Australian Government

Rural Industries Research and
Development Corporation

Should I Convert to Organic Farming?

Information to support your decision

A report for the Rural Industries Research and Development Corporation

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August 2005

RIRDC Publication No 05/084
RIRDC Project No DAV-180A

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ISBN 1 74151 147 X
ISSN 1440-6845

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Published in August 2005

Foreword

This project aims to provide information on organic production to broadacre grain farmers that will assist them with the organic conversion process. Consumer demand for organic produce is increasing rapidly, yet the rate of farm conversion to organic agricultural systems is still relatively slow. In economic terms, this means that opportunities for increasing organic exports are being missed. Two important reasons for the slow rate of conversion are the inadequate provision of information to farmers on organic production, and the relative isolation (geographic, information support) of farmers who wish to convert their farms. This project addresses both these issues through the provision of timely information, and the opportunity for farmers to attend an annual workshop.

This final report covers the results obtained from an economic survey of the latest trends in organic versus conventional grain production, organic certification and production information collected for the information package, and farmer evaluation data from the workshops and farmer meetings.

This project is part of Program 2, Conversion Processes, in the Organic Produce R&D Program that aims to facilitate the adoption of organic systems.

This project was funded from RIRDC Core Funds which are provided by the Federal Government.

This report, a new addition to RIRDC's diverse range of over 1200 research publications, forms part of our Organic Produce R&D program, which aims to optimise the profitability of Australian organic production in both domestic and overseas markets, and promote the adoption of organic farming systems that enhance the sustainability of Australian soils and other natural resources.

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

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

Peter O'Brien
Managing Director
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Acknowledgements

We acknowledge the contributions made to this project by the organic and conventional producers who were interviewed for the economic survey, the producers that attended the workshops and meetings, organic industry representatives who contributed to the information package and the workshops, and the efforts of DPI Victoria and DPI NSW staff.

Abbreviations

RIRDC	Rural Industries Research and Development Corporation
GRDC	Grains Research and Development Corporation
ROFO	Riverina Organic Farmers Organisation

Contents

Executive Summary

World demand for organic produce is increasing rapidly, yet in Australia the rate of farm conversion to organic agricultural systems is relatively slow. Two key reasons for the slow rate of conversion are inadequate provision of information to farmers on organic production, and the relative isolation in terms of geographic and information support felt by farmers who want to convert their farms. This project addresses both these issues with the provision of timely information, and the opportunity for farmers to attend and participate in an annual workshop.

The aims of this project were to use information gathered in a previous project (DAV 142A) as well as some additional economic analyses, to prepare an information package for farmers, and to conduct workshops to further extend conversion information. The project was designed to provide decision support for farmers wanting to convert their farms to organic production.

The project conducted an economic survey of a sample of five conventional and five certified organic farmers to determine a recent estimate of relative profitability during the years 1998/99 and 1999/00. An information package consisting of both production and certification information was produced, and two workshops were held to deliver organic conversion information. In addition, the information package was promoted at a number of conventional farmer events in Victoria and southern NSW.

Results of the economic survey showed that organic farmers who have recently converted had lower financial returns than farmers who had been certified as organic for a longer period of time. Relative yields per hectare were estimated to be lower on organic farms, but premium prices for organic wheat were higher than in previous surveys. This may reflect improved marketing as well as increased demand for organic products. Returns from organic and conventional systems were estimated to be similar in the first year of the survey, however, returns for organic farmers in the second year of the survey did not compare favourably to conventional production in terms of returns to capital and management. *It was clear that crop premiums for organic produce played an important role in financial returns on organic farms.*

Results from the workshop evaluations showed that half the conventional farmers that attended the workshops expressed a willingness to adopt organic practices on their farm. The majority of farmers indicated that they would continue to seek information about organic farming, with approximately one third indicating that they would join an organic farming group. Significantly, a smaller percentage were willing to take the additional step of commencing an organic conversion paddock. *Results from the conventional farmer meetings showed that more research is needed to validate organic systems in specific areas, and to provide successive years of relative financial performance.*

This project has shown that conversion to organic production is still a developing industry in Australia and can entail risks for the farmer. Information provision via workshops proved a successful method because it generally enthused farmers to have a go at something new on their farms, to hear from others who are involved in the industry, and to learn some new skills. Workshops also provided the opportunity for social interaction and net-working.

However, workshops are only ever as successful as the information delivered to the participants and the process of learning adopted. This project relied on information developed from previous projects, and current field-validated research, to provide farmers with a realistic assessment of organic farming within the south-east Australian context. It is recommended from this project that:

- Future investment targets the first phase of organic conversion to enhance farmer skills,
- Economic, financial, production and sustainability information is required over successive years to provide a realistic picture of organic farm performance,
- Continued investment is required for field validation of organic systems in the Australian environment,
- Specific information sessions for practising organic farmers would complement current efforts to increase organic conversion.

Chapter One

Introduction

The demand for organic produce on export markets is increasing rapidly, yet the rate of conversion to organic agricultural systems on farms is relatively slow. This means that opportunities for continuity of supply of organic exports to large customers are being squandered. Reasons for the slow rate of conversion include the inadequate provision of information to farmers on organic production, and the relative geographic isolation of farmers who want to convert their farms. This project addresses both these issues with the provision of timely information, and the opportunity for farmers to attend an annual workshop.

This project used information gathered in a previous project (DAV 142A) and additional economic analyses to prepare an information package for farmers, and to conduct workshops to further extend conversion information. Through a shared learning environment, such as a workshop forum, farmers built confidence to take steps towards changing management of their land to organic standards that are efficient and environmentally sustainable.

The project directly benefits broadacre farmers who want to convert their farms to organic production. It is estimated that NSW and Victoria have about 55 organic grain farmers. If the number of certified organic grain farmers increased by 10% as a result of this project, then an extra 1,390 tonnes of organic wheat could be produced with a value of $250,200. The benefits to the sustainability of farming systems in this region are significant if the rate of organic conversion increases. Conversion to an organic farming system status with its focus on soil improvement may help alleviate general soil acidification problems that are widespread in the region. In addition, the effects of herbicide resistance can be reduced by adoption of organic practices that pay close attention to grazing management and the reduction of the weed seed bank.

The project consisted of an economic survey of five conventional and five certified organic farmers to determine relative profitability during the years 1998/99 and 1999/00; an information package consisting of production and certification information was produced; and two workshops held to deliver organic conversion information. The information package was also promoted at a number of conventional farmer events throughout Victoria and southern NSW.

Chapter Two

Objectives

The objectives of this project were:

- To deliver one annual workshop and three farmer meetings to provide broadacre farmers with information to convert to organic production,
- To produce an information package that includes production, economic and certification information, which is delivered at the workshops.

Methodology

The project was comprised of four phases. A sample of both organic and conventional farmers were interviewed to obtain economic data on farm performance over two financial years (1998-1999 and 1999-2000). The information collected from this survey was combined with production and certification information in one package. The package was delivered in an interactive workshop forum once per year, and at conventional farmer meetings throughout the year. An evaluation of the workshops was conducted by asking farmers to complete a brief questionnaire following their participation. Results from the evaluation were analysed and presented according to Bennett's Hierarchy to assess changes in knowledge and practices on the farm.

Chapter three of this final report comprises six separate sections. Sections one through to four comprise the information package delivered to farmers (Section 1: Economic survey; Section 2: Production; Section 3: Agronomy; Section 4: Conversion and certification). Section five reports on the annual workshops and farmer meetings, and section six reports on the workshop evaluation process using Bennett's hierarchy.

Chapter Three

Detailed Results

(Sections One to Four comprised the written component of the Information Package provided to farmers).

1. Economic Survey

(Reproduced with permission from the author Dr Els Wynen)

1.1 Introduction

In 2000, RIRDC and Primary Industries Research Victoria (PIRVic) funded a survey of five organic cereal-livestock farms. The aim of the survey was to assess the economics of organic broadacre farming in recent times. Any conventional farmer interested in changing to organic management would be interested in knowing the likely profitability. In the mid-1980s, a similar study was carried out in Eastern Australia that found that organic farmers were doing as well as their conventionally farming counterparts (Wynen, 1990). But changes in relative yields, input and output prices, rotations and marketing conditions could well have changed the relative economic position of organic farmers, and therewith the interest of conventional farmers to contemplating conversion. The purpose of this study was to provide up-to-date data. However, a study of five farms can't provide all the answers. What it can do is give an indication of how some organic farmers are progressing. Any definitive study, however, would need to include more farms.

What aspects of farming were covered in this study? The survey included a wide range of physical and financial data to ascertain the long-term sustainability of the farms. Questions on all inputs used on the farm, both variable (such as seed, fertilisers, pesticides, fuel, hired labour) and fixed (family labour, land and capital improvements such as fences and buildings) were included. Yields per hectare together with rotations showed the total production on the farm. Prices received for the products provided the figures for the returns to farming. The analysis took into account imputed costs, such as the costs of family labour and depreciation of capital. No statistical inferences were drawn as the sample was too small for this to be meaningful.

1.2 Choosing the farms

For the study carried out in the mid-1980s, a total of eight fully organic cereal-livestock farmers were located in south-eastern Australia. A further five farmers deemed to be close to organic certification were also included in the survey (Wynen, 1990). With expansions in area farmed under organic management in the last decade (Hassall and Associates, 1990, and Hassall and Associates, 1995), it was expected that it would be easy to find five organic farmers in the dryland cereal-growing area of Victoria and Southern New South Wales.

For the 2001 survey, farms were selected from a list provided by the National Association for Sustainable Agriculture, Australia (NASAA) and the Biological Farmers of Australia (BFA). One of the requirements was that the farmers were to be dry-land farmers, with a main emphasis on crop rather than on livestock. The organic farms had to have been farmed organically for at least three years. The NASAA list provides names of farmers who were willing to be included in marketing and research purposes. The BFA has a member's list. This organisation tends to be more active in Queensland and northern New South Wales than towards the south, and therefore had less farmers on the list located in the area relevant to this study.

Most of the growth in numbers on the NASAA's lists, however, seemed to stem from farmers who are producing on floodplains or lakebeds. These producers tend to use organic management systems when cropping anyway, and may register as organic farmers when there are opportunities in the organic market. As the aim of this study was to provide information for farmers who are not organic, the floodplain farms were excluded from the survey.

Farmers identified as potentially suitable were sent a fax with details about the intent of the survey. A follow-up telephone call was then made to establish suitability of the farm, and to see if the farmer would agree to participate. The survey cannot be seen as a random sample, but more as case studies. However, as most of the included farmers were willing to provide data only on the condition that their particular farm could not be identified, figures in this report only show averages, and every effort has been made to maintain confidentiality. In a survey with few participants, such as this, presenting averages can be a problem if one or two farmers have results greatly different from the other farmers. By influencing the average significantly, the picture presented may be different than the underlying details would suggest. For this reason the variations between farmers is discussed when relevant.

To remove the effects on yields of soil types and climate, organic farms were compared with conventional farms in their immediate neighbourhood. These farms were chosen on the basis of similarity to the organic farm in physical characteristics (such as soil type, climate and inclusion of enterprises) and management skill. Names of potential inclusions were obtained from officers of the local Departments of Agriculture and from the organic farmer, after which the conventional farmers were contacted. Usually there was limited choice and all characteristics could not usually be matched.

1.2.1 Farmer characteristics

The farm results reflect not only the physical farm characteristics (such as size of farm, soil type and rainfall) and financial constraints (such as input costs and product prices) but also the management skill of the farmers. Some management skills are learned over time, through years of farming, whilst another part of being able to manage a farm is attributable to natural ability. When trying to determine whether there is a difference between two farm management systems it is important to differentiate between results due to physical farm characteristics and to the natural management skill of farmers in the survey. Although it is very difficult, if not impossible, to estimate the skills accurately, some insight can be gained through knowledge of the years of experience in farming, and in organic farming, and about the farmers' opinion related to their own management skills and those of their neighbour.

Regarding the first point, years of experience in farming, three of the participating pairs of farmers were of the same generation. One of those pairs had started to farm in the second half of the 1940s, and two pairs in the early to mid-1970s. In two pairs there was a generation difference between the two neighbours, in one case the organic farmer being older, and in the other case being younger than the conventional farmer. On average, the organic farmers had farmed for 23 years, and the conventional farmers for 22 years. It therefore may be concluded that, if there is a difference in management system, it is not likely to be due to a difference in experience in farming in general.

The experience in farming organically was rather diverse between the five organic farmers. One had moved towards organic agriculture as early as the 1960s, with the last one converting in 1995, only just qualifying for inclusion in the survey. Two converted in the mid-1980s, and two in the late 1980s - early 1990s. The average years farmed organically was 14, with the average pulled up substantially by the one long-standing organic farmer. Three had farmed organically less than ten years, including one who had organically farmed for only three years at the time of the survey.

