not possible to obtain permission in many cases, due to either difficulty identifying or locating the copyright holder, significant costs in obtaining permission, or refusal to give copyright permission. Where permission could not be obtained, a brief description of the publication was included where possible - a description which does not reproduce parts of the publication is not subject to copyright law. Approximately 50% of citations include an abstract or description.

Location of publication: Where possible, a location was given for publications. The database does not give locations for most journals, as they may be held in a wide range of libraries, but does give locations for more obscure publications, particularly unpublished reports and conference proceedings.

The database, once completed, had a searchable interface built onto it. This interface allows users to input search words or phrases to search the author, title, keywords and abstract/summary fields, and will produce reports giving full citation details for entries which match the search words/phrases. The interface is fairly simple; more resources would be needed to build a more complex search interface allowing Boolean searches and a wider range of search functions. The advantage of the simple search functions built is that they will run relatively quickly on most computers, as they do not require a considerable amount of memory.

A guide to using the database is available with the database.

Scope of information for inclusion in the database

Discussions were held with the Advisory Panel for the project to determine the scope of the information and the types of publications and projects to be included in the database.

Information included in the database

No restriction was placed on the types of research and related information on farm forestry and agroforestry in Australia included in the database¹. When searching for publications and projects, the only requirements placed on their inclusion in the database were that they:

¹ Note that some effort was made not to deliberately overlap content of the *FFARL* database with selected existing agroforestry/farm forestry databases (discussed on page 7). However, often the search processes used in developing the *FFARL* identified publications that were already in other databases. A decision was made not

- Met the definitions of agroforestry and farm forestry described below;
- Included research or research related information, defined below; and
- Involved information on agroforestry/farm forestry in Australia.

Defining farm forestry and agroforestry

Farm forestry and agroforestry were defined for the purposes of the database as any of various forms of ‘commercial non-industrial tree planting’. This definition sits in the middle of the continuum of types of tree planting that are undertaken in Australia. The types of information included fell into the broad spectrum of plantings identified as ‘farm forestry plantations’ box in Figure 1 below. These all represent forms of commercial, non-industrial tree planting.

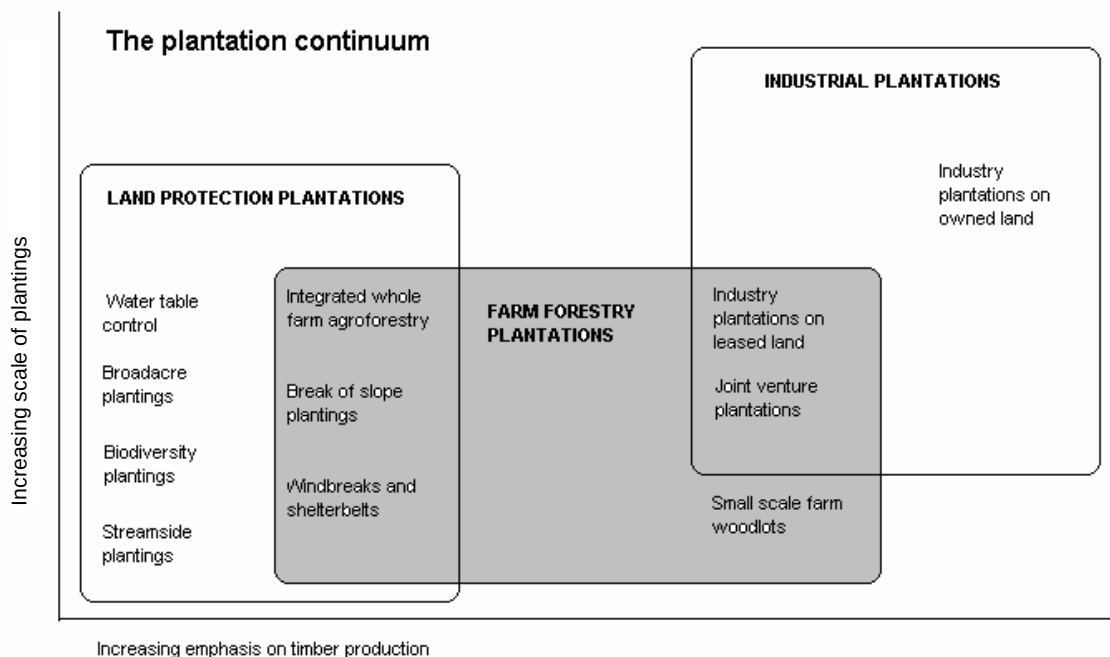


Figure 1: Continuum of tree planting types undertaken in Australia (modified from Stephens *et al.* 2001)

The database was restricted to referencing information on commercial, non-industrial tree planting in Australia for two reasons. Firstly, this type of tree planting is being encouraged at many levels from local to national, and a wide range of research and related information has been produced on it that is not always easy to access. Secondly, the database was developed to be a support tool for farm foresters, extension officers and researchers wanting to access research and related information in this area.

The database is an initial project aiming to develop a simple, accessible database, and which hopefully can be built on in the future to build a more comprehensive database. Some references are included which are probably more related to non-commercial tree planting or industrial plantations than to agroforestry/farm forestry as defined above. This has occurred because the boundaries of the definition of agroforestry/farm forestry were not always easy to define. Because of this, where it was difficult to identify if the information was directly related to agroforestry/farm forestry and the information was easy to include, it was included in the database. Ideally a future upgrade would include a broader range of topics in the database, particularly as a great deal of research has been undertaken about non-commercial planting or industrial plantations, which is of great relevance to the agroforestry and farm forestry sector in Australia.

to check for duplication of particular citations within other databases as this would increase the time required to enter publications into the *FFARL* database; hence some overlap resulted.

Defining ‘research and related information’

The focus of the database was on research and research related information produced on agroforestry and farm forestry. Research and research related information was defined as *information which reports on or refers to the results of any systematic investigation into agroforestry and farm forestry in Australia, or which is otherwise likely to be directly useful to researchers and users of research.*

This definition covers a wide range of material, and the distinction between research - related information and other information is not always clear. For example, many extension materials do not directly refer to research and may not be useful to researchers, while others contain summaries of research results which can be very useful to researchers and others trying to find research on particular topics.

A decision was made not to include many of the diverse brochures, kits and guides which have drawn on existing research, but not directly referred to it, to provide advice to farm foresters on how to adopt and undertake farm forestry. This type of information can be easily found by visiting websites such as Farm Forest Line². The exception to this rule was the inclusion of some brochures, kits and guides which reviewed or described research in some detail.

Other than this, the definition above was used to guide whether references should be included in the database.

Geographic boundaries of information included in database

The database does not in general contains references for publications, reports and research projects which examined farm forestry and agroforestry in countries other than Australia. Again, while it is recognised that this information may be very relevant for Australian agroforestry and farm forestry professionals, this first edition of the database did not have the resources to include information from other countries. Some references have, however, been included where they formed part of existing citation lists provided for incorporation into the *FFARL* database.

Topics included in the database

No restriction was placed on the topics related to agroforestry and farm forestry other than those created by the definition and scope described above. As a result, the database covers topics including social, economic, environmental, silvicultural and other research and research related information. The broad range of topics included were³:

- Breeding and tree improvement;
- Communities and social impacts;
- Economics, markets and marketing;
- Environmental impacts and characteristics;
- Extension, education, information provision;
- Forms of agroforestry and farm forestry;
- Government, legislation and planning;
- Harvesting and processing;
- Integrating trees and agriculture;
- Measurement and research methods;
- Silviculture (establishment and management);
- Site/species types and characteristics;
- Wood and non-wood products; and
- Others including aesthetics, design, occupational health and safety and transport.

² <http://www.farmforestline.com.au>

³ A list of over 500 specific keywords used in the *FFARL* database is provided in the ‘User’s Guide’ to the database; these provide more specific details of the breadth of topics within each of the categories listed here.

Search terms and processes used to gather information for the database are discussed below.

Types of publications included in the database

It became clear once the project was initiated that much research has not been reported through 'traditional' outlets such as refereed journals. Many trials of species and provenances, for example, have been reported through conference papers or articles in agroforestry and farm forestry newsletters and magazines. This is partly a reflection of the nature of research into agroforestry and farm forestry, where research, extension and practice may take place hand-in-hand, and where research is not always conducted through traditional organisations such as universities and funded research agencies.

As a result, the database contains a wide range of information, ranging from traditional academic literature to 'grey' literature including information sheets and summaries often used as extension materials. The database references various types of publications, and research projects, including:

- Academic and non-academic books on agroforestry and farm forestry in Australia;
- Articles published in refereed academic journals;
- Articles published in non-refereed journals, magazines and newsletters;
- Conference proceedings containing papers on agroforestry and farm forestry in Australia;
- Papers presented at conferences, workshops and meetings;
- Published and unpublished reports produced by various research, government and industry sector organisations;
- Videos, CD-ROMs and other non-written forms of research and information; and
- Research projects on agroforestry and farm forestry (only those not already included in the Infoscan databases as discussed below).

The database has focussed in particular on referencing conference papers, unpublished reports and non-refereed journal, magazine and newsletter articles reporting research. This is due to the lack of existing databases which reference these types of publications – there are several existing databases which reference many journal articles and books on agroforestry and farm forestry⁴, and so it was considered less urgent to include journal articles and books.

Two non-refereed journals were identified which commonly report recent research on agroforestry and farm forestry in Australia: the *Agroforestry News* newsletter and *Australian Forest Grower* magazine.

Agroforestry News agreed to supply a copy of back issues of the newsletter and articles from each were included in the database. Many of these discuss research initiatives, although some do not.

Australian Forest Growers (AFG) agreed to supply their existing Microsoft Excel database for conversion and inclusion in the database. Their database included basic citations for all articles from *Australian Forest Grower* and conference papers from the various Australian Forest Development Institute (AFDI) and AFG conferences (AFDI is the previous name of AFG). The conversion of the database took some time, and the resulting entries are slightly inconsistent with those in the rest of the database as different types of keywords are included. Time constraints prevented conversion of the 3,000 entries to achieve consistency with the rest of the database. The entries are still easily searchable. AFG's Excel database contained citations only; abstracts or descriptions of all conference papers were added to their database entries as part of this project. Resource constraints did not permit this to be done for all the articles published in *Australian Forest Grower* magazine.

⁴ See Appendix 1 for a list of existing databases, including a brief description of each database and how to access it. The principal databases citing journal articles and books are the SILVDAT database produced by RIRDC, CABI Agroforestry Abstracts, and three of the Infoscan databases (another Infoscan database cites many research projects on agroforestry and farm forestry).

Information not included in the database

As a large amount of information fitting the criteria described above exists on agroforestry and farm forestry, a decision was made to identify where this type of information is already easily accessible, and where possible to avoid repeating entry of such easily accessible information. It was decided that, as far as practicable, the database would not attempt to include information already available through three existing, easily accessible sources⁵:

- The bibliography of references on plantation hardwood and farm forestry silvicultural research compiled by Rosemary Lott (Lott, 2001)
- The ABOA, ARRIP, ARRIP Archive, and Streamline databases searchable at www.infoscan.com.au. These contain many references to agroforestry and in particular references research projects on agroforestry and farm forestry; and
- CSIRO's online list of publications.

As a result, there is a low number of CSIRO reports, and a relatively small number of research projects included in the database. Note that not all of these were excluded from the database – the other searches conducted still resulted in some plantation hardwood and farm forestry silvicultural research, research projects and CSIRO reports being included in the database. It was decided that resources were best directed to expanding the database rather than comparing the citations in the *FFARL* database with citations in other databases and removing any overlapping entries. Appendix 1 lists other readily accessible sources of information on agroforestry and farm forestry, and gives a brief guide to accessing them.

Locating information

Several strategies were used to identify and locate publications and projects for inclusion in the database. These included:

- Identifying agroforestry and farm forestry researchers and networks and contacting them to ask for information on research;
- Searching existing library catalogues;
- Searching existing databases to identify potential journals for searching; and searching journals containing many publications on agroforestry;
- Searching private libraries holding many agroforestry and farm forestry references;
- Searching the internet for online reports and lists of references;
- Identifying conferences held on agroforestry and farm forestry and related topics and searching for copies of the proceedings; and
- Contacting publishers of non-refereed journals on agroforestry and farm forestry to obtain back issues for inclusion in the database.

Contacting researchers

Internet searches and discussions with the project Advisory Panel were used to identify organisations commonly undertaking agroforestry and farm forestry research. The websites of the organisations identified were searched for lists of publications. Also, both email coordinators and individual researchers at the identified organisations were emailed electronic forms for entering details of publications and projects they wanted included in the database (the forms are attached at Appendix 2). These forms were emailed to email coordinators and individual researchers at 17 university departments, eight Cooperative Research Centres, three Research and Development Corporations, three government research agencies (as well as subprograms within these where relevant), two joint government-private research centres, seven Commonwealth government agencies, and thirteen State level government agencies or programs. Where forms were sent to an email coordinator, they were asked to forward the forms to any researchers who had or were currently undertaking research on

⁵ See Appendix 1 for a list of these and other potentially useful databases, and details of how to access them.

Australian agroforestry/farm forestry. The forms were also made available on the *FFARL* project website⁶.

Around 50 researchers returned completed forms by email or mail, listing anywhere from one to 80 research publications and projects each.

Searching existing catalogues, collections and databases

Existing catalogues, collections and databases were searched for citations to be included in the database. When searching electronically, the initial search terms used were 'agroforestry', 'farm forestry', 'agro-forestry', 'plantations', 'forestry', and 'forest management'. Where searches for these keywords returned hits, the search was expanded by looking for associated keywords used in each catalogue/database.

Principal public library catalogues searched included⁷:

- Australian National University;
- Charles Sturt University;
- CSIRO Forestry and Forest Products;
- National Library of Australia;
- Southern Cross University; and
- University of Melbourne.

Some existing databases were also searched, primarily to identify journals which commonly publish research on agroforestry and farm forestry. The following journals were then searched for citations for inclusion in the database, by searching either online or hard copies of journals⁸:

- Agricultural Water Management;
- Agroforestry Systems;
- Arid Land Research and Management;
- Austral Ecology (former name Australian Journal of Ecology);
- Australian Forestry;
- Australian Journal of Agricultural Research;
- Australian Journal of Experimental Agriculture;
- Australian Journal of Soil and Water Conservation;
- Forest Ecology and Management;
- Journal of Agricultural and Resource Economics;
- Journal of Agricultural Science;
- Journal of Agriculture, Western Australia; and
- Rangeland Journal.

In addition, some private collections held by researchers, and some private libraries including the Greening Australia library at Yarralumla, Canberra and the library of the Department of Agriculture, Fisheries and Forestry were searched to find publications for citation in the database.

⁶ This website was operational while the project was underway to provide information about the project as well as downloadable survey and project/publication data entry forms. Since finalisation of the database the project website has been closed.

⁷ These were not the only catalogues searched, but are those where the majority of references were found.

⁸ The database also includes articles from other journals which were either submitted by researchers for inclusion, or found through other search mechanisms, but which were not found by directly searching issues of the journal.

Searching the internet

Keyword searches were undertaken on the internet. These identified some publications available online, and also enabled lists of references to agroforestry and farm forestry research to be uncovered and used for further searches.

Searches were undertaken on the Google search engine, using an ‘advanced search’ for any of the terms ‘agroforestry’, ‘farm forestry’, ‘agro-forestry’, or ‘plantations’ in combination with the term ‘Australia’ or any of the State or Territories. The terms ‘forestry’ and ‘forest management’ were not used as they returned too broad a range of results. From the initial list returned by this search, links to other associated websites were explored until no new relevant websites were being found.

This search resulted in identification of a number of websites containing information about Australian agroforestry and farm forestry. A list of these websites, with some details of their content, is given at Appendix 1.

Identifying conferences

Internet and other searches were also used to identify conferences which included papers on agroforestry and farm forestry. Where possible conference proceedings were obtained and details of papers included in the database.

Obtaining back issues of non-refereed journals

Back issues of both *Agroforestry News* and *Australian Forest Grower* publications were kindly provided and included in the database. As discussed above, AFG also provided access to an existing database of their publications and gave permission for it to be converted, expanded and incorporated into the database.

Results and discussion

The completed database contains over 5,000 citations. Several aspects of the process of database development and its results are discussed below, including:

- Types of citations included in the database;
- Coverage of research achieved by the database; and
- Amount of information on each citation included in the database.

Types of citations included

Not all citations in the database are for publications directly reporting agroforestry and farm forestry research. As discussed earlier, many conference papers and all articles from *Australian Forest Grower* and *Agroforestry News* are included. Many of these do not directly refer to research. They were still included as it would have taken considerable time to distinguish between those relevant to researchers and those not relevant. In addition many publications contain information or views useful to researchers even though they do not report the results of a research project.

This approach has drawbacks, in that database users may find search results include articles not of use to them. However, the number of ‘non-research’ citations included should not make it overly difficult to find research articles on similar topics.

