

**AN ANALYSIS OF THE CONVERSION TO ORGANIC FARMING IN  
SOUTH AFRICA WITH SPECIAL FOCUS ON THE WESTERN CAPE**

THESIS PRESENTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF  
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by  
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## **DECLARATION**

I the undersigned declare that the work contained in this thesis is my own original work and that I have not previously in its entirety or in parts submitted it at an university for a degree.

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Signature

Date

## SUMMARY

Organic agriculture is a growing sector world wide due to the ecological and socio-economic crisis in conventional agriculture. The International Federation of Organic Agriculture Movements (IFOAM) estimated a growth rate of between 20 and 30 percent annually across the world. This trend is also detectable in South Africa although it is still a relatively new movement. During the last two years the number of farmers who had converted to organic farming has increased sixfold and although they still account only for a minute small percentage of the total agricultural production, the increasing importance of this sector can now be observed. This was the reason for this study, which dealt specifically with the conversion process to organic farming. Based on survey results, knowledge was gathered about organic farmers in South Africa concerning socio-demographic aspects, farming operations, motivations and problems of the conversion process. In the second part of the study, the focus was placed on three farming systems in the Western Cape, including pome fruit, vegetables and table grapes. Six farms were evaluated on the basis of technical, social and economic aspects of the conversion period.

Several differences were observed between organic and conventional farmers, including a higher level of education and a younger age of organic farmers. Mainly horticultural holdings were converted, with a potential for exporting. Problems farmers had to face during the conversion period included the lack of knowledge and information, higher weed infestation and high certification and inspection costs. On most of the farms it was still too early to assess the financial impacts of the conversion, but where it was possible, the feedback was mainly positive. The changes that took place during the conversion period included technical changes such as the approach to pest and disease control, fertilization and seed inputs. Essential investments at the beginning of the conversion period were a financial burden. Variable costs rose mainly as a result of an increase in labour and machinery input. The conversion period had no obvious impact on the fixed costs and thus the net farm income.

With respect to these findings it was recommended to support the conversion to organic farming not only financially with different instruments such as subsidies for certification costs but also to develop an improved infrastructure for marketing, networking and information exchange. Several areas for research were identified to increase the knowledge of organic farming in the South African context.

## OPSOMMING

Organiese boerdery is wêreldwyd 'n groeiende bedryf as gevolg van die ekologiese en sosio-ekonomiese krisis waarin konvensionele landbou verkeer. Die International Federation of Organic Agriculture Movements (IFOAM) het die groeikoers op tussen 20 en 30 persent per jaar wêreldwyd beraam. Hierdie neiging is ook in Suid-Afrika waar te neem, alhoewel dit hier nog 'n relatief nuwe beweging is. Gedurende die afgelope twee jaar het die getal boere wat na organiese boerdery omskakel het, sesvoudig toegeneem. Alhoewel hulle nog 'n baie klein persentasie bydra tot die totale landbouproduksie, is die toenemende belangrikheid van die bedryf waarneembaar. Dit was die beweegrede vir hierdie studie, wat spesifiek klem gelê het op die omskakelingsproses na organiese boerdery. Beskrywende inligting oor organiese boere in Suid-Afrika, soos sosio-demografiese eienskappe, boerdery-aktiwiteite, motiverings en probleme met die omskakelingsproses, is met behulp van 'n opname verkry. In die tweede gedeelte van die ondersoek is daar op drie boerderystelsels in die Wes-Kaap gefokus, naamlik vrugte, groente en tafeldruiwe. Ses boerderye is aan die hand van tegniese, sosiale en ekonomiese aspekte van die omskakelingsperiode geëvalueer.

Verskeie verskille is waargeneem tussen organiese en konvensionele boere, insluitend 'n hoër vlak van opvoeding en 'n jonger ouderdom van organiese boere. Hoofsaaklik boerderye in die hortologie, met uitvoer moontlikhede is omskakel. Van die probleme wat boere gedurende die omskakelingsperiode ondervind het, het 'n gebrek aan kennis en inligting, hoër voorkoms van onkruid, asook hoë sertifiserings- en inspeksiekoste ingesluit. By die meeste van die boerderye was dit nog te vroeg om die finansiële impak van omskakeling te kon beoordeel, maar waar dit tog moontlik was, is hoofsaaklik 'n positiewe terugvoer gevind. Die veranderinge wat gedurende die omskakelingsperiode plaasgevind het, het tegniese veranderinge soos die benadering tot pes- en siektebeheer, bemesting en saad ingesluit. Noodsaaklike investerings aan die begin van die omskakelingsperiode het 'n finansiële las tot gevolg gehad. Koste het hoofsaaklik weens 'n toename in arbeid- en masjinerie insette gestyg.

Op grond van die bevindinge van die ondersoek is aanbeveel dat ondersteuning vir die omskakeling na organiese boerdery nie net finansiël deur middel van verskillende instrumente soos subsidies vir sertifiseringskoste gegee word nie, maar om ook 'n verbeterde infrastruktuur vir bemarking, netwerke en inligtingsuitruiling te ontwikkel. Verskeie gebiede

vir verdere navorsing is geïdentifiseer om kennis oor organiese boerdery in die Suid-Afrikaanse konteks uit te brei.

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# **CHAPTER ONE**

## **INTRODUCTION**

## 1.1 INTRODUCTION

The growing ecological and socio-economic struggle of agriculture continues to result in the marginalisation of farmers world-wide, especially in the Third World countries, where it is happening at an increasingly concerning rate. Organic farming is one way of guiding agriculture in a different direction by providing opportunities for farmers and consumers. As a result organic farming is growing very fast. The International Federation of Organic Agriculture Movements (IFOAM) (2000a) estimated a growth rate of production of between 20 and 30 percent annually across the world. This movement, which was founded in 1972, has 770 member organisations in 107 countries, with its membership increasing especially in developing countries. IFOAM provides minimum production standards, which were used as the basis for the European Community (EC) regulations governing organic farming.

Based on surveys done in 1999/2000 10.5 million hectare (ha) are already managed organically. Oceania holds 50 percent of the world's organic land with 5 293 723 ha, followed by Italy with 958 687 ha, the United States of America (USA) with 900 000 ha and Germany with 452 279 ha. Although 'only' 32.8 percent of the world's organic area is located in Europe, the leading countries are located on this continent. Regarding the percentage of agricultural land allocated to organic farming, Liechtenstein is first with 17 percent, followed by Austria with 8.4 percent, Switzerland with 7.8 percent and Finland with 6.3 percent (Willer and Yussefi, 2000:23).

The organic food market shows greater growth rates than the market for conventionally produced food. In 1997 the main markets were the USA, Europe and Japan. Europe had retail sales of \$6 255 million, of which Germany was leading with \$1 800 million. The expected growth rate for the USA was 15 to 20 percent until the year 2000. In developing countries the movement is still relatively slow and the market small. However, the fast growing demand for organic products in Western countries, which cannot be satisfied with local production any longer, caused Willer and Yussefi (2000:25) to predict good results with export crops like coffee, tea, cocoa, spices, tropical fruits, vegetables and citrus fruits, as well as other products.

Another reason for expecting significant growth in organic farming is the way in which the occurrence of mad-cow disease "is changing the way Europe thinks about food (which has inspired) a political backlash against 'factory farming' (Emerson, 2001:8). In Britain, where the disease emerged much earlier than on the continent, the market for organic

products has grown six-fold since 1990, causing demand to outstrip supply by far (Emerson 2001:9). As a result, some politicians plan to put an end to factory farming and to support farmers who want to switch to organic farming to a greater extent.

What makes organic agriculture a particularly attractive option, is IFOAM's (2000b) view that it is the realisation of the sustainable agriculture approach (SARD), which aims at the sustainable use of land, water, plants and animal genetic resources, as well as environmentally non-degrading, technically appropriate, economically viable and socially acceptable farming techniques. Not only is it attractive to developed countries, therefore, but it could also contribute positively to the development of the economy of developing countries.

## **1.2 KEY ELEMENTS OF ORGANIC FARMING**

### **1. 2.1 The concept and philosophy of organic farming**

Organic farming can be defined as an approach to agriculture where the aim is:

“to create integrated, humane, environmentally and economically sustainable agricultural production systems, which maximise reliance on farm-derived renewable resources and the management of ecological and biological processes and interactions, so as to provide acceptable levels of crop, livestock and human nutrition, protection from pests and diseases, and an appropriate return to the human and other resources employed” (Lampkin, 1994a:4-5).

Organic farming is characterised by holistic thinking. The focus is not on producing high yields and achieving maximum output, but on maintaining sustainability in an environmental as well as in a social way. According to Lampkin (1994a:5) it is the concept of the farm as an organism, in which all the component parts – the soil, minerals, organic matter, micro-organisms, insects, plants, animals and humans – interact to create a coherent whole.

Owing to the holistic way of thinking, all types of organic farming pursue the same aims (Lampkin, 1994a:5-6 and Luenzer, 1992:319-320). As far as possible organic farmers attempt to operate in a closed-operation cycle, with minimal use of non-renewable resources. The natural living basis is used and fostered with a sense of responsibility and intentional avoidance of pollution. Furthermore, an improvement of the natural fertility of soils is considered important, as well as diversified production and a farm structure with

different plant and animal species. Extreme specialisation and intensive livestock management is avoided. Another important aspect of holistic thinking is the fact that full regard is paid to evolutionary adaptations, behavioural needs and welfare issues of animals, especially with respect to nutrition, housing, health, breeding and rearing. To complete the cycle, attention is paid to the production of healthy food and the creation of a secure existence on the basis of satisfying living conditions and a proper income for farmers and farm workers.

The key principles of organic farming are the use of predators and thermal or mechanical intervention instead of chemical-synthetic fertilisers, hormones, insecticides, pesticides or herbicides. A highly diversified crop rotation with a low share of maize, beets and cereals and a high share of legumes for nitrogen fixation, for example, is another important principle. Shallow turning and deep loosening cultivation are important, as well as the use of animal and green manure to foster soil fertility.

### **1.2.2 Regulations and certification**

After the steady development, which started in the 1920's, organic farming experienced unprecedented growth rates. Especially in Europe, a large number of different organisations were formed, which issued their own certificates and regulations for organic products. Germany alone has seven such organisations.

To develop a common basis and to make it easier for the consumer, the European Union (EU) accepted Council Regulation (EEC) No. 2092/91 of 24 June 1991 on Organic Production of Agricultural Products and Foodstuffs. The regulation governs labelling, rules of production, inspection systems, imports from non-EU countries, *etc.* (EU, 1991). The fertilisers, soil conditioners, products for plant protection and pest control, *etc.* that are permitted, are described in the annex to the regulations. Also included are processing aids and other products which may be used for the processing of organically produced ingredients of agricultural origin.

All organic products in Europe must have an EU-certification number on the label to make sure that they are 'purely' organic. Due to the fact that the EU does not yet have a logo, products are labelled with the logo of the respective organisations. During the time of conversion, which can differ between three years for organic-biological farming and seven years for biodynamic agriculture, the products are labelled with a special conversion label. Biodynamic products in conversion are, for example, labelled Biodyn.

The regulations of IFOAM are compulsory for organic farmers who are members and are even used by farmers in countries that neither have organic farming organisations nor export to the EU. Should these farmers wish to export to the EU, they would have to comply with the stricter EU regulations, which also apply to non-EU countries.

### 1.3 BACKGROUND FOR THE STUDY

#### 1.3.1 Organic farming in South Africa

As in most African countries, organic farming is still a very young industry in South Africa. During the last few years, however, more and more farmers have started with the conversion to organic farming. According to Moffet (2001:12) in 1999 only 35 farms were certified in South Africa, whereas in 2000 it had increased to approximately 150. According to the latest statistics, 211 farms were certified at the beginning of 2002 (see Table 1.1). The main products under certification were vegetables, wine and table grapes and other fruit, while the number of certified livestock is still very small.