With regard to the second point, natural ability to manage, each farmer was asked to rate him/herself on a scale of 1 to 9 (9 being the best), and then to rate his/her neighbour. A summary of the farmers' opinion is shown in Table 1. In only three pairs were both farmers willing to express an opinion. In one case, both agreed that the conventional farmer was better. In both other cases the organic farmers thought that the farm management skills of both farmers were similar. In one of those cases the conventional farmer thought that he was better than the organic neighbour, and in the other case it was the other way round. In the two pairs where only one of the pair expressed an opinion, one considered the conventional farmer to be far better, and the other considered the two to have similar management skills. The organic farmers gave the conventional farmers an average of 7.1 and themselves 6.6 (see Table 1). The conventional farmers' estimates were 6.7 and 5.6, respectively. In other words, it is likely that the management skills of the conventional farmers was similar to those of the organic farmers. If anything, and especially in one case and possibly two cases, it was likely to be better. In fact, both groups of farmers thought that the conventional farmers were, on average, better managers, though the organic farmers thought this to a less degree than the conventional farmers. That is, it can be assumed that differences in financial farm results between the two groups of farmers is not due to the organic farmers being better managers. The reverse, where differences in results are partly due to the included conventional farmers being better managers, is more likely to be the case.

Table 1. Comparison of farm management skills on a scale of 1 to 9 (9 being best).

Surveyed farmers	Farmer rating of organic	Farmer rating of conventional	Org./Conv.
Organic	6.6	7.1	93
Conventional	5.6	6.7	84

1.2.2 Physical farm characteristics

The physical farm characteristics of the organic farms compared to the conventional farms were very similar to those in the 1985-86 survey. Results of the previous survey are included here to give some indication of the likelihood of some characteristics of organic farming occurring (Table 2). It should be stressed, however, that the figures of the two surveys are not directly comparable, as there are several differences between them, such as in time and space. The previous survey was conducted in the mid 1980s, and included farms from Queensland to South Australia. This time the survey concentrated on Victoria (Mallee-Wimmera and Central) and southern New South Wales. The farms in the present study had an average rainfall of 425 - 450 mm, with the exception of one pair, which was located in a 650 mm average rainfall area. The average for the lower rainfall group in 1998-99 was 445 mm, ranging from 285 mm to 505 mm. In 1999-00, rainfall was somewhat higher with an average of 530 mm, varying between 454 mm and 650 mm. In the higher rainfall area the rainfall in the two years was somewhat lower than average, around 575 mm in both years. The variation in climate in the previous study was greater.

1.2.3 Area operated and cropped

On average, the organic farms were 20 per cent smaller than the conventional farms (Table 2). As in the earlier survey, this figure was dominated by the small size of one of the organic farms, being not much larger than a quarter of the area operated by the neighbour. If this farm is removed from the calculations, the other four organic farms are only 11 per cent smaller, on average, than the conventional farms. One organic farm is larger than the conventionally managed neighbouring farm.

Table 2. Some physical characteristics of organic and conventional farms.

		Organic	Conventional	Organic+ Number*	Org/Conv %	Org/Conv %
		1998-1999				1985-86
Area operated	ha	962	1208	1	80	81
Improved capital value	$/ha	866	875	1	99	97
Arable area / operated area	%	81	82	3	99	90
Cropped area / arable area	%	32	52	1	62	61
		1999-2000				
Cropped area / arable area	%	33	52	1	64	

* Number of individual organic farms with greater values than their counterparts.

The quality of farm, as shown in 'improved capital value' per hectare operated (and expressing the quality of the land and capital improvements such as buildings and fences) was similar on both farm types. This was influenced by the percentage of the farm being arable, which was estimated by the farmers as similar in the two farm types.

There is a dramatic difference, though, in area cropped as a percentage of arable area in both years, the extent of which is masked by the fact that in one pair the organic farmer cropped over half of the arable area, while the conventional neighbour cropped just under one third of the land. All other organic farmers cropped between 22 and 35 per cent of their arable land, whilst their neighbours cropped between 50 and 62 per cent, approximately double the percentage cropped on organic farms. This reflects the differing rotational requirements of organic management.

1.3 Inputs

Some inputs to the farming operations are shown in Tables 3 and 4. Inputs used mainly on crops and measured on a cost per hectare cropped basis are shown in Table 3. Some inputs are more relevant than others. For example, fertilisers and pesticides (including all biocides, such as herbicides, fungicides, insecticides, etc.), and also fuel and machinery and equipment, are mainly used on crops. Table 4 shows all inputs on a per hectare operated basis including those inputs that are more difficult to allocate to only cropping such as labour.

As can be expected, the use of pesticides is low on organic farms, and those which are used are either compounds approved within organic standards (such as CO_2 in grain storage silos), or for which the farmer has withdrawn certification (such as a drench of sheep in case of emergency, for which that part of the flock is prohibited to be sold as organic for a specified time).

The use of nutrients per hectare cropped is more interesting. Expenditure on this input on these organic farms is between half and three quarters of that of their neighbours'. This figure is heavily influenced by extensive use of lime (strictly speaking not a nutrient, but used for the enhancement of nutrient availability) on one organic farm, also on part of the non-cropped area. Excluding that pair of farmers' results in the organic farmers' spending, on average, far less than half the amount per hectare cropped from what their conventionally farming neighbours spend (41 per cent in 1998-99, and 35 per cent in the next year). The figure in the earlier survey of 33 per cent also shows that organic farmers, though spending less on this input than conventional farmers, do buy plant nutrients or substances that enhance soil fertility.

Table 3. Some financial characteristics of organic and conventional farms ($/ha cropped).

		Organic	Conventional	Organic+ Number*	Org/Conv %	Org/Conv %
Variable costs		**1998-1999**				**1985-86**
Fertilisers	$/ha	49	69	1	72	33
Pesticides	$/ha	1	33	0	3	6
Fuel	$/ha	58	35	5	165	107
Fixed costs						
Depreciation machinery	$/ha	**108**	**108**	**2**	**100**	88
		1999-2000				
Variable costs						
Fertilisers	$/ha	44	84	1	52	
Pesticides	$/ha	1	43	0	2	
Fuel	$/ha	56	36	4	157	
Fixed costs						
Depreciation machinery	$/ha	102	111	2	91	

* Number of individual organic farms with greater values than their counterparts.

The use of fuel on organic farms relative to that on conventional farms is changing with organic farmers now using around 60 per cent more than on conventional farms. In the earlier survey the amount spent by organic farmers was similar to that on conventional farms. In this survey, every organic farmer in 1998-99 and four in 1999-00 spent more on fuel than their neighbour. This may reflect more a change in conventional practices since the mid 1980s where, for example, more intensive use of herbicides substituting for tilling, has increased in popularity over the years.

The depreciation of machinery and equipment per area cropped is similar on organic and conventional farms, and, percentage wise, only slightly higher than in the earlier survey where depreciation on organic farms was 88 per cent of that on conventional farms. In absolute terms, two organic farmers showed higher depreciation costs on machinery and equipment per hectare cropped than the neighbour. One of the conventional neighbours, however, was about to retire and used contractors to carry out many of the cropping operations, thereby minimising his machinery requirements.

When looking at the inputs per hectare operated (Table 4), the use of inputs on organic farms drops relative to the use on conventional farms. This is due to the fact that organic farmers crop less than conventional farmers.

Table 4. Some financial characteristics of organic and conventional farms ($/ha operated).

		Organic	Conventional	Organic+ Number*	Org/Conv %	Org/Conv %
Variable costs				**1998-1999**		**1985-86**
Fertilisers	$/ha	17	29	1	57	16
Pesticides	$/ha	0	17	0	2	3
Fuel	$/ha	14	15	2	94	54
Hired labour	$/ha	17	23	2	75	191
Fixed costs						
Family labour	$/ha	43	35	2	126	72
Depreciation machinery	$/ha	26	45	1	57	42
				1999-2000		
Variable costs						
Fertilisers	$/ha	14	34	1	40	
Pesticides	$/ha	0	17	0	1	
Fuel	$/ha	14	14	3	99	
Hired labour	$/ha	19	22	2	88	
Fixed costs						
Family labour	$/ha	43	35	3	126	
Depreciation machinery	$/ha	26	45	1	57	

* Number of individual organic farms with greater values than their counterparts.

The organic farmers spent around half of the costs on nutrients (around $15 as opposed to $30 per hectare) and, on average, a bit over three quarters of the cost on hired labour (around $18 and $22, respectively) of the amount conventional farmers spent. They used less fuel (between 94 and 99 per cent of conventional), incurred just over half of the depreciation costs on machinery ($26 to $45 per hectare), and had half as many costs again on family labour ($43 to $35 per hectare). The total use of labour between the two systems was very similar in this sample (around $62 and $56 per hectare), as it was in the previous survey ($43 and $35 per hectare). It is tempting to conclude that organic farmers have not moved to contract labour to the extent that conventional farmers have. They now have a much higher use of family labour per hectare. This was not the case in the previous survey. However, the sample size is so small that this displayed tendency may be due to the family situation of these particular farms. Not too many conclusions should therefore be drawn.

In summary, the farmers included in this survey relative to those in the earlier survey, were closer in spending patterns per hectare cropped to their conventional neighbours for nutrients and machinery and equipment. Their fuel bill was relatively high. When looking at expenditure per hectare operated, this picture continued. Expenditure on total labour was similar on both farming types, both in the past and recent surveys.

1.4 Outputs

1.4.1 Output per hectare

Figures for output per hectare were collected for all crops, together with the marketing details. All farmers cropped wheat for which the yields, and output price, are shown in Table 5.

Table 5. Wheat yields and prices on organic and conventional farms.

		Organic	**Conventional**	**Organic+ Number***	**Org/Conv %**	**Org/Conv %**
		1998-1999				**1985-86**
Wheat yield	T/ha	2.1	3.3	1	64	96
Wheat prices	$/tonne	200	125	5	160	130
		1999-2000				
Wheat yield	T/ha	1.6	3.2	0	50	
Wheat prices	$/tonne	191	121	4	159	

* Number of individual organic farms with greater values than their counterparts.

The average yield figures are lower for organic than for the conventional farms (two thirds in the first year of the survey, half in the second year), as opposed to in the earlier study where yield figures were similar between the two systems (96% of conventional). On only one organic farm was the yield higher than on the conventional farm in one of the years, with a considerably lower yield in the next year. Of the four other cases, those farms which had been under organic management longest reached 84 per cent of the yields of their conventional neighbours in 1998-99, and 62 per cent in 1999-00.

Although no specific questions were asked about problems on organic farms, it became clear that ryegrass is a major problem in the cropping phase. One farmer felt that he was getting on top of the problem by selecting a wheat variety which grows well in the early stages (in his particular case Wylah or Cunningham were the preferred options), and by planting early. Both measures are designed to smother weeds in the early growing stage.

Although all farms had stock (mainly sheep, with some also having beef cattle), it was difficult to compare yields. The reason was that some farmers received most of their income from wool (with different classes of wool which yield differently and fetch different prices on the market) and others from prime lambs. These should be seen as different enterprises where, for example, number of animals per hectare or wool clip per animal are really not comparable. No attempt has therefore been made to compare yields of those enterprises in this study.

Wheat prices showed that the organic farmers received, on average, 60 per cent premium. In the 1980s study, this was considerably lower at 30 per cent. This was influenced by the fact that, at that time, not all organic farmers sold their wheat in the organic market. Three of the eight didn't receive any premium for their wheat, while only two of the eight sold all their wheat in the organic market. All of the five farmers in the present study received a premium for at least part of their crop in 1998-99, although one failed to attract a premium in the following year. For each farmer individually, the lowest price increase over and above the average price the conventional neighbour received for wheat in 1998-99 was 33 per cent, and the highest 115 per cent. For one other organic farmer the premium was in the mid 30s, while for the two others it was around 60 per cent. Most organic farmers delivered to several outlets. Though no specific data were collected on the marketing activities of the farmers, it seemed that organic farmers were spending more time and effort on finding marketing outlets where premiums were paid. Some organic farmers had received premiums for stock but these, and premiums for wool, are much less prevalent than for crops.

1.4.2 Output per farm

A longer rotation period, in which there is less emphasis on cropping, was mentioned earlier as one of the characteristics of organic farming. This characteristic was evident in the earlier and the present study. It implies that on organic farms a lower portion of the total income was derived from cropping. Despite higher prices for at least some of the products, four of the five organic farmers received less income from their cropping enterprises relative to the total farm returns than conventional farmers. The exception was the organic farmer with a small acreage and relatively high cropping percentage. The average for all five organic farmers in both years was just over half of their returns from cropping and stock were due to the cropping enterprises (including hay making), and for the conventional farmers the average was three quarters.

Even though less area is cropped on organic farms, the number of crops per farm was, on average, higher in 1998-99 (4.2 crops) than on conventional farms (2.8 crops). In 1999-2000 this difference was less distinctive, with averages of 3.6 and 3.0 for the organic and conventional farms respectively. Rye was grown on several organic farms, as well as safflower, flax and mustard.

1.5 Financial returns

The financial data are presented in Table 6 in two parts. The first part is the cash costs and returns, important for the cash flow. These cash figures are, of course, of great importance on a farm, but in the long run it is the returns net of all costs, including family labour and depreciation, which is the most important figure. This figure is shown under the heading 'adjusted returns to capital and management'. The figures are adjusted for interest and rent paid, in order to be able to compare the production capacity of the farms, irrespective of whether there is a debt on the farm. These figures are shown as $ per hectare operated and as a percentage of capital invested. This figure is the net profit of the farm. If it is zero it means that although all costs including family labour have been paid, the management skills of the farmer have not been rewarded. Similarly, there is no return to the investment in the farm, which would have been received if the farm had been sold and the money invested differently.

Table 6. Some financial measurements of organic and conventional farms ($/ha operated).