Coverage of research achieved

The database includes a large number of references. It does not include many citations for work already included in other databases, as discussed earlier, although there is some overlap.

It is difficult to assess the extent of coverage of existing research on agroforestry and farm forestry in Australia achieved by the database. Assessing the extent of coverage would require knowledge of

the volume of research existing, and this is not possible to evaluate. What is known is that the database:

- Has relatively good coverage of journal publications on agroforestry and farm forestry, although publications which did not use the keywords searched for in journal searches may not be included. The keywords searched for in various journals were ‘agroforestry’, ‘farm forestry’, ‘alley farming’, ‘shelterbelt/s’, and ‘woodlots’;
- Has achieved some coverage of existing reports on agroforestry and farm forestry that have been used and cited by other researchers. Reports focussed on specific regions and not widely used or cited have probably not been covered well, and many consultancy reports are not included as it was difficult to access copies of them for inclusion;
- Has achieved good coverage of conferences held on agroforestry and farm forestry, although some conferences have not been included because a copy of the proceedings could not be obtained. Papers from conferences which were not specifically on agroforestry and farm forestry, but which included papers on agroforestry and farm forestry, are not well covered; and
- Has good coverage of articles from two major agroforestry and farm forestry periodicals in Australia, *Australian Forest Grower* and *Agroforestry News*, but not from other non-refereed journals.

There are clearly gaps in the coverage of research in the database, and more work is needed to make the database more comprehensive.

Information included for citations

A varying amount of information was included for citations in the database. All citations include information on author/s (where an author or author/s were specified for the publication or a researcher/researchers for a research project), year, title and rest of reference. Most contain keywords related to the publication.

Locations of publications are given where possible, particularly where the publication may only be held in a limited number of locations or is only available through contacting a particular organisation.

Over 2,000 citations include some kind of abstract or description of the publication or project. It was not possible to include these details for other citations for a range of reasons as discussed earlier.

While not all citations included keyword, location and abstract/descriptions, the search functions developed in the database interface allow users to search for keywords or phrases in the title and other parts of the citation, so all citations – even where not containing information in some fields – are accessible and useful.

Recommendations

The process of database development clearly showed that there is considerable scope for expanding and upgrading the database developed in this project. Ongoing work to add more citations should take place to ensure the database does not become out of date, and includes the most recent research and research-relevant information on agroforestry and farm forestry in Australia.

Consideration should be given to expanding the database to include information which, while not specifically on agroforestry and farm forestry, is relevant to it – for example, information from the broader forestry and forest management literature, or from farm management and revegetation/land rehabilitation areas. Inclusion of applicable information on agroforestry and farm forestry from other countries should also be considered.

Part 2: Information Availability and Needs in Agroforestry and Farm Forestry

Objectives

The objectives of this component of the *FFARL* project were to examine information availability and needs for agroforestry and farm forestry in Australia.

Methods

Two methods were used to investigate information availability and needs: analysing the type of publications located in the search for citations to include in the database, together with a small survey of agroforestry and farm forestry research professionals.

Publications and projects search

In the process of searching for citations to include in the database, a large amount of information on the type of research already conducted on agroforestry and farm forestry was collected⁹. In particular, information on the ways in which research has been published and disseminated was collected.

As the search for citations for the database progressed, qualitative observations and notes were made of:

- The most common topics for which research and research related information on agroforestry and farm forestry in Australia is available;
- The most common ways research and related information has been published and disseminated;
- The general accessibility of results of research on agroforestry and farm forestry; and
- Who is undertaking research.

Directions survey

The type of information gathered through the publications and project search discussed above allowed a general review of the broad topics covered and the accessibility of existing research and related information, on agroforestry and farm forestry. It did not allow an in-depth review of specific research carried out on particular topics, or the success/breadth of research and availability of information on each topics. As a result, it was decided to undertake a small survey of agroforestry and farm forestry professionals.

The survey was designed and discussed by the Advisory Panel for the project. It was designed as a small survey. Given the difficulty of defining the total size/nature of the ‘agroforestry professional’ population in Australia, it was not possible to design a survey that could be analysed using tests of statistical significance, and no attempt was made to do this. However the survey was sent to a wide range of farm forestry extension officers and practitioners as indicated below.

⁹ The methods used to search for citations to include in the database were described in detail in Section 1 of this report, and provide the boundaries within which the analysis of information availability and needs for this second part of the project took place.

The final questionnaire is attached at Appendix 3, and asked the following questions:

- In what region/s the respondent undertook agroforestry/farm forestry activities;
- In what way/s the respondent was involved in agroforestry/farm forestry;
- Whether the respondent believed more research and information is needed to be able to develop more effective forms of farm forestry;
- What types of research and information are currently lacking on agroforestry/farm forestry (for this question respondents were given no prompts about types of research); and
- For a list of topics, the respondent was asked to indicate whether (a) they required information on that topic for their work; and (b) if more information is needed or if adequate information is available on that topic.

The survey was aimed particularly at farm forestry extension officers and practitioners – ie, those involved in trying to promote development of farm forestry through marketing, growing, advocacy and other means. Researchers were not directly targeted, as it was decided they were less likely to have a broad view of information needs for farm forestry systems, as they generally have a more specific focus in their work. That said, many individuals are both practitioners, advocates and researchers in agroforestry and farm forestry in Australia, and several of those who completed the survey were involved in research on agroforestry and farm forestry, as is discussed in the results section below.

The survey was emailed to key agroforestry and farm forestry networks in Australia with a request for individuals to complete the survey. A more targeted approach was not used due to the limited resources allocated to the survey. This approach meant that it was not possible to identify a response rate, as the total population who received the survey could not be identified using this method. It was also not possible to analyse the representativeness of the response beyond commenting on the distribution of responses by geographic location and type of involvement with agroforestry/farm forestry. The survey was emailed to:

- The coordinators of 20 Regional Plantation Committees active in 2002. These were located across the country; and
- Coordinators of Australian Forest Grower and SE Australia Agroforestry networks throughout Australia. A total of approximately 50 networks were emailed the survey by the coordinators of the AFG and SE Australia Agroforestry networks.

The survey was also made available for download on the project website.

Some network coordinators who received the survey forwarded it to members of their networks, while others did not. As some networks overlap with RPCs the survey may have been sent to the same people more than once. As a result, it is not possible to state how many people received the survey, and hence a percentage response rate for the survey cannot be given.

Results: Publications and projects search

The analysis of citations included in the database¹⁰ resulted in a number of observations about:

- The topics for which research and related information had been published on Australian agroforestry and farm forestry;
- Who is undertaking research (based on published research and related information);
- The arenas in which research results and related information are published; and
- Accessibility of the research and related information.

¹⁰ For details of the types of citations included and search methods, see Section 1 of this report.

Agroforestry and farm forestry topics

The most common topics found for which specific research and related information had been produced on agroforestry and farm forestry in Australia (rather than other types of tree planting, such as larger scale plantations or non-commercial plantings), were:

- Trials of tree species (although many trials provide results applicable to a wider range of tree planting than just agroforestry and farm forestry);
- Economic analysis on integrating trees into the farm enterprise and on markets for farm forestry products;
- Studies on interactions between trees and crops/pasture;
- Studies examining particular forms of planting e.g. shelterbelts, alley farming, inter-cropping;
- Studies on on-farm and small-scale harvesting;
- Studies on adoption of and extension for agroforestry and farm forestry; and
- Studies on policy relating to agroforestry and farm forestry.

Other relevant research and related information was not generally focussed specifically on farm forestry and agroforestry. Rather, it was applicable to a wide range of forms of forest and land management of which agroforestry/farm forestry was only one. Examples of this include research and related information on establishment and management techniques, weed control, browsing control, use of trees for land rehabilitation and native forest silviculture and management.

While there are often reports in newsletters and magazines which apply this broader research and related information to agroforestry and farm forestry, there may be more scope for conducting reviews of the broader literature and assessing its applicability to agroforestry/farm forestry in Australia.

Who does the research?

It became clear as the search for citations continued that a considerable amount of research into agroforestry and farm forestry is undertaken via collaboration between agroforestry and farm forestry researchers, extension officers and practitioners.

The depth of analysis possible from examining the citations included in the database did not allow different types of research to be distinguished, for example scientific research trials versus more observational research. However, discussions with the Advisory Panel for the project indicated that both 'traditional' scientific research and non-traditional research undertaken by people such as practitioners can provide valuable information for those involved in agroforestry and farm forestry. As such, the whole range of investigation into agroforestry and farm forestry from formal to less formal research is discussed below and referred to simply as research.

Demonstrations and trials examining various aspects of tree species suitability, breeding and improvement, as well as harvesting and processing research, tend to be undertaken by a wide range of individuals and organisations. These range from traditional research organisations such as CSIRO and universities, the plantation industry companies and State forestry agencies, to Regional Plantation Committees and extension officers working within agroforestry networks, and individual practitioners. The latter have sometimes recorded results of particular silvicultural regimes on their land and written article or papers about the outcomes for an agroforestry newsletters, magazine or conference.

Research on silvicultural aspects is undertaken by both the traditional research sector, practitioners and extension officers. A considerable amount of reporting and learning on many aspects of silviculture in recent years also appears to be discussed and driven forward by practitioners, again

through discussion of particular methods and approaches in agroforestry newsletters, magazines and conferences.

Research on economic and marketing aspects is also undertaken by a wide range of individuals and organisations, particularly university researchers and consultants. Economic analysis is often undertaken through traditional research channels, while market analysis is undertaken by a wide range of individuals and organisations involved in agroforestry and farm forestry in many ways. There are many consultancy reports examining economic and financial aspects of farm forestry.

Studies on the impacts of farm forestry on the environment, eg on salinity and waterlogging; and studies on interactions of farm forestry and agricultural production, have most often been undertaken by traditional research organisations – government, university and industry.

Studies on social aspects of farm forestry such as adoption have most commonly been undertaken by university researchers, extension officers and consultants.

Clearly, care needs to be taken not to exclude the wide body of research and knowledge on agroforestry and farm forestry that has and is being built and adopted by practitioners, extension officers and others outside the ‘traditional’ research sector.

Where is research and related information published?

Research and related information on agroforestry and farm forestry in Australia is disseminated in a wide range of ways. When searching for citations to include in the project database, the greatest number of papers reporting research and related information on agroforestry and farm forestry were found in:

- Conference papers and proceedings. The largest number of papers directly discussing research on agroforestry and farm forestry in Australia were found in conference proceedings. There were both a large number of conferences held on agroforestry and farm forestry, and a number of other conferences (for example on forestry, Landcare, and farm management) where papers on agroforestry and farm forestry have been presented;
- Magazines and newsletters This refers to journals publishing non-refereed papers. For this project, *Australian Forest Grower* and *Agroforestry News* were the two magazines/newsletters primarily examined. A large number of articles in these magazines and newsletters reported on the establishment of research projects, gave progress reports or presented summaries of results from research. While generally not containing detailed results of research, they provide a very useful guide to the type and nature of research undertaken in a range of areas;
- Books and reports. This category includes research reports produced by particular organisations, and consultants reports commissioned by various organisations;
- Journal papers. This refers to refereed papers in academic journals. Journal papers published directly on agroforestry and farm forestry tended to fall into one of three categories. The first was papers which provide scientific evidence about some physical impact/effect/potential of farm forestry - for example providing evidence on ability of particular species to use water from different soil levels, or providing quantitative evidence on shelter effects of trees on neighbouring crops. The second were economic analyses of potential farm forestry options; and the third were papers on adoption of farm forestry or farm forestry policy;
- Information sheets and series. These tend to report results of research but do not necessarily reference it – making it difficult in many cases to trace the original research the information is based on. The aim of these is usually to provide advice to agroforestry and farm forestry practitioners on various aspects of establishing, managing, harvesting and marketing products from agroforestry and farm forestry, often developed from research results; and
- Theses. Some theses were found during the searches undertaken for this project; it is likely there are considerably more that were not found in the search processes, as many university libraries do not catalogue Honours or Masters theses.

How accessible is research and related information?

The accessibility of research on agroforestry and farm forestry varies widely. The accessibility of different types of publications is discussed below, including aspects such as their inclusion in searchable databases other than the *FFARL* database.

Workshop and conference papers

Workshop and conference papers are not generally highly accessible except to participants and those who request a copy of the proceedings close to the time the conference is held. They tend not to be lodged in public or depository libraries and so are often located primarily in the private collections of those who attended the conference, and sometimes in government department and university libraries. Depending on the organisation producing the proceedings, it can be difficult to obtain a copy of proceedings after the conference is held, particularly if some time has passed.

This is changing in recent years, however, with an increasing number of conference proceedings published on the internet, or made available on CD, enabling further copies to be made relatively easily in the future as needed.

Some conferences are cited in research databases such as CABI's 'Agroforestry Abstracts', which is a subscription database. Approximately 20% of those included in the *FFARL* database had been included in other searchable databases, primarily conferences held by international organisations such as the International Union of Forestry Research Organizations (IUFRO). Most of these databases are only accessible by paying to subscribe to the database or having membership to a library that has a subscription.

Newsletters and magazines

The only newsletters and magazines examined in depth in the *FFARL* project were *Agroforestry News* and *Australian Forest Grower*. These have the highest circulation of any newsletter/magazine publications on agroforestry and farm forestry in Australia. Both are held by several libraries around Australia and so back issues can be obtained relatively easily, although ordering back copies is not always easy for older issues. Articles in these publications are generally not included in searchable databases such as 'Agroforestry Abstracts'. Their inclusion in the *FFARL* database allows individual articles from these publications to be found via searching a bibliographic database for the first time.

Reports

Reports vary considerably in their accessibility, depending on the method by which they are published and made available. In general, reports tend to be easily accessible soon after publication, but may be extremely difficult to access within only a few years of publication. This is due to many organisations producing only a small number of copies of reports, and having limited ability to reprint reports. However, some institutions, such as the Joint Venture Agroforestry Program, do provide good access, with reports available to either download or order on the internet¹¹ and lodged in State and national libraries, as well as made readily available to those who order them.

Reports are not as likely as books or journals to be purchased by libraries, and those that are not published are generally not lodged with depository libraries such as the National Library.

Reports are sometimes cited in searchable databases and sometimes not. It is not possible to know what proportion are included as it is difficult to identify all existing reports, as discussed in Section 1 of the report.

¹¹ At www.rirdc.gov.au

Journals

Refereed journals tend to be easily accessible compared with other types of publications. Journal articles are cited in a range of searchable databases, are held in many libraries, and in recent years many journals are making it possible to purchase copies of individual articles over the internet.

Information sheets and series

Information sheets and series are easily accessible, and are usually freely accessible on the internet, and available through a range of outlets in the State in which they are produced.

Theses

Theses are generally fairly inaccessible. Where they have been lodged in a library they are generally only available in that library, and obtaining copies of the thesis can be difficult. Where theses have not been lodged in a library they can be almost impossible to access unless the author of the thesis can be contacted directly.

Results: Directions survey

Survey responses and respondent characteristics

A total of 46 surveys on directions in agroforestry and farm forestry research in Australia were completed and returned. As discussed above, the rate of response could not be calculated as the population surveyed was not known due to the email survey distribution system used, and care should be taken when reading the results as it is not possible to identify how representative the responses were of those involved in agroforestry and farm forestry in Australia. The opinions expressed by those who responded to the survey may therefore not be representative of the wider body of agroforestry professionals (practitioners, extension officers and researchers) in Australia.

The respondents were from a range of geographic locations, and were involved with agroforestry and farm forestry in a number of ways.

Geographic location of respondents

Respondents were asked to describe their location, which was specified as being the state and region in which they are involved in agroforestry/farm forestry. If their work was undertaken nationwide, they were asked to reply 'Australia' to indicate the geographic range of their involvement. Table 1 shows the geographic locations where respondents were primarily involved in agroforestry/farm forestry.

The geographic spread of respondents was wide. At least one survey was returned from all major agroforestry/farm forestry regions except southern Queensland. For every State except Tasmania and Queensland a spread of geographic regions was represented in the returned surveys. However, from some regions there were few respondents. To ensure that the final opinions did not overly reflect Victorian/South Australian opinions, differences in responses between different geographic regions were specifically searched for when analysing results, and any differences highlighted. There were, however, few differences in responses from different geographic regions, as discussed below.

Type of involvement with agroforestry and farm forestry

Respondents were asked to specify in what ways they were involved with agroforestry/farm forestry. The options given were involvement as a practitioner, extension work, representation of agroforestry/farm forestry interests¹², marketing and research, or other. They were allowed to specify multiple types of involvement.

¹² Eg via a growers cooperative or a group representing the interests of agroforesters/farm foresters

The majority of the respondents (27 of the 46) were involved in multiple roles relating to agroforestry/farm forestry. Many were involved in both extension, representation and marketing roles simultaneously, and so these three categories are combined as ‘extension, advocacy and marketing’ in Table 2, which summarises the ways survey respondents were involved in agroforestry and farm forestry.