**Table 1.1:** Certified farms in South Africa<sup>1</sup>

Province	Number of farms	Total certified area in ha <sup>2</sup>	Organic area in ha <sup>3</sup>	Area in conversion in ha <sup>3</sup>	Number of livestock	Main products
Western Cape	98	8 307	6 590.5	540.5	358	Vegetables, herbs, wine
Northern Cape	5	23 887.5	2 259.5	72	0	Grapes
KwaZulu-Natal	38	272	206.5	35.5	48	Vegetables, sugar, citrus
Gauteng	18	1 849	856	93	1707	Vegetables, herbs, livestock
Limpopo	16	480.7	418.2	32.5	96	Fruit, vegetables, herbs
Mpumalanga	12	705.9	298.5	87.4	0	Fruit, vegetables
Eastern Cape	9	32 313.5	1 351	3 013.5	1 000	Field crops, vegetables, teas
Free State	9	1 489.2	426.2	89	1 319	Fruit, vegetables, field crops
North West	6	1 571	1 379	118	63	Vegetables, livestock
<b>Total</b>	<b>211</b>	<b>70 875.8</b>	<b>13 785.4</b>	<b>4 081.4</b>	<b>4 591</b>	

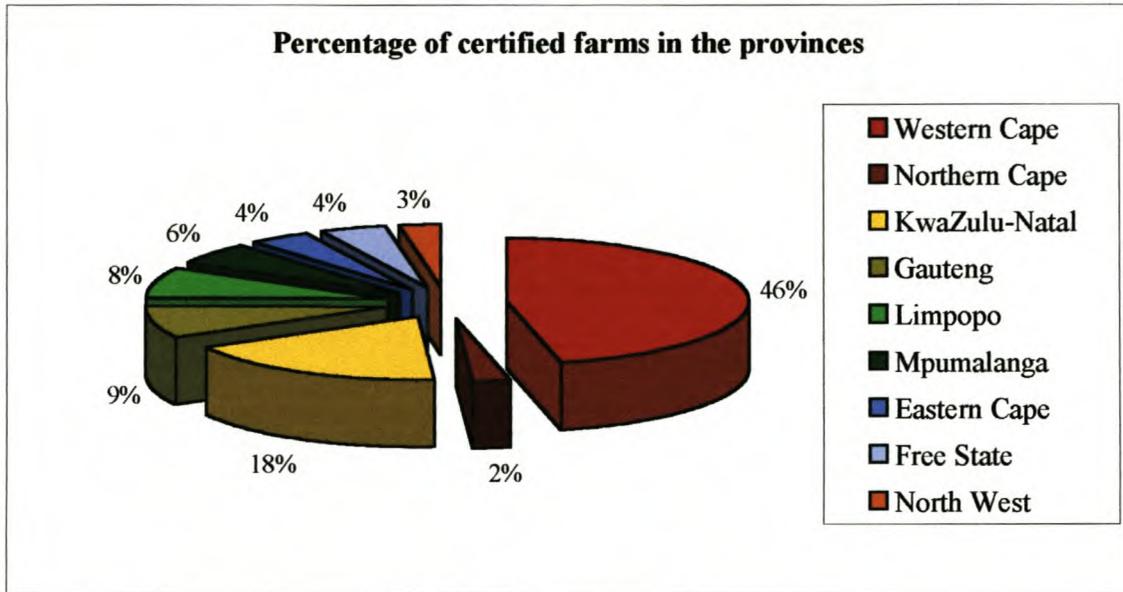
1: Excluded is the area certified by the Soil Association with a total of 787 ha (375.5 ha organic, 411.5 ha in conversion). The area could not be distributed over the provinces. The farms were mainly situated in the Western and Northern Cape with wine and table grapes as main enterprises. Also excluded are the area of Skal and the area under conversion of Société Générale de Surveillance (SGS), since no information was available.

2: Total area including cultivated land, permanent pastures and farm yard

3: Only area under crop production. Same information is missing as for 1).

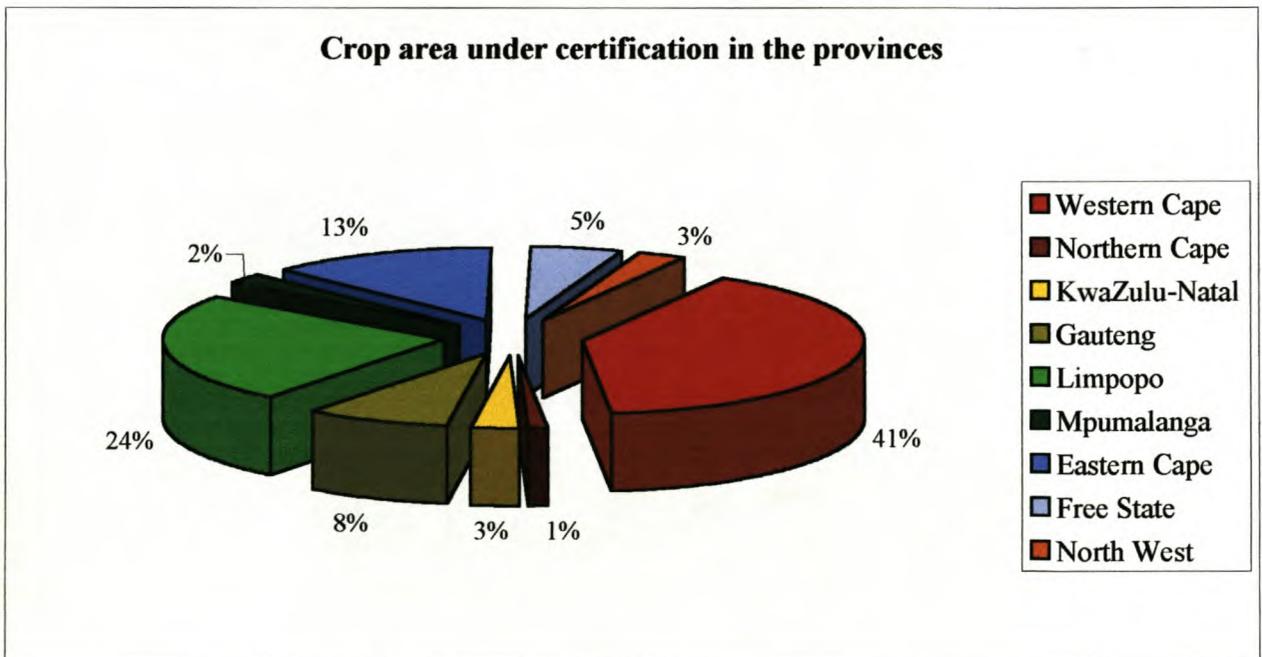
Source: Callear (2002)

The largest percentage of farms was located in the Western Cape (46 percent), followed by KwaZulu-Natal with 18 percent (see Figure 1.1). The other provinces had only a relatively small percentage of the certified farms, with three to nine percent.



**Figure 1.1:** Percentage of certified farms in the provinces  
 Source: Callear (2002)

Looking at Figure 1.2 it can be observed that the Western Cape also had the largest cropping area under certification with 41 percent. The second largest area was located in Limpopo with 24 percent, followed by the Eastern Cape (13 percent). Especially small percentages were found in the Northern Cape and Mpumalanga.



**Figure 1.2:** Percentage of crop area under certification in the provinces  
 Source: Callear (2002)

Six certification bodies were active in South Africa in 2002 (Kupka, 2002:16). Data were available on only five of them, which are displayed in Table 1.2. Not included is Skal SA, an international certification body based in the Netherlands. According to Kupka (2002:19) three farmers have been certified by this organisation thus far. At that stage, 52.1 percent of the farms were certified by Ecocert, a certification body from Germany with local inspectors available in South Africa. It was one of the first organisations active in South Africa, which explains the high number of certified farms. Certification by Ecocert is recognised in South Africa, the EU and, from December 2002 onwards, in the USA and Japan.

**Table 1.2:** Distribution of farms according to the certification organisations active in South Africa<sup>1</sup> in 2002

	Number of certified farms	Percentage of certified farms
Ecocert	114	52.1
SGS <sup>2</sup>	34	15.5
Afrisco	33	15.1
BDOCA	29	13.2
Soil Association	9	4.1
<b>Total</b>	<b>219</b>	<b>100</b>

1: Excluding Skal, which currently has three farms certified in South Africa (Kupka, 2002:19)

2: SGS includes only the fully organic producers. No information was available on the number of farms in conversion. According to Kupka (2002:19) the total number of SGS certified farms in South Africa varied between 90 and 95 in 2002.

Source: Callear (2002)

As shown in Table 1.2, Société Générale de Surveillance (SGS), an international inspection authority based in Switzerland, had 15.5 percent of all certified farmers<sup>1</sup> under contract. This percentage excluded the farms which were still in conversion. Kupka (2002:19) referred to between 90 and 95 certified farms under SGS in South Africa. SGS has been active in South Africa since three years and also does other audits such as Hazard Analysis and Critical Control Point (HACCP). The certification is accepted in South Africa, the EU and the USA.

As a local certification body, Afrisco has grown since its establishment in June 2001, and held 15.1 percent of the certified farmers in the country in 2002 (Kupka, 2002:16 and Callear, 2002). Certification is recognised only in South Africa so far, but a recent joined venture with Ecocert will open international markets for Afrisco’s producers.

<sup>1</sup> ‘Certified farmer(s)’ refers throughout this study to organically certified farmer(s) as well as to the ones who are still in the conversion process, unless stated differently.

The BDOCA belongs to the BioDynamic Agriculture Association of South Africa and does organic and biodynamic certification. 29 farmers were certified with this organisation at the beginning of 2002. Another certification body, represented by a small number making up 4.1 percent of the total is the British Soil Association. This certification body is based in the United Kingdom (UK) and recognised in South Africa as well as in the EU.

### 1.3.2 The Western Cape

The Western Cape is one of South Africa's nine provinces. According to Eckert *et al.* (1996:101) it is located in the south-western part of the country, and covers an area of 129 386 km<sup>2</sup>, or 10.6 percent of South Africa's total area. The population of 3 676 335 accounts for 9 percent of the total population and produces 13 percent of the Gross Domestic Product (GDP). The province differs in several aspects from the rest of the country. The population of the Western Cape consists of 58 percent so-called coloureds, 24 percent whites, 17 percent blacks and less than 1 percent Asians, whereas South Africa as a whole has 76.4 percent blacks, 12.6 percent whites, 8.5 percent coloured and 2.5 percent Asians (Eckert *et al.*, 1996:101).

As stated by the Development Bank of Southern Africa (1998:11) the Western Cape can be divided into three broad topographical zones, which are the coastal plain with an altitude below 400 meters (m), the folded ranges with mountains up to 2 260 m, and the interior plateau consisting of the Little Karoo with an altitude between 300 m and 600 m and the Great Karoo at between 600 m and 1200 m.

The soil patterns in the province are very complex. "Most of the mountains have shallow, rocky soils with rock outcrops, while the interior has shallow, calcareous soils, with some clayed duplex soils where geology dictates. The coastal belt ranges from sands, sometimes with underlying clay or podzol layers in the south-west, to clayey structured soils on weathered rock in the Swartland, and sandy loam soils on weathered rock in the Overberg. East of the Overberg, more significant occurrences of podzols are found where the conditions for their formation are optimal. The agricultural potential of the coastal portion of the Western Cape can be regarded as being reasonable because of the specific winter rainfall pattern, with the outer edges of the province being low because of the shallowness of the soil and semi-desert conditions. The richer soils of the Winelands, Breede River, Overberg and West Coast support vineyards, orchards and wheat fields" (Development Bank of Southern Africa, 1998:12).

The south-western parts of the Western Cape are the only parts of South Africa that fall in the winter rainfall area with warm summers and cool, wet winters, a climate that is comparable to that in the Mediterranean countries. The rainfall in the region is highly influenced by the warm Agulhas current in the Indian Ocean flowing southwards along the eastern coast and the cold Benguella current in the Atlantic Ocean flowing northwards along the west coast (Development Bank of Southern Africa, 1998:13). It varies from 400 millimetres (mm) in the north to 600 mm in the Overberg and reaches 750 mm in the Cape Flats. Extreme conditions exist in the mountains with up to 3000 mm in Jonkershoek and less than 400 mm in the Karoo. Typical for the Cape are the strong winds from the south-east in summer and from the north-west in the winter. According to Wesgro (1992:3) the landscape of the region is extraordinary in its diversity, contrasts and quality and has a variety of microclimates, influenced by the wind and the mountains.