		Organic	**Conventional**	**Organic+ Number***	**Org/Conv %**	**Org/Conv %**
		1998-1999				**1985-86**
Total cash costs	$/ha operated	87	146	1	59	59
Total cash receipts	$/ha operated	172	231	1	74	69
Total farm cash operating surplus	$/ha operated	85	85	2	99	78
Adjusted returns to capital and management	$/ha operated %	11.78 0.82	8.45 1.43	3 3	128 51	112 156
		1999-2000				
Total cash costs	$/ha operated	93	146	1	63	
Total cash receipts	$/ha operated	139	259	0	54	
Total farm cash operating surplus	$/ha operated	46	113	0	41	
Adjusted returns to capital and management	$/ha operated %	-15.80 -1.41	39.70 3.94	0 0		

* Number of individual organic farms with greater values than their counterparts.

The cash figures for 1998-99 look rather similar to those of the 1980s study, though the data for 1999-2000 look substantially worse for the organic farmers. Cash costs on organic farms in both years of this survey were around 60 per cent of those on conventional farms as in the earlier study. Cash receipts were close to three quarters in 1998-99, but only half of the conventional farmers' receipts in the following year. The resulting farm cash operating surplus (which is the receipts minus the costs) were similar to those of the conventional neighbours' in 1998-99, but only 41 per cent in the following year. In 1985-86 the difference between the two systems was somewhere between the two years included in the present study.

The returns to capital and management in 1998-99 were $11.78 per hectare on organic farms, or 0.82 per cent of the capital invested. On conventional farms the corresponding figures were $8.45 per hectare operated and 1.43 per cent of capital invested. The lower average for conventional farms in returns per hectare with higher averages for invested capital can occur when capital values per operated hectare differ between regions.

In 1998-99 the returns to capital and management on the organic farms included in the survey were similar between the two systems, depending on the measurement used. This result is not that different from that obtained in the earlier study, where both measures were found to be somewhat higher on the organic farms.

When looking at the figures in more detail, it was interesting to note that only the two farmers who most recently converted to organic agriculture had negative returns, although one of the conventional neighbours had a lower return than the organic farmer. The other three had positive returns, two of which were higher than their neighbour's. It is therefore legitimate to ponder whether the relatively low average returns are due to aspects of the conversion process, such as the biological processes on the farm, or knowledge about organic management.

This measure (returns to capital and management) can also be used as a good example of the limits of generalising from a sample of only five farms. When discussing the management skills of the farmers, mention was made of the likely lesser average management skills of the organic farmers. In particular, one pair of farmers was mentioned where both farmers agreed that the conventional farmer was much better. If this pair of farmers were to be removed from the survey, the averages would be considerably different. In that case the figures for the organic farmers would show returns per hectare operated of $19.39, and returns to capital of 1.59 per cent. Corresponding figures for the conventional farms would be -$6.53 and -0.15 per cent.

In 1999-2000 the situation looks much more bleak for the organic farmers and much more positive for the conventional farmers, making the difference between the two systems quite pronounced. The returns to capital and management were well below zero for the organic farmers (-$15.80 per hectare operated and -1.41 per cent for the invested capital), and well above zero for the conventional farmers ($39.70 and 3.94 per cent, respectively). None of the organic farmers had higher returns than the conventional neighbour, as opposed to the previous year where three had better results. Eliminating the one pair of farmers with stated differences in management skills does not reverse the situation, and would still leave a difference of just under $50 per hectare operated between the two systems, and over 4 percentage points of returns to capital invested.

It is not quite clear why the relative results were so different for the different systems in the two years. For the organic farmers in 1999-00 cash costs per hectare rose 7 per cent but receipts fell 20 per cent on the previous year. Looking at the individual farms it is apparent that events such as not securing a premium for the crop, or not cutting hay in a particular year have large influences on the returns and, due to the low number of farmers in the sample, also on the averages. But other events must also have influenced the final outcome. Low relative yields for all organic farms in 1999-2000 is one of the explaining factors. The main lesson to be drawn from this is, perhaps, that several different aspects need to be attended to for organic farming to be profitable, both on the production (yield, rotations) and marketing side.

Two other issues are of importance in connection with long-term farm profitability. The first is the premium prices received by organic farmers. The returns to farming on the organic farms are heavily influenced by the premiums available. It is difficult to predict the future of these premiums. Although premiums are expected to fall in the long term, there is little evidence of this yet. The second issue is the relative prices of crop and livestock received by farmers. In the survey years, crop prices as compared with livestock prices were high. This means that, in a system where livestock is more important for the rotation system, general revenue will drop, as it would have done on organic farms. In times when prices of livestock and their products increase relative to crop prices, these farms will then do better. This is what can be expected on organic farms in the future.

1.6 Summary and conclusions

Notwithstanding the problems of drawing conclusions from a small sample, four tentative conclusions can be drawn from the current survey.

1. *Organic farmers still exist.* Many of these farmers appear to be making a living from organic farming (as opposed to off-farm income). However, it was more difficult than anticipated to find suitable farmers for the survey. The fact that organic farms are not obviously doing better than conventional farming would, more than likely, be an important factor. It is also noteworthy that farm business entities are becoming much more complex, with share-farming, both off and on farm, and contracting of services becoming more prominent.

2. *Better knowledge of organic methods in the community does not appear to have led to an increase in yields relative to conventional farms.* Relative yields per hectare are estimated to be lower in the more recent survey. This could, of course, be due to a stronger growth in wheat yields on conventional than organic farms over the last decade, but this was not verified in this study. What is noticeable is that those who have farmed organically the longest also get the highest relative yields.

3. *Premium prices are higher than previously, at least for wheat.* This is also counter-intuitive, as one expects lower prices with increased productivity and supply. It may reflect improved marketing as well as increases in demand for organic products for the time being.

4. *Although returns from the two systems are estimated to be similar in the first year of the present survey, organic farmers in the second year of the survey do not compare favourably in terms of returns to capital and management.* It is clear that crop premiums for organic produce played an important role in the returns on organic farms. Other important factors are relative yields and rotational requirements.

What do these results imply for the future of organic farming? On the positive side, there are farms still operating organically after many years, and there are substantial premiums to be had. Livestock prices have risen since the survey years, favouring organic farmers with livestock as the principal enterprise in their rotations. The depreciation of machinery and equipment on organic farms is also substantially lower in the recent study, as it was in the 1980s study.

However, challenges remain for organic farming. The increase in the number of organic farms in recent years has been disappointing. Conventional farmers are not seeing organic farms as good business models and hence are not attempting to emulate them. Survey results presented here indicate why this might be. Yields were found to be substantially less than on conventional farms, especially on those farms more recently converted. Also, the combination of inputs and outputs on the two farm types are such that returns to organic farming were shown to be comparable with conventional farms only in one of the two years surveyed. These results are not easy to interpret and hence have not provided a convincing economic argument for conversion. The totally different results between the two years illustrate the need to analyse the organic farm and the conventional neighbour for a full rotation and under a range of climatic conditions as they occur over the years. Inclusion of more farmers in the survey is paramount to minimise the impact of fluctuations on any one farm. An analysis of ways of handling risk might also be instructive as it is assumed organic farmers are less at risk because their input costs are lower and the perceived higher organic matter in the soil helps them in dry years.

In summary, under present conditions of input use and prices, productivity, output premiums and unfavourable relative output prices, some farmers who have implemented organic management systems can be close in financial performance to conventional farmers interviewed in this survey. Those who have converted to organic management more recently seem to struggle more at least in one of the two years surveyed. If this is the case, the implications of this research for the industry is that much of the attention of research and extension in organic agriculture should be directed towards the early phase of organic management. Another implication is that, if the aim of research into organic agriculture is to provide good information to conventional farmers about the economic possibilities of organic farming, data will need to be available over a longer period (say, the duration of a full rotation), and collected over a substantial number of farms.

2. Production Information

2.1 What is organic farming?

Organic farming is more than just farming without chemicals: organic farming is a system of farming that produces food "in soils of enhanced biological activity, determined by the humus level, crumb structure and feeder root development, such that plants are fed through the soil ecosystem and not primarily through soluble fertilisers added to the soil.

Plants grown in organic systems take up nutrients that are released slowly from humus colloids, at a rate governed by warmth. In this system, the metabolism of the plant and its ability to assimilate nutrients is not overstressed by excessive uptake of soluble salts in the soil water (such as nitrates).

Organic farming systems rely to the maximum extent feasible upon crop rotations, crop residues, animal manures, legumes, green manures, mechanical cultivation, approved mineral bearing rocks and aspects of biological pest control to maintain soil productivity and tilth, to supply plant nutrients and to control insects, weeds and other pests."

National Standard for Organic and Bio-dynamic Produce, 1997.

2.2 Aims of organic farming

- Production of food of high nutritional value
- Optimisation of biological cycles in farming systems
- Maintaining and increasing fertility of soils
- Working as far as is practicable within a closed system of nutrient supply
- Avoidance of pollution caused by conventional agriculture
- Minimising the use of non-renewable resources
- Co-existence with, and the protection of, the environment.

2.3 Growth in the organic farming industry over the past five years

There has been steady growth in the organic farming industry over the past decade throughout the world. Growth rates in Europe, UK, US and Australia have been approximately 20-25% per annum for the past five years. The growth rates in Europe and the UK have been substantial where conversion to organic farming systems has been highly subsidised by the European Union to alleviate environmental problems such as ground-water pollution and pesticide contamination.

In Australia, similar growth rates in the organic industry have been achieved in the past decade but these have come off a very small base of only 1-2% of total agricultural production. In the last five years there has been a 90% increase in the number of producers becoming organically certified (Table 7). The Organic Federation of Australia have forecast likely growth rates for both conservative and optimistic scenarios in number of operators and gross retail value of product (Figure 1).

Table 7. Growth in the number of certified organic producers in Australia from 1990 until 2000.

Year	Number of certified organic producers	% increase
1990	491	
1995	862	76
2000	1670	94

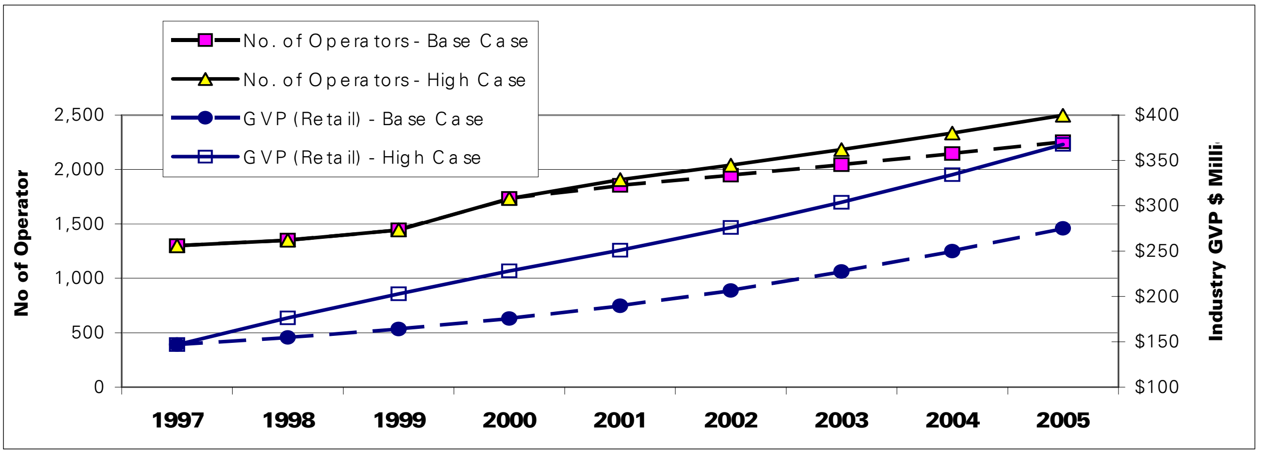


Figure 1. Forecast growth rates in number of operators and gross value of product (farm gate) for conservative and optimistic scenarios.

Source: Macarthur Agribusiness, & Quarantine and Inspection Resources Pty Ltd. 1999.

2.4 Overview of organic grain production

There are approximately 200 certified organic grain producers in Australia, and this comprises about 12% of the total number of certified producers. The remaining certified producers are involved in horticultural production. Organic grain producers are growing the full range of cereals,
pulses and oilseeds for both domestic and export markets (Figure 2).

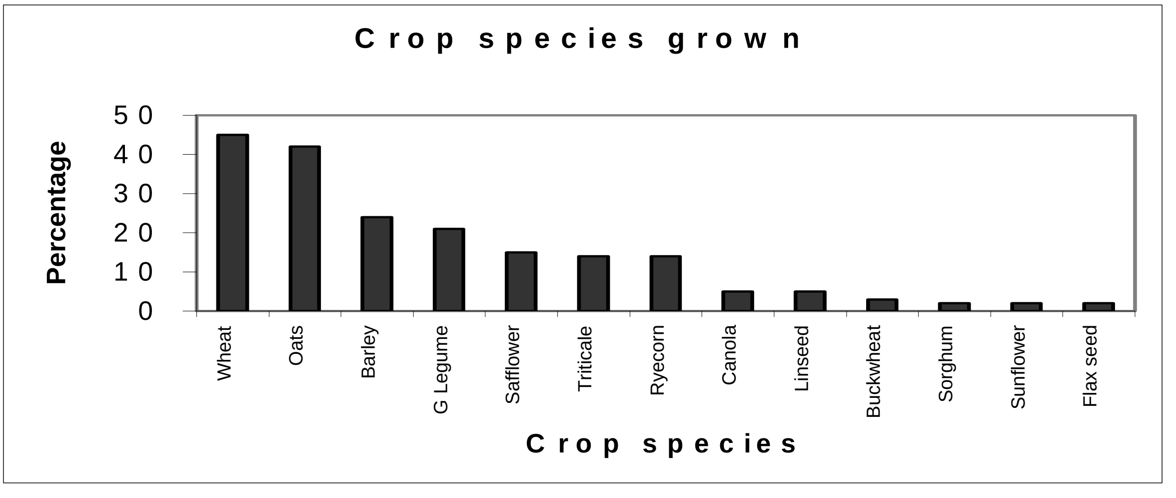


Figure 2. Crop species grown by certified organic producers.