Table 1: Regions where respondents undertook agroforestry/farm forestry activities

State where respondents are involvement in agroforestry/farm forestry	Number of respondents	Regions within State represented
Australia	4	Three respondents stated ‘Australia’ and one ‘south-east Australia’ as their regions of primary involvement with agroforestry/ farm forestry
New South Wales	5	New South Wales (one respondent); Southern Tablelands (one respondent); South-west Slopes (one respondent); Hunter/coastal region (one respondent); and Northern Rivers region (one respondent)
Northern Territory	1	Northern Territory
Queensland	5	Queensland (one respondent), Far North Queensland/Atherton Tablelands (one respondent), North Queensland (three respondents)
South Australia	8	Lower south-east including Mount Gambier (three respondents), mid south-east (one respondent), upper south-east (three respondents) and Kangaroo Island (one respondent)
Tasmania	1	Tasmania
Victoria	18	Victoria (five respondents), South-west/Green Triangle (three respondents), Wimmera (one respondent), Central North (one respondent), Gippsland (eight respondents)
Western Australia	4	South-west Western Australia (three respondents), south-east Esperance region (one respondent)

Table 2: Ways in which respondents were involved in agroforestry/farm forestry

Type of involvement	Number of respondents identifying themselves as having all these roles
Practitioner, extension/advocacy/marketing and research	11
Extension/advocacy/marketing	8
Practitioner and extension/advocacy/marketing	5
Practitioner	10
Extension/advocacy/marketing and research	5
Research	3
Other (included members of regional development boards promoting agroforestry and a nursery practitioner)	4
Total	46

A total of 26 respondents were agroforestry/farm forestry practitioners; 29 undertook some form of extension, advocacy and/or marketing, and 19 were involved in research activities. The survey was targeted primarily at the first two categories of respondent, but clearly many respondents undertake a range of roles, and can comment on information needs from multiple perspectives.

Types of information needed (Q3)

The third question of the survey gave a list of topics and asked respondents for which topics they needed information in their agroforestry and farm forestry related activities. Table 3 summarises the responses. No differences were noted in the responses by either geographic region or type of involvement with agroforestry/farm forestry, other than that some respondents pointed out that particular categories did not apply in their region. For example, respondents in the Wet Tropics pointed out they had no salinity problems and no need for information on those issues, while some respondents pointed out that they were not in a region where a market for Christmas trees existed.

Between four and 24 respondents required information on each topic listed in the survey. The number of respondents requiring information on different topics varied from a low of 8.7% needing information on Christmas trees to a high of 52% requiring information on sawn timber. Between eight and 14 respondents indicated a need for information on 64% of the total range of topics. This indicates a differentiation in information needs between respondents although, as stated above, no clear patterns in terms of information needs based on geographic region or type of involvement with farm forestry was found.

The most common information needs appear to be related to marketing, economics and particular products - sawn timber, posts and poles, and non-market services such as biodiversity and salinity credits. These made up the top seven categories with 18 or more respondents.

Respondents required information about a wide range of products from agroforestry/farm forestry. A high number (N=24) needed information on sawn timber products, and 18 respondents required information on posts and poles. Fourteen stated a need for information on fuelwood, while fewer respondents needed information on other timber products such as plywood and veneers (N=10), biomass for energy (N=10) or woodchips (N=7). Information on environmental services such as biodiversity credits (N=21), salinity credits (N=19) and carbon credits (N=15) ranked relatively high, while very few respondents indicated a need for information on the services of tourism and recreation (N=6 and N=5 respectively). Few indicated a need for information on non-timber products such as industrial products, eucalyptus oil or fodder (N=8 for all three), bush foods (N=7), extractives (N=6), nut trees (N=6) or Christmas trees (N=4).

With regard to silvicultural information, respondents were more likely to need information on competition control using thinning and spacing (N=18), tree growth and wood production (N=18), genetics and breeding (N=17), pruning (N=16) and fertilisation (N=15) than any other aspects. Few needed information on native forest silviculture (N=7), although this is likely reflect a bias in the sample, with few respondents from regions in which private native forest harvesting forms a large part of farm forestry e.g. Tasmania. Need for information on most other silvicultural aspects ranged between 10 and 14 respondents, although only 8 needed information on watering and irrigation.

Economics and market information tended to rank relatively high in terms of information needs. Marketing strategies, market specification and economic of farm forestry ranked 5th to 8th highest of all information needs, with 18 respondents indicating a need for information in their work for each of the three topics. Seventeen respondents needed information on log prices. Fewer indicated a need for market reports (N=14) and joint ventures (N=13), although these were still in the top 50% of ranking of information needs, while 12 respondents needed information on grower cooperatives and 10 on lease/annuity schemes.

In terms of interactions with agricultural production, stock shade and shelter (N=16) and crop shade and shelter (N=14) ranked highest, while agistment was ranked lower (N=11).

With regard to landcare and land rehabilitation, information on planting for salinity control ranked highly (N=17), as did information on soil nutrient decline (N=16) and planting multiple species (N=16). Fourteen respondents needed information on planting to reduce spread of weeds, while 10 to 13 respondents needed information on other topics in this category.

Table 3: Types of information on agroforestry/farm forestry respondents needed in their work¹³

Topic	No. resp.	Topic	No. resp.
Sawn timber products	24	Weed control – before planting	12
Biodiversity credits	21	Tree seed & propagation material	11
Salinity credits	19	Education	11
Posts and poles	18	Agricultural agistment	11
Market specifications	18	Studies on adoption of farm forestry	11
Marketing strategies	18	Landscape design	11
Economics of farm forestry	18	Soil compaction	11
Competition control - thinning	18	Wildlife on farms	11
Competition control – spacing	18	Shelterbelts	11
Tree growth and wood production	18	Protection of young trees eg fencing	11
Log prices, stumpage and royalties	17	Insect pest management	11
Planting for salinity control	17	Fungal disease management	11
Genetics and breeding	17	Grading of product	11
Stock shade and shelter	16	Plywood and veneers	10
Soil nutrient decline	16	Biomass for energy	10
Planting multiple species	16	Leases/annuities	10
Pruning	16	Designing revegetation for wildlife	10
Carbon credits	15	Planting indigenous species	10
Fertilisation	15	Alley farming	10
Fuelwood	14	Break of slope plantings	10
Crop shade and shelter	14	Fire protection	10
Planting to reduce spread of weeds	14	Industrial products	8
Market reports	14	Eucalyptus oil	8
Woodlots	14	Fodder	8
Weed control – post-planting	14	Policy analysis/review	8
Harvesting options and techniques	14	Aesthetic/scenic values and valuation	8
Processing	14	Watering and irrigation	8
Species selection, trials	14	Transportation	8
Measurement techniques	14	Extension strategies	8
Joint ventures	13	Woodchips	7
Waterlogging & salinity	13	Bush foods	7
Water quality	13	Native forest silviculture	7
Catchment impacts	13	Extractives	6
Wide spaced	13	Nut trees	6
Farm/property management planning	13	Tourism	6
Soil cultivation/ ground preparation	13	Recreation	5
Education strategies, courses	13	Christmas trees	4
Soil erosion by wind and water	12		
Planting to reduce impact of pests	12		
Grower cooperatives	12		

Five topics related to farm-scale design of farm forestry. The highest number of respondents in this category indicated a need for information on woodlots (N=14), while fewer needed information on

¹³ Some of the categories as presented here appear very similar. They were presented to respondents as part of various broader categories. If two topics appear similar or are unclear, refer to the survey in Appendix 3 for clarification.

wide-spaced design (N=13), shelterbelts (N=11), alley farming (N=10) and break of slope plantings (N=10).

Information was needed on harvesting options and techniques, and on processing, by 16 respondents, while information on product grading was ranked lower (N=11) and eight respondents indicated a need for information on transportation.

Priority needs for further information (Q2)

Respondents were asked if they believed there are areas where more research and information are needed to be able to develop effective forms of farm forestry (Q2A). All but one respondent replied 'yes' to the question; the one remaining respondent replied neither 'yes' or 'no' but went on to detail information needs, so can be assumed to believe more information is needed in certain areas.

Before being presented with a range of topics to comment on, respondents were asked to state, without any prompting through use of lists, what types of research and information on agroforestry/farm forestry are currently lacking (Q2B). Forty one respondents (89%) gave responses to this question. The responses given by respondents were coded and placed into categories, shown in Table 4.

The most common response given was that further information is needed on the potential suitability and silviculture of a wider range of tree species. Lower rainfall species were most commonly mentioned, although respondents in northern Queensland generally specified a need for more information on cabinet timbers. More information on market and economic aspects of agroforestry and farm forestry, including potential for economic return from environmental services, was the other commonly mentioned need. Information on salinity issues, on genetic improvement and breeding, and on wood quality and processing were each mentioned by more than three respondents. Other topics were less commonly mentioned.

General areas in which more information is needed (Q3)

Respondents were given a list of topics related to agroforestry and farm forestry, and asked to state for each topic whether more information is needed on that topic, or if adequate information is available. As discussed above, very few differences were found in responses related to the geographic location or type of involvement the respondent had with agroforestry/farm forestry.

All respondents gave opinions on a majority of the topics listed in Question 3. However, not all respondents gave an opinion on whether information is adequate or more is needed for every topic. In most cases, where a respondent did not provide an assessment of information needs they had indicated that they did not need information on that topic in their agroforestry/farm forestry related activities. In addition, seven commented that they did not have enough knowledge of particular topics to comment on whether more information was needed or not.

To make it easier to compare results, the responses are reported as percentages, with the total number of respondents for each topic also given.

Results are presented in percentages to allow a useful, easily comparable summary of responses, not to indicate whether the views expressed were representative of the entire population of agroforestry/farm forestry professionals in Australia.

Table 4: Priority needs for more information and research in agroforestry and farm forestry (Q2B)

Topic for which more information or research is needed	No. resp *	Description
Increasing the range of species for which information is available, and increasing species trialling	13	Of the 13 respondents, five specified a need for more information on low rainfall species, one for more information on riparian species and two for more information on cabinet timber species. Two identified a need for better access to existing information on species trials.
More information on lower rainfall species and silviculture	7	Respondents indicated a need for more information on suitability of a wider range of species, their wood properties, growth and silviculture.
Marketing information	8	Identification of markets, improving market access and developing new markets were all identified as areas requiring more information
Economic information	8	Most respondents specified a need for more information on economic viability and returns. One respondent specified a need for information on impacts of taxation on returns.
Non-market services	7	Respondents specified a need for more information on viable options to achieve returns from environmental services provided by farm forestry
Access to existing information	6	Six respondents specified that they believed access to existing information is often lacking in many areas, and that more work is needed on transforming existing information into viable farm forestry systems/activities.
Salinity, waterlogging and hydrology	4	
Genetic improvement and breeding	4	Two respondents specified more information on genetic improvement and breeding of lesser known species is needed
Wood quality for processing and wood products	4	Two respondents specified more information is needed for lesser known and specialty species
Research on specific geographic regions	3	
Research at landscape and broader scale	2	
Research on propagation methods	2	
Better identifying and responding to landholder needs	2	
Pest and disease research	2	
Fertilisers	1	
Pruning and thinning	1	
Shelter effects	1	
Multiple purpose planting	1	
Wide-spaced plantings	1	

* Note that the total number of responses on different topics is higher than the total number of respondents to the survey, as respondents could specify several areas where they believed more information is needed.

Timber products

Figure 2 shows the responses relating to information needs on timber products. Most respondents choosing to comment on timber product information needs believed more research is needed on sawn timber, biomass for energy, plywood and veneers, and posts and poles. In all these categories very few (20% or less) respondents felt adequate information was already available. Comments given by respondents on specific information needs and other issues related to research on this topic included:

- Three respondents from the Northern Territory and Queensland indicated that there was a need for information on cabinet timber species and specialty timbers, while nine respondents from Australia, New South Wales and Victoria believed more work is needed on sawn timber, plywood and veneer products from eucalyptus; and
- Many respondents commented that work on sawn timber should focus on wood quality, recovery, maximising returns and productivity;
- Two respondents believe more research is needed on fast-grown eucalypt species.

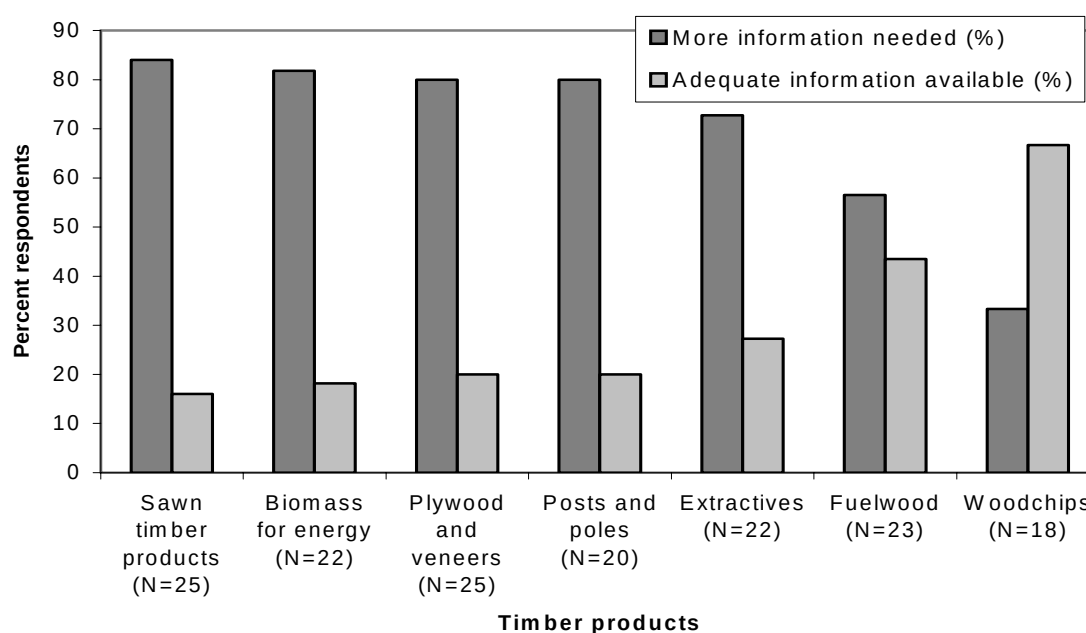


Figure 2: Information needs on timber products

Slightly fewer respondents, although still a majority (72% of 22 respondents) felt there is a need for more information on extractives. Comments included that there is a need to identify product ranges and potentials, indicating a need for basic research on all aspects of extractives.

Fewer believed there is a need for more information on fuelwood, with 43% believing adequate information is already available. Those who commented on what information is needed (four respondents from Victoria, South Australia and Australia) all commented on the need for information on marketing and economics of fuelwood, as well as its integration with production of other products.

A majority (67%) of the 18 respondents commenting on woodchips believed enough information is already available on woodchips. Comments included:

- One respondent stated that information dissemination of existing research is needed more than new research; and
- Two respondents stated that economic aspects need further examination for small growers.

Non-timber products

Figure 3 shows the responses relating to information needs on non-timber products. Respondents to the survey were more likely to believe adequate information is available on non-timber products than on timber products. Only one category of non-timber products – industrial products – had a large majority of respondents (80%) who stated more information was needed on the topic.

Around half of all respondents stated more information is needed on bush food, eucalypt oil, and tree seed and propagation materials, while half believe adequate information is already available. Statements on specific research needs included:

- For bush foods, one respondent commented that there is a need for information on mixing bush food species with native timber species and their potential biodiversity and other values;
- For eucalyptus oil one respondent suggested research is needed on producing oil and timber simultaneously;
- With regard to tree seed and propagation material, one respondent suggested research into improved propagation systems; another suggested genetics research needs to meet market demands for tree form and growth; and a third suggested research is needed on improved seed where contamination of local native populations of the species is not a problem.

A large majority of respondents believed adequate information is available on nut trees and Christmas trees. Some respondents stated they did not assess the need for information on these topics as they were not relevant in their region; one suggested research into combining timber and nut production.