The Western Cape is the province that makes the largest contribution to agricultural gross production (16.7 percent). "A main feature of the region's agriculture is production stability, based on stable and relatively adequate winter rainfall and supported by a well-developed infrastructure for both input supply and output processing" (Kassier, 1993:66). 34.4 percent of the land area is potentially arable, of which 4 percent is under irrigation. Grazing land comprises 77.7 percent. The main products of the region are fruit, winter grain, white meat and wine and grapes, but a large number of other farm products such as vegetables also contribute to the provincial economy (Eckert *et al.*, 1996:103). Of the more than 80 000 ha intensively cultivated and irrigated land, Elgin and Ceres are the main centres for apple and pear production and the Hex River Valley and Paarl for table grapes. With 270 000 ha, the Swartland is the main region for rain-fed wheat production and pastures. As cited by Eckert *et al.*, (1996:103), the product mix of the province taps into world trade through exports of fresh fruit, grapes and wine, where the demand is strong and price trends favourable. Especially the fruit and wine industry strengthened their position on the European, North American and Oceanian markets in 1990's.

Notwithstanding the positive picture of farming in the Western Cape, farmers are always examining their prospects. In an ever-changing industry, organic farming is one way to respond to the direction that export markets seem to be taking at present. Some examples of the existing organic movement in the Western Cape include the involvement of Capespan in organic fruit production (see Capespan, 2000), the organic vegetable production of Go Organic at Spier near Stellenbosch that intends converting the whole

estate into organic production, and Cape Organic, an organisation that manufactures and sells compost and pesticide sprays for the growing organic farming industry.

#### **1.4. STATEMENT OF THE PROBLEM**

As mentioned above, organic farming in South Africa is a fairly new industry that has experienced some growth during the last few years. Because in the Western Cape this new movement is quite strong, farmers have gained some experience of the conversion process. Their reasons for conversion are of different nature. Some are simply responding to personal difficulties. Others wish to create a more environmentally friendly and holistic way of farming. Yet others are responding to the increasing health awareness of consumers in South Africa and overseas.

Whatever the reason, however, it appears that South Africa and especially the Western Cape is following a worldwide trend towards a higher percentage of organic farms and will perforce have to deal with the problems related to conversion. The research problem that directed this study was therefore to analyse the process of conversion to organic farming in South Africa and especially in the Western Cape.

To give more clarity to this issue, the following sub-problems were identified for research in this study: What are the features of organic farmers in South Africa? What are the problems associated with the conversion from conventional to organic farming in South Africa and especially in the Western Cape, and how can they be resolved? This included an examination of technical, economic, institutional and social factors that influence agriculture in South Africa (with a closer look at the Western Cape) and are likely to affect the conversion process.

#### **1.5 AIM AND VALUE OF RESEARCH**

To summarise: the aim of this study was to acquire knowledge about organic farmers and farms in South Africa. A further aim was to determine which problems are associated with conversion from conventional to organic farming in South Africa and specifically in the Western Cape, and how they can be resolved.

The value of the research lay in its ability to help farmers who intend to switch to organic farming. The concluding guidelines could help them with the planning, the technical steps of the process of conversion and economic decisions. Furthermore it could prepare the

farmers for the problems they are likely to face during this period. It should also provide some recommendations on how to deal with the problems. Both the South African Government and Cape Organic Producers Association (COPA) as well as Organic Agriculture Association of South Africa (OAASA), who could help to establish methods and instruments to deal with these problems and to make organic farming more attractive, will benefit by this information. Researchers would learn what kinds of problems require further research.

## **1.6 UNDERLYING ASSUMPTIONS AND HYPOTHESES**

The assumption underlying this study was that South Africa and especially the Western Cape is a region with a potential for organic farming. However, all forms of agricultural conversion are accompanied by problems. To address the problems of conversion successfully, they need to be identified and analysed in terms of the conversion process experienced elsewhere. This assumption has given rise to the research question of this study.

Several hypotheses, based on the findings of the literature, were tested in this study. These included that organic farmers are younger and better educated than their conventional counterparts and that organic farms are smaller than conventional, since organic farming is still in an early stage of development in South Africa. It was expected that farmers in South Africa who are in the process of converting to organic farming have to deal with the same basic problems, such as lower yields and lower product prices, as converting farmers in other countries. However, additional problems that are specific to the region were identified in the study. One problem that was already apparent is the lack of suitable legislation and of certification bodies.

## **1.7 METHODS SELECTED FOR THIS STUDY**

For the first part of the study, a survey was done to collect data about organic farmers in South Africa. By means of postal questionnaires a large number of farmers (29 respondents) could be included to draw a picture of organic farmers and farms in South Africa.

The limited response on the postal questionnaires led to limited data (16 respondents) that was available in the Western Cape. For this reason the case study approach has been

selected for the second part of this study. The number of farmers farming organically or in conversion were too small for survey data. Also, this small number was spread over too many different production systems for the data to be adequate for any of the other approaches, all of which require a larger set of data.

The case studies were instruments for the identification of specific problems of conversion in the Western Cape. Three main production systems were chosen, with two farms in each of the systems. Data were collected from the last year conventional farming, as well as from the years of conversion. Where possible, data from the first organic year were included as well. This method was selected to clarify specific aspects of and problems occurring during conversion on organic farms in the Western Cape and to show whether the problems existed only within the conversion process and what changes took place during this process. The method also allowed for the identification of differences in the nature of the problems encountered the three types of farming systems.

The data for both parts of the study were collected by means of questionnaires. Two questionnaires were developed with specific questions on technical, economical, institutional and social aspects of the farm as well as of the conversion process. Questions on problems of the conversion process were therefore included in the questionnaires. The first questionnaire covered these aspects rather generally, while the questionnaire designed for the case studies covered the relevant aspects in depth. Interviews were used as a tool in this context because information was needed on specific changes and problems occurring during the conversion process. Finally, all the data gathered for this study were analysed with the theory on organic farming and the findings of the literature in mind.

## **1.8 POSSIBLE LIMITATIONS**

Since the number of organic farmers is still relatively low and response rates were not expected to be higher than 30 percent, the representativeness of the data must be handled with care. Another limitation was that this study covered multiple components of the conversion process. A far more detailed economical analysis of the conversion could be done. However, several limitations, discussed in Section 1.7 and 4.5, would not have resulted in a representative analysis at that stage. Nevertheless, a study of that import could only benefit from the results of this study, which identified specific changes and problems of conversion and of organic farming in the Western Cape, as well as possible additional areas for research in this regard. A lack of literature on organic farming in South

Africa meant a further limitation for this study. At the time the literature review was done (2001) hardly any sources were available and thus international literature was used.

## **1.9 SEQUENCE OF CHAPTERS**

Chapter 2 and 3 provided a theoretical description of the conversion process. Technical, institutional and economic steps are described, as well as instruments that are needed for the conversion process. The third chapter ends by identifying general problems of conversion. In Chapter 4 the general aspect of researching organic farming systems were discussed. Furthermore, the methodologies used in this study were illustrated. Chapter 5 provided an analysis of the data collected by means of the first questionnaire. Chapter 6 and 7 evaluated the data collected in the case studies specifically for the Western Cape. Chapter 8 contained the conclusions and recommendations.

## **CHAPTER TWO**

# **REVIEW OF THE CONVERSION PROCESS AND ITS KEY ELEMENTS**

## 2.1 INTRODUCTION

Conversion to organic farming is influenced by physical, financial and social factors, which differ from those associated with established organic farming systems. The process is complex, requiring the restructuring of the farming system, changes in production methods and other innovations. The success of the conversion is highly dependent on the social, natural, institutional and political environment of the farm and a well designed conversion plan.

In this chapter an introduction to the conversion process is given. Typical socio-demographic characteristics of converting farmers and their farms are discussed according to the findings of the literature and the steps of the process leading to the decision to convert a farming operation to organic farming are outlined. The most important steps of the planning process are examined in detail. Theoretical aspects such as the extent of planning and the framework as well as the steps of the planning process are depicted. The second part of the chapter deals with the elements of the conversion plan and analyses their planning aspects. The emphasis is put on crop production, fertilization, insect and disease management. The chapter concludes with the examination of administrative and economic elements of the planning process.

## 2.2 THE CONVERSION PROCESS

According to Padel and Lampkin (1994:295) conversion to organic farming is a process over several years during which a farming system is changed from conventional to organic practices. The physical, financial and social influences during this period differ from those an established organic farming system has to deal with. In the case of a three-year conversion, which is a common period, the first year is called the zero year. During this year, the products are sold as conventional products requiring no specific certification. Under European Community legislation (EU, 1991), products can be labelled 'in conversion' during the next two years to get premium prices (Freyer *et al.*, 1994:244).

The conversion is a complex process in which farms are required to meet several aims. One of the aims is the improvement of soil fertility with legumes. This method replaces synthetic nitrogen fertilisers and reduces the input of bought-in manure. To meet the natural capacity of the farm concerning fodder, the stocking rate also has to be reduced. Another important requirement is that the management of the farm should be changed so

that the farm is able “to maintain animal and plant health with the limited inputs available according to organic production standards” (Padel and Lampkin, 1994:295).

Padel and Lampkin (1994:300-301) identified four different stages in the conversion process. Stages 1 and 2 contain the agglomeration of knowledge. This can be done in different ways, such as a study of the literature in stage 1, followed by discussions with other organic farmers and organisations and the attendance of seminars and conferences in stage 2. Stage 3 is called the ‘trial’ phase. This refers to the practice of testing practices on one field in order to gain experience. The main problem in this regard is that the method does not provide experience of organic farming as a complete system. Stage 3 can also be used for planning the conversion in order to reduce the risk of the conversion process. Stage 4 is the final adoption process.

Three different approaches to conversion can be identified: *staged conversion*, *single step conversion* and *gradual deintensification*. Padel and Lampkin (1994:301) defined *staged conversion* as a process that involves the conversion of parts of the farm, typically 10 to 20 percent, in successive years, using fertility-building legume crops as an entry into organic management. The learning costs, capital investments and risks can be spread over a longer period of time, sometimes up to ten years or the full length of a rotation cycle, and are more easily carried by the remainder of the farm business. The disadvantage of this type of conversion is that certification bodies do not always accept it. In the *single step approach* the whole farm is converted at once. The advantage of this approach is that the farms gain access to premium prices sooner. The disadvantage is that all the risk, learning costs and financial impacts of conversion are concentrated in a short period of time (Padel and Lampkin, 1994:301). Table 2.1 summarizes the characteristics of these two conversion strategies.

**Table 2.1:** Characteristics of staged versus single step conversion

Factor	Staged conversion	Single step conversion
Risk of decline in total farm income	low	High
Conventional contracts	retained	Lost
Initial investment costs	low	High
Management	complex, inconsistent	simpler, consistent
Transition period	long	Short
Initial volume of organic produce	low	High

Source: Fisher (1989:43)

*Gradual deintensification*, which can be defined as the way of experimenting with the taking out of inputs, is also not acceptable to certification bodies. It can, however, be used in cases where certification is not important. Since it is difficult to determine when conversion has been fully achieved, this approach is not discussed in detail here.

The success of the conversion process is largely dependent on the condition of the farm before conversion and the peculiar difficulties a farmer has to face. One general requirement, however, is that the conversion process starts with a change in thinking. To maintain interest throughout the process, the farmer must be convinced that an organic farming system is better than a conventional one. Whichever approach a farmer selects, conversion includes both opportunities and risks. Important is the willingness of the whole family or farm community to handle the risks and problems and to work together to find solutions. Affinity with the conversion is therefore a key principle (Rantzau, 1992:21).

According to Lampkin and Measures (2001:32-33) the conversion process involves a large number of innovations, including the introduction of:

- new marketing approaches such as direct marketing to consumers, local shops or specialist organic retailers, as well as adding value (*e.g.* cleaning cereals) and processing (*e.g.* milk into yoghurt or cheese) in order to obtain a premium;
- new crop production practices and inputs, such as mechanical weed control, biological control, clover/grass mixtures, undersowing, intercropping, and new tillage practices;
- new livestock management practices such as more natural rearing systems, appropriate housing, complementary animal therapies like homeopathy and integration of livestock into the whole farming system;
- new manure management practices such as composting and slurry aeration;
- new crop and livestock enterprises such as potatoes, grain legumes, field-scale vegetables, integration of sheep and cattle;
- new labour sources such as students or casual labour.

## 2.3 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF ORGANIC FARMERS AND FARMS

Studies by Schulze Pals (1994), Padel (2001), Lockeretz (1995), Lockeretz (1997), Duram (1997), Egri (1999), Fischer (1989) and others have evaluated, among other things, the socio-demographic characteristics of organic farmers in Europe and the US. Included were age structures, education levels and farm sizes compared with conventional farmers and farms. Other indicators were not included since this study not solely concentrates on socio-demographic characteristics. The indicator used were seen as the most interesting in this context. In Chapter 5 additionally motivation factors of the surveyed farmers for conversion are discussed.