2.5 Soil fertility

"Sufficient organic material should be returned to the soil to increase, or at least maintain, humus content. Conservation and recycling of nutrients is a major feature of any organic farming system. The use of mineral fertilisers should be regarded as a supplement to recycling, not as a replacement".

National Standard for Organic and Bio-Dynamic Produce, 2nd Edition, 1998.

The basis of a successful organic grain crop will be the fertility of the soil in which it is grown. An organic grain crop has the same essential nutrient requirements for growth as a conventional grain crop. Physically the soil will contain an adequate supply of organic matter, have demonstrable structure, moisture retention, be well drained, have good gas exchange around the root zone, and light and warmth at the appropriate time.

In conventional grain production, soluble fertiliser is applied to provide a direct growth boost to the plant. The fertilisers being used are typically superphosphate based, often with nitrogen. In Australia, our soils are generally very poor in available nutrients and in organic matter, and normally require addition of nutrients for successful crop production. However, in organic production the aim is to build a biologically active soil that will release nutrients for plant growth, and to have those nutrients cycling within the system rather than relying on external nutrient additions.

2.5.1 Nitrogen

Nitrogen (N) is essential for plant growth as it is a component of amino acids that form proteins. Nitrogen is taken up by the plant as inorganic ions in the form of ammonium (NH_4^+) or as nitrate (NO_3^-). In Australian farming systems the supply of nitrogen for plant growth comes mostly from the fixation of atmospheric nitrogen via the legume/rhizobia symbiosis. In recent years however, there has been a shift to applying more inorganic N to meet protein requirements in cereals.

The most important method to improve soil nitrogen fertility and organic matter levels in an organic farming system is through the addition of a green manure crop to a crop/pasture rotation. A green manure is a legume crop that is ploughed into the soil in spring to boost the supply of nitrogen. Green manures are critical in N maintenance and accumulation in the soil. The amount of N fixed is generally proportional to the amount of legume growth above ground; the more top growth, the more N fixed in the soil. Green manures are also important in the maintenance and accumulation of carbon and organic matter, reduced nutrient leaching, improved water utilisation, weed and insect pest management, and soil structure. The relative additions of N from common green manure species are presented in Table 8.

Table 8. N contributions from legume green manures

Green Manure	N- gain (kg/ha) per year
Subterranean clover	60-100
Red clover	80-120
White clover	60-100
Faba beans	80-140
Lupins	50-100
Lucerne	100-120
Vetch, peas	50-80

2.5.2 Phosphorus

Phosphorus (P) is an essential element for plant growth. It is needed for cell division and for the development of meristem tissue, which is the growing point of the plant. It plays a fundamental role in the enzyme reactions that make energy available within the plant. Phosphorus exists in the soil mostly as inorganic phosphates, either as phosphate compounds or as films of phosphate on the surface of organic matter particles. Plants take up P almost exclusively as inorganic phosphate ions, mostly as $H_2PO_4^-$.

The amount of P in the soil depends on the parent material, the extent of weathering, how much has been lost through leaching, and the level of organic matter. Phosphorus will become increasingly available at a pH range of about 5.5 to 6.5 ($CaCl_2$). Below this pH, P is increasingly bound up in iron and aluminium phosphate compounds, and above this range, in calcium phosphate compounds. Phosphorus also exists in soil organic matter but this is generally unavailable to plants. There are however, rhizosphere micro-organisms that can solubilise phosphate from minerals of low solubility and organic matter, and can increase the phosphate supply to the plant but the process is dependant on temperature and moisture. Mycorrhiza, a fungal like organism, can also form a symbiotic relationship with plant roots and is an important factor in phosphate supply. Australian soils are typically low in phosphorus and some addition of this element is usually required for plant growth. Ensuring your soil pH is at the correct level will enable the maximum availability of P for plant growth.

The most common source of phosphorus fertiliser being used in organic crop production is reactive phosphate rock (RPR). Reactive phosphate rock is a form of phosphate rock that has been transformed through natural chemical processes, whereby carbonate groups have replaced phosphate groups in the crystal structure of the molecule. The more carbonate groups on the crystal structure, the more soluble is the RPR in the soil environment. The soil environment is the main agent to break down the RPR, with the requirements being a supply of hydrogen ions and soil moisture. Producers need to be aware that RPR is restricted in its utility for crop production. Generally, RPR is effective as a source of P in areas that have an annual rainfall of at least 750 mm and acidic soils. Other naturally occurring sources of P include Guano™ and some foliar fertilisers. It is not known how effective these products are for grain production in a broadacre situation.

2.5.3 Potassium and Sulphur

Potassium (K) is also essential for plant growth and its role is in the building of proteins from ammonium ions. Potassium is closely linked to both N and P and may become deficient in the soil if either of these elements is increased. Potassium is taken up by plants as water soluble K, or as exchangeable K attached to soil colloids, but it also exists in a fixed form which is unavailable for plant growth. Potassium deficiency can be a problem on lighter textured soils where there is an increased chance of leaching, but deficiency of this element in our cropping systems is not considered a widespread problem.

Although over half the K taken up by plants during the growing season is returned to the soil as straw, a proportion of K is removed in grain. There are restricted sources of K for use in organic farming systems (sulphate of potash) but these can only be applied if there is a demonstrated need. It is therefore important to consider the value of green manure in sourcing K from the soil environment for plant growth, and the rotation being used, to ensure that depletion of this element is minimised.

Sulphur is also an important element as it is a component of many proteins. Many plants in the Brassica family have a requirement for sulphur as it is a major component of the oils that are contained in their seeds. Where canola has been introduced into farming rotations in south-east Australia, and conventional production has adopted double and triple superphosphate which has a lower sulphur component, the incidence of sulphur deficiency has increased. In an organic system the use of crop rotation where canola may only constitute one crop in five years may avoid the need to supply additional sulphur. However, based on demonstrated deficiency, sulphur can be applied either as elemental sulphur or as gypsum ($CaSO_4$), where the sulphate component will be readily available for plant growth.

2.5.4 Organic Matter

Whilst organic matter only comprises a small percentage of the total soil mass, it is fundamental to the fertility of any farming system and the production of plants and animals. The aim of organic farming is to maintain and preferably increase the organic matter status of the productive soil. Organic matter in the soil can be increased through the regular additions of green manures, animal manures, composts and the root mass from crops grown. Other ways of maintaining organic matter levels in the soil are by reducing cultivation and fallows, retaining stubbles, reducing burning and increasing the frequency of pasture in the rotation. In addition, greenhouse gases in the atmosphere can be reduced by improving levels of soil organic matter. The organic matter cycle is shown in Figure 3.

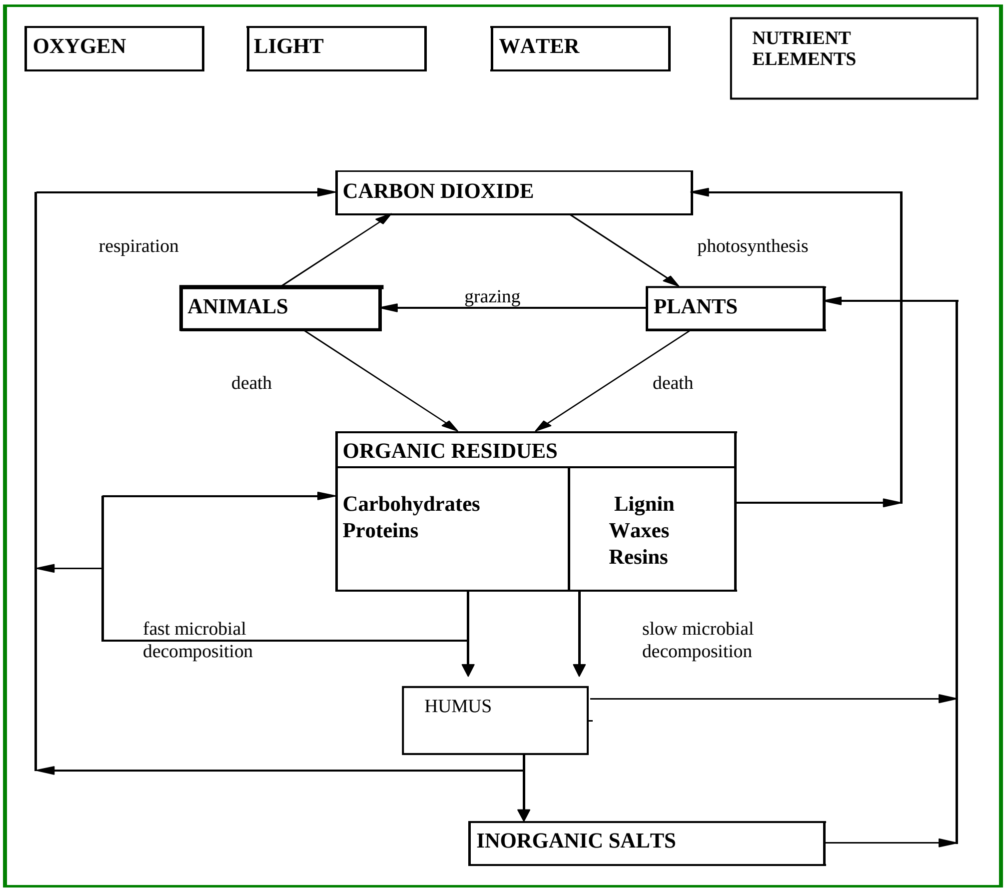


Figure 3. Organic Matter Cycle

Source: Re-produced from Handreck, K.A. (1993) Organic Matter and Soils, CSIRO Division of Soils. ISBN 0 643 024182.

Soil organic matter is comprised of:

- remains of plants and animals at various stages of decomposition,
- cells and tissues of soil organisms,
- substances such as humus made by soil organisms.

Organic matter is important to a healthy soil for six main reasons:

(i) Organic matter is a source of essential elements for plant growth – elements become available or unavailable through the processes of ion exchange in the soil environment.
(ii) Organic matter plays an important role in binding soil particles to form stable aggregates contributing to soil structural stability.
(iii) Organic matter, through its role in soil structure, allows greater penetration of soil water.
(iv) Organic matter increases the water-holding capacity of the soil.
(v) Organic matter provides the energy and nutrients for micro-organisms and soil fauna to grow and reproduce.
(vi) Organic matter provides soil structural stability that works to prevent soil erosion.

2.5.5 The role of microbes

Soil microbes play a fundamental role in recycling nutrients for plant growth. In an organic system the emphasis is to protect and enhance the activities of soil microbes so that nutrients are made available. The theoretically "ideal" soil environment that supports optimal microbial activity is one which has plenty of oxygen (needed for aerobic micro-organisms), neutral pH, and quality organic matter. In addition, if micro-organisms are to be effective in converting organic matter to products that can become available to plants, the level of nitrogen in the organic matter must be adequate. If the level of carbon in the organic matter is high, such as in sawdust, the amount of nitrogen required by micro-organisms to digest the sawdust is also high. If the nitrogen is not available, the rate of decomposition will be slow. It is important to consider carefully the **carbon/nitrogen ratio** of potential sources of organic matter prior to using them as this will affect the rate of decomposition and the potential benefits for plant growth. Carbon/nitrogen ratios of some sources of organic matter are presented in Table 9.

Table 9. Carbon/nitrogen (C/N) ratios of organic matter sources.

Organic Matter sources	C/N Ratio
Lucerne	13/1
Rotted manure	20/1
Clover residue	23/1
Oat straw	74/1
Sawdust	400/1

2.6 Allowable inputs

Certified organic farmers can access a range of inputs to their farming system, the principal criteria being that they are of natural origin and are not chemically or synthetically altered. Their use must be demonstrated on a needs basis, so for example, lime, being a naturally occurring product, can be used in farming areas where soil acidification is prevalent.

Certified organic producers are currently using a range of inputs to produce crops. These include commercially produced and certified organic fertilisers, lime, reactive phosphate rock, gypsum, dolomite and green manures. The percentage of producers using these inputs is shown in Figure 4.