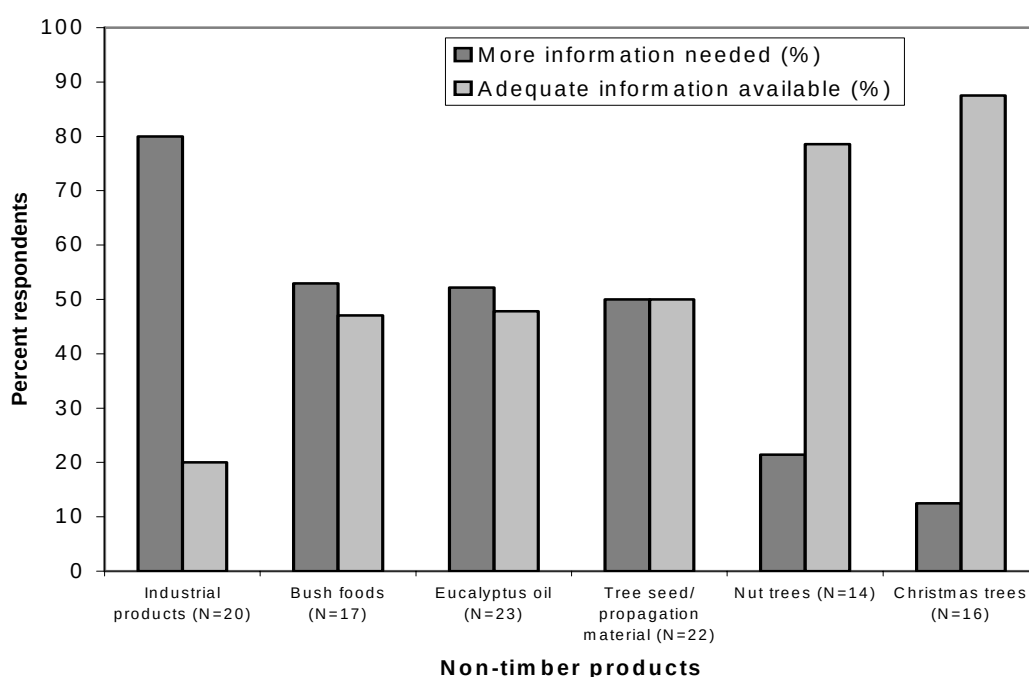


Figure 3: Information needs on non-timber products

Environmental and social services

Figure 4 shows the responses relating to information needs on environmental and social services. A large majority of respondents believe more information is needed on trading environmental services through biodiversity credits (96%), carbon credits (85%) and salinity credits (84%). Comments made by respondents regarding specific research needs focussed on suggesting a need for developing systems which operationalise the concept of trading systems and return monetary value to growers.

Other comments included:

- With regard to salinity credits, four respondents believe more research is needed into the physical aspects, for example monitoring impacts of farm forestry on water table levels and location and design to capture benefits; and
- One respondent commented that, in addition to research on potential positive returns from environmental services, there needs to be research on the potential for social and environmental impact penalties e.g. negative social impacts or increased fire hazard from plantations.

A majority of respondents (74%) believed more information is needed on how to use education to promote farm forestry. Only a small majority of respondents believe more information is needed on recreation or tourism service potential of farm forestry, and suggestions indicated that basic research on the potential of farm forests to provide recreational or tourism opportunities is needed.

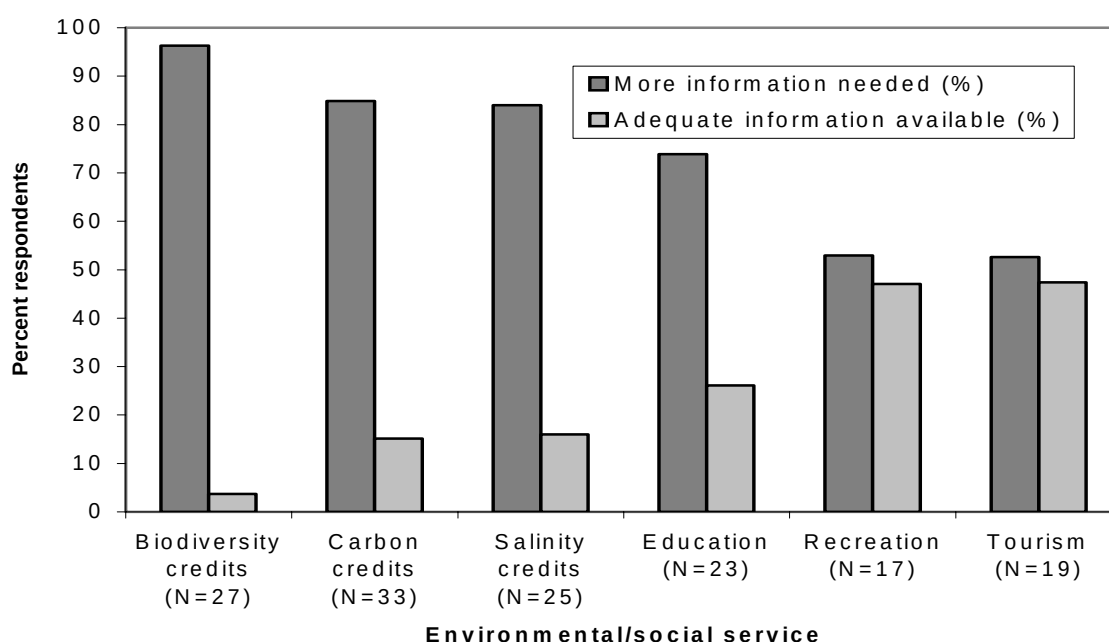


Figure 4: Information needs on environmental and social services

Interactions with agricultural production

Figure 5 shows information needs related to interactions of agroforestry and farm forestry with agricultural production. Sixty percent of respondents believed more information is needed on agricultural agistment; 57% on stock shade and shelter; 55% on crop shade and shelter, and 47% on fodder. Comments by respondents on all these topics included:

- Three respondents believed there is a need for more research into the economic impact of agroforestry and farm forestry on agricultural production;
- Four respondents believed more work is needed on quantifying benefits in some regions, such as the Northern Territory;
- Three respondents suggested a need for development of extension and dissemination tools on the potential of farm forestry to improve agricultural outcomes; and
- One respondent commented that more research is needed proving the potential of agroforestry/ farm forestry to improve agricultural productivity.

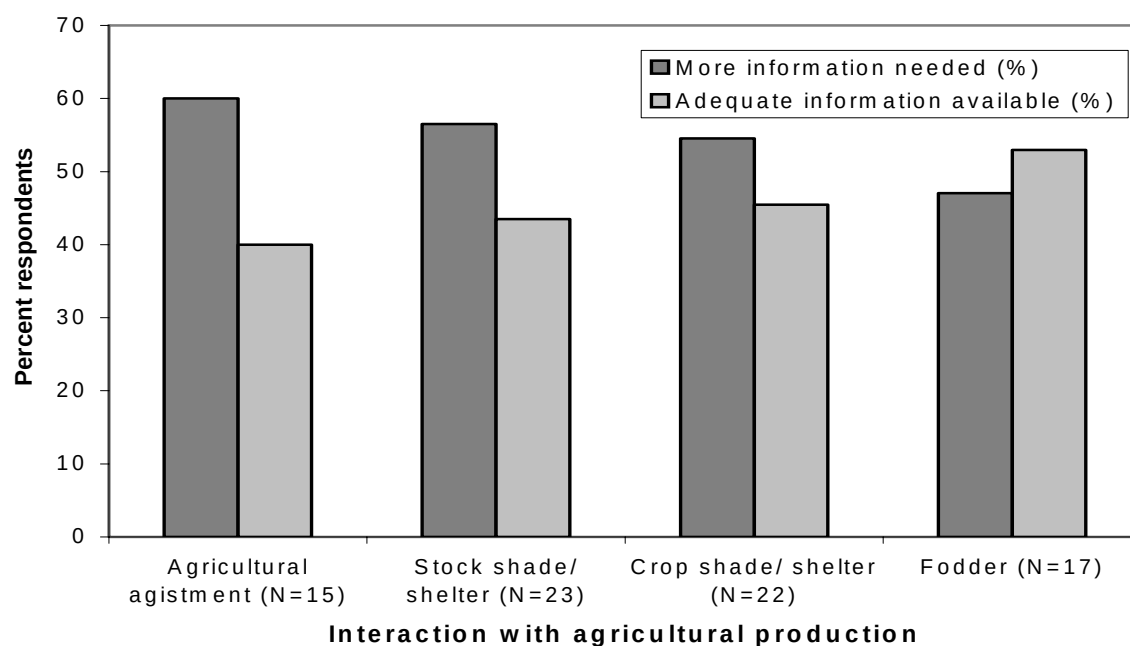


Figure 5: Information needs on interactions with agricultural production

Policy and social analysis

Figure 6 shows information needs relating to policy and social analysis. A majority of respondents (68%) believe more policy analysis is needed. Respondents detailed needs for research on economic and social benefits of farm forestry, taxation issues and effectiveness of past policy programs. A slight majority (55%) of respondents believed more research is needed on adoption of farm forestry, while 45% believed adequate information is available. Suggestions for research included more regional studies, research on motivations for adoption, and comparison of adoption rates of different types of farm forestry. One respondent suggested that operational funding, rather than research funding, is needed to increase adoption.

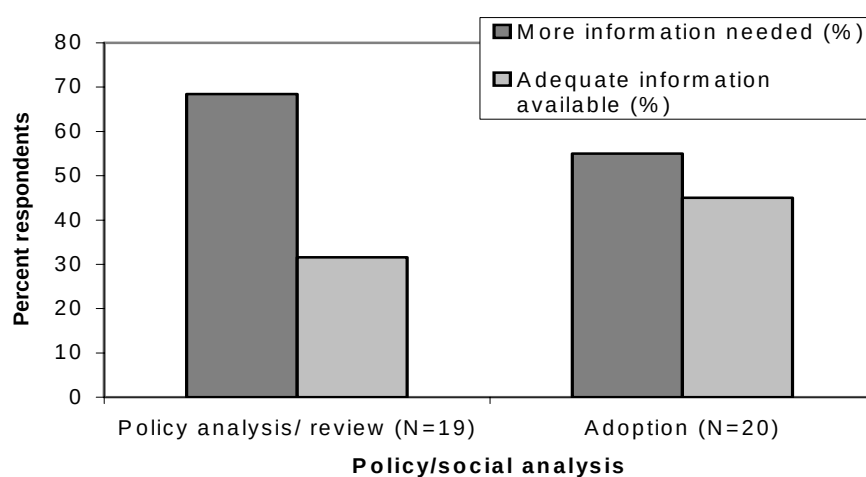


Figure 6: Information needs on policy and social analysis

Landscape design and scenic quality

Figure 7 shows information needs on landscape design and scenic quality. A large majority of respondents (75%) believe more information on aesthetic and scenic values of farm forestry is needed. Of six respondents commenting on this issue:

- Two believe the link between aesthetic improvement and property values needs to be examined;
- One believes examination of equitable planning mechanisms relating to aesthetic and landscape issues is needed; and
- Three commented that this is an important issue for development planning and differentiating between different types of plantations (eg large scale industrial versus small scale farm forestry).

Almost half of all respondents believed adequate information is already available on landscape design (48%). However, one who believed adequate information is available commented that many in government, research and industry do not treat this as a legitimate issue, while two believe research is needed at a regional scale on landscape issues, and one believed improved methods of working with communities to identify landscape and other issues are needed.

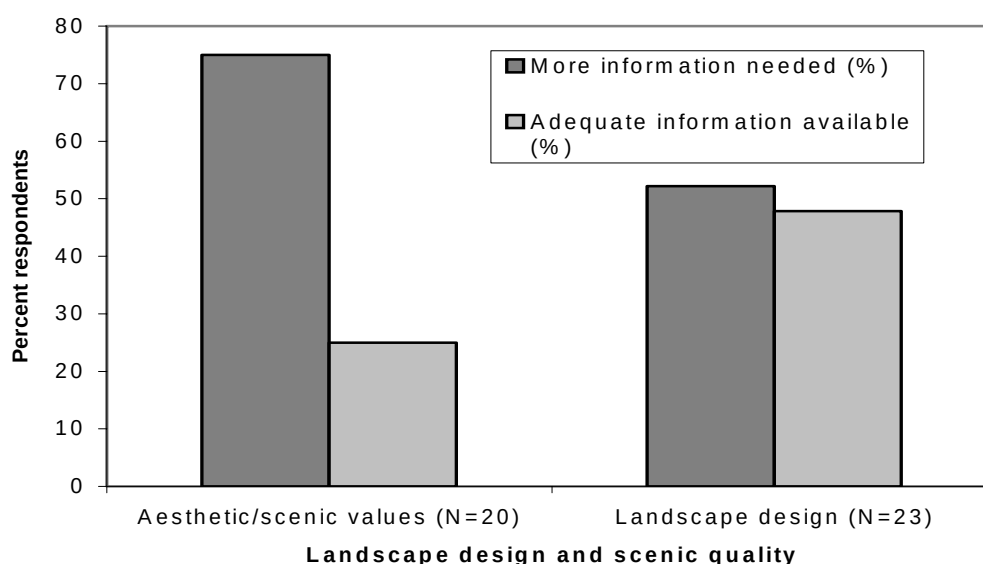


Figure 7: Information needs on landscape design and scenic quality

Landcare and rehabilitation

Figure 8 shows information needs relating to landcare and rehabilitation. Most respondents believed more information is needed on planting to reduce impact of pests (83%), planting to reduce spread of weeds (76%), catchment impacts (74%), water quality (72%) and soil nutrient decline (68%). Respondents suggested research on reducing impact of pests and weeds should include developing design principles and examining in more detail the viability of forestry for weed control.

Fewer respondents (59%) believed more information is needed on soil erosion by wind and water, with 41% believing adequate information is already available. Similarly, 58% of respondents believed more information is needed on waterlogging and salinity and 55% believed more information is needed on soil compaction, with almost half the respondents believing adequate information is already available. With regard to waterlogging and salinity, some of those who believed adequate information was available pointed out that they had only basic needs for information in their region, while those from salinity prone regions were more likely to believe more information is needed. Two specified that ongoing research in the area of waterlogging and salinity should continue.

One respondent commented that monitoring at both farm and catchment scale is needed to examine all the potential impacts of farm forestry on landscape reconstruction and land rehabilitation, in order to provide better evidence about the impacts of farm forestry. Another respondent commented that there is a need for more focus on developing good extension tools to teach farm foresters to diagnose problems and design appropriate systems to overcome them.

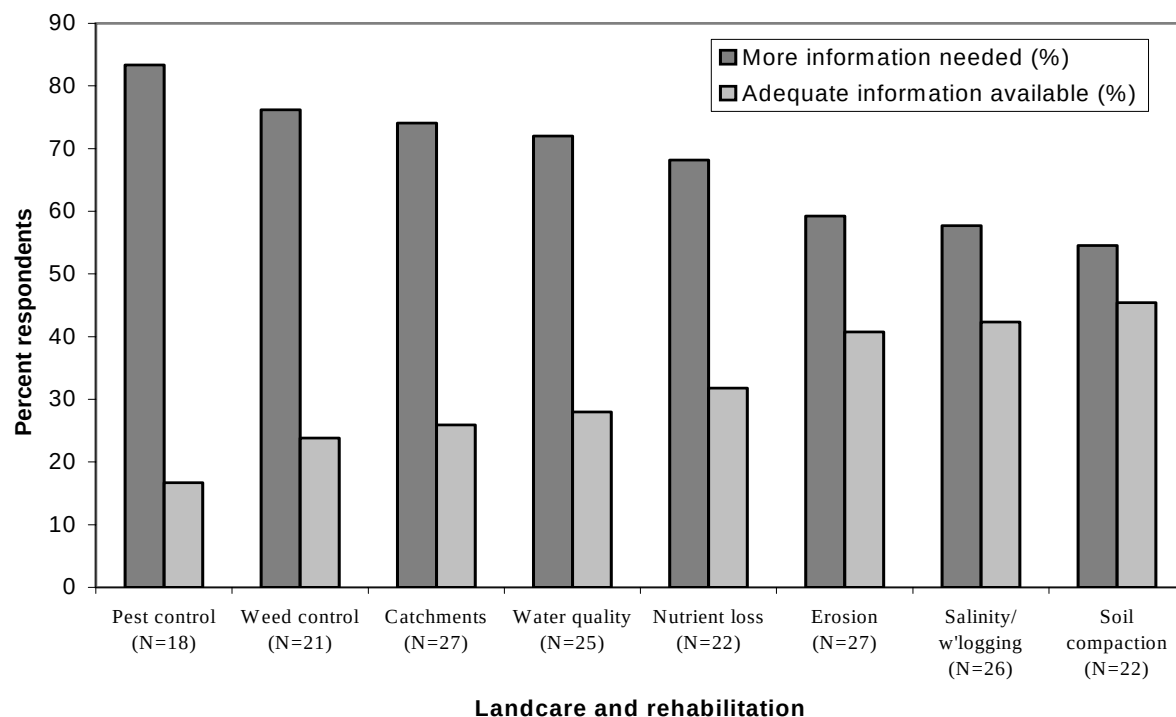


Figure 8: Information needs on landcare and rehabilitation

Nature conservation and biodiversity

Figure 9 shows information needs relating to nature conservation and biodiversity.