### 2.3.1 Age structures

Fisher (1989) and Egri (1999:65) found no differences in age between organic and conventional farmers in New Zealand and Canada, while Schulze Pals (1994:99) discovered that organic farmers in Germany were significantly younger than conventional farmers. The latter is supported by Duram (1997:205), who documented an age difference of over 10 years on average in the USA. Lockeretz (1995:664) came across similar results in a study also done in the USA. Several reasons can be responsible for this difference in age:

- Young farmers are not as strongly involved in the farming community due to the absence from the farm for education purposes. The decision to convert can be made on a more rational base (Schulze Pals, 1994:99, Rantzau *et al.*, 1990).
- Young farmers are often better educated than older farmers and therefore have a better knowledge of the risk they are taking (Schulze Pals, 1994:99).
- Young farmers could be more conscious about the environment.
- Younger farmers are more likely to have the physical ability to accept a higher working load during and after conversion (Fischer, 1989).

The hypothesis tested in this study is that organic farmers are on average younger than conventional farmers.

### 2.3.2 Education levels

Fisher (1989), Rantzau *et al.* (1990), Schulze Pals (1994:100) Lockeretz (1995:664), Lockeretz (1997:18-19) and Egri (1999:65), all found higher levels of education among organically certified farmers in their studies, which were carried out in New Zealand, Germany, the USA and Canada. Although it cannot be agreed that organic farming is restricted to well-educated farmers, the higher level of education meets the demand for detailed and specific information especially during the conversion period (Rantzau *et al.*, 1990). Schulze Pals (1994:100) also saw a higher level of education as support when the farmer evaluates the risk he is taking, as mentioned already in Section 2.3.1.

A higher level of education also corresponds with the theory of innovations, which states that innovators are better educated than later adopters (Padel, 2001:43-44). Furthermore Lockeretz and Wernick (1980:714) confirmed a positive relationship between education level and the adoption of environmentally beneficial agricultural practices, which is supported by Egri (1999:65) and Fisher (1989). A higher level of education among organic farmers compared to their conventional counterparts will also be tested in this study.

### 2.3.3 Farm size in comparison to conventional farms

Several studies have supported the hypothesis that organic farms in the USA, Canada and New Zealand are smaller in scale than conventional ones (MacRae *et al.*, 1990, Lockeretz, 1995, Fisher, 1989, Egri, 1999 and Alteri *et al.*, 1983). Lockeretz (1995:664) examined a sharp difference both in sales and in the amount of land cultivated in the USA, while Lockeretz and Wernick (1980:716-717) found no difference in size in an early study in the USA. Egri (1999:65) documented that conventional farms in British Columbia, Canada were on average 61 acres larger than organic farms. Reasons for this could be that risks and problems associated with the conversion process fright large-scale farmers, as they see difficulties in implementing organic methods on a large-sized farm (Egri, 1999:65). A further aspect could be due to financial pressure owners of smaller farms have to face often. Thus they are forced to consider high-value agricultural activities such as organic farming.

Offermann and Nieberg (2000) discovered in a newer study that organic farms in the EU are larger than their conventional counterparts. According to the authors a shift took place in the EU as early as the late 1980s and in Germany in the early 1990s when the size of organic holdings overtook that of conventional ones. Padel (2001:44-45) hypothesised that

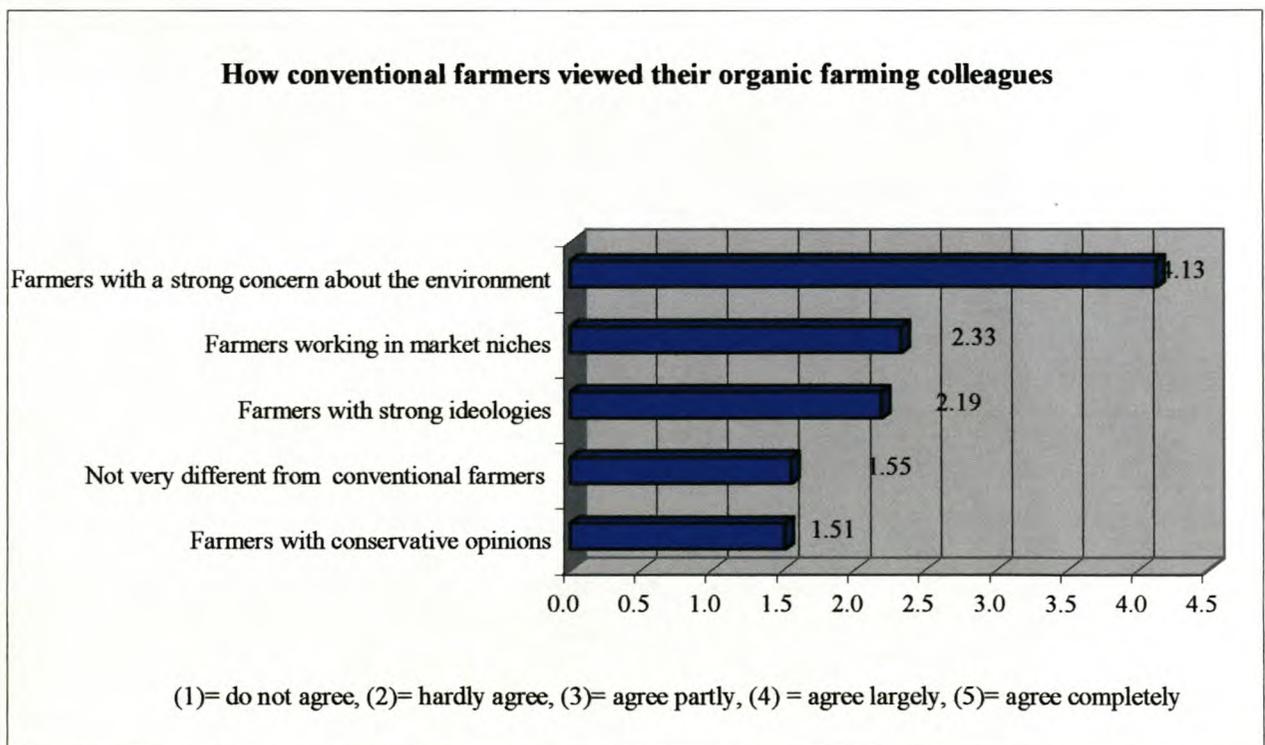
this increase occurred during the process of diffusion of innovation, but could also be related to structural changes in agriculture. Despite the findings of Offermann and Nieberg (2000), the hypothesis for this study will be that organic farms are smaller than conventional farms, since organic farming is still in an early stage of development in South Africa.

## 2.4 EVALUATION OF THE DECISION PROCESS

Schulze Pals (1994:102) identified three phases during the process of deciding to convert to organic farming: (1) contact phase, (2) information phase and (3) decision phase.

### 2.4.1 Contact phase

Schulze Pals (1994:103) found, in a study on aspects of the conversion process in Germany, that most of the 107 farmers interviewed came into contact with organic agriculture at the beginning of the 1980s, although conversion started only in 1990. As can be seen in Figure 2.1, the opinions of conventional farmers about organic farmers were mostly positive, especially with respect to their strong concern about the environment.

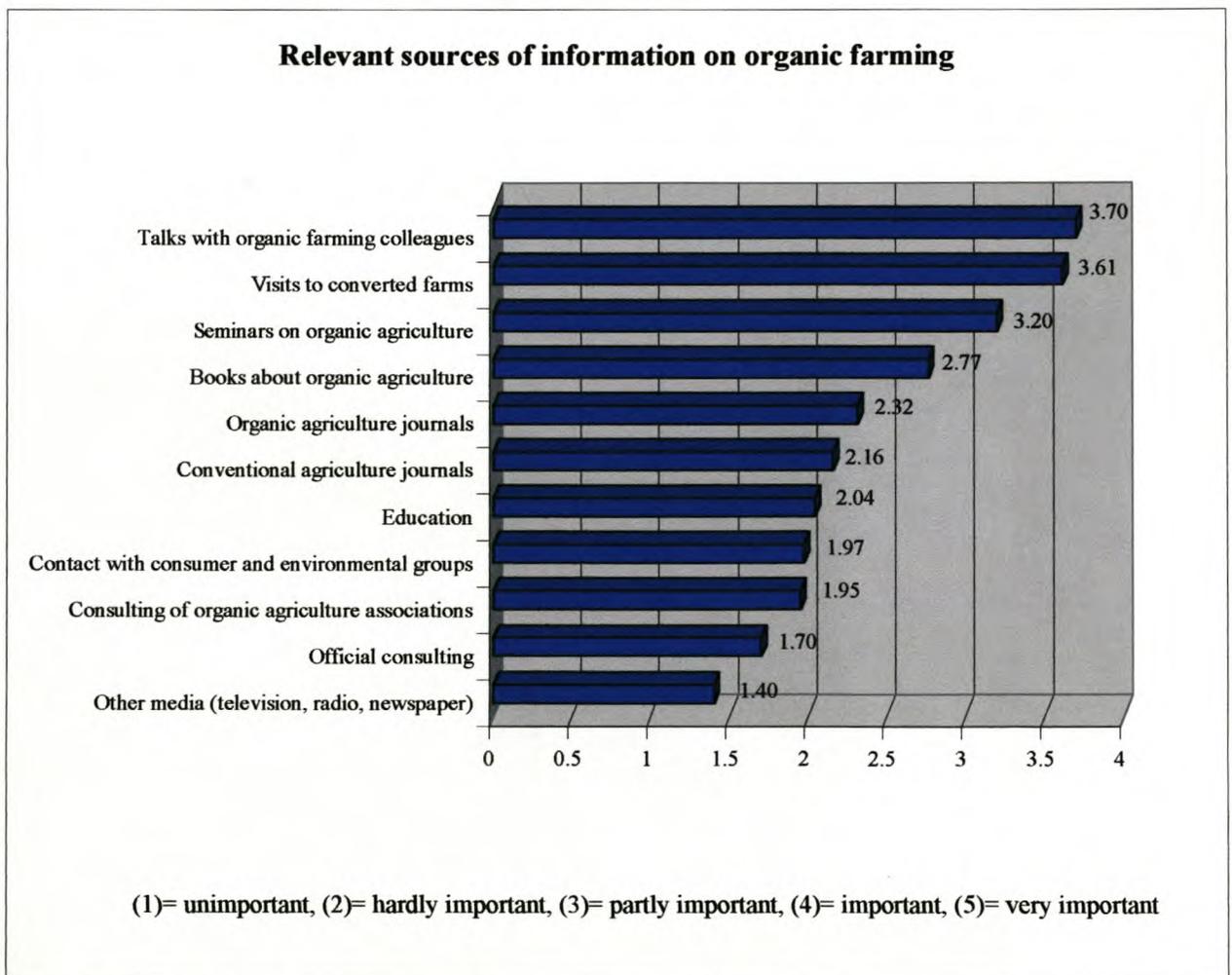


**Figure 2.1:** Opinion of interviewed farmers on their organic farming colleagues during the contact phase

Source: Schulze Pals (1994:103)

### 2.4.2 Information phase

During the information phase the farmer must try to accumulate as much knowledge as possible. Talks with colleagues, visits to other farms, seminars about organic agriculture and specific books are most often used as sources of information (Schulze Pals, 1994:104). These findings were confirmed by Fisher (1989:36), who found books, seminars and talks with individuals in the organic movement to be the most useful sources for practicing and prospective organic farmers. Other sources could be journals for organic and conventional agriculture, training courses, contact with consumer and environmental groups and other media like television, radio and newspapers. Figure 2.2 shows the results of the evaluation done by Schulze Pals (1994:104). The most used sources of information in that study were talks with colleagues, visits to farms and seminars.



**Figure 2.2:** Relevant sources of information on organic farming

Source: Schulze Pals (1994:104)

### 2.4.3 Decision phase

The information phase results in the decision to convert to organic agriculture. After the decision is made it normally takes another year or two until the conversion process is started.