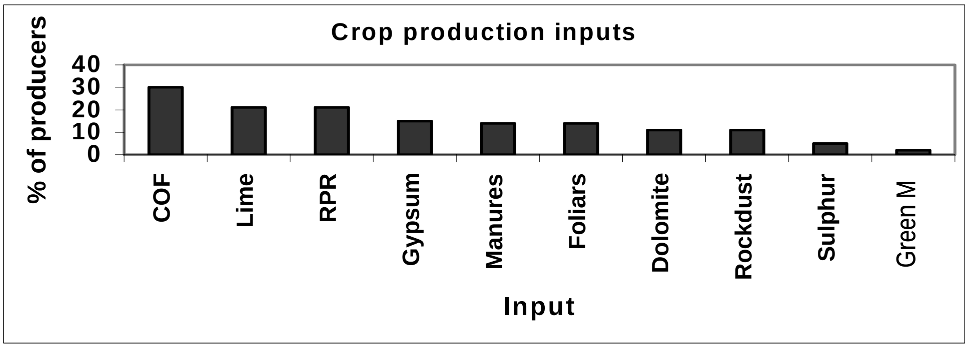


Figure 4. Crop production inputs used by organic producers.

Key:
COF = Commercial certified organic fertilisers; RPR = Reactive phosphate rock;
Foliars = Foliar nutrient sprays; Green M = Green manures

2.7 Nutrient removal from farming systems

Nutrients are removed from every farming system whenever product is taken off-farm. Whilst a healthy and biologically active soil will compensate for some nutrient loss, producers need to be aware of nutrient export from their farms. The following table (Table 10) provides a list of major nutrients removed in kilograms per tonne of grain.

Table 10. Nutrients removed (in kg) per tonne of grain

Crop	Nitrogen (N)	Phosphorus (P)	Sulphur (S)
Wheat	21	3.0	1.5
Barley	20	2.7	1.5
Oats	17	2.5	1.8
Faba beans	41	4.6	2.0
Field peas	41	4.5	2.4
Lupins	51	4.5	3.0
Chickpeas	35	3.2	2.7
Lentils	4	4.0	1.8
Canola	40	7.0	10.0
Rice	10	2.5	1.0

Source: Pivot Prescription Farming Brochure

2.8 Importance of soil testing

Producers considering organic production should obtain an accurate soil test to determine the levels of available nutrients for crop growth. The pH analysis is still one of the best indicators of soil conditions for crop growth. The majority of nutrients required for optimum plant growth occur in the pH range of 6.0 - 6.5 (H_2O) or in the range 5.7 - 6.3 ($CaCl_2$). Whilst this is an optimum range, many of our crops are grown in pH situations that are outside this range, with soils being either too acidic or alkaline. In acidic soils the use of lime to raise pH is critical, whilst in alkaline soils where pH is too high, the need for adequate supplies of available nitrogen and phosphorus becomes important.

3. Agronomy

Attention to the agronomy of cereal production will reduce the risk of crop failure in organic systems. Where grain is being produced under organic standards the choice of crop and cultivar, sowing time, seeding rate and depth are critical.

3.1 Rotation

It is important to grow crop species that fit into a sound rotation on the organic farm. In surveys conducted in 1993 and in 2000 most organic farms have long pasture phases to build fertility for crop production. In any five-year period there will generally only be two grain crops produced, and these will be different species to avoid the risk of pest and disease outbreaks.

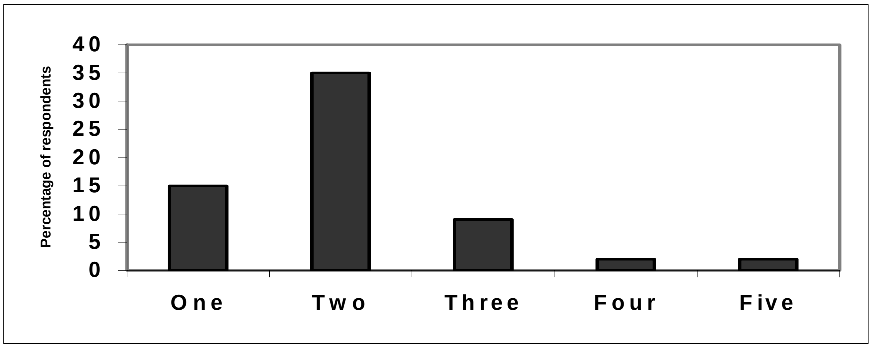


Figure 5. Number of crops produced in any five-year period on organic farms.

The length of the pasture phase is also important in an organic farming system. The pasture phase is often known as the restorative phase where organic matter and nitrogen fertility is built up in preparation for the exploitative or crop production phase. In conventional farming systems a three-year pasture phase is often adequate to restore fertility when combined with additions of soluble fertiliser for the crop production phase. In organic farming systems the production of crops must rely on the natural fertility built in the pasture phase and this may need to be longer than three years to provide for crop production. The majority of organic producers have pasture phases that are three years or longer (Figure 5).

3.2 Sourcing seed

An organic farming system will use seed that has been produced under organic standards in preference to seed grown under conventional farming conditions. There is also a requirement that seed be free of any chemical or fungicidal dressings. The use of bacterial inoculants such as *Rhizobia* is generally permitted, as this is a naturally occurring micro-organism. The National Standard states:

“ Seeds and vegetative reproductive material should be from plants grown in accordance with the provisions of this Standard for at least one generation or, in the case of perennial crops, two growing seasons.”

In the majority of situations the sourcing of organic seed can be easily achieved as producers keep seed from harvest for the following year’s crop, or alternatively, purchase their seed from other certified organic producers. In some instances however, sourcing certified organic seed may not be possible, for example, when an organic market requires a specific cultivar for which no organic seed is available. It is usually possible to obtain seed of new cultivars without chemical dressing by prior arrangement with the seed grower without affecting organic certification. Producers should attempt to source quality seed and be aware of potential sources of seed contamination (weed seeds) that might affect their crop's production.

It is important to consider from what area seed (cereal or pasture) is sourced as this can affect the early vigour of seedlings in the establishment phase. Research conducted at Rutherglen showed that seed sourced from areas with a history of low phosphorus application had reduced levels of phosphorus in the seed, and emergence was subsequently affected. Healthy vigorous seedlings are essential in an organic farming system where the relative competitiveness of the crop or pasture species over other species is critical.

3.3 Sowing time

Much research has been done on the optimal time for sowing most crop and pasture species. This information is widely available to producers. When growing crop or pasture in an organic system the time of sowing is still critical with later sowing generally affecting yield and quality of many crops and pastures. Many organic growers wait for weeds to emerge after break rainfall and then sow. There are risks and benefits associated with this strategy: it may become too wet and crop sowing may be delayed even further; soil structural damage may occur with more cultivation; later sowing can result in yield declines. The benefits of this strategy include an early weed kill that directly benefits the crop in the establishment phase. The choice of whether to sow at the best time or to wait for a weed germination will also depend on the season and the early vigour of the species chosen. The risk of yield reduction through late sowing could be avoided with greater attention to seed banks prior to cropping.

3.4 Sowing rate

Information on optimal sowing rates is also available for most currently produced crops and pastures. These are calculated on the weight of the seed and the optimum plant density per metre square. In an organic system the need for an emerging crop to compete vigorously with emerging weed species at the beginning of the season is critical. It is important to ensure that the largest seed is sown, that it is sown at the correct depth and with appropriate fertiliser, and that the seeding rate is increased (to 100 kg/ha for wheat) to provide competitive advantage for the crop species. Studies in Western Australia have shown that increased seeding rate and narrower row spacings have reduced ryegrass growth within the crop. Results from Rutherglen have also shown crop yield increases with higher seeding rates. Recommended plant densities for Victoria are shown in Table 11.

Table 11. Recommended plant density ranges based on TopCrop™ focus site results, 2000.

Plants/m^2	Victorian Mallee	Wimmera	North Central/North East Victoria	South West Victoria
Plants	150-200	150-200	200-250	150-300
Shoots	350-400	500-600	500-600	450-600
Heads	200-350	350-400	350-450	400-500

Source: TopCrop™ State Focus Seeding Rates for Quality Wheat 2000

3.5 Crop and cultivar choice

In this section there are two primary considerations when considering organic grain production. These are: what crop species are suited to the area, and where can the grain be sold as an organic product? Once producers have some certainty about the potential market for their grain species, then cultivar choice becomes the next most important consideration.

One of the most important factors to be considered in organic farming systems is the competitive ability of crop species and cultivars. Early vigour in a grain crop is critical in organic systems where there is a weed problem as there is little recourse to weed management after the crop has been sown. Research has established that triticale, rye and oats are the most competitive grain species. Competitive ability of crops against ryegrass is shown in Table 12.

Table 12. Competitive ability of crops against ryegrass.

Crop species	Grain yield reduction (%) from 300 ryegrass plants/m^2
Oats	2-14
Cereal rye	14-20
Triticale	5-24
Oilseed rape	9-30
Wheat	22-40
Barley	10-55
Field pea	100
Lupin	100

Within crop species, cultivars also differ in their competitive ability. The crop variety sowing guides for both Victoria and NSW provide some comments on early vigour. Recent research conducted in South Australia has shown that the wheat cultivar Frame has far lower grain losses (6%) from annual ryegrass than Silverstar (17%) or Chara (24%). Producers should consult their crop variety sowing guides for comprehensive information on the suitability of cultivars for their area.

Another consideration in crop choice is the potential for disease, and the need to rotate crops to reduce disease risk. It is important to avoid growing wheat on wheat if disease is present in year one, and avoid growing canola within 400 metres of the previous year's canola.

3.6 Weed management

In surveys of conventional producers interested in converting to organic farming practices, the issue of weed management is cited as the most important. Sustainable organic crop production will depend on managing the weed seed burden **prior** to sowing the crop. In a sustainable cropping system, weeds that have the potential to compete vigorously (for example, annual ryegrass), will have to be managed during the pasture phase so that the seed-bank of these species is reduced to such an extent that a vigorous cereal crop will have a competitive advantage over the weed species. This management should commence at least two years prior to cropping and include the prevention of weed seed set through grazing, mowing or cutting of silage. The use of fallow or a reliance on cultivation to kill weeds prior to cropping is not considered a sustainable method of weed management because of the risk of soil erosion and soil structural damage.

Key weed management strategies for organic grain production

- Incorporate a pasture phase and rotate crop production
- Manage grass weeds in the pasture phase by grazing, slashing or cutting hay/silage
- Ensure crop seed is clean of weeds
- Choose healthy crop seed
- Choose vigorous crop species
- Increase seeding rates for crop production

Organic producers use a range of weed management tools. The results from a recent survey show that grazing and cultivation are the most popular methods (Figure 6) which support the findings of previous surveys. Other methods cited in the current survey data included crop rotation (31%), cutting hay or silage (30%), green manuring (29%), fallowing (27%) and using higher seeding rates (27%) (Figure 6).

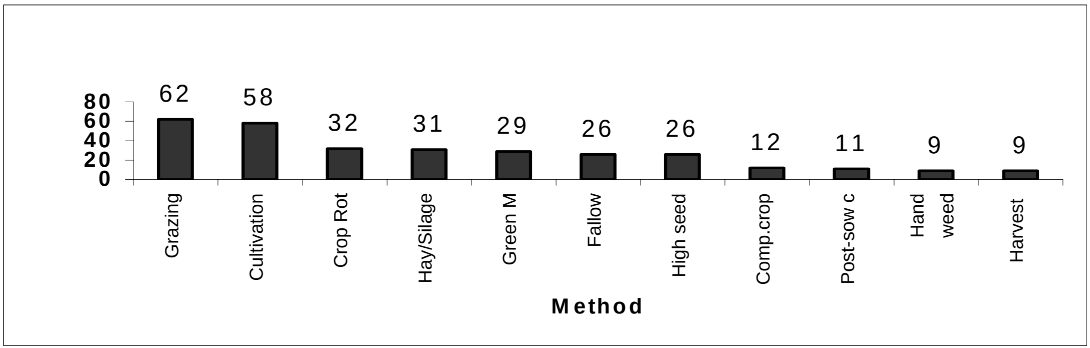


Figure 6. Weed management methods used by organic producers.

Key:
Crop rot. = Crop rotation
Green M = Green manure
High seed = High seeding rates
Comp. Crop = Competitive crops
Post-sow c = Post sowing cultivation
Hand weed = Manual weeding
Harvest = Collection of weed seeds at harvest

3.7 Stubble management

An organic farming system does not generally allow for the burning of stubble. Some flame weeding is practised in organic horticultural enterprises where row crops are grown, but burning of crop stubble is considered polluting to the environment, and generally results in losses of nutrients such as nitrogen and sulphur. A 2 t/ha crop stubble can provide about 15 kg of N, 1.5 kg of P, 25 kg of K and 5 kg of sulphur (S). In contrast, if crop stubbles are burnt, up to 240 kg/ha of carbon monoxide (CO) and about 20 kg/ha of hydrocarbons (HC) are produced that can contribute significantly to pollution from agricultural systems.

There is a range of options to successfully manage crop stubbles. The most important of these options in an organic system is to use rotation to avoid the problem of retained stubble. For example, a two-year cropping program may consider growing canola followed by wheat to avoid large quantities of wheat stubble. If a wheat crop is to be produced after an oat or triticale crop where stubble may be a problem, the strategic use of mechanical procedures (stubble mulching) and grazing management can prepare that area for sowing in the following season.

4. CONVERSION AND CERTIFICATION PROCESS

4.1 Definition

Conversion refers to the physical and biological processes the farmer and the farming system must undergo to comply with organic standards. Certification refers to a formal process which assesses and then accredits the farming system for compliance with organic standards.

4.2 Conversion planning (pre-certification)

Conversion to organic farming is a long term process. There are no fixed methods for organic conversion. Each farm unit is an individual system and successful conversion requires a careful assessment of the resources available and the interactions between components in that system.