The majority of respondents believe more information is needed on wildlife and farm forestry (73%) and on planting multiple species (71%). A small majority (57%) believed more information is needed on designing revegetation for wildlife, and on planting indigenous species (57%). Comments from respondents on information needs included:

- One respondent believed that commercial aspects of farm forestry should be prioritised over nature conservation;
- One respondent commented that nature conservation complementary to commercial farm forestry should be considered, rather than combining nature conservation and commercial production;
- With regard to planting multiple species, three respondents specified that research reflecting both positive and negative outcomes, and research on the comparative impacts of monocultures, is needed;
- With regard to wildlife interactions, two respondents specified a need for research on browsing damage by wildlife, and three specified that research is needed on designing farm forests to maximise wildlife diversity.

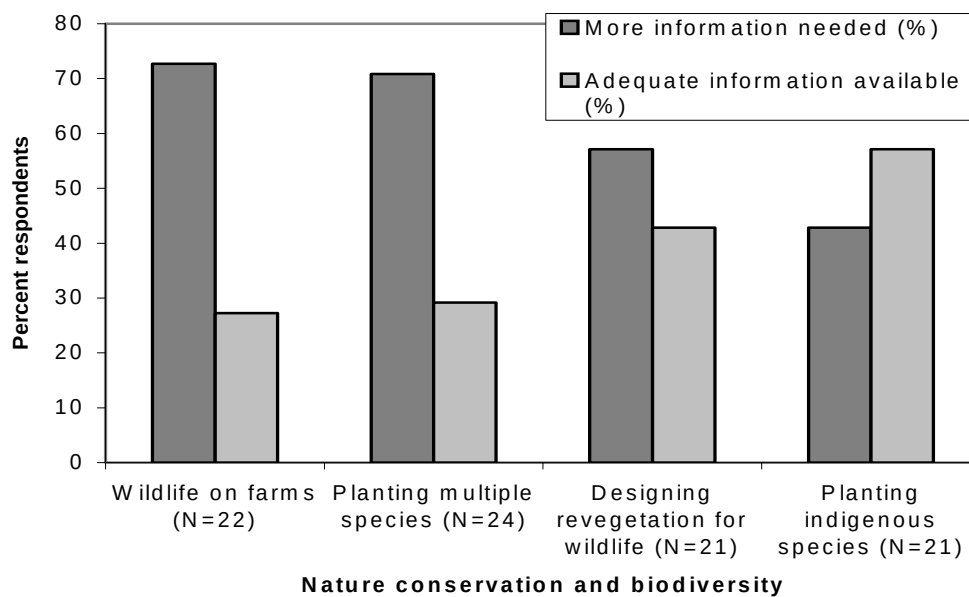


Figure 9: Information needs on nature conservation and biodiversity

Marketing forest products and services

Figure 10 shows information needs on marketing forest products and services. The highest number of responses were given for the category of ‘marketing forest products and services’. A large majority of respondents believe more information is needed on marketing strategies (96%), market specifications (89%), economics of farm forestry in general (81%), and log prices, stumpages and royalties (79%). Specific suggestions for research on these topics included:

- More research on economics in specific regions and for minor, niche and lesser known species (five respondents);
- More information on marketing niche and specialist species (one respondent);
- More information on log prices and reviews of log pricing procedures in Australia (one respondent);
- More research integrating farm forestry economic analysis with whole-farm economic analysis (one respondent);
- A need for research quantifying non-monetary benefits of farm forestry (one respondent); and
- More economic analysis specifically on small-scale forestry (one respondent).

A smaller majority believe more information is needed on grower co-operatives (73%), lease and annuity schemes (65%), market reports (64%) and joint ventures (61%). Respondent comments included:

- Suggestions that joint ventures be designed with farmers, and be underpinned by development of a better understanding of why farmers are reluctant to enter joint ventures (two respondents);
- More information on what joint venture and lease schemes are available in different regions (one respondent);
- Two respondents stated that existing market reports are good, but more open access to information in general on markets, sales and prices is needed;
- Two respondents suggested more research on using brokers is needed; and
- Five respondents suggested research on grower cooperatives needs to examine where/why they are successful/unsuccessful.

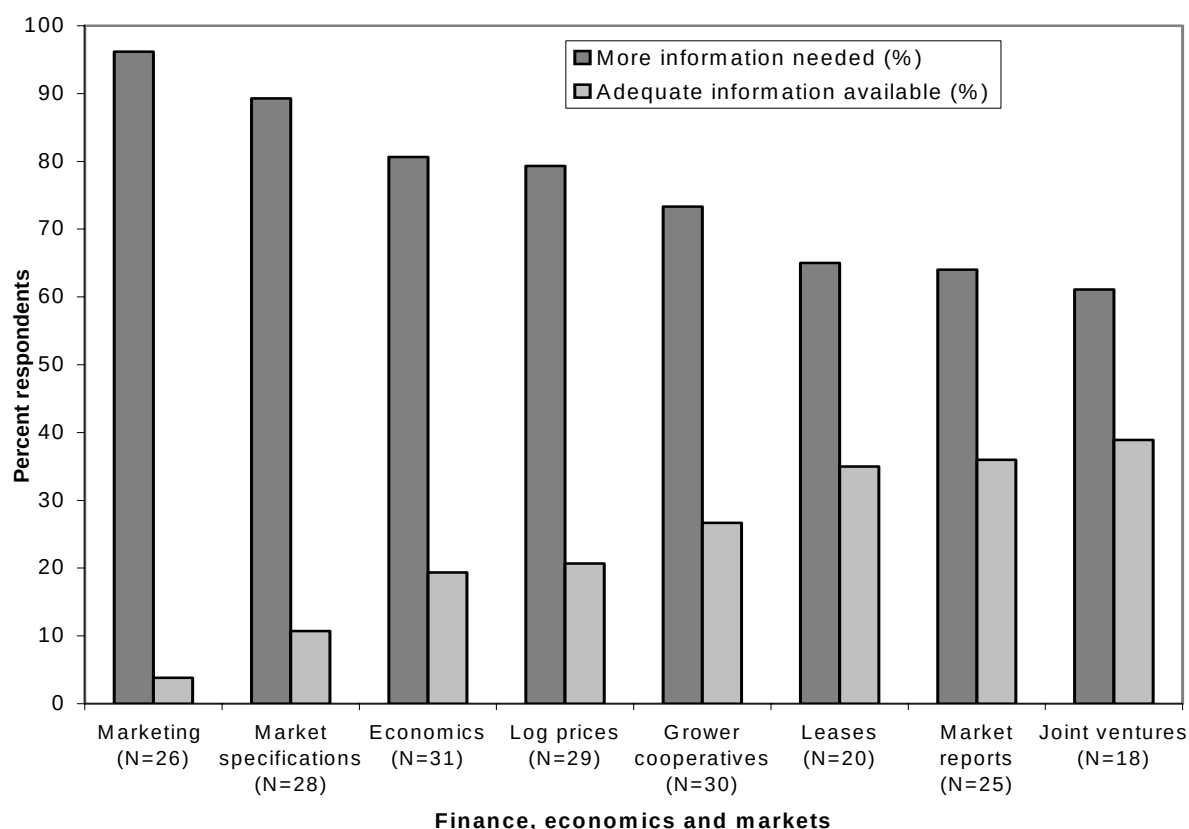


Figure 10: Information needs on finance, economics and markets

Designing farm forestry

Figure 11 shows information needs relating to farm forestry design. The majority of respondents believed an adequate amount of information is available on the various farm-scale farm forestry design options. There were only two categories in which a majority of respondents believed more information is needed – designing plantings for salinity control (61.5%) and farm and property management planning (56.5%). A majority believed adequate information is available on woodlots (61%), shelterbelts (58%), break of slope plantings (57%), wide-spaced designs (54%) and alley farming (52%). No questions were asked on catchment scale planting design.

Respondents commented:

- More research is needed on shaping design to individual needs;
- Physical impacts of different farm-scale design options e.g. on hydrology, catchments should be further examined; and
- One respondent believed that transformation of existing information into adequate extension and a form suitable for dissemination, was needed more than new information.

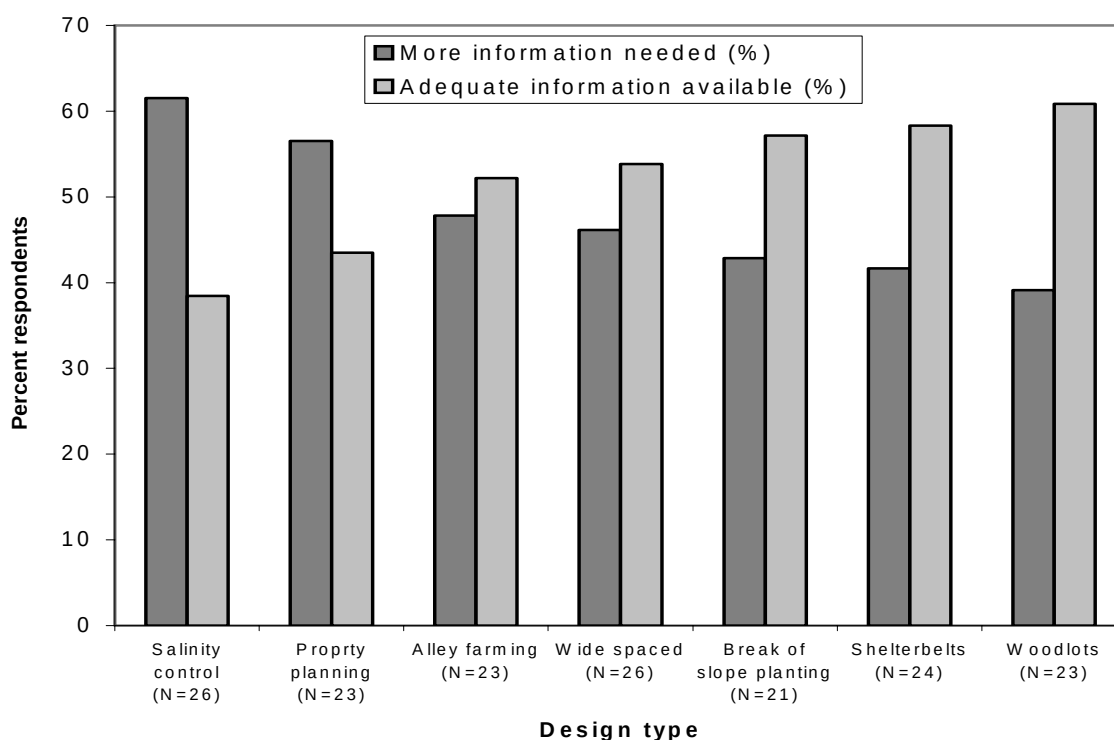


Figure 11: Information needs on design of agroforestry/farm forestry

Silviculture

Figure 12 shows aspects of silviculture for which a majority of respondents indicated a need for more information. A large majority of respondents wanted more information on growth and wood production (96%), genetics and breeding (79%), and species selection and trials (72%).

Specific descriptions of information/research needs given included:

- Five respondents specified that more information on tree growth and wood production is needed for a wider range of species, including low rainfall and cabinet species, while three commented that research needs to be end-product and market driven;
- With regard to genetics and breeding, two respondents commented that existing information needs to be more accessible, while two respondents commented that market-driven improvement is needed. A further two respondents suggested that more information is needed on maintaining integrity of local gene-pools, and maintaining genetic diversity in farm forests; and
- Six respondents wanted a wider range of species to be trialled, while three believed better dissemination of information on existing trials is needed.

A smaller majority of respondents wanted more information on thinning and spacing (69%), fertilisation (68%), fungal diseases (67%), insect pests (65%) and pruning (60%). Comments on specific information/research needs included:

- For competition control by thinning and spacing, a range of specific comments on extending existing knowledge were given. These included research on different thinning regimes in thick regrowth, basal area approaches, examining form and branching, low rainfall species, wide spaced silviculture, and alternative species and timing¹⁴;

¹⁴ Note: Respondents were not specifically asked if more information was needed for particular types of thinning – for example thinning for particular product regimes.

- Comments on fertiliser research included that the research needed is a broadening of current knowledge to wider range of species and soil types (two respondents) and a refinement of existing knowledge e.g. by examining impacts of fertiliser at different stages of growth;
- Comments on fertiliser research i
- Comments on insect pests included two respondents specifying a need for non-chemical and bio-friendly methods, and one a need for research specifically on small woodlots;
- One respondent stated that in practice, work is done by farmers and industry - ideas and practices are constantly being adapted and changing through practical experience, without there necessarily being a need for detailed research on many silvicultural aspects; and
- With regard to pruning, one respondent believed no further research, but rather more implementation, is required.

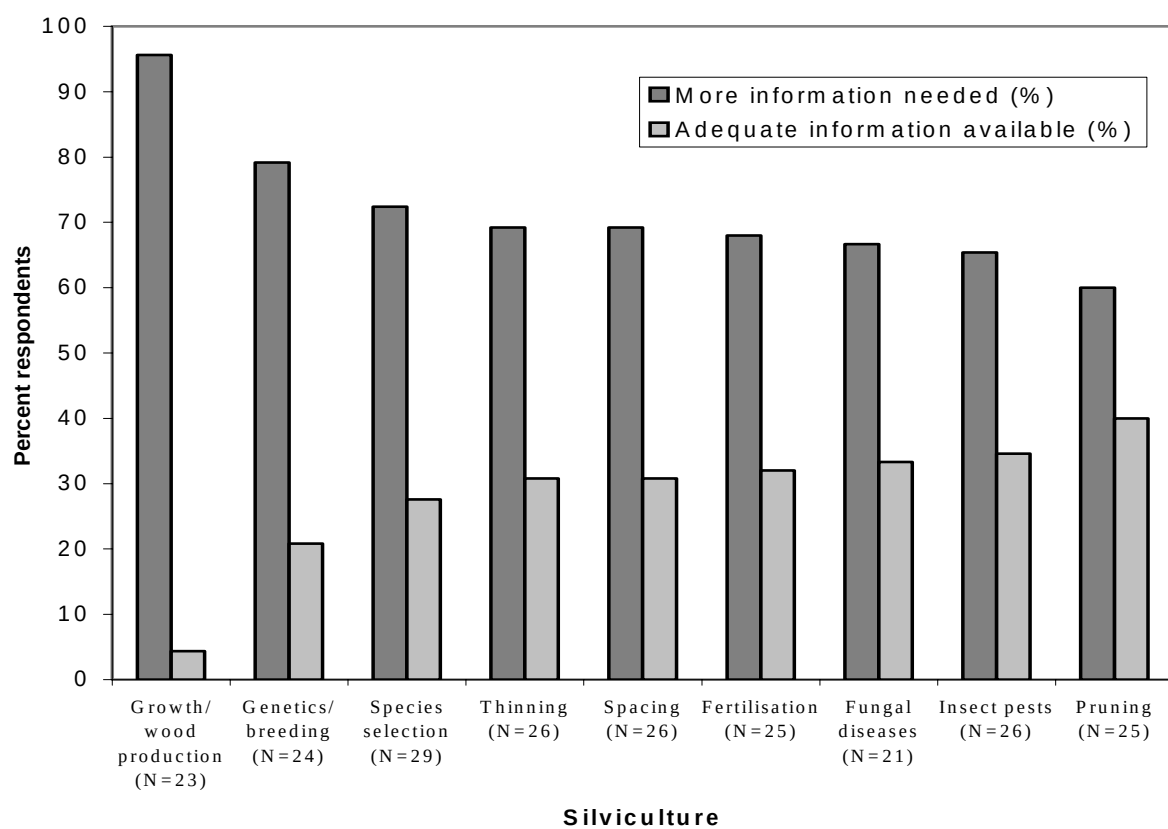


Figure 12: Silviculture research topics for which a majority of respondents indicated a need for more information

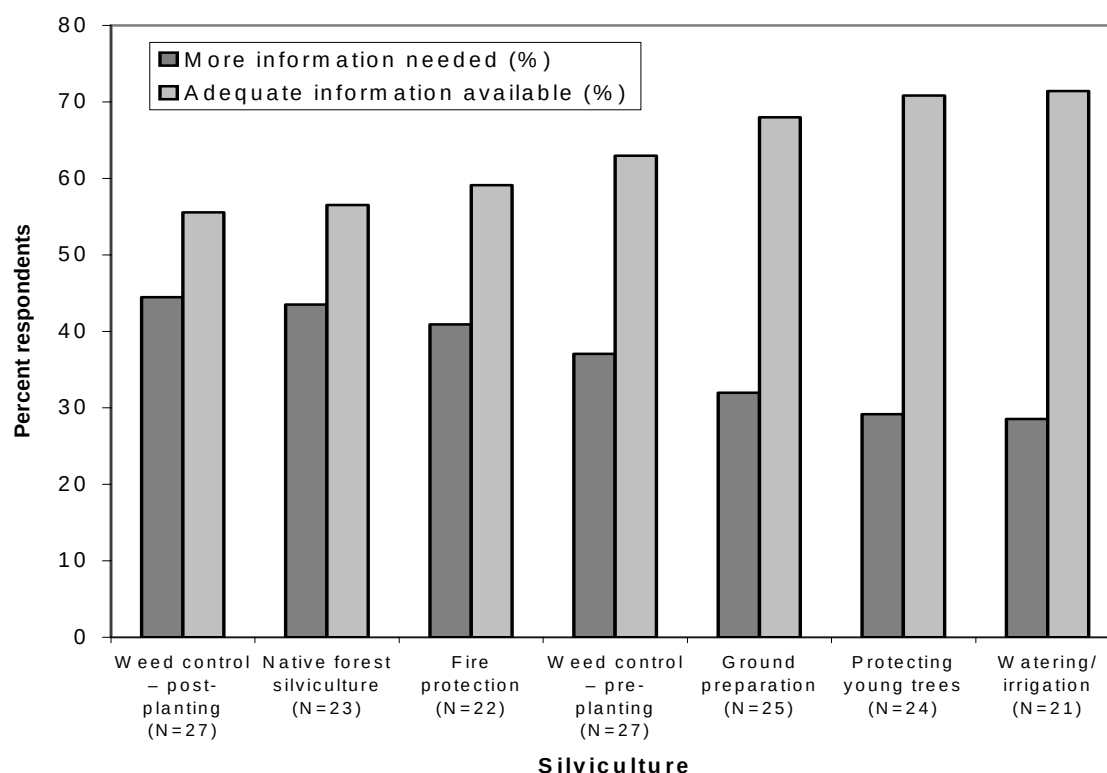


Figure 13: Silviculture research topics for which a majority of respondents indicated adequate information already exists

Figure 13 shows aspects of silviculture for which a majority of respondents believe adequate information is already available. The majority of these respondents either commented that refinements to existing research were needed, or that existing information requires better dissemination.