Negative experiences with conventional farming systems are often reasons for converting to organic farming. According to Freyer *et al.* (1994:245) a survey of 63 farms in Germany found the following reasons: decline in farm income (32 percent); soil exhaustion and soil erosion (14 percent); increase in animal diseases (32 percent); increase in pesticide costs and aversion to the use of pesticides (19 percent). Financial reasons are especially at the forefront (Padel, 2001:46, Lockeretz and Wernick, 1980:714-715), although a change to organic farming does “not intend to be a solution for the structural problems of farming in general” (Freyer *et al.*, 1994:245). An important issue is also nature conservation and environmental protection (Michelsen, 2001a:74-75, Padel, 2001:46, Lockeretz and Wernick, 1980:714-715). The focus is put on maintaining and protecting nature instead of achieving high yields. Other concerns such as sustaining a traditional agricultural structure based on small family farms, enhancing relationships between producers and consumers or supporting the Third World, show that conversion is not focused on the farming situation alone, but also on wider issues (Freyer *et al.*, 1994:245, Rantzau *et al.*, 1990, Padel, 2001:47).

## 2.5 THEORY AND COMPONENTS OF THE PLANNING PROCESS

### 2.5.1 Theoretical background

#### 2.5.1.1 *Planning the conversion process to organic farming*

Farm planning in general consists of finding and formulating aims, formulating a structure to achieve these aims (time and content) and preparing the accompanying means for the change. These steps must be taken in order to develop a farm organisation which functions well and meets all the needs of the family and farm community. An important factor in the planning process is the analysis of the farm history and the current farm situation. These are essential for the accomplishment of the aims and the selection of a procedure for achieving these aims (Freyer, 1991:31).

The planning of the conversion to organic farming includes the need to emphasize the differences between the conventional farm and organic farming in planning. It is also

important to distinguish between the theoretical elements and the methods of production systems of conventional and organic agriculture. Short term and long term optima for the farm must be considered. Although planning is a means of lowering the risks and can help to estimate the effects of possible decisions, it does not prevent the farmer from having to make everyday decisions, which may not be included in the conversion plan. According to Freyer (1991:31-32) the planning of conversion to organic farming differs on several points from planning within conventional farming:

- Extent of planning:

All parts of the farm must be changed with respect to the regulations. Exceptions are farms with extensive systems or dairy farms, which can keep their production systems largely as they are. Since conversion process spans several years, multi-period planning is necessary for agricultural production as well as for investment, financing and cash flow. Basing the individual production years on each other in a holistic way is part of the planning process. This differs from a conventional system, in which complete new planning of the farm is rarely undertaken, since parts of the production can be planned separately.

- Input supply

Most organic farming regulations prescribe a limited supply of inputs from outside. Maintaining and improving the soil fertility, production of fodder and maintaining the stock numbers should be achieved from within the farm as much as possible. Thus the parts of the production process cannot be seen as isolated from each other. This differs from conventional farming, which allows for the supply of inputs from outside without limits.

- Framework for production

Organic production is oriented to specific regulations, which must be taken into account when the conversion is planned.

#### *2.5.1.2 Information needed for the planning process*

Decisions about the development of the farm are made on the basis of knowledge of possible alternative methods of achieving these aims and the farmer's assessment of these alternative methods. Information about aims and the possible ways of achieving these aims can be known and certain, known and strongly varying, or missing.

A system of aims can be either static (working with secure future expectations) or dynamic (working with time references or achieving of aims in stages). In the conversion to organic agriculture, the planning basis must be a dynamic system of aims, which means that losses and delay times have to be taken into account (Freyer, 1991:38). One of the main elements of planning is to develop a target farm, which must, however, be continually adjusted during the process of conversion. Several decisions that have to be made are based on uncertain factors and influences, which make the field of decisions multi-dimensional, including a time dimension. The more the target farm differs from the original farming system the more uncertain the planning situation is. Especially in the first year of conversion, the farmer has to deal with a number of uncertainties such as reduction of yields or insect infestation. As the process of conversion progresses, the uncertainties decrease, since the farmer can rely on experiences made in the first years of conversion. Thus the farmer must adapt his conversion plan after a certain time (*e.g.* one conversion year). Freyer (1991:40-41) mentioned two approaches for adapting to the changing situation:

- At the beginning of the conversion period a plan is developed. After a certain period of time, the plan is upgraded, taking the experiences and the different market situations into account. The plan is changed or developed anew.
- In the beginning, different alternatives are developed. After a certain time period one of the alternatives is chosen based on experience and a different market situation. No update takes place. For this approach, information about the expected development of the farm and the factors which influence the farm from the outside (politics, environment, *etc.*) is needed from the outset.

### 2.5.2 Steps in planning the conversion process

Although whole-farm planning with the assistance of a specialised advisor can help the farmer during the process of conversion, it is not practised very often, even where organic farming is already established in European countries (Freyer *et al.*, 1994:245). Whole-farm planning helps to identify structures and risks that can make conversion difficult. By identifying these problems they can be addressed in advance. Part of the conversion planning is ideally a multi-period analysis of financial and physical aspects of the whole farm. It includes an analysis of the existing farming situation, the definition of a conversion

target and a step-by-step plan of how to reach this target. Rantzau (1992:26) cited five measures of conversion planning, which are discussed in the following sections.

### *2.5.2.1 Description of the current farming situation*

When analysing the existing farming situation one must not collect detailed data but rather identify typical features of the farm. This helps to create a picture of possible limitations concerning resources and structures of the farm and the environment. Some aspects may be as follows:

- family situation;
- labour equipment, labour intensity;
- farm size, distribution of activities;
- soil features;
- climatic conditions such as rainfall, temperature;
- crop rotation;
- fertilization;
- weed, pest and disease control techniques;
- livestock stocking-rate;
- animal housing;
- feeding;
- marketing and proximity to the market;
- financial situation;
- expected problems, special features.

Special attention must be given to the financial aspect of the current farming system due to the fact that higher leverage causes a higher conversion risk. Rantzau (1992:20) advised against conversion in the case of high financial debt.

### 2.5.2.2 Identification of the expectations of family and farming community

The second step is to explore the expectations of the family or the farm community. What do the members expect from the conversion and what are their fears? These could include no increase in work, no big investments or more independence. No matter what the expectations are, they must be discussed and accepted by all parties involved.

### 2.5.2.3 Planning of the target farm

After a clear picture exists of the expectations, the planning of the target farm can start. Besides the above-mentioned planning points, Herrmann and Plakolm (1991:391-400) included fertilization and marketing planning as elements in the planning. During the planning of the organic target a balance must be found between creativity and ideas that are possible to realize. The ideal plan is led by the existing factor of the farm that is the most difficult to change (e.g. marketing or milk quota). This factor is also the starting point of the plan with every step developed accordingly. If the steps are not based on each other, problems of a different nature can occur. Rantzau (1992:28) provided a few examples:

- The planned crop rotation is ideal for the existing soil, but there is a lack of straw. Too much fodder is produced and the income stays negative.
- A farm with a positive income is created but direct marketing cannot be realized due to a lack of labour.
- The milk quota should be kept but at the same time the crop rotation is extended by introducing so much bread grain that the area for fodder is insufficient.

The following three examples based on Rantzau (1992:28) are given to visualize the possible course of the conversion planning as it can be the case under European conditions:

**Example 1** (dominating enterprise is milk production):

milk quota – stocking rate – demand for animal feed – crop rotation – labour/income – additional activities (vegetables, direct marketing)

**Example 2** (dominating enterprise is the marketing of animal products):

marketing – stocking rate – demand for animal feed – crop rotation – labour/income – additional activities (vegetables, processing)

**Example 3** (dominating enterprise is crop production):

crop rotation – labour/income – additional activities (direct marketing, animals)

These examples provide an idea of the planning process. The points included are discussed in more detail in Section 2.6 and Chapter 3.

#### *2.5.2.4 Time planning*

Time planning involves the decision on the approach to conversion. The farmer has to decide, together with the certification organization, whether a staged conversion or a single-step conversion will be chosen. Then special emphasis must be put on fodder planning (if animals are involved) and rotation planning. This is necessary to avoid decreases in yield and to guarantee an uncomplicated shift to the planned organic crop rotation. Vegetables require special attention since it is an exact business. According to Lampkin (1990:428) precise timing is necessary for primary cultivation, planting, weed control and harvesting. Lampkin suggested special strategies for the selection of varieties, choice of plant densities and the achievement of uniform production at the correct time of year.

#### *2.5.2.5 Controlling of the plan*

The planning of the conversion process must be flexible over the years and must be adapted to reality. Although the planning is done for the whole conversion period, the plan should be revised after the first year, in order to include the experience of the first year. A re-examination of the farming situation and thus the plan should be done at the end of every conversion year.

## **2.6 ELEMENTS OF CONVERSION PLANNING**

In the following sections the different elements of the conversion plan are discussed. Due to the lack of South African literature on this topic, mainly literature written on European, North American and New Zealand conditions is used. Thus general principles are discussed and examples are given, which are not necessarily applicable as such to the South African conditions, unless stated differently.

### 2.6.1 Design of a marketing strategy

The planning of marketing is the most important part of the conversion plan and highly dependent on the marketing possibilities. Since the rest conversion strategy should flow from this part of the plan, it is discussed first. This importance means a farmer has to find out if well-established marketing systems exist and how his farm is located in relation to the markets. Other factors that must be taken into account the structure of the population and the number of consumers who are willing to pay higher prices for organic products. If no demand or market exists for planned output, the production plan must be reconsidered.

Marketing during the conversion period is difficult because the products can in most cases not be sold at a premium price. They could either be labelled as ‘in conversion’ or sold as conventional products. Therefore the farmer must try to get as much security as possible from the products he is producing. According to MacRae *et al.* (1990:177) he has various possibilities. The farmer can either adjust product quality and variety to meet local consumer demand or can diversify the product offerings and marketing strategies to meet fluctuations in climate and price. MacRae *et al.* (1990:177) provided the example of growing a special product for an ethnic group, which can be a target group of the marketing activities. This could be of special interest under South African conditions due to the different ethnic groups the population is consisting of. Other possibilities are the processing of products and marketing through different channels. Direct marketing from the farm is favoured in the organic farming movement is. If a large enough group of consumers exists, higher gross returns can be expected than from selling to a wholesaler. The often great distances between farms and towns, however, make this way of marketing in most parts of South Africa less suitable. Further alternative marketing channels are food-coops, delivering services or farmers’ markets.

Financial risk can be minimized if the converting farmer plans ahead, identifies markets for products, converts the farm in stages, and gradually cuts expenditures on off-farm inputs. Early identification of the market is especially important in the case of vegetables in order to avoid poor prices (Lampkin, 1990:428). Developing cropping systems that balance the financial and biological needs of the farm will also reduce the chances of farm failure (MacRae *et al.*, 1990:190).

## 2.6.2 Design of a suitable crop rotation

The conversion process causes a change in the relationship between enterprises. The entire farming operation becomes more integrated and new combination possibilities are formed. These closer connections result in the necessity for a more strongly differentiated organisation of the farm. A change in capacity in one enterprise requires an adjustment in the related enterprises respecting the whole farm. In this context special attention must be given to the design of an efficient crop rotation, as it is a central issue of the organic farming system. It is a key factor of soil management, animal feeding and weed, pest and disease control. A balance must be found between crops needed for animal feeding and cash crops. According to Freyer (1991:46) two ways can be chosen in the planning of the conversion rotation:

1. The focus is on efficient production of forage and the regeneration of the soil. To achieve this, a higher percentage of legumes than planned for the long term is planted.
2. To increase the farm income a higher percentage of cash crops is planted. Forage and legumes are reduced as far as possible. The input of feed from outside is increased up to the limit the regulations allow.

Alternative one raises the plant health and yields in the middle and long term. In this case the profit will be achieved later. The conversion time is used to invest in soil fertility and to fulfil the need for basic fodder out of own production.

Possibility two is used to increase the short-term income. The higher income can be used to reduce debt and for necessary investments during the conversion period. Reduction in soil fertility is either accepted or managed with intensive use of undersowing and catch crops<sup>1</sup>. Which of the alternatives is chosen depends on the restrictions placed by the situation of the farm or the environment in which the farm has to operate.