Ease of conversion is largely dependant on what you start with - if you start with a degraded resource base, then that is what you will end up with. Economic pressures resulting from previous activities can be the biggest constraint to successful conversion. More specialised and intensive farms will generally take longer to convert. These farm generally require more time and effort to re-introduce diversity and to reduce the scale of individual enterprises.

The conversion process requires a high level of commitment to succeed and often entails financial risk. Furthermore, there is little in the way of detailed information and advice to help you through the process. Prior to moving down the conversion pathway ask yourself some key questions to determine what you will need to do.

4.2.1 Where do I start?

Primarily, the conversion process begins with personal conversion - attitude and approach. Initially, it is important to gather as much information about organic farming as possible.

Sources of information include:
- The National Standard for Organic and Bio-dynamic Produce and certifiers standards;
- conventional and organic advisory services;
- organic farming publications and journals;
- organic conferences and field days,
- the internet, and
- other organic farmers.

Conversion planning involves developing a planning framework for organic conversion. Often referred to as an Organic Management Plan (OMP), the plan allows for changes in production methods and financial consequences to be considered and outlines your plans to enable ongoing adherence to organic standards. The OMP should also set out steps to be followed during conversion and a time scale over which it will occur. Preparation of an OMP is an essential pre-certification strategy.

When developing the OMP you should consider:

4.2.2 How much, and over what time frame, will I convert?

It is a good idea to initially convert part of the farm to trial organic methods - a drawback to this is that it may not allow for suitable rotations or the scale required for necessary adjustments in techniques and machinery. Converting part of the farm may, however, allow for better financial 'stability' if yields become depressed.

Under organic standards, the growing of organic and conventional product on the same farm is referred to as parallel production. Organic standards prohibit the production of the same crops (or livestock) organically and non-organically on the same farm where the crop (or livestock) products are not visibly different. For example, you could not grow an organic crop of 'Rosella' wheat and a conventional crop of 'Janz' wheat on the same farm, but you could grow organic 'Rosella' and conventional oats, provided all other sources of contamination were considered.

4.2.3 What are the potential sources of contamination and how will I overcome them?

Organic standards require that a process is implemented which documents and monitors the potential for contamination from substances and practices that are not permitted, and that strategies are put in place to avoid these risks. A system similar to HACCP (Hazard Analysis Critical Control Points) should be considered.

A risk assessment system would require asking at each point in the production process:

- What are the potential sources of contamination during the production, harvesting, storage, transporting and processing of the crop;
- Which of these contamination risks are significant and likely to occur if not properly managed?
- What must be done to control these risks to an acceptable level?
- What records or evidence will I need to demonstrate that I have controlled the hazard?

If parallel production is practiced then harvesting, sowing and transport equipment will need to be thoroughly cleaned prior to handling organic crops. Grain storages should ideally be separate.

External sources of contamination, such as over-spray from adjoining properties and the potential for contamination to water courses running through your farm, should also be identified. The use and source of any external input (even if it is organic), such as seed, fertiliser and livestock feed must be recorded.

4.2.4 What rotations should I implement?

Choice of rotation should consider the implication of each crop on subsequent crops in the rotation. You will need to consider the potential to host pests and diseases, weed management, fertility management and livestock requirements, and the need to balance this choice with what is profitable for the farming business

4.2.5 Is my farm layout appropriate?

Now is the time to consider the appropriateness of your farm layout and how it will facilitate organic conversion. Considerations should include paddock size, fencing, irrigation layout, location of water courses and wetlands, windbreaks, topography and soil types.

4.2.6 Do I have appropriate equipment and farm structures?

Conversion to organic management may require the modification or replacement of existing farm equipment and structures. This could include specialised sowing and weed management equipment or construction of sealed grain storages to allow for CO_2 disinfestation of stored grain to control insect pests.

4.2.7 Do I have a recording and monitoring system in place?

Records of crop and livestock production, cropping history, soil tests, livestock movements, pest and disease management and crop and livestock sales will assist you to monitor the impact of your management and the changes that you have made during conversion. Certifiers will request some information (such as crop yield and sales) as part of your certification contract.

4.2.8 What financial issues should I consider?

You should assess the capital investment required for changes eg livestock housing, machinery, grain storages, processing, packaging, and marketing of produce. A viable marketing strategy should be established before proceeding with your OMP. You will need to assess marketing options, including the availability of markets, premiums available (generally none for in-conversion products), marketing alliances, and value adding potential.

4.2.9 How do I start?

Start slowly **-** gain experience with new crops and techniques and the potential output of the system. Start with a couple of paddocks entering the rotation for a couple of seasons. Then other paddocks can be brought in and the original paddocks progress into later stages of the rotation. This way the original paddocks are always a couple of years ahead and mistakes learnt here hopefully won't be repeated. Record observations and redesign the conversion plan each year to take into account your experiences on each paddock.

Having planned and implemented an organic conversion strategy, you are now in a position to have this system formally certified.

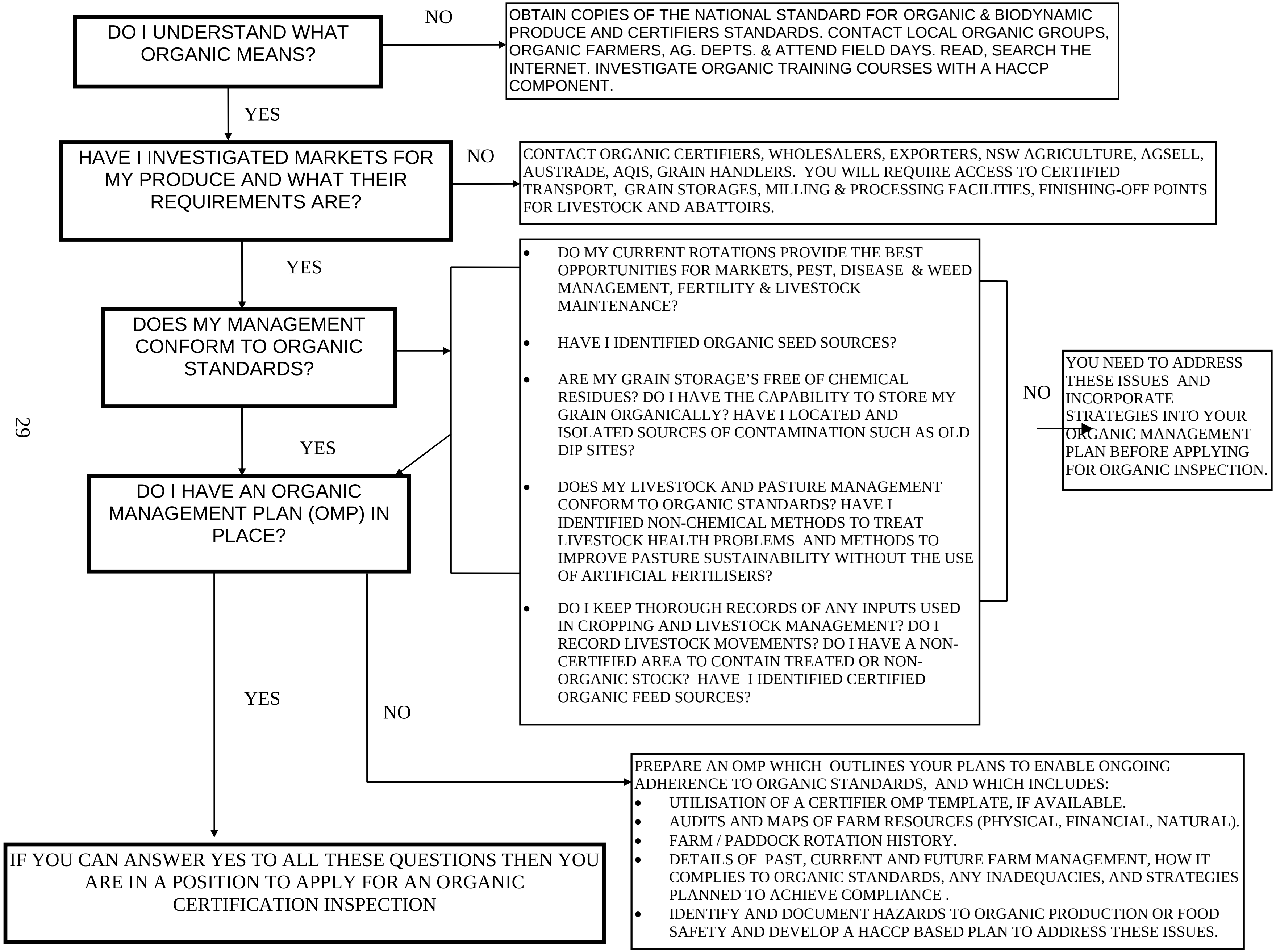


Figure 7. HOW FAR AWAY AM I FROM BEING READY TO APPLY FOR ORGANIC CERTIFICATION?

4.3 Organic certification

4.3.1 What is certification?

Certification means having your farm and farming methods inspected to confirm that they meet the certifier's standards for organic farming. The certifier's standards cover all the requirements of the National Standard for Organic and Bio-dynamic Produce.

Since January 1993, exports of organic produce have been required to meet this standard. The *National Standard* sets out the minimum requirements for production, processing and labelling of organic produce. It also requires all exporters, as well as producers and processors, to be certified with an accredited industry organisation.

There are currently seven organisations accredited by the Australian Quarantine and Inspection Service (AQIS) to inspect and certify organic producers. Each certifier has their own set of standards which must be complied with, in addition to the National Standard. Contact details for these organisations are listed at the end of this paper.

4.3.2 Why become certified?

Certification ensures the integrity of the organic product from 'paddock to plate'. Certification also protects the interests of genuine organic producers in maintaining and increasing their market share. Trade Practices Law applies severe penalties for selling non-organic produce as organic.

There appears to be significant potential for export of Australian organic product. Producers and exporters need to be especially aware that any treatment, preparation, and packaging of the organic product prior to export must be covered by a certification program. All exporters must also be approved for this purpose.

Domestically, the market has also expanded for organic produce. Domestic consumers now recognise a certified organic product as their best guarantee that the product was produced using organic practices. This is particularly important to consumers with health concerns. Organic retailers and wholesalers generally will not purchase uncertified produce. Organic produce sold on the domestic market is often purchased by exporters.

4.3.3 The Certification Process

Figure 8 illustrates the certification process. If you answered 'yes' to all the questions posed in the self-assessment flow chart (Figure 7) then there is a good chance that you may already qualify for certification.

Remember: Prior to applying for certification you should obtain a copy of the certifiers' standards and a certification information kit. Compare the standards with how you farm currently operates and look for possible differences. Check with the certifier about any points that are not clear and proceed to develop and implement your OMP.

4.3.4 Levels in the certification process

Full certification is generally granted following three consecutive years of organic management. Producers must be under an accredited certification system for a minimum period of 12 months prior to receiving any certification level.

Some certifiers' standards refer to 'pre-certification' (also known as 'pre-conversion'), 'in-conversion' and 'organic' levels. Organic standards must be adhered to during *all* levels, each level usually a reflection of the length of time, or degree to which, an organic system has been implemented. Adherence to the 'in-conversion' and 'organic' phases entitles you to market and label your product accordingly. No label is issued during 'pre-certification'.

4.3.5 How to apply

If you decide to proceed with certification, send in the completed application form with the fee. The certifier will then ask you to complete a statutory declaration which describes the products that you wish to have certified and the management practices currently used on the farm.

4.3.6 The inspection process

Once you have applied to the certifier and they determine that an organic system is possible (based on the information provided in your statutory declaration), then an inspector will contact you to arrange a suitable inspection time.

This inspection usually takes 2-4 hours but may take longer, especially on large properties. The inspector will go through your application and statutory declaration with you and ask questions. You and the inspector together inspect the farm, machinery and livestock. The inspector may take soil or product samples to detect if there are any chemical residues. Problem areas could include old dip sites and grain storages.

The inspector then makes an overall assessment of the property and your management. The inspectors report and recommendation is reviewed by a certification review committee. You may be asked for more information, or require further inspections and tests for chemical residues. If successful, your farm will be approved for 'pre-certification'. The pre-certification phase demonstrates to the certifier your ability to manage your enterprise organically.

Following 'pre-certification' another inspection takes place and if you have met organic standard requirements, a certificate of certification is granted and you will be required to enter into a licensing agreement with the certifier. From application to certification will take 12 months. You are now at the stage of certification that is commonly referred to as the 'in-conversion' level.

A further two years 'in-conversion' is generally required before 'organic' level is issued by the certifier.

4.3.7 Re-inspections

Once certified, re-inspections of your farm will be carried out annually. Random (unscheduled) inspections are also carried out as part of the certifiers responsibility to meet AQIS requirements.

4.3.8 How much will certification cost?

A number of fees are associated with becoming certified. The amount and type of charges imposed depend on the certification organisation. In general allow $1,000 in the first year for joining fees, inspections and soil and produce tests. Typical fees may include:

- initial joining fee and follow-up annual membership fees (cost varies);
- a non-refundable application fee (around $150). This may also cover 12 months associate membership;
- an inspection charge ($250-$300);
- soil /produce chemical residue test (around $70);
- Additional charges include things such as a fast track inspection fee (if a quicker time to inspection is required $120-$200).