For weed control after planting, a small majority (56%) believed enough information is already available, while 63% believed adequate information is available on weed control pre-planting. Suggested research included non-chemical and bio-friendly options (three respondents).

Similarly, only a small majority believed enough information is already available on native forest silviculture (57%). As discussed earlier, this may be a bias in the type of respondents to the survey, with few responses from areas where private native forest management for commercial return is common. A range of suggestions for further research were made, including:

- Expanding the range of forest types researched;
- Examining impacts of thinning;
- Methods of rejuvenating over-cut and degraded forests;
- Methods for improving diversity and wildlife.

Three respondents suggested there is a need for market research to underpin development of improved silvicultural regimes that better meet market needs, and for better dissemination of existing information.

A small majority believed enough information is already available on fire protection (59%). Suggested research varied from the impacts of fire on different species to fire fighter safety research.

One respondent suggested that these issues would be worked on through practice and experience, rather than through undertaking formal research.

Seventy one percent of respondents believed adequate information is available on protection of young trees. The only suggestions for new research were economic analysis of different options and minor refinement to existing research.

Seventy one percent of respondents also believed adequate information is available on watering and irrigation. Suggestions for new research included wood properties of irrigated plantations, benefits of watering in dry periods and more information on irrigation methods and species requirements.

Harvesting and processing

Figure 14 shows information needs for harvesting and processing.

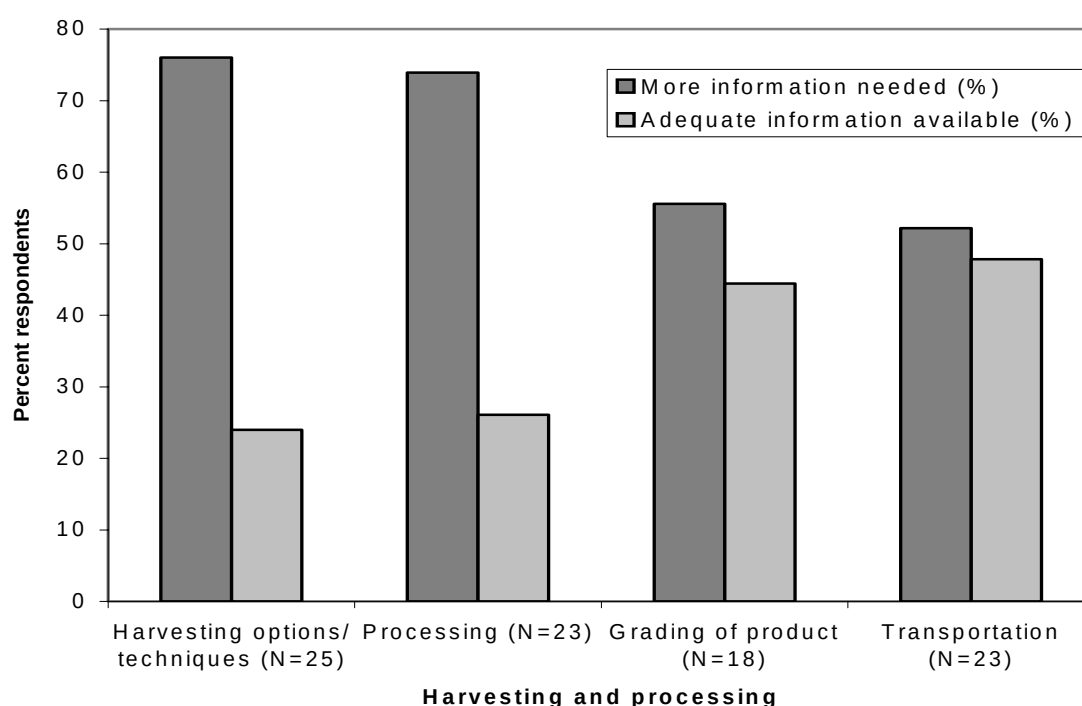


Figure 14: Information needs on harvesting and processing

A high proportion of respondents believed more information is needed on harvesting (76%) and processing (74%). For harvesting options, respondents specified they wanted more information on:

- Costs (one respondent);
- New technologies (one respondent);
- Harvesting mixed age, mixed species plantings (one respondent); and
- Increasing the range of harvesting options (one respondent).

For processing nine respondents specified they wanted more information on sawlogs, three on veneer, posts and poles, two on firewood and four on processing technologies and options such as on-farm processing.

A small majority of respondents believed more information is needed on grading (56%) and transportation (52%). With grading, three respondents wanted more information on sawn timber, one on pulp, and one respondent stated a need for grading information to be more easily understood. Comments on transportation included a need for research targeted at transport issues faced by small

scale growers (three respondents), and one respondent believed a national audit is needed to look for any gaps in existing regional transport programs.

Tree and forest measurement

Respondents were asked if more information is needed on measurement techniques. Of 26 respondents, 65% believed adequate information is already available while 35% believe more information is needed. Specific comments made by respondents on this topic included:

- Three respondents commented that existing information needs to be transformed into user-friendly, standardised inventory techniques; and
- One respondent suggested more research into use of GPS/GIS and satellite imagery for inventory.

Communication

Figure 15 shows information needs relating to communication. A small majority of respondents believe more information is needed on extension strategies (56%) and education strategies and courses (58%). Comments made on these topics included:

- With regard to extension, one respondent suggested designing high school courses, and another suggested research comparing options and approaches, and another extension focussing on small scale shelterbelts and woodlots. Three other respondents commented that considerable information exists on extension which is not necessarily used; and
- With regard to education, some education topics were suggested (managing the environment and production systems for seedlings); one respondent suggested more courses targeted at consultants, foresters and investors; and another suggested research assessing the impacts of existing education programs.

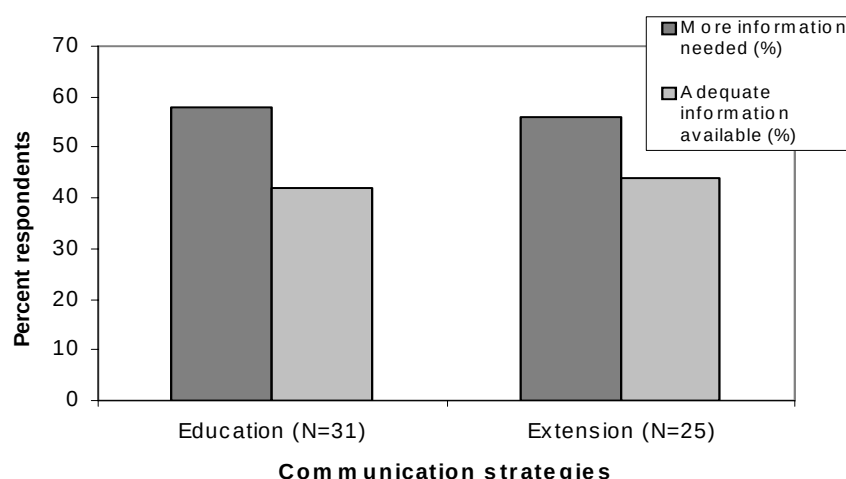


Figure 15: Information needs on communication strategies

Discussion

A key issue arising from both the search for citations to include in the database, and from the survey of agroforestry and farm forestry professionals, is the accessibility of agroforestry and farm forestry research. Some respondents commented that they could only answer questions about information needs from a position of having incomplete knowledge of existing research. This should be kept in mind when considering results of the survey.

Part of the accessibility problem stems from the way in which much research on agroforestry and farm forestry is reported. Because much of the research is applied research, it is often reported in non-refereed journals and conferences to allow its rapid adoption and operationalisation, rather than

through refereed journals. Refereed journals, however, provide the best ‘long term memory’ for research as refereed journal articles are generally included in various searchable databases, and journals are available in many locations.

Increasing the accessibility of agroforestry and farm forestry can be done in a number of ways. Below are four options identified based on the nature of research, where it is published, and suggestions from survey respondents:

- 1) Ensuring publications are included in searchable databases such as the *Farm Forestry and Agroforestry Reference Library* or topic-specific research databases such as that on silviculture research developed by Lott (2001). This may include expanding the scope of the *Library* database in the future, including not only research on agroforestry and farm forestry in Australia, but research undertaken in other countries and in other fields that is relevant to agroforestry and farm forestry in Australia;
- 2) Developing better access to publications by (a) making sure electronic copies of publications are available for download or purchase, which ensures they can be easily ordered into the future, whereas hardcopy publications tend to run out of print; and (b) ensuring they are held in publicly available collections. Researchers and research institutions, and organisers of conferences, should be encouraged to lodge publications and conference proceedings in depository or university libraries, to allow easier access to them in future years, particularly where publications are likely to be difficult to reprint. JVAP publications already follow this model but many other organisations do not;
- 3) Developing a culture in which research information is disseminated and accessible in both the short- and long-term. The ways in which results of the ANU Forestry Market Report project are disseminated provide a good example of this – results are presented in various forms, both at conferences and in journals, and are also available online so they can be accessed in the short and the long term; and
- 4) Funding reviews of current and past research in specific areas, and making the reviews easily accessible. This would provide those who need the information with a useful summary of previous topics and results of research in particular fields.

The survey had significant limitations. The number of respondents was relatively small, and representation from different regions varied considerably. Therefore the results may not reflect the opinions of some agroforestry and farm forestry professionals. It is difficult to assess the extent to which this may bias the survey results. However, a search for differences in responses from different types of respondents, and from respondents in different regions, found few differences, which may mean that there is at least some representativeness in the survey results.

Three broad types of information needs were often identified by respondents: a need for information on wood products, primarily posts, poles and sawn timber; a need for information on a wider range of tree species, and a need for more economic and market information, particularly on market potential for returns from environmental services. For all of these, a high number of respondents indicated both that they needed information in the course of their work, and that more information was needed.

A need for information on some timber and non-timber products was ranked high. A large majority of respondents specified that they needed information on sawn timber and posts and poles for their agroforestry activities, and that more information was needed on these topics. A smaller majority indicated that the same needs with regard to plywood and veneers in their work.

While few respondents needed information on biomass production in their work, many believed more information is needed on biomass. Respondents wanted information on wood quality and products, but in general were unlikely to need information on woodchip production in their work or

to believe more information is needed on woodchips. Many respondents needed information on harvesting options and techniques and processing in their work, and believed more information is needed on these topics.

A need for information on the suitability, growth, silviculture and economics of a wider range of species was identified both in the unprompted replies to Question 2 and in the comments provided on a range of specific topics. For example, many who commented on types of research needed on economics, markets and silviculture specified that information on a wider range of species is needed. Most commonly information was sought on low-rainfall and cabinet timber species.

Similarly, economic, financial and market information which was commonly needed by respondents in their work, were also specified as priority needs in the unprompted replies to Question 2. Few respondents believed adequate information on these topics was available. The types of economic, financial and market information most often stated as being needed were information on a wider number of regions and species, market specifications, and information on services for which markets currently haven't been developed – eg carbon credits, biodiversity credits. In addition, work is needed on valuing the economic impact of farm forestry on agricultural production and property values.

For other topics there was less need for new information specified. Where respondents did specify a need for new information in areas other than those listed above, they were more likely to specifically define the type of research needed within a particular topic, rather than stating that more information was needed on the topic overall.

The information needs in silviculture appear to be centred around improving yield and quality of products from a range of species, as well as improving growth and final products by other means such as competition control (thinning and spacing) and pruning. Respondents were less likely to believe more information was needed on establishment techniques, and protection of young trees from browsing and weed competition. This seems to indicate a confidence in the level of basic knowledge on establishing and managing trees and a desire to focus on improving the end product. This is consistent with the silviculture research needs identified during the National Farm Forestry Silviculture project (Lott pers. comm.).

Respondents indicated two aspects of environmental and nature conservation topics in particular required more research, both in the unprompted responses to Question 2, and as areas where information is needed: salinity control, and soil nutrient decline. Water quality and catchment issues were also often identified as areas where more information is needed.

Interestingly, while around a quarter to a third of respondents identified a need for information on woodlots, wide spaced plantings, shelterbelts, alley farming and break-of-slope plantings in their work, the majority of respondents – including some of those identifying a need for information on the topics in their work – believed enough information already exists on these types of farm-scale farm forestry design. This would seem to indicate a good level of research and/or dissemination of research results in these areas has occurred.

For many other topics around half of all respondents believed adequate information is available, while half believed more information is needed. These topics included interactions with agriculture, landscape impacts, policy and social analysis, extension and education, and measurement. Possible reasons for this (based on comments made by respondents), are that:

- In regions where much research has taken place, refinements may be needed to existing research;
- Existing research needs to be supported by further operationalisation and commercialisation through developing appropriate extension and dissemination of research, and further work on marketing and commercial aspects; and

- Research needs to be undertaken on many topics in regions where agroforestry and farm forestry is less well established.

The discussion above has focussed on survey results relating to availability of research, where lack of availability may reflect either a lack of research undertaken, or a lack of dissemination of research results. It was not possible to identify whether information needs identified by respondents correlated to the number of publications produced on different topics. Any attempt at direct comparison between identified information needs and keywords for citations included in the database, for example, would have been biased by an underlying assumption that all citations in the database were equally accessible to those who required information, and would therefore not be meaningful.

Some of the survey results could not be explained by comparing respondents' information needs and their assessment of availability of information. Respondents identified a range of different information needs, but the survey sample did not allow for development of explanations of the differences in needs – in other words, explanations for why some respondents were more likely to need particular types of information than others. It would be useful to further explore differences in information needs in future studies, examining information needs by region and other relevant factors. This could then help to focus information dissemination about agroforestry and farm forestry to those who are most likely to need particular types of information.

The results of the survey clearly indicate that further work is required to distinguish perceived research needs from information dissemination needs, by identifying research that has been done and whether results of the research have been communicated to relevant audiences.

Implications & Recommendations

The following implications and recommendations arose from the examination of directions in agroforestry and farm forestry research:

- Accessibility of existing research should be improved through ensuring publications are included in searchable, regularly updated databases such as the *Farm Forestry and Agroforestry Reference Library* or topic-specific research databases such as that on silvicultural research developed by Lott (2001);
- Accessibility of research and research 'long-term memory' should be improved through encouraging researchers and organisations to (a) make sure electronic copies of publications are available for download or purchase, which ensures they can be easily ordered into the future, and (b) ensure publications are held in publicly available collections by encouraging researchers and research institutions, and organisers of conferences, to lodge publications and conference proceedings in depository or university libraries, to allow easier access to them in future years;
- There is a need to further develop a culture in which research information is disseminated and accessible in both the short- and long-term. The ways in which results of the ANU Forestry Market Report project are disseminated provide a good example of this – results are presented in various forms, both at conferences and in journals, and are also available online so they can be accessed both in the short- and long-term; and
- Reviews of current and past research in specific areas should be undertaken which critically examine the research available, its quality, accessibility, and key results. These reviews should be made easily accessible. This will provide those who need the information with a useful critical summary of previous topics and results of research in particular fields. Areas where this is particularly needed are economic and market research; some environmental research; and some silvicultural aspects of farm forestry. A review of silviculture research relevant to farm forestry native species is part of another JVAP project, but the specific areas identified in the FFARL project still require further review (Lott pers. comm.).