Special attention must be given to the percentage of legumes since they are essential in any rotation and should comprise, *e.g.* under European conditions, 30 to 50 percent of the cropland. They are necessary to fix nitrogen from the atmosphere into the soil. Table 2.2 shows, as examples from North America and Europe, the seven most important rules a farmer should obey in order to create a successful crop rotation. With these rules in mind a carefully planned crop rotation increases not only yield stability but helps also to reduce

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<sup>1</sup> Catch crops are crops (often legumes) planted between the harvesting and the sowing of two crops. They are used as green manure, to bind nitrogen and/or to protect the soil against erosion.

disease and weed pressure as well as soil erosion. Furthermore it ensures a balanced nutrient supply for the crops (Stockdale *et al.*, 2000:280).

If only the biological needs are taken into account, pastures or an annual legume are the best crops to start the conversion. Maize should be avoided in the beginning because of their nutrient-demanding nature. To meet both biological and economic needs, a small-grain or soybean crop can be planted (MacRae *et al.*, 1990:170-171). Vegetables can be included in the rotation at any point, although potatoes should not be planted after long-term grasses because of the risk from wireworm (Lampkin, 1990:428). Special attention must also be paid to the requirement of the crops concerning soil and nutrients.

**Table 2.2:** Rules for the designing of an effective conversion rotation

1.	Deep-rooting crops should follow shallow-rooting crops – helps keeping the soil structure open and assists drainage.
2.	Alternate between crops with high and low root biomass – high root biomass, especially pasture grasses, provides soil organisms, particularly earthworms, with food.
3.	Nitrogen-fixing crops should alternate with high N (Nitrogen)-demanding crops – aim to meet all of the farm's N requirements from within the system.
4.	Slow-growing crops, which are more susceptible to weed invasion, should follow weed-suppressing crops.
5.	Where risks of diseases or soil-borne pest problems exist, potential host crops ( <i>e.g.</i> brassicas, potatoes) should only occur in the rotation at appropriate time intervals.
6.	Catch crops, green manures, and undersowing techniques should be used, whenever possible, to keep the soil covered – reduces erosion and nutrient leaching, particularly in winter.
7.	Consider also:  suitability of individual crops with respect to climate and soil;  balance between cash and forage crops;  seasonal labour requirements and availability;  cultivation and tillage operations.

Source: Vogtmann *et al.* (1986:30)

### 2.6.3 Site selection for orchards and vineyards

Crop rotation does not need to be planned when farming with long-term crops such as apples, pears or grapes is envisaged. Instead the right selection of the site for the orchard or the vineyard is important. The controlling of pests and diseases must guide this choice.

In the case of apples codling moth and apple scab are two of the most widespread pest and disease problems, which also occur frequently in South Africa. In cool and dry climates it is much easier to deal with these problems, since codling moth has under these conditions only two to three generations, while in warmer climates it can have up to four (Swezey *et al.*, 2000:4). With regard to the use of pheromone-based mating disruption, large solid blocks and flat land favour the distribution of the pheromone. Furthermore, areas where winter cover crops can be planted to provide lower-cost nutrition and soil enhancement should be favoured (Swezey *et al.*, 2000:4).

Similar considerations are valid for organic vineyards as for conventional. Special attention must be paid to the fact that neighbours can be sources of diseases, pests, spray drift and unwanted runoff (Wahlquist, 1995:1).

### 2.6.4 Stocking rate adjustments and feeding plan

An important part of the conversion plan on farms with livestock is the adjustment of the stocking rate to balance self-sufficiency and nutrient cycling. Stocking rates in organic farming systems vary substantially according to the intensity of the system. Intensive organic farming systems in Europe have stocking rates of 1.0 to 1.2 Livestock Units (LU) per ha which is around 80 percent of conventional rates. The extensive farming systems of North America have lower rates, especially on rangeland with rates of 0.1 LU per ha (MacRae *et al.*, 1990:175), which is more applicable to most South African regions.

The planning of the amount of feed needed and planted is dependent on the stocking rate and part of the crop rotation planning. It results from the stocking rate and can dominate the crop rotation plan if the focus of the farm is on animal production. According to the different regulations of organic farming associations basic and additional feeding should as far as possible come from the farm, but it is also possible, by additional feeding, to guarantee a balanced supply of all necessary elements for the animals.

### 2.6.5 Planning of supplemental fertilization

In the first years of conversion supplemental fertilization must be planned to establish equilibrium nutrient cycles. Synthetic fertilizers are not allowed so the focus is on animal and green manure. Special attention must be paid to N (Nitrogen) and K (Potassium). P (Phosphorus) is usually not a limiting nutrient, also under South African conditions. The export of K from the farm in the form of sales of hay, straw or other plant and animal products must be minimized. Choosing the right handling techniques of manure are important to reduce losses of nutrients (MacRae *et al.*, 1990:165-167).

### 2.6.6 Financial planning and labour requirements

After researching the marketing possibilities, the planning of the financial side as well as the labour input is the next step. According to Lampkin (1990:530) considering the financial implications is appropriate only in order to assess whether the target farm system has been developed within an agricultural/ecological context. The gross margin of the farm must be calculated individually for the different enterprises on the basis of estimated yields and current prices and premiums. This gross margin should then be compared with the anticipated gross margin to see if the requirements are fulfilled. Another, more detailed, approach is to include fixed costs and capital investment for specific items. The necessary new investments must be identified and sorted according to identified priorities. The farmer has to decide which investments are needed immediately and which can be postponed. This topic is discussed in more detail in Section 2.6.8. A further stage would involve the preparation of annual budgets during the conversion period (Vogtmann *et al.*, 1986:94 and Lampkin, 1990:531). A further important step in the financial planning, which is also concerning the investment planning discussed in Section 2.6.8, is to research the possibilities of financial support like bank loans.

The evaluation of the labour requirements helps the farmer to see if his ideas are realizable or limited due to the limited labour availability. Often, especially on small farms, the labour demand can be covered by family labour. If that is not possible and additional labour must be employed, the labour cost occurring must be identified.

### 2.6.7 Administrative requirements

Administrative planning is the development of a strategy for getting from the current situation to the target farm. It should take cognisance of the conversion strategy, *e.g.* single step or staged conversion, the timing of the changes as well as the necessary formalities.

A certification organization must be chosen towards whose standards the conversion is aimed. This can be a certification body in the country, or, if non-existent a body from another country. It is important that the body should be at least in line with the regulations of the IFOAM or, if export to the EU is planned, with the EU regulations.

As already mentioned, the average time of conversion is three years, but that can differ from organisation to organisation. According to the Scottish Agricultural College (SAC) (2001:3-4) the best time to start with the conversion is as follows:

- Spring crops: before normal sowing time in spring;
- Winter crops: before normal sowing time in autumn;
- Sheep: before normal hay/silage time;
- Calving cows: three months before normal calving time.

### 2.6.8 Investment planning

Besides the investments every farmer has to make, there are investments specific to the conversion to organic farming. Investments are related to the conversion process if they are necessary for:

- the fulfilment of the regulations of the certification body;
- the economic survival of the organic farm;
- the optimal organisation of the interrelationship between the enterprises.

The amount of investment that is necessary is dependent on the equipment of the conventional farm and the structure of the target farm. The following investments are all connected to or typical for the conversion process (Freyer *et al.*, 1994:255):

- equipment for dehumidification, cleaning and storage;
- machinery for weed control;
- machinery for new enterprises such as potatoes and field vegetables;

- facilities for storage of manures and slurry;
- equipment for marketing;
- adaptation of animal housing to meet organic production;
- tractors and cars.

According to a study undertaken by Freyer *et al.* (1994:256) the largest investments were made in tractors, which cannot be designated as specific to conversion. Investments necessary for crop production are mainly equipment for the composting of manure and cleaning machines for cereals. The latter is important for the cleaning of seeds since no application of chemicals is allowed to prevent damage or for cleaning cereals that are marketed. Further investments are machines for the mechanical and thermal regulation of weeds.

Improvement of housing conditions is the most important investment in livestock production. However, such investments are generally more frequently required in conventional production systems. If high prices during the conversion period cannot be achieved and large investments have to be made, investments in livestock husbandry might be postponed. Further investments are necessary if products have to be processed or are marketed on the farm.

A timetable for investments cannot be given. Various factors determine the order in which they might be called for. These include:

- requirements of the certification organization;
- organisational criteria such as dependency on seasons or labour;
- economic criteria such as greatest short term profit or realisable with own means;
- a short phase of decision making.

Economical considerations, especially in livestock production, could make it difficult to apply regulations. The financial means are not always available. The advantage of investment in plant production and marketing lies in the clear profit to be gained in the short term, whereas conversion to organic farming with livestock delays the realisation of profits.

### **2.6.9 Choosing the right certification body**

At the beginning of the conversion period a certification body must be chosen. The regulations of this organization are obligatory for the farmer and give the basic rules for the conversion process.

As a first step, a copy of the organic production standards and an application form should be requested from the chosen certification organization. This form and the fee for certification must be returned to the organization if the grower agrees with the standards and agrees to comply with them. After the certification body has received the application form, an inspector is sent to the farm in order to inspect the area to be certified and note any problems such as major weeds. Soil conditions and current management practices are examined. This information, together with a questionnaire, helps the organization to decide whether the farm will be certified or rejected. Once the farmer is accepted, he must comply with the production standards and can use the labels or logos of the certification (in conversion, and later full organic). An annual reinspection is usual (Madge, 1995:47-50). Madge (1995:50) cited several benefits of certification:

- organic certification indicates that an organic producer's status has been verified by an independent organization or inspection process;
- certification is required if products are to be exported under an organic label;
- practical and marketing information is provided for the growers;
- promotion is made for organic agriculture, the certification schemes and the organic products to the public.

## **2.7 SUMMARY**

This chapter discussed the nature of the conversion process to organic farming. The elements of a conversion plan were outlined and discussed in detail.

The conversion process to organic farming is a complex one that takes several years and requires thorough planning to lower the risk of problems or failure. Whether the conversion is done in a single step or in stages, the elements of the plan are the same; only the time frame differs. Included in the plan must be the description of the current farming situation, identification of the expectations of the family and the farm community, the planning of the target farm, time planning and supervision of the plan.

The marketing is the most important part of the conversion plan from which the rest of the plan has to flow. The farmer must try either to find an already well-established market or step into a niche market and create new possibilities to distribute products to the customers. In most cases it is difficult to get premium prices for products during conversion. Some certification bodies have a conversion label, which allows for higher prices during conversion. Financial risk can be minimized if the converting farmer researches his marketing possibilities before the start of the conversion process.

Another main aspect of the conversion process is to plan a diversified, well-developed crop rotation. It is the key factor of soil management, animal feeding and weed, pest and disease control. A balance must be found between crops needed for animal feeding, improving the soil fertility and cash crops for keeping a positive farm income. Two ways can be chosen to design a crop rotation for the conversion. Either the farmer concentrates on animal feeding and the improvement of soil fertility by planting a large proportion of legumes, or he plants more cash crops to generate a positive farm income. Undersowing and catch crops result in the improvement of soil fertility.

Further important adjustments concern the stocking rate. Stocking rates are reduced to approximately 80 percent of intensive systems. Extensive farming systems reduce stocking rates even more to balance self-sufficiency and nutrient cycles. An improvement in housing conditions has to be planned to pay attention to animal welfare issues such as health, breeding and rearing. The use of antibiotics is allowed only in extreme cases, so the treatment of diseases must be done with alternative methods.

Finally, the financial side, the investments and the labour input have to be planned. The gross margin of every enterprise has to be calculated and compared with the necessary gross margin to achieve a positive net farm income. All aspects of the farming system have to be taken into consideration since a lot of financial changes take place during the conversion process, which are discussed in the following chapter. Investments are necessary to introduce new farming methods or to develop new marketing possibilities. For all these investments a timetable must be developed to reduce the financial pressure while still meeting the organic farming regulations. Labour requirements have to be planned since in most cases more labour is needed during the conversion. In extensive pasture systems, however, labour requirements are reduced due to the lower stocking rates. The

choice of the right certification body is a further aspect that has to be taken into consideration during the planning process.

This discussion and the analysis of changes taking place during the conversion process demonstrates the importance of a carefully planned conversion to reduce the negative effects and problems that are discussed in the following chapter.

**CHAPTER THREE**

**REVIEW OF THE CHANGES IN THE FARMING  
OPERATION**

### **3.1 INTRODUCTION**

This chapter focuses on the changes that take place in the farming operation during the conversion process. The technical and financial aspects of changing to organic farming are examined and suggestions based on the literature are made. Special emphasis is placed on the role of crop rotation as a method for pest management and on alternative methods of fertilization.