Once certified annual fees may include:

- a re-certification fee (around $50);
- an inspection fee ($150 - $300);
- a levy based on sales of organic produce. This is generally around 1% of gross sales per annum. Some certifiers include the annual inspection fee in the levy. Others exclude the levy.

Some certifiers offer a small grower scheme, where groups of 5 or more may apply for certification at a reduced rate. The minimum fee which applies per producer is around $250.

4.3.9 What do I have to do to stay certified?

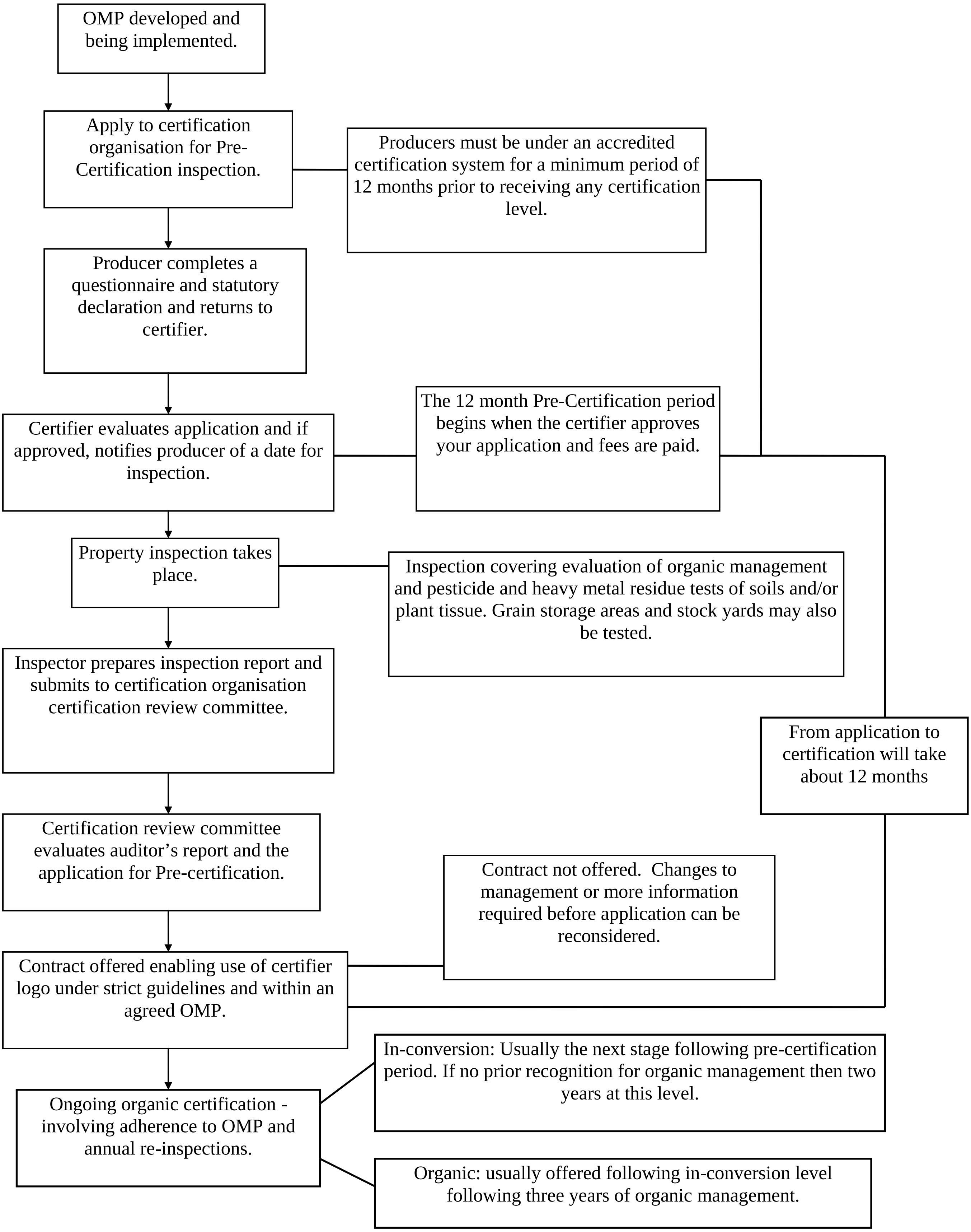
To comply with and retain organic accreditation, organic standards must be followed. Any breach of the standard, such as use of a prohibited substance, will result in temporary, or for continued non-compliance, permanent de-certification. Under organic standards inputs such as fertilisers or substances for pest and disease control, are classified according to "permitted", "restricted", or "non-allowable" use.

Regardless of the type of input, its use <u>must</u> be recorded in the farm diary. If, for any reason, a non-allowable input is used then this use must be recorded and the certifier contacted immediately. Produce will not be permitted to be sold as organic until the certifier is satisfied that organic management has been re-applied.

4.3.10 Keeping records

On-going certification will require keeping good records. During inspections you will have to present these records to the inspector. This helps to verify that you have been managing in accordance with the standard. The adoption of a system to monitor risk, such as HACCP, whilst not compulsory, is recommended by the National Standard for Organic and Bio-dynamic Produce.

Figure 8. Certification Flow Chart



5. Annual Workshops and Farmer Meetings

5.1 Annual workshops

Two annual workshops were conducted during this project. The workshops were both held at Rutherglen Research Institute in August 2001 and June 2002. Attendance at the workshops was similar in each year with approximately 25 primary producers at each. The producers were primarily conventional producers with an interest in organic production systems.

The major workshop for 2001 was held on Friday August 3 at Rutherglen Research Institute. Advertising for the workshop was carried out through the DPI Organic Newsletter, which is distributed to 200 interested producers. A workshop flyer was also sent to North East and Goulburn Valley Top Crop groups of which there are about 400 participants. In addition, advertisements were placed in rural and regional newspapers (Shepparton News, Border Mail, Wagga Advertiser, Corowa Free Press, and Wangaratta Chronicle), and a feature article appeared in the Weekly Times promoting the event.

A range of speakers covering all aspects of the organic grain industry participated in the workshop. These included Chris Alenson (healthy soils), Viv Burnett (agronomy), Neil and Gina Wiseman (Organic growers), Phillip Nickson (Goodman Fielder Consumer Foods), Tim Ada (DPI Victoria Agribusiness), Robyn Neeson (Conversion and Certification), and Dr Els Wynen (Economics). A field visit to the experimental site at Rutherglen was incorporated into the day, and a wholly organic lunch and morning and afternoon tea was provided.

The annual workshop for 2002 was conducted at Rutherglen Research Institute on June 3. Twenty-four producers attended along with NSW DPI and DPI Victoria staff. Of these, twenty were farming conventionally; there were two hobby farmers also farming conventionally, one certified organic producer and one student. Information packages were sent to producers who could not attend on the day. Advertising for the workshop was carried out through the DPI Organic Newsletter, which is distributed to over 200 interested producers. Advertisements were also placed in rural and regional newspapers (Shepparton News, Border Country Mail, Corowa Free Press, and Wangaratta Chronicle).

A range of speakers covered aspects of organic conversion and production for the grain and livestock industries. Livestock was incorporated this year to complement the information being provided on grain production. It is well recognised that many of the producers interested in organic grain production also have livestock within their enterprises. Speakers included Viv Burnett, project officer, DPI, organic wheat), John Schneider (DPI, organic canola), Tim Enshaw (DPI, GRDC weed management), Lindsay Trapnell (DPI, Agribusiness Analyst), Dr Els Wynen (Eco Landuse Systems Economist), Stuart Clarke (DPI Agribusiness, Markets), Peter Hunter (DPI, Agribusiness, Organic Livestock), Robyn Neeson (NSW DPI, Certification), Peter Botta (DPI, Grain Storage), Greg Ferrier (DPI Farmbis, livestock).

The workshop involved formal presentations from a number of the speakers; a field visit to the sealed silos, and the certified organic site at Rutherglen to inspect organic lambs. Participants enjoyed an organic morning tea and BBQ lamb lunch.

5.2 Farmer meetings

The project was promoted at conventional farmer meetings. These were the GRDC Expos held at Birchip on July 10, and at Corowa on July 12 during 2001, and at the Rutherglen Research Institute Annual Organic Field Day (where over 70 producers attended). Aspects of the package were included in presentations at the GRDC Adviser Expos held at Bendigo and Wagga, in the Riverine Plains Farming Systems Trial Booklet, and at meetings of the Springhurst Best-wool Group.

Over 300 producers attended the Birchip Expo in 2001 (Birchip Cropping Group) but there was very little interest in organic production systems. Four producers asked for copies of the information package from that farmer meeting. About 150 producers attended the Corowa Expo (Riverine Plains Farming Systems Group) and there was more interest from this farmer meeting. A further six producers requested the information package. The Southern Farming Systems Producer Group was also made aware of the project and the information package but there has been no response from that group.

6. Project evaluation using Bennett's hierarchy

6.1 Project evaluation - 2001

1. Resources

Funding of $32,458 was allocated for the first year of this project. This consisted of $7,000 in operating funds from RIRDC, and a further $5,000 in operating funds from DPI Victoria. The majority of the operating funds ($10,000) was allocated to obtain up to date economic analysis between organic and conventional cereal/livestock farms. The remaining funds provided from DPI Victoria for the employment of an industry development officer at 0.2 FTE, based at Rutherglen, and 0.05 FTE contribution from NSW DPI, for the services of Robyn Neeson, based at Yanco, the production of the information package, and the conducting of the workshops.

2. Activities

(a) Economic analyses

Dr Els Wynen (Consultant Economist) interviewed five pairs of organic/conventional farmers in south east Australia to obtain relevant economic data for the information package. The organic farmers had to have been certified for at least three years, and the conventional farmers were sourced from information provided by local Departments of Agriculture. Farmers were asked to provide financial performance data from the 98/99, and the 99/00 seasons. This data has been tabulated and developed into a report within the information package.

(b) Information package

An information package has been developed for primary farmers in the mixed farming zones of south east Australia. The package is applicable to farmers who grow grain crops in rotation with pasture/livestock systems. Information for inclusion was obtained from a variety of sources using both organic and conventional scientific literature. There are sections on soil fertility and agronomy, and the organic certification process. The information package also includes the NSW developed Agfact on organic grain storage.

(c) Annual workshop and farmer meetings

The information package was promoted at two conventional farmer meetings, the Birchip Cropping Group Expo, and the Riverine Plains Farming Systems Group Expo. This provided exposure of organic farming systems to over 450 conventional farmers.

The annual workshop was held at PIRVic Rutherglen and 25 farmers attended this event. The information package was launched, a variety of speakers contributed to the event, and an evaluation of the workshop was performed.

3. Participation

The project has targeted conventional farmers wanting to convert their farms to organic production systems. The workshop was highly successful in attracting these farmers with 20 of the 25 who attended, having strong intentions to convert their farming system to organic production. The remaining participants were either already farming organically or associated with businesses servicing the organic industry.

The farmer meetings were less successful in attracting conventional farmers to the information package. The Expos were dominated by conventional agriculture businesses (chemical and fertiliser manufacturers) but there was some interest in the project and the package. It is evident from the small numbers of farmers that indicated an interest in organic systems at these events that much more work is needed to get key sustainability messages to these farmers.

4. Reactions

(a) Reactions at the farmer meetings

There was little interest in organic production systems or the information package at the two farmer meetings that were attended. A total of 10 farmers out of a possible 450 indicated an interest in obtaining the information package. The majority of farmers did not express an interest in the package or the broader research program being conducted in this area. Those that did express an interest, and engaged in short conversations with the project officer, had many concerns about the profitability of organic systems in their specific environments, citing weed management and grain yield as the most important considerations. On the positive side, these farmers agreed with the research effort, and were fully aware of the long-term unsustainability of their farming practices.

(b) Reactions at the annual workshop

Evaluation conducted after the workshop indicated that the information package was extremely useful to 17%, very useful to 50%, and useful to 33% of participants at the workshop.

Participants made a range of comments on the workshop and these are listed below:

- " Being informal makes it easier to ask questions, and although that means the speakers go over time, we can get answers to our own problems. They were interesting speakers as well."
- "Well done - please make this an annual event."
- "The workshop was well run and gave a broad overview of organic grain production."
- "I enjoyed it and found it interesting and informative - always keen to learn more. We hope you'll keep on persevering in this challenging and important area - well done."
- "As a marketer I found the day very useful - thanks to the organisers."

5. Changes in *KASA (Knowledge, Attitudes, Skills, Aspirations)*

(a) Knowledge

Farmers rated their understanding in a range of areas before and after the workshop, and in all areas they showed that their understanding had improved as a result of the information delivered (Table 13).

(b) Attitudes

There was a contrast in attitudes between the participants at the workshop and the farmers at the farmer meetings. There were a small number of farmers (10) who sought further information and were positive about the contribution that organic systems could make to the environment. However, the majority of conventional farmers at the farmer meetings were not interested in the organic systems information package. Whilst not overtly dismissive, they did not engage in conversation with the project officer and did not stop to look at the display.

The workshop participants had a much more committed attitude to organic production systems and were either already certified organic farmers (2), or actively seeking information on organic production (23). Their attitude was positive and supportive of the research program, the workshop, and other farmers learning about organic systems.