- New research should focus on testing a wider range of tree species in a wider range of regions, particularly low rainfall species and cabinet species; and on improving economic, financial and market knowledge on a range of aspects of agroforestry and farm forestry. This includes the economic impact on agricultural production and land values, and potential for environmental services markets;
- In regions where much research has taken place, refinements may be needed to existing research and gaps filled. Existing research needs to be supported by further operationalisation and commercialisation through developing appropriate extension and dissemination of research, and further work on marketing and commercial aspects; and
- Basic research needs to be undertaken on many topics in regions where agroforestry and farm forestry is less well established.

References

Lott, R. 2001. *A bibliography of plantation hardwood and farm forestry silviculture research trials in Australia*. October 2001, RIRDC Publication No. 01/101. Available at <http://www.rirdc.gov.au/reports/AFT/01-101.pdf>

Stephens, N., Wood, M., Allison, B. and Howell, C. 2001. *Farmer and landholder contributions to Australia's commercial plantations*. National Forest Inventory, Bureau of Rural Sciences, Canberra.

Appendix 1: Useful databases and websites on agroforestry and farm forestry

The *Farm Forestry and Agroforestry Reference Library* database (RIRDC Publication No CD04/001) does not reference the full range of research and related information relevant to agroforestry and farm forestry practitioners, extension officers and researchers, because there are other databases and websites which provide a range of useful information. Useful websites and databases available online are listed below, with a brief description of their content and use.

Databases and online publications

There are a range of commercial (searchable for a fee) and non-commercial (freely searchable by anyone) databases which reference research relevant to agroforestry and farm forestry in Australia and overseas. There are also some websites where a number of research papers on agroforestry and farm forestry are available to download.

Agroforestry Systems

<http://www.kluweronline.com/issn/0167-4366/contents>

This is the primary international journal of agroforestry research. Subscriptions and articles are available to purchase online.

CABI Agroforestry Abstracts

<http://www.cabi-publishing.org/journals/Abstract/AFA/Index.asp>

This is an online subscription service. Agroforestry Abstracts is a database of agroforestry papers – including journals, conference papers, reports and books – published internationally. It includes citations for Australian publications, and includes abstracts. The database has 13 years of citations and adds around 1500 citations annually. The subscription rates can be found on the website – an annual subscription must be taken out to use the database, or it can be accessed in libraries that subscribe to it. It is possible to have a free trial use of the database before subscribing.

CSIRO

<http://www.csiro.au/index.asp?type=mediaIndex&stylesheet=mediaListsAndInformation>

The website above contains a list of links to the publications of different divisions of CSIRO. Of particular relevance to agroforestry are publications by the Australian Tree Seed Centre, Forestry & Forest Products, Land & Water, and Sustainable Ecosystems. Note that CSIRO journals can also be accessed online (see below) with a pay-for-view service.

<http://www.publish.csiro.au/books/>

This website has a catalogue of CSIRO publications which can be purchased online.

CSIRO Forestry and Forest Products

<http://reprints.ffp.csiro.au/>

This online database allows a search of CSIRO Forestry and Forest Products publications. The search provides citations for publications, and sometimes an abstract of the publication.

CSIRO Journals

<http://www.publish.csiro.au/journals/>

From this website you can access CSIRO journals with articles about agroforestry. The site provides subscription and pay-for-view services. Journals published by CSIRO with particular relevance to aspects of agroforestry include *Australian Plant Pathology*, *Australian Journal of Agricultural Research*, *Australian Journal of Botany*, *Australian Journal of Experimental Agriculture*, *Australian Journal of Soil Research* and *Wildlife Research*.

Elsevier Publishing

<http://www.elsevier.com>

Elsevier publish several journals and many other publications with relevance to agroforestry. Journals of particular relevance include *Agricultural Water Management*, *Forest Ecology and Management*, and *Agricultural Systems*. All Elsevier publications can be searched for from the central website and most can be ordered online. There are subscription and pay-for-view services for journals.

Infoscan databases

<http://www.infoscan.com.au/>

This is one of the best online resources for finding citations of agroforestry, farm forestry, forestry and agricultural management research in Australia. You can search several databases online, and can also browse the database by topic – agroforestry is one of the topics that can be browsed. A considerable amount of research is cited in the databases with detailed descriptions of the citations given. You can do a ‘Power Search’ that searches all the Infoscan databases, or search any of the following databases separately:

- *ABOA*: Contains citations for published information on Australian agriculture, including abstracts for many of the citations;
- *ARRIP*: Contains citations for current research projects being undertaken on Australian agriculture and natural resources, including detailed descriptions of project goals, methods and progress;
- *ARRIP Archive*: Contains citations for completed research projects on Australian agriculture and natural resources, including detailed descriptions of project goals, methods and progress;
- *Streamline*: Contains citations for published information on Australia’s natural resources, including abstracts for many of the citations;
- *Geosearch*: Allows the user to search for information related to a particular agro-ecological region or drainage division of Australia by clicking on a map interface; and
- *NamesNet*: Allows users to search for contact details of researchers by name, organisation, or State/Country. It is then possible to link to details of research projects listed in *ARRIP* and *ARRIP Archive* by that researcher.

Joint Venture Agroforestry Program

<http://www.rirdc.gov.au/programs/aft.html>

This is the homepage of the Joint Venture Agroforestry Program of the Rural Industries Research and Development Corporation. Many research reports on agroforestry and farm forestry in Australia can be downloaded free from this site; others can be ordered online.

National Library of Australia

<http://pandora.nla.gov.au>

The Pandora archive of the National Library provides online resources. A search for the terms ‘agroforestry’ and ‘farm forestry’, or related terms, will provide a range of papers filed in the archive, many of which can be accessed online. The amount of information about the papers accessible varies.

The Regional Institute

<http://www.regional.org.au>

The Regional Institute is an independent, non-profit on-line publisher of educational and research information, with over 3,000 full-text documents by authors from over 50 countries available online through the site. Searching for ‘farm forestry’ or ‘agroforestry’ on this site produces a number of online documents on various aspects of management, economic, species and policy, amongst other topics.

Silviculture bibliography

<http://www.rirdc.gov.au/reports/AFT/01-101.pdf>

This is an annotated bibliography of over 625 citations related to hardwood plantation and farm forestry silvicultural research in Australia. The full bibliography is available at the site above as a PDF file. The full reference for the bibliography is Lott, R. (2001) *A Bibliography of Plantation Hardwood and Farm*

Forestry Silviculture Research trials in Australia. A report for the RIRDC/Land & Water/FWPRDC Joint Venture Agroforestry Program. RIRDC Publication No. 01/101.

World Agroforestry Centre

<http://www.worldagroforestrycentre.org/level1a.htm>

This website provides access to a wide range of resources on agroforestry and farm forestry, including databases. The following databases can be accessed from the site:

- *The Agroforestry Database*: Provides information on the management, use and ecology of a large number of tree species that can be used in agroforestry systems
- *The Tree Seed Suppliers Directory*: Provides a list of suppliers of seed and microsymbiont for nearly 6000 tree species, including 26 Australian suppliers.
- *The Botanical Nomenclature Database*: Provides information on taxonomy of trees including synonyms and common names.

Australian Websites

The list of websites given below is not comprehensive. It contains many sites which have information on farm forestry and agroforestry in Australia. Many of the sites listed have developed very good 'links' pages which will guide users to other useful sites on agroforestry and farm forestry which may not be listed below.

The sites listed here are all either:

- Education;
- Government;
- Grower organisations; or
- Research related.

The websites of commercial plantation growers have not generally been included, although some which include online resources on agroforestry and farm forestry, or provide both commercial growing options and extension and management services have been listed.

Websites are listed in alphabetical order below. A good starting point is to go to Farm Forest Line, at www.farmforestline.com.au, which has links to a broad range of information on agroforestry and farm forestry.

Agriculture, Fisheries and Forestry

<http://www.daff.gov.au>

The Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF) website has links to a range of information on forestry and farm forestry, including policy, general information, and links to other websites. This website includes information on the work of the Bureau of Rural Science, which conducts research on agroforestry and farm forestry through various of its research programs – for example, the Bioenergy Atlas of Australia is linked into this website (http://www.brs.gov.au/bioenergy_atlas).

Information on agroforestry and farm forestry research undertaken by BRS is best found by typing search terms into the DAFF website search engine as the website overall can be difficult to navigate.

Agriculture WA

<http://www.agric.wa.gov.au>

The AgWA site contains the *Treenote* information sheet series¹⁵. These information sheets cover a range of practical management aspects of agroforestry and farm forestry, focussed on management of agroforestry and farm forestry for Western Australia. Other resources are also available on the site.

¹⁵ The term 'information sheet' refers to provision of a brief document providing a guide to or information on a particular aspect of agroforestry/farm forestry.

ANU Forestry – School of Resources, Environment and Society of the Australian National University

<http://sres.anu.edu.au> - General entry to the site including information on researchers, education and publications

http://sres.anu.edu.au/programs/forestry/distance_ed - For information on the ANU-CSU Joint Graduate Programme in Farm Forestry

<http://sres.anu.edu.au/associated/marketreport> - Contains the ANU Forest Market Report project, with access to all the reports and associated materials. The ANU Forest Market Report is also available from RIRDC as Short Report No 65 (which includes Reports 1 to 8) and Short Report No 111 (which includes Reports 9 to 16).

Australian Forest Growers

<http://www.afg.asn.au>

Australian Forest Growers (AFG) are a national advocacy and representative group for private forest growers. The website provides information on membership, subscription to the magazine *Australian Forest Grower* which contains a wide range of information on management, species, policy and other aspects of agroforestry and farm forestry. Some publications and government submissions are also available on the site.

Australian Greenhouse Office

<http://www.greenhouse.gov.au>

This site includes information and guidance for private forest growers on the potential for growing trees as greenhouse sinks and various carbon-sequestration and carbon management issues.

Australian New Crops Newsletter

<http://www.newcrops.uq.edu.au>

Newsletter on new crops including agroforestry and farm forestry.

Central Victorian Farm Plantations

<http://www.cvfp.org.au/>

The website of the Central Victorian Regional Plantation Committee.

Charles Sturt University

<http://www.csu.edu.au/faculty/sciagr/esu/study/forest.htm>

This page has information on Charles Sturt University's Graduate Certificate in farm forestry.

Cooperative Research Centre for Greenhouse Accounting

<http://www.greenhouse.crc.org.au>

Includes links to research and researchers examining greenhouse and carbon-related issues relevant to farm forestry, agroforestry and revegetation.

Cooperative Research Centre for Sustainable Production Forestry

<http://www.forestry.crc.org.au>

The CRC conducts a range of research on agroforestry and farm forestry. Information about the types of research being conducted, contact details of researchers, and publications are available on the website.

Cooperative Research Centre for Tropical Rainforest Ecology and Management

<http://www.rainforest-crc.jcu.edu.au>

Research undertaken at the CRC includes research on growing and managing rainforest species for commercial wood production.

CSIRO

<http://www.csiro.au> - CSIRO main website

<http://www.ffp.csiro.au> - CSIRO Forestry and Forest Products

<http://www.ffp.csiro.au/tigr/atscmain> - Australian Tree Seed Centre

<http://www.det.csiro.au/science/energyresources/biomass.htm> - Biofuel database

Note: There are several other relevant research programs undertaking research in agroforestry and farm forestry.

CSIRO has many research programs of relevance to agroforestry and farm forestry, and these can be navigated to from the main website, or by going directly to the homepage for different programs

Department of Sustainability and Environment (Victoria)

<http://www.dse.vic.gov.au> (Go to 'Forestry' and then 'Private Forestry')

Contains a number of useful pages giving information for private foresters in Victoria, including contact details of other organisations, information sheets (the Farm Forestry Notes series), and other publications.

Farm Forest Line

<http://www.farmforestline.com.au>

Farm Forest Line provides an entry point to a wide range of information on farm forestry and agroforestry in Australia. The website has both information, links and contact details for obtaining further information on a range of areas. Farm Forest Line has weblinks to many farm forestry organisations, making it a good central point to start looking for information on agroforestry and farm forestry in Australia. The FFARL database will be available for download from this website.

Farmwood Tasmania

<http://www.farmwood.com.au>

Farmwood represents farm forestry and private forestry grower co-operatives and similar organisations throughout Australia.

Forest Farmers Association of Queensland Inc.

<http://www.forestfarmers.com.au>

An organisation for private foresters in Queensland providing information and services for private forest growers.

Forest Products Commission

<http://www.fpc.wa.gov.au>

The Forest Products Commission (FPC) is the government enterprise responsible for managing commercial forest operations in publicly owned forests and plantations in WA. The site includes a history of plantation and sharefarming development in WA, and discusses various farm forestry and agroforestry options (without giving specific management advice).

Forest Science Centre (VIC)

<http://www.forestsciencecentre.vic.gov.au>

Provides information and links for a wide range of forestry research, including agroforestry and farm forestry topics.

Forest and Wood Products Research and Development Corporation

<http://www.fwprdc.org.au>

Contains information on research projects undertaken on various forestry topics, including research publications available online.

Forestry in Queensland

<http://www.forests.qld.gov.au>

This site includes information and management advice on agroforestry and farm forestry in Queensland and links to other useful sites in Queensland. It is a good portal for finding information on forestry in Queensland, particularly government information. Includes a downloadable directory of farm forestry in Queensland.

ForestrySA

<http://www.forestry.sa.gov.au>

The ForestrySA website includes information on farm forestry in South Australia.

Gippsland Farm Plantations

<http://www.gippslandfarmplantations.com.au>

This is the website of the Regional Plantation Committee for Gippsland and contains a range of information on agroforestry and farm forestry in the region, links to other websites, and contact details.

Greater Green Triangle Regional Plantation Committee

<http://www.gtplantations.org>

Website of the Greater Green Triangle Regional Plantation Committee of south-western Victoria and south-eastern South Australia. Includes links to online farm forestry directory for services and information.

Green Skills

<http://www.greenskills.green.net.au>

Provides information on training in Green Skills, including revegetation skills, in Western Australia.

Greening Australia

<http://www.greeningaustralia.org.au> - National website which includes links to the State and Territory websites.

Website provides a wide range of information and materials including Greening Australia activities and projects, and online guides to various aspects of revegetation and tree planting. Includes contact details for State and regional offices, and online publications.

Hardwoods Queensland

http://www.dpi.qld.gov.au/hardwoods_qld/

This site includes research results and related information from the Hardwoods Queensland project which conducts and communicates research on high value plantation hardwoods suitable for rotations of 25 years or less.

Institute of Foresters of Australia

<http://www.ifa.unimelb.edu.au>

The IFA is a member organisation for professional foresters in Australia.

Joint Venture Agroforestry Program (JVAP) of the Rural Industries Research and Development Corporation

<http://www.rirdc.gov.au/programs/aft.html>

Home page of the Joint Venture Agroforestry Program giving access to a large number of research reports on agroforestry and farm forestry in Australia. The FFARL database is available for download from this website.

Master TreeGrower Program

<http://www.mtg.unimelb.edu.au>

The Master TreeGrower program is a training and development program run throughout Australia for agroforesters and farm foresters. The website gives information on extension, education, research, training and more, including information on taking part in the Master TreeGrower program.

Natural Heritage Trust (NHT)

<http://www.nht.gov.au>

The website of the Natural Heritage Trust contains information on farm forestry projects funded under the NHT.

New Horizons – South East Primary Industries, Australia

<http://www.newhorizons.org.au/forestry>

Includes some online resources for farm forestry with downloadable documents. Expected to be expanded in the future.

Northern Rivers Regional Plantation Committee

<http://www.privateforestry.org.au>

Website of the Northern Rivers Regional Plantation Committee. This website has information on agroforestry and farm forestry in northern New South Wales, plus links to other useful websites around Australia.

NSW Agriculture

<http://www.agric.nsw.gov.au/reader/11328>

This page of the NSW Agriculture website contains information on farm forestry in NSW.

Office of Private Forestry (NSW)

<http://www.opf.nsw.gov.au>

The Office of Private Forestry provides advice and information on agroforestry and farm forestry in NSW. A range of information is provided on the website.

Oil Mallee Association of Australia Inc.

<http://www.oilmallee.com.au>

Provides information on the developing oil mallee industry including grower organisations, processing and a range of other aspects.

Private Forests Tasmania

<http://www.privateforests.tas.gov.au>

Private Forests Tasmania provides extension and management advice on farm forestry. It has produced decision support tools for farm foresters, in particular the *Farm Forestry Toolbox*. A range of information sheets are provided on the website, as well as a newsletter, links and other information.

Private Forestry North Queensland (PFNQ)

<http://www.pfnq.com.au/>

Website provides information for private forest growers in north Queensland.

Private Forestry Southern Queensland (PFSQ)

<http://www.pfsq.org>

Website provides information for private forest growers in southern Queensland.

Southern Cross University

<http://www.scu.edu.au/schools/rsm/courses/forestry>

Provides information on forestry education at Southern Cross University.

Southern Tablelands Farm Forestry Network (STFFN)

<http://www.stffn.org.au>

Website of the Regional Plantation Committee for the Southern Tablelands of New South Wales

State Forests of New South Wales

<http://www.forest.nsw.gov.au>

State Forests of New South Wales (SFNSW) is the government agency responsible for managing publicly owned forests and plantations in NSW. It also provides joint venture and lease plantation options for private landowners. The website has some information on agroforestry and farm forestry.

Subtropical Farm Forestry Association

<http://www3.turboweb.net.au/~sffa/>

The Subtropical Farm Forestry Association is an association for agroforesters and farm foresters in the subtropics providing a range of information and services.

Timber 2020

<http://www.timber2002.com.au>

The website of the Regional Plantation Committee for the Great Southern region of Western Australia, Timber 2020 (previously called Timber 2002). Has information on farm forestry and agroforestry in the region, as well as links to State and national information.

University of Melbourne

<http://www.landfood.unimelb.edu.au>

Provides information about forestry education and research, including agroforestry and farm forestry training and research, at the University of Melbourne.

University of Queensland

<http://www.uq.edu.au/>

Searching for the term 'agroforestry' on the search engine for this site results in information on agroforestry education at the University of Queensland.

Western Timber Cooperative

<http://www.wn.com.au/westim>

The Western Timber Cooperative is a private forest growers cooperative operating in Western Australia. A range of information for members is provided for forest growers on the site.

Wimmera Farm Forestry

<http://www.farmforestry.wimmera.com.au>

Website of the Wimmera Agroforestry Network. Has information on farm forestry in the Wimmera and current projects being undertaken on farm forestry in the region.

International websites

Some key international websites are given below. The list is not comprehensive, but the sites listed have links to a far wider range of international agroforestry and farm forestry sites, and so are useful start points for looking for information.

agroforestry.net and agroforester.com

<http://www.agroforestry.net/> and <http://www.agroforester.com/>

These two sites provide online information and resources for tropical agroforestry and forestry, including a range of publications, online information, and links to other sites. You can subscribe to a free email newsletter on agroforestry, *The Overstory*, and access all back issues (over 100) of the newsletter online.

Agroforestry Research Trust

<http://www.agroforestry.co.uk/>

The ART is a UK based organisation and focuses on temperate agroforestry systems. The information on the website is primarily focussed on agroforestry in the British and European context. The ART produces *Agroforestry News*, a quarterly journal (not to be confused with Australia's *Agroforestry News*, for which articles are cited in the *Farm Forestry and Agroforestry Reference Library* database), and other publications are available online.

Association for Temperate Agroforestry

<http://www.missouri.edu/~afta/>

This organisation is based in the USA and most of its resources were developed with the USA in mind. The website is not large, but does contain links to online publications. Some publications can be ordered online.

Glossary for Agroforestry

<http://www.bugwood.org/glossary/>

Useful glossary of agroforestry terms.

USDA National Agroforestry Center

<http://www.unl.edu/nac/>

This website has a range of information on agroforestry, centred on information relevant to the United States. It contains a number of useful links to other sites. A number of publications are available for download from the site.

World Agroforestry Centre

<http://www.worldagroforestrycentre.org/level1a.htm>

This website contains a large range of information on agroforestry and farm forestry, targeted primarily at agroforestry development in developing countries. The World Agroforestry Centre was previously called the International Centre for Research in Agroforestry. The site contains considerable information on a wide range of aspects of agroforestry, links to many other sites, and access to three databases (The Agroforestree Database, The Tree Seed Suppliers Directory, and The Botanical Nomenclature Database, as listed above in the guide to useful databases).

Appendix 2: Publication and projects forms

Publications/reports on agroforestry/farm forestry

Completing and sending this form

Please enter publications or unpublished reports/theses/papers you want included in the database in this form (the form begins on page 3 of this document). The form provides space for up to 20 publications/ reports (you can enter as few or as many as you like up to 20 on a single form). If you have more than 20, please download the form again and keep entering publications.

Completed forms can be sent for entry into the database by:

- Emailing the completed form as an attachment to Jacki Schirmer at jacki.schirmer@anu.edu.au. Alternatively, you can copy the completed form/s into the text of an email if sending attachments is a problem. If you have more than one form (ie over 20 publications), save each completed form under a slightly different name and then send them all as attachments.
- Sending the hard copy of the completed form to Jacki Schirmer by fax on (02) 6125 0746 or by mail c/- ANU Forestry, Bldg 48, Australian National University, ACT 0200

If you don't have time to complete this form, and already have a list of your publications available, you can submit that list of publications – but please include an abstract/ description of the publication, keywords for the publications, and let us know if you are willing to be included in the database as a person people can contact regarding that publication.

Please note that when you submit information to be included in the database you are warranting that you have the right to provide that information, and you are agreeing to the subsequent entry of the information provided into a database that will be available in the public domain. As the information to be listed in this database is generally in the public domain already, it is unlikely there will be any issues related to the provision of information. Please contact Jacki on (02) 6125 2623 if you have any questions about having the information you provide included in the database.

Instructions for completing form

For each publication, please complete the following:

Reference: Please give the full reference for each publication/report in Harvard format (examples are given below for different types of publications and reports).

Book: Author/s, date, title of book, edition, publisher, location of publisher. Series title and number (if part of a series)

Part of book: Author/s, date, title of part of book, editor of book, title of book, publisher, location of publisher, series title and number (if part of a series), pages

Edited book: Editor/s, date, title of book, publisher, location of publisher, series title and number (if part of a series)

Journal: Author/s, date, title, journal title, issue, number, pages

Conference paper: Author/s, date, title of paper, title of conference, conference location, pages

Thesis: Author/s, date, title of thesis, institution

Report: Author/s, date, title of report, title of organization producing report and of organization for which report was produced,

Other: Author/s, date, title, other details

Keywords: Provide as many keywords describing the paper as you believe are needed. A list of common keywords is provided on the project website, and can also be emailed to you on request (contact Jacki on jacki.schirmer@anu.edu.au)

Abstract/summary: If possible, provide the text of the abstract or a brief summary of the work (no more than a paragraph is needed, although the entry can be as long as you like)

Contact details for author/s: If you are willing to be contacted by people wanting to know more about this publication and your research, please include whatever contact details you wish eg phone, address, email. If you do not wish to have your contact details included in the database, don't fill in this section.

Location of publication: This field is included so people know where they can go to find publications which may only exist in one or two locations. If you are entering a report which is only available in a limited number of locations, please tell us where it is available! If you are entering a journal paper, or other widely distributed publication, you don't need to fill in this field.

Farm forestry and agroforestry publications and reports form

To enter details, type in the grey box – it will expand to let you type as much as you want

Please give us your contact details so we can contact you and ask questions relating to the information you provide us in this form:

Name:

Email:

Phone:

Fax:

Postal address:

Please enter the details of publications and reports below

Publication 1

Full reference:

Keywords:

Abstract:

Contact details for author/s:

Location of publication:

....

Project form

Please use this form to provide information on research projects on agroforestry and farm forestry. By research project, we mean any survey or trial or research intended to further knowledge on some aspect of agroforestry or farm forestry. Instructions on completing the form are given below. The actual form follows the instructions; enough space is given to enter up to five research projects. If you have more than five projects to be entered, please download another copy of the form and continue entering information.

Completed forms can be sent for entry into the database by:

- emailing them to Jacki Schirmer at jacki.schirmer@anu.edu.au To do this, save the form when you complete it, and attach it to an email sent to Jacki. If you have more than one form (ie over five projects), save each completed form under a slightly different name and then send them all as attachments. Alternatively, you can copy the completed form/s into the text of an email if sending attachments is a problem
- sending the hard copy of the completed form to Jacki Schirmer by fax on (02) 6125 0746 or by mail c/- ANU Forest, Building 48, Australian National University, ACT 0200

Please note that when you submit information to be included in the database you are warranting that you have the right to provide that information, and you are agreeing to the subsequent entry of the information provided into a database that will be available in the public domain. As the information to be listed in this database is generally in the public domain already, it is unlikely there will be any issues related to provision of information. Please contact Jacki on (02) 6125 2623 if you have any questions about having the information you provide included in the database.

How to complete the form

We ask you to fill in the following details for each project you want included in the database:

Project name: The title of the project

Project description: Please give a description of the aims and methodology of the project; you may include as much information as you wish

Keywords relating to the research: List as many relevant keywords as necessary, for examples of keywords go to <http://sres.anu.edu.au/associated/reslib/index.html>

Primary researcher/s: Give names of primary researchers involved in the project

Organisation/s supporting the project: List the organizations funding and undertaking the project

Contact person for more information on this project: Please provide the details of a suitable contact person or persons for the project.

Farm forestry and agroforestry research projects form

To enter details, type in the grey box – it will expand to let you type as much as you want

Please give us your contact details so we can contact you and ask questions relating to the information you provide us in this form:

Name:

Email:

Phone:

Fax:

Postal address:

Please enter the details of research projects below

Project 1

Project name:

Start year of project:

Finish year of project:

Project description:

Keywords relating to the research:

Primary researcher/s:

Organisation/s supporting the project:

Contact person for more information on this project:

Name:

Postal address:

Phone:

Fax:

Email:

...

Appendix 3: Research Directions Survey

The Farm Forestry and Agroforestry Reference Library

Survey on directions in farm forestry and agroforestry research in Australia

The following survey asks about the types of information most needed in Australian agroforestry and farm forestry. The results of the survey will be compared to the types of research being undertaken to get an idea of gaps in current research, and needs for future research.

It is a short survey; the time it will take to complete will depend on the level of detail you provide in some of your answers. We would appreciate you completing the survey, and returning it by email (to jacki.schirmer@anu.edu.au) or by post (to Jacki Schirmer, ANU Forestry, Building 48, Australian National University, ACT 0200) by **April 10th 2003**.

(1) (A) BACKGROUND INFORMATION

Name (optional):

Organisation (optional):

Location: (Please list the state and region in which you are involved in agroforestry/farm forestry; if your work is not primarily in a single region put 'Australia' or some other suitable description of the region in which you work):

(1) (b) In what way/s are you involved in agroforestry/farm forestry?

(click in the check-box to place a cross next to as many as apply to you)

- ☐ Agroforestry/farm forestry practitioner
- ☐ Extension work, encouraging the adoption of agroforestry/farm forestry
- ☐ Representing the interests of agroforestry/farm forestry practitioners
- ☐ Marketing agroforestry/farm forestry products
- ☐ Research into agroforestry/farm forestry in the following areas:
- ☐ Other (please describe):

(2)(a) Do you believe there are particular areas where more research and information is needed to be able to develop effective forms of farm forestry?

- ☐ Yes
- ☐ No

(2) (b) If yes, what types of research and information are currently lacking? Include as much detail as you like – for example, detail why and for what types of farm forestry particular research is needed

3. Please see next page

(3) In the table below, please place a cross in the appropriate column beside the topics listed.

Please note: the categories listed below are not comprehensive, and many topics could be placed in more than one category. Each topic has only been listed once to save space. Please tell us of topics that have not been included which should be.

	For each topic, please place a cross in the box under the statement/s that apply			
Topic	I need information on this in my work	More information on this topic is needed	Adequate information on this topic is already available	Detail any specific aspects of this topic on which more research is needed (For example, for 'Plywood and veneers' you might specify a particular species for which research on plywood and veneers is needed)
Timber products				
Sawn timber products	☐	☐	☐	
Plywood and veneers	☐	☐	☐	
Woodchips	☐	☐	☐	
Posts and poles	☐	☐	☐	
Fuelwood	☐	☐	☐	
Extractives	☐	☐	☐	
Biomass for energy	☐	☐	☐	
Other	☐	☐	☐	
Non-timber products				
Bush foods	☐	☐	☐	
Industrial products	☐	☐	☐	
Eucalyptus oil	☐	☐	☐	
Tree seed & propagation material	☐	☐	☐	
Nut trees	☐	☐	☐	
Christmas trees	☐	☐	☐	
Other	☐	☐	☐	
Environmental services				
Carbon credits	☐	☐	☐	
Salinity credits	☐	☐	☐	
Biodiversity credits	☐	☐	☐	
Other	☐	☐	☐	
Social services				
Tourism	☐	☐	☐	
Recreation	☐	☐	☐	

	For each topic, please place a cross in the box under the statement/s that apply			
Topic	I need information on this in my work	More information on this topic is needed	Adequate information on this topic is already available	Detail any specific aspects of this topic on which more research is needed (For example, for 'Plywood and veneers' you might specify a particular species for which research on plywood and veneers is needed)
Education	☐	☐	☐	
Other	☐	☐	☐	
Interactions with agricultural production				
Agricultural agistment	☐	☐	☐	
Crop shade and shelter	☐	☐	☐	
Stock shade and shelter	☐	☐	☐	
Fodder	☐	☐	☐	
Other	☐	☐	☐	
Financial arrangements				
Joint ventures	☐	☐	☐	
Leases/annuities	☐	☐	☐	
Other	☐	☐	☐	
Policy and social analysis				
Policy analysis/review	☐	☐	☐	
Studies on adoption of farm forestry	☐	☐	☐	
Other	☐	☐	☐	
Landscape design and scenic quality				
Landscape design	☐	☐	☐	
Aesthetic/scenic values and valuation	☐	☐	☐	
Other	☐	☐	☐	
Landcare and rehabilitation				
Soil erosion by wind and water (wind, sheet and rill, tunnel, gully and streambank erosion, landslips)	☐	☐	☐	
Waterlogging & salinity	☐	☐	☐	
Soil compaction	☐	☐	☐	

	For each topic, please place a cross in the box under the statement/s that apply			
Topic	I need information on this in my work	More information on this topic is needed	Adequate information on this topic is already available	Detail any specific aspects of this topic on which more research is needed (For example, for 'Plywood and veneers' you might specify a particular species for which research on plywood and veneers is needed)
Soil nutrient decline	☐	☐	☐	
Water quality	☐	☐	☐	
Catchment impacts	☐	☐	☐	
Planting to reduce impact of pests	☐	☐	☐	
Planting to reduce spread of weeds	☐	☐	☐	
Other	☐	☐	☐	
Nature conservation and biodiversity				
Designing revegetation projects for wildlife	☐	☐	☐	
Planting indigenous species	☐	☐	☐	
Planting multiple species	☐	☐	☐	
Wildlife on farms	☐	☐	☐	
Other	☐	☐	☐	
Marketing forest products and services				
Market specifications	☐	☐	☐	
Log prices, stumpage and royalties	☐	☐	☐	
Market reports	☐	☐	☐	
Marketing strategies	☐	☐	☐	
Grower cooperatives	☐	☐	☐	
Economics of farm forestry	☐	☐	☐	
Other	☐	☐	☐	
Designing farm forestry				
Woodlots	☐	☐	☐	
Shelterbelts	☐	☐	☐	
Wide spaced	☐	☐	☐	
Alley farming	☐	☐	☐	
Break of slope plantings	☐	☐	☐	

	For each topic, please place a cross in the box under the statement/s that apply			
Topic	I need information on this in my work	More information on this topic is needed	Adequate information on this topic is already available	Detail any specific aspects of this topic on which more research is needed (For example, for 'Plywood and veneers' you might specify a particular species for which research on plywood and veneers is needed)
Planting for salinity control	☐	☐	☐	
Farm and property management planning	☐	☐	☐	
Other	☐	☐	☐	
Silviculture				
Genetics and breeding	☐	☐	☐	
Weed control – before planting	☐	☐	☐	
Weed control – post-planting	☐	☐	☐	
Soil cultivation & ground preparation techniques	☐	☐	☐	
Fertilisation	☐	☐	☐	
Protection of young trees eg fencing, tree guards	☐	☐	☐	
Watering and irrigation	☐	☐	☐	
Competition control - thinning	☐	☐	☐	
Competition control – spacing	☐	☐	☐	
Tree growth and wood production	☐	☐	☐	
Pruning	☐	☐	☐	
Insect pest management	☐	☐	☐	
Fungal disease management	☐	☐	☐	
Fire protection	☐	☐	☐	
Harvesting options and techniques	☐	☐	☐	
Processing (please specify product/s eg sawlog)	☐	☐	☐	
Grading of product (please specify product/s)	☐	☐	☐	
Transportation	☐	☐	☐	

	For each topic, please place a cross in the box under the statement/s that apply			
Topic	I need information on this in my work	More information on this topic is needed	Adequate information on this topic is already available	Detail any specific aspects of this topic on which more research is needed (For example, for 'Plywood and veneers' you might specify a particular species for which research on plywood and veneers is needed)
Native forest silviculture	☐	☐	☐	
Species selection, trials	☐	☐	☐	
Other	☐	☐	☐	
Tree and forest measurement				
Measurement techniques	☐	☐	☐	
Other	☐	☐	☐	
Education, extension and communication				
Extension strategies	☐	☐	☐	
Education strategies, available courses	☐	☐	☐	
Other/s	☐	☐	☐	