Since the performance of a farming system is most likely to change under organic production and especially during the conversion process, these changes are investigated. The impact on yields and livestock performance is examined and remedial steps are suggested. In view of the fact that financial performance during the conversion process often determines the success or failure of a system, a closer look at this aspect is taken. Finally, barriers that hinder farmers from converting to organic farming are identified and problems that farmers would most likely have to face, are discussed.

As discussed in Section 1.8 and 2.6, the lack of South African literature remains a problem, also in this chapter. Thus general principles discussed and examples given are taken from European, North American and New Zealand literature and are not necessarily applicable as such to the South African conditions, unless stated differently.

### **3.2 THE CROP ROTATION**

#### **3.2.1 General characteristic of the crop rotation during conversion**

A carefully designed crop rotation is the key factor in every organic crop farming system. As already mentioned, the design of the crop rotation system is not only important for a balanced distribution of area for forage crops and cash crops (grains), but also to prevent diseases manage weed infestation.

After the farmer has chosen the crops to be included in the rotation, the next step is to decide in what order the crops should be planted. To manage this it is important to figure out which crops can follow a preceding crop. Table 3.1 shows examples of the extent to which following crops are suitable in relation to their preceding crop. According to Schulze Pals (1994:133-134) a regular change between winter and spring grain is useful under European conditions to provide more time for intensive weed control, to plant catch crops for the maintenance of the soil fertility and to reduce the risk of diseases caused by

crop rotation in grain production. Furthermore seed legumes should not be planted between important marketable crops. The risk of an increase in weed infestation is too high.

**Table 3.1:** Selection of rotation in relation to preceding crop

Following crop	Preceding crop										
	w	wb	sb	r	oa	m	pe	al	pas	p	be
Winter wheat (w <sup>1</sup> )	–	–	–	+	+	+	*	+	+	*	+
Spring wheat (w <sup>1</sup> )	–	–	–	+	+	*	(*)	+	+	*	*
Winter barley (wb)	+	–	–	+	+	–	*	+	+	–	–
Spring barley (sb)	+	–	+	+	+	*	○	–	+	*	*
Winter rye (r <sup>1</sup> )	+	+	+	+	+	+	*	+	+	+	○
Spring rye (r <sup>1</sup> )	+	+	+	+	+	*	(*)	*	*	*	*
Oats (oa)	+	+	+	+	○	*	*	*	*	*	*
Maize (m)	*	*	*	*	*	○	*	*	*	*	*
Peas (pe)	*	(*)	*	*	*	*	–	–	*	*	*
Alfalfa (al)	(*)	+	*	*	+	+	–	–	–	*	*
Pasture (pas)	+	+	*	*	*	+	*	+	+	*	*
Potatoes (p)	*	(*)	*	*	+	*	*	*	*	○	*
Beets (be)	*	*	*	*	*	*	*	*	*	*	–

1: As preceding crop it has no influence on the suitability if it is a winter or summer crop.

\*: good.

(\*): good, but unnecessary. Other crops make better use of the preceding one. Could be used in combination with catch crop or green manure.

+: possible.

○: limited applications, e.g. not possible if preceding crop harvested late, in dry areas, if pest risk exists (mainly nematodes), or if danger of lodging (e.g. spring barley after legumes).

–: bad or impossible.

Source: MacRae *et al.* (1990:171)

Also necessary is to investigate what plants are used for undersowing if this method is practised. Allelopathies can occur, such as in the case of barley undersown with grass and clover, and will give a poor take of the subsidiary crop because barley roots exude a chemical inhibiting the germination of grass and clover seed.

### 3.2.2 Crop rotation and pest management

Unlike the conventional farmer, who uses reductionist methods to tackle pest problems, the organic farmer tries to look at the problem in a holistic context and will develop an environment so that the pests are kept under control. The use of a well-designed rotation plays a very important role in pest management. According to Widdowson (1987:67) the

simple act of a change in crop could create a less hospitable environment for the potential pest.

The task of the crop rotation in the case of long-term crops is the right choice of varieties. It is for example essential to select an apple scab (caused by the fungus *Venturia inaequalis*) resistant variety in regions where spring rainfall occurs (as it is the case in the Western Cape). Damage by the codling moth can be reduced with early-maturing varieties (Swezey *et al.*, 2000:6).

### 3.2.2.1 Insect management

According to Ware, quoted by Francis and Clegg (1990:115), crop rotation is one of the most effective ways to control against insects that have specific host ranges and relatively short migration distances. Bringing one new crop into the rotation can often control these insects.

### 3.2.2.2 Plant disease management

Bacterial diseases are only a real problem in monoculture if the bacteria can find the same host every year. If the crop rotation is more diverse this disease should not be a problem. Reeves *et al.* cited in Francis and Clegg (1990:114) gave an example of a 63 percent infection level with brown leaf spot (*Pleiochaeta setosa*) in a continuous lupine cultivation in Australia, whereas a lupine-wheat rotation showed a level of only 18 percent.

Fungus diseases are a far bigger problem for today's agriculture and also for the organic farmer. Alternating crops makes it unlikely that the disease will be carried over for a long period until the crop is resown on this particular piece of land. A fungus disease that can occur if barley is planted in successive years, is an example of a problem caused by not taking the suitability of the preceding and following crop into account (Widdowson, 1987:69). A diverse crop rotation also influences the nematode population in the soil. Good management can lower the numbers and thus also lower the economic damage.

### 3.2.2.3 Weed management

In the controlling of weeds a useful method is to rotate between winter and summer crops in order to have both winter and summer weeds under control. Weed populations are often

sensitive to a change in crops especially when a perennial is rotated with an annual crop. Especially for the organic farmer who is not allowed to use most chemicals (synthetic chemicals such as fast releasing phosphates), a suitable rotation together with the necessary cultivation technique, allowed spray control methods and mechanical methods can be successful in fighting weeds, which are one of the biggest problems in the conversion process. Table 3.2 shows how the weed occurrence changes with a more diverse rotation.

**Table 3.2:** Incidence of weed seeds (per square metre)

Wheat monoculture	525
Wheat/wheat/maize	224
Wheat/maize	183
Wheat/maize/soya	60

Source: Widdowson (1987:62)

During the planning of the rotation it is also necessary to pay attention to the aspect of erosion. A loose sown field grain crop or the rotation of corn, soybeans and wheat is a good method to control diseases but not to protect the soil against erosion unless no tillage or reduced tillage is used (Committee on the Role of Alternative Farming Methods in Modern Production Agriculture *et al.*, 1989:141).

Table 3.3 shows a practical example of how the structure of the use of area changes during the conversion process, as evaluated in a survey of 49 farms in Eastern Germany.

**Table 3.3:** Percentage of the crops on the agricultural land

Crop	Percentage of agricultural land in conversion			Change in percentage 1992 to 1994
	First conversion year 1992	Second conversion year 1993	Third conversion year 1994	
<b>Grain</b>	48.72	43.07	43.77	-10.16
<b>Root crops</b>	1.90	1.91	1.66	-12.63
<b>Legumes</b>	4.80	5.33	6.97	+45.21
<b>Oilseed</b>	5.87	6.26	4.52	-23.00
<b>Fodder</b>	33.18	27.56	27.60	-16.82
<b>Fallow land</b>	1.20	12.18	13.96	+1063.33

Source: Dwehus and Meyer zu Hartlage (1996:94)

A huge change happened in the case of fallow land because the German state supports these areas and they can be used as pastures after 15 July (date after which it is allowed to mow or to graze these areas).

### 3.3 CHANGES IN TILLAGE TECHNIQUES

Cultivation is a difficult topic during the conversion period. The disruption of the soil life and soil erosion must be kept as low as possible and at the same time weeds must be fought in an efficient way and soil fertility improved. Different approaches exist for the cultivation of the soil in sustainable and organic agriculture, as shown in Table 3.4 for conditions existing in Europe and parts of the USA. Which tillage method is chosen depends on the farmer's knowledge, access to equipment, and the farmer's particular economic and environmental conditions (Schriefer and Brusko *et al.*, as quoted in MacRae *et al.*, 1990:173). Special attention must be paid to weed control since especially the no-till practices where the farmer sows directly into the previous crop, create difficulties with weed handling.

**Table 3.4:** Common tillage practices in sustainable agriculture

System	Some common practices
Minimum tillage	Chisel ploughing Disc harrowing Overseeding Two-layer ploughing <sup>1</sup>
No-till without chemicals	Arial seeding Drilling into previous crop Overseeding
Ridge tillage	Ridging Planting on ridges Chisel ploughing <sup>2</sup> Disc harrowing <sup>2</sup>
Ro-till	Planting with in-row chisel
Contour tillage	Variety of tillage practises

1: A plough manufactured in Germany that does not bring lower soil layers to the surface or invert the top layers.

2: Unnecessary in many ridge-tillage systems.

Source: MacRae *et al.* (1990:174)

Minimum tillage leaves more than 30 percent of crop residues on the soil surface. It can lower farm expenses because of less use of machines, reduced runoff and soil erosion, aid in soil organic matter and increase soil moisture retention (Stinner and Blair, 1990:130). By using minimum tillage the decomposition of the organic matter is enhanced. Further information on the advantages and disadvantages of the different tillage systems was given in Stinner and Blair, (1990:130-131), MacRae *et al.*, (1990:173-174) and Committee on the Role of Alternative Farming Methods in Modern Production Agriculture *et al.*, (1989:156-162).

### **3.4 CHANGES IN THE APPROACH TO PEST CONTROL**

#### **3.4.1 Weed handling**

Weeds are often identified as the key problems in organic farming, often intensified by the use of minimum tillage. Especially in the early years of conversion the weed population can increase fast (Stockdale *et al.*, 2000:287). Besides the design of a useful crop rotation to reduce weeds, technical methods must be used to maintain weeds at a manageable level. After the preparation of a stale seedbed, mechanical hoes and harrows can be used for shallow cultivation. Flaming is also a useful method as well as occasional hand weeding and letting livestock graze in the fields. How effective these methods are, depends on both the crop and the soil conditions where it is used.

According to MacRae *et al.*, (1990:176) weeds are not a greater problem in well-established cropping systems than in conventional systems, even though weed incidence may be higher than on conventional farms. A certain level of weeds will be tolerated and even encouraged because it has several valuable functions to perform, such as nutrient cycling, disease and pest control, soil and moisture conservation, and organic matter improvement as green manures.

In the case of long-term crops, weed control is also often the biggest challenge. According to Swezey (2000:11) organic weed control methods in apple production include the use of cover crops, cultivation to uproot or cut weeds, mulches to smother weeds, and flames to burn weeds. In the first years it is especially important to avoid competition with tree growth. Perennial weeds are the biggest threat since they compete with tree growth during the active growing season (Swezey, 2000:11). During the winter months weeds can be useful here too for the prevention of erosion and the improvement of soil tilth.

### 3.4.2 Pests and diseases

According to Stockdale *et al.* (2000:288) pest control strategies in organic farming systems are largely preventive, rather than reactive, due to the fact that most chemicals (especially synthetic chemicals) are not allowed. Crop rotation can help to prevent pests and diseases as can looser sowing which is especially important for the prevention of fungus. Good soil management is necessary to hamper root diseases. Stockdale *et al.* (2000:290) quoted several authors (Workneh *et al.*, Workneh and van Bruggen, Knudsen *et al.*, Cook and Backer, Keel and Defago and AzconAguilar and Barea), who discussed the importance of soil microbial activity. Increased levels lead to increased competition and antagonism in the rhizosphere and to the presence of beneficial root-colonizing bacteria, which have been identified as contributing factors in the control of root disease. Furthermore, the farmer must choose between varieties at individual crop level with disease-resistant varieties, and at the farming system level with a wide range of resistant crops especially for fighting diseases and pests where no other method is effective. Instead of synthetic chemicals, other sprays allowed by the certification organization can be used. According to Freyer *et al.* (1994:250) copper oxychloride is used against potato blight and a *Pyrethrum* preparation against the potato beetle larvae.

Changed planting and harvest dates also help to reduce or avoid pest damage. Luna and House (1990:161) provided the example of delayed planting of wheat as a means of controlling the Hessian fly, *Mayetiola destructor*. In maize production late planting encourages the occurrence of the European corn borer. Early harvest of alfalfa can be used to control both alfalfa weevil and potato leafhopper due to the fact that the chopping of hay for haylage destroys most of the weevil larvae and immature leafhoppers. In orchards and vineyards cover crops play a major role in the fight against insects since they develop an environment for a balanced population of harmful insects and their predators.

### 3.5 ALTERNATIVE FERTILIZATION TECHNIQUES

According to MacRae *et al.* (1990:165) soil fertility and high organic matter are seen as almost synonymous, so a variety of techniques for incorporating organic matter into the soil, such as the addition of animal manures, green manures, and compost, and the use of pastures in crop rotations, is usually included in the conversion plan.

Cover crops play a key role for long-term crops. In the case of apples a high percentage of nitrogen demand can be met by planting leguminous cover crops. They also improve the

humidity and structure of the soil and support a better drainage and oxygen supply in the orchards and vineyards (Hofmann *et al.*, 1999:43).

Although most chemical fertilizers are not allowed in organic farming, there are certain ones that can be used. These fertilizers usually release their nutrients slowly, promote biological activity and have beneficial effects on the soil's physical structure and chemical characteristics. Mostly allowed are powdered mineral-bearing rocks and seaweed extracts. Which chemicals the farmer can use depend on the regulations of the certification body and is thus not discussed in detail.

The use of a wide range of compounds such as green manure, composted plant material, cover cropping and animal manure is important because they play different roles in the soil fertility and provide the soil with different amounts of nutrients. Special attention must be paid to soil fertility in the early years of conversion. In most cases the exhausted soil must be improved with extra fertilization. It is important in this case to supply the soil with only the necessary nutrients to prevent washing out into the groundwater. Widdowson (1987:44-47) analysed farmyard manure, urine, slurry and straw. Table 3.5, 3.6, 3.7 and 3.8 give an overview of the analysis results. These numbers vary from farm to farm, but can be taken as orientation points under European as well as South African conditions.

**Table 3.5:** Analysis of farmyard manure

Dry matter	20-25%
Organic matter C:N ratio	20:1
N	0.2-0.6%
P <sub>2</sub> O <sub>5</sub>	0.1-0.7%
K <sub>2</sub> O	0.1-1.0%

Note: only 30 percent of nitrogen becomes available in the year of application; 15 percent is available in the second year, and in each succeeding year the amount available is halved. Phosphorus and potassium are not 'fixed' and are easily available to the crops.

Source: Widdowson (1987:45)

Instead of applying raw manure it is often composted to guarantee the aerobic fermentation of farmyard manure. Weed seeds are killed during this process and damage to the plants, diseases and offensive odours are avoided. Essential is an efficient handling system to minimize losses, which can occur during storage, handling, application, and in the soil ecosystem.

**Table 3.6:** Analysis of urine

Dry matter	5%
Organic matter	Insignificant amount of organic carbon
N	0.2%
P <sub>2</sub> O <sub>5</sub>	0.02%
K <sub>2</sub> O	0.6%

Source: Widdowson (1987:45)

Urine is an important nitrogen-potassium fertilizer and very quick-acting. It should not be applied in warm weather due to the loss of ammonia and the disturbing odour.

**Table 3.7:** Analysis of various slurries

	Cattle	Pig	Hen (Poultry)
Dry matter	10%	15%	80%
Organic matter	5.5%	6.0%	11.0%
N	0.4%	0.6%	1.0%
P <sub>2</sub> O <sub>5</sub>	0.25%	0.5%	0.75%
K <sub>2</sub> O	0.5%	0.25%	0.5%

Source: Widdowson (1987:46)

Slurries can be used to balance products such as straw, which have a high carbon:nitrogen ratio since they contain mainly urine, faeces and washing-down water and act as a source of nitrogen. Slurry must be used with care. Overuse can cause soil damage, and the high nitrate content of some slurries would cause excesses to be leached from the soil (Widdowson, 1987:46).

**Table 3.8:** Analysis of Straw

Dry matter	95%
Organic matter, C:N ratio	
Oats	40:1
Wheat	100:1
N	0.5%
P <sub>2</sub> O <sub>5</sub>	0.3%
K <sub>2</sub> O	1.2%

Source: Widdowson (1987:47)

Straw must be used carefully after harvest since its high carbon:nitrogen ratio causes a depletion of the nitrogen content in the soil. That occurs due to the fact that the microorganisms which degrade the straw need a nitrogen component, and this will be taken from the nitrogenous compounds in the soil. If a soil is low in nitrogen it will take a long time. So for the first year of conversion, when the soils are still low in nitrogen, straw must be applied with care.

According to MacRae *et al.* (1990:168-169) four points should be stressed during transition concerning techniques for solid and liquid digestion of manure:

1. Conservation of liquid fractions in animal wastes is essential because they contain about half of the N, most of the K, and some mobile trace elements (Watson; Vogtmann *et al.* quoted by MacRae *et al.*, 1990:168-169). Steps should be taken to avoid nutrient losses by runoff or volatilization. When composting on concrete, any liquid that seeps out can be collected.
2. Adapting existing equipment can minimize costs. For example, manure spreaders can be modified to prepare compost in windrows by changing the wings on the back of the spreader, or by employing a detachable hood (Puetz; Sims quoted by MacRae *et al.*, 1990:168-169). Unfortunately, much slurry technology remains expensive (Vogtmann *et al.* quoted by MacRae *et al.*, 1990:168-169). Besson, quoted by MacRae *et al.* (1990:168-169), has described some basic approaches to manure digestion that keep costs low.
3. Local sources of suitable organic waste should be investigated for use during the transition period. Food-processing wastes are usually high in plant-nutrient value (Knorr; Poincelot quoted by MacRae *et al.*, 1990:168-169), and some communities are successfully developing community-composting systems (Golob; Vogtmann *et al.* quoted by MacRae *et al.*, 1990:168-169) from which farmers can collect organic material. Care should be taken, however, to ensure that such materials do not contain unacceptable levels of toxic materials, such as pesticides and heavy metals.
4. Because composting reduces the bulk of organic material, spreading costs will be lower than for fresh manure (Hanley quoted by MacRae *et al.*, 1990:168-169). Furthermore, because most of the nutrients are immobilized in compost, it can be spread in the fall with minimal loss of nutrients, whereas fresh manure must usually be spread in the spring (Vogtmann *et al.* quoted by MacRae *et al.*, 1990:168-169), unless it is incorporated with a green manure or surface composted.

It is important to acknowledge that only a low percentage of inputs can be taken from conventional production. The amount depends again on the regulations of the certification body. Special care must be taken in case three above where organic material from a public source is used.

### 3.6 CHANGES IN THE PRODUCTION OF LIVESTOCK

Although some organic farms operate without animals, livestock plays a major role in the organic farming system. A balanced system with crop and animal production is ideal to guarantee self-reliance as far as possible. As discussed earlier, stocking rates are reduced during the conversion to lower the disease pressure and to allow the rehabilitation of soil and pastures. Buying additional fodder from outside is only allowed to a certain extent, and is regulated by the certification bodies.

Special attention must be paid to animal welfare issues with respect to nutrition, housing, health, breeding and rearing. Light and climate conditions of the housing must be improved as well as the grazing systems because of their importance in pest and disease management. Rotational grazing is a method of interrupting the lifecycle of animal parasites by removing the host animals for a period. The use of resistant breeds also plays a major role, since organic veterinary treatments are not yet as established as conventional methods and the use of antibiotics is forbidden (Madge, 1995:23-24). They can be used only in serious situations and must be declared. Herbal and homeopathic remedies are alternatives for treating diseases. In the case of mastitis an outbreak can be avoided by paying more attention to housing, nutrition and parlour hygiene. If an outbreak occurs, early detection combined with stripping of the affected quarter and hosing with cold water (to stimulate blood circulation and assist the body's own defence mechanisms) are useful methods of treatment (Vogtmann *et al.*, 1986:75).

In intensive livestock systems stress is a big factor, which has a negative impact on health and shortens the production time. Therefore stress must be reduced, especially if housing is used. Vogtmann *et al.* (1986:72) mentioned three practices, common in Europe, to achieve this aim:

- the introduction of more natural rearing systems
  - nurse cows or artificial suckling systems
  - feeding of whole milk
  - increase in pre-weaning period
  - reduction in concentrate feeding where possible
  - optimum timing of concentrate feeding
- the introduction of livestock families or other appropriate small groups

- modification of the housing systems
  - increased quantity of appropriate bedding (straw)
  - increased available space
  - flexibility in housing dates.

### 3.7 REVIEW OF YIELDS AND LIVESTOCK PERFORMANCE DURING CONVERSION

#### 3.7.1 Yield changes

A large number of studies (Dabbert, 1994; Lampkin, 1994c; Freyer *et al.*, 1994; Peters, 1994; Schulze Pals, 1994) outlined yield reductions during the conversion compared to conventional and established organic farming systems under European conditions. Various reasons were suggested. Peters (1994:269) saw the length of time under organic farming as an important indicator for yield as well as the choice of the starting crop. The most profitable starting crops in the low-input systems he tested were an oats/red clover mixture. He evaluated a higher yield in more established farming systems. This transition effect can be related to the low availability of N at the beginning of the conversion. Freyer *et al.* (1994:251) also stated low soil fertility as a reason as well as damage to soil structure and cultivation techniques. Furthermore, yield reduction depends on the intensity of the system before conversion. In low intensity systems the yield changes are often smaller than in intensive systems. A further aspect to consider is the extent of refinement (thorough breeding) of the crop. Due to specialised breeding wheat is often more resistant to yield reductions than oats.

According to MacRae *et al.* (1990:182) some crops in sustainable farming systems do not suffer from yield reduction because of their particular growth pattern. These are hay, soybeans, oats, barley, and rye. After a decline in the first years corn often recovers in the long-term, because of rotational benefits (Oelhaf, 1978:198 and Lockeretz *et al.*; Brusko *et al.*; Culik *et al.* and Crookston quoted by MacRae *et al.*, 1990:182). A high decline in yield is experienced with potatoes, high-nutrition-demanding vegetable crops such as cabbage, leeks, broad beans, spinach, and apples (Oelhaf, 1978:198 and Pimentel *et al.*; Fischer and Richter; Reinkenand Wagstaff quoted by MacRae *et al.*, 1990:183). Legumes and oilseed are sensitive to weeds, which could cause a yield decline, as could diseases in potatoes

(Schulze Pals, 1994:145). The effect of the conversion period on yield in South Africa are discussed in Section 6.6.

Padel and Lampkin (1994:302) concluded that conversion-specific crop yield reductions are not found universally and can often be avoided:

- where the farmer has access to information and the opportunity to learn about organic management before starting conversion;
- where the conversion is undertaken in stages and starts with a legume crop on each field;
- and where the change to an organic rotation is carefully planned to avoid yield decline as a result of rotational mistakes.

### **3.7.2 Changes in livestock performance**

According to Lampkin (1994c:227) the milk yield during the conversion period declined by about 10 percent. The reason for this can be seen in a 35 to 40 percent reduction of concentrate use on his study farms. This, combined with the lower stocking rates, resulted in a milk yield per hectare that was significantly lower than on conventional farms (Lampkin, 1994c:227). In the beef production the lower availability of basic fodder causes a lower livestock performance (Freyer, 1994, Lampkin, 1994c, Schulze Pals, 1994).

## **3.8 ECONOMIC CONSIDERATIONS**

### **3.8.1 Changes in labour demand**

In most cases labour demand increases during conversion. Rantzau *et al.* (1990:64) identified different reasons for the increase in the amount of work. The changes in weed control or seedbed preparation are examples where more intensive labour is needed. A change in crops, especially to vegetables and root crops, also increases the work drastically, as does the introduction of direct marketing. Lampkin (1994c:238) also saw diversification into new high-value and labour-intensive enterprises, such as fodder beet and thatching straw, as well as new marketing initiatives, as reasons for the higher labour requirements. Padel and Lampkin (1994:303) identified on-farm cleaning, grading, processing, small-scale experimentation and increases in farm size as further reasons for the increase. Lampkin (1994c:238) could find no evidence that the labour requirements of

existing enterprises had increased significantly with the transition. The cutting down of production systems like swine production can reduce work, as Rantzau *et al.* (1990:65) found.

### 3.8.2 Financial performance

According to Lampkin (1994c:224) and Padel and Lampkin (1994:304), conversion-specific financial changes related in general not only to the possible conversion-specific yield reductions, but also to:

- the loss of income relative to