(c) Skills

The workshop provided the opportunity for participants to observe the field research site at Rutherglen Research Institute. They were able to view the experiments in seeding rate in both wheat and canola, and the experiments in annual pasture management in preparation for cropping. This provided them with some idea of the differences in plant densities both in crops and pastures, and how to monitor the influence of species that may affect the yield of crops and pastures.

(d) Aspirations

Farmers were asked what their intentions were in their farming business as a result of the workshop and the information package. These are listed below and indicate a strong intention to find more information about organic farming, and to begin adoption of organic farming methods on their farms.

- Forget about organic production completely - 0
- Find more information about organic production - 67%
- Contact an organic certification agency for more information - 17%
- Join an organic farming group - 33%
- Adopt organic farming practices on your farm - 50%
- Begin an organic conversion paddock - 33%

6. Practice changes

Farmers were asked the question that if they chose to adopt organic practices on their farm, what practices would they adopt? The responses indicated a variety of interests but showed a commitment to achieve change on their farming properties.

Two of the farmers were certified organic and indicated that they would continue to farm organically. The other farmers indicated that they would start monitoring their soil biology as an indicator of soil health, begin to use non-soluble fertilisers, adopt natural weed management methods, and get sealed silos for grain storage.

7. Social, economic and environmental consequences

The project has contributed to the information pool on organic farming systems in the south-east Australian context. Whilst there is interest in organic systems amongst conventional farmers, the farmer meetings indicated that there is much more work needed to validate organic systems in particular areas, and to promote their social and environmental benefits to the wider rural community. The economic component of the information package showed that organic production can be profitable, but that farmers who have recently converted to organic systems have found the road tough. Significant effort will be required to explain the 'triple bottom line' to farmers so that economic benefits/costs are not seen in isolation from social and environmental benefits/costs.

Table 13. Producer understanding (% of respondents) before and after the workshop in the range of subject areas presented.

Subject area	No understanding		Low understanding		Good understanding		Excellent understanding	
	Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**
Soil health	0	0	50	0	50	100	0	0
Agronomy	0	0	33	0	67	100	0	0
Processing	33	0	67	0	0	100	0	0
Field trials	17	0	50	0	33	100	0	0
Certification	33	0	0	17	67	83	0	0
Economics	17	0	83	17	0	83	0	0

6.2 Project evaluation – 2002

1. Resources

Funding of $27,287 was allocated for the second year of this project. This consisted of $6,000 in operating funds from RIRDC. The remaining funds ($21,287) provided from DPI Victoria were for employment of the project officer (0.2 FTE) based at Rutherglen, and the contribution from NSW DPI, for Robyn Neeson (0.05 FTE), based at Yanco, the producing of the information package and the conducting of the workshop.

2. Activities

(a) Update of the information package

The information package was updated using economic analyses from the financial year 1999-2000, as well as incorporating information from a previous survey conducted in 1985-86 for comparison purposes. The package delivered to farmers also included up-to-date information on gross margin analyses from the 2001 season for both organic wheat and canola, organic crop research currently being conducted by DPI Victoria at Rutherglen and Donald, and information on weed management in organic grain systems from the DPI Victoria/GRDC Managing Weeds In Organic Farming Systems project (DAV 438).

(b) Annual workshop and farmer meetings

The information package was made available to producers at the Rutherglen Research Institute Annual Organic Field Day (October 2001) where over 70 farmers attended, and through the newly established producer group, Springhurst Best wool Group (15 farmers). In addition, aspects of the project were included in presentations made at the Annual GRDC Adviser Expos held at Bendigo and Wagga, which attracted at least 100 grains advisers and farmers.

The information package was delivered at the annual workshop held at Rutherglen Research Institute on June 3, 2002. Over 20 farmers attended this event, which was a similar attendance to 2001.

3. Participation

The project has targeted conventional farmers wanting to know more about organic production. This year's workshop did attract interested farmers, all of them indicating that they wanted to find out more information about organic farming, and saw the workshop as an on-going learning process.

A mixture of both certified organic farmers (10%) and interested conventional farmers (70%) attended the Annual Organic Field Day held at Rutherglen Research Institute. DPI Victoria staff and private agribusiness consultants, as well as some conventional farmers attended the GRDC Expos at Bendigo and Wagga. The project officer Viv Burnett was asked to speak about organic grain production at this year's GRDC Adviser Expos in response to evaluation conducted at last year's Expos that showed organic production is a growing area of interest for private consultants.

4. Reactions

There was significant interest in organic production systems generally at the Annual Organic Field Day, the Springhurst Best-wool Group, and the workshop held recently at Rutherglen. The main reactions obtained from these events included:

- " I enjoyed having the field day in the field - I always learn something, reinforces, reminds and/or increases knowledge."
- "I always learn something new."
- "Very good length for a novice like me - plenty of opportunities to ask questions."
- "I'm certified bio-dynamic - we need more discussion on questions of contamination."

The range of responses from the events we have either organised or attended has indicated that there are now more distinct audiences within the organic farming community. We have targeted our events towards conventional farmers moving towards organic production but there is a largely un-met demand for information arising from currently certified producers. In our opinion future events need to make this distinction and provide information accordingly.

5. Changes in KASA (Knowledge, Attitudes, Skills, Aspirations)

(a) Knowledge

Farmers rated their understanding in a range of areas before and after the workshop and in the majority of areas they showed that their understanding had improved as a result of the information delivered (Table 14).

(b) Attitudes

There are still contrasting attitudes towards organic production systems within the broader farming community. The events organised as part of this project and others generally attract farmers that are relatively committed to the principles of organic farming, even if they are not practising them on their own farms. These farmers are cautious and mostly conservative, and will require substantial on-going positive results to successfully convince them of the long term sustainability and profitability of organic systems.

In contrast, some conventional farmers and private consultants who attended the GRDC Adviser Expos often displayed a non-committal and disinterested attitude towards organic systems. However, in the project officer's opinion, this attitude is slowly changing. An approach by the successful Birchip Cropping Group to work towards having a demonstration of organic systems within their experimental program arose from the GRDC Expos held this year. The project officer will be actively pursuing this opportunity during 2002 in order to have organic systems featured at Birchip during 2003.

(c) Skills

Farmers at this year's workshop were provided with detailed information about seeding rate and its effects on weed growth and grain yield. They were also shown results on the effect of forage management on weed populations. While these methods are yet to be validated at commercial scale they provide farmers with techniques that can be readily used on their own farms.

Farmers were also shown how to complete a paddock level gross margin for their crops so that they can assess whether their crop production system has been a profitable enterprise in any one year. Detailed information on organic certification was also provided in the form of a self -assessment questionnaire. By answering a number of these key questions, farmers could ascertain whether they were ready to apply for organic certification. Such skills are essential for farmers who want to move towards organic production because they will need enhanced management ability to convert from conventional to organic, combined with better business skills in order to manage risk.

(d) Aspirations

Farmers were asked what their intentions were in their farming business as a result of the workshop and the information package. These are listed below. Significantly only 22% of farmers indicated that they were prepared to start an organic conversion paddock on their farms.

- Forget about organic production completely - 0
- Find more information about organic production - 67%
- Contact an organic certification agency for more information - 33%
- Join an organic farming group - 22%
- Adopt organic farming practices on your farm - 56%
- Begin an organic conversion paddock - 22%

6. Practice changes

Farmers were asked the question that if they chose to adopt organic practices on their farm, what practices would they adopt? The responses reflected a diversity of views ranging from doing nothing to actively trying a new technique.

- "Integrated pest management."
- " Seeing the farm as an overall holistic enterprise - a more environmentally sustainable approach."
- "Green manure after silage."
- "Reduce chemicals - look at drench solutions and long fallow green manure."
- "No new practices adopted at this stage."

7. Social, economic and environmental consequences

The project has continued to provide relevant and up to date information for farmers. The past two years have seen a significant investment by PIRVic, NSW DPI and RIRDC to expand the range of information on organic production to interested farmers. Economic and market information has been readily available to farmers as a result of this and other projects. However, results of gross margins and economic surveys have been highly variable which demonstrates that the organic industry is still developing and involves varying degrees of risk for the farmer. Production information is beginning to flow to farmers for the grains industry but this needs to expand to include livestock and a range of horticultural enterprises. Significant effort and investment will be required to demonstrate any environmental benefits of organic farming within the Australian environment. Only when all three of these parameters (economic, social and environmental benefits) can be brought together convincingly in examples of market success or advantage for farmers, will movement towards organic conversion occur more rapidly.

Table 14. Producer understanding (% of respondents) before and after the workshop in the range of subject areas presented.

Subject area	No understanding		Low understanding		Good understanding		Excellent understanding	
	Before	After	Before	After	Before	After	Before	After
Wheat	33	0	22	11	44	89	0	0
Canola	44	0	22	22	33	78	0	0
Weeds	22	0	22	11	56	78	0	0
Economics	33	0	44	0	11	100	0	0
Markets	33	0	56	56	11	44	0	0
Livestock	44	0	56	44	0	56	0	0
Certification	33	0	11	11	33	56	22	33
Grain Storage	33	0	44	22	0	56	11	22

Chapter Four

Discussion of results

Both objectives for this project were clearly met. A package containing economic, production and certification information was produced and presented at annual workshops and farmer meetings over the two years. Comprehensive evaluation of the workshops was conducted to ascertain whether farmers were likely to implement changes on their farms as a result of the new information delivered.

Despite the limited number of farms surveyed and the fact that only two years of financial performance data were collected, results from the economic survey showed that financial performance for organic farms could be deemed similar to that of conventional farms in at least one of the survey years. However, the survey also found that those farmers who have most recently converted their farms to organic production were not as well rewarded as those who had been organically certified for longer periods of time and were more experienced. This necessarily meant that the main effort for research and development to assist farmers in organic conversion should be directed at the first three years of organic production.

Information on organic production collected for the package was generated from the previous organic project, DAV 142A, in addition to other generic information of relevance to grain farmers in south-east Australia. For the first time many farmers were able to see a realistic snapshot of what other certified organic grain farmers were doing on their farms. For example, the package contained information on the crop type grown, the length of rotations, management methods for weeds, and soil fertility inputs. This recent information was generated as a result of a survey of certified farmers conducted in 2000. The package also utilised generic agronomic information such as crop densities for Victoria, yield losses due to ryegrass infestation, nutrient removal data, and stubble management information. The use of this information is significant because there is a substantial quantity of information generated within the conventional research sector with direct applicability to organic farming. Promotion of this information in a way that is sympathetic to organic systems value added to an existing resource and encouraged farmers from both organic and conventional systems to appreciate what alternatives had to offer.

The conversion and certification details provided in the package complemented the production and economic information well. The processes of conversion planning followed by certification application divided organic certification into two steps, which was more 'user-friendly' for farmers. Comprehensive checklists for both conversion and certification were supplied.

Farmer evaluation via the workshops indicated that a positive approach towards organic farming would continue as a result of the information package and workshop attendance. Approximately two thirds of farmers indicated that they would continue to find out more about organics. About half of the farmers indicated that they would begin adopting organic farming practices on their farms as a result of the new information supplied. As for taking the first step of commencing an organic conversion paddock, 33% of farmers in 2001, and 22% of farmers in 2002, indicated that they would do this. These last two results showed that at least half of the farmers attending the workshops were willing to adopt organic methods on farm, but the additional commitment of starting an organic conversion paddock was less popular.

The project has contributed to the expanding information pool on organic farming systems in the south-east Australian context over the past two years. Whilst there is interest in organic systems amongst conventional producers, the farmer meetings during 2001 and the GRDC Adviser Expos in 2002, indicated that there is much more work needed to validate organic systems in particular areas. Whilst many farmers realise the issues associated with conventional farming systems, the benefits of organic systems in terms of financial performance, social and environmental outcomes have yet to be sufficiently validated in an Australian context. Results of gross margins and economic surveys were highly variable which demonstrated that the organic industry is still developing and involves varying degrees of risk for the farmer. Significant investment in research and development capability will be required to demonstrate environmental benefits of organic farming in the Australian environment. Only when all three of these parameters (economic, social and environmental benefits) can be brought together convincingly in examples of market success or advantage for producers, will movement towards organic conversion occur more rapidly.

Chapter Five

Implications and Recommendations

This project has shown more evidence that the organic industry in Australia is perceived to entail significant risk for the farmer. However, the project provided a sound basis for farmers to commence organic grain production and gain an understanding of the organic industry and the certification process. A priority need for research and development applicable to currently practising organic farmers, in addition to those interested in conversion, was identified.

Information provision via workshops proved a successful approach because it generally enthused farmers to have a go at something new on their farms, to hear from others who are involved in the industry, and to learn some new skills. Workshops also provide the opportunity for facilitated social interaction, as farming is often an isolating experience for many, and often more so for farmers who are interested in organic production.

However, workshops are only ever as effective as the quality of information delivered and the process of engaging the participants. This project relied on information developed from previous projects, and current field validated research, to provide farmers with a realistic assessment of organic farming within the south-east Australian context. Continued investment in field research to validate organic production is required to provide the answers necessary for farmers to make informed decisions. Further effort is also required to bring forward leading organic farmers who can actively demonstrate success in organic farming.

It is recommended from this project that:

- Future investment targets the first phase of organic conversion to enhance farmer skills through training and decision support tools,
- Economic and financial information is required over successive years to provide a realistic picture of organic farm performance,
- Continued investment is required for field validation of organic systems in the Australian environment,
- Specific information sessions for practising organic farmers would complement current efforts to increase organic conversion.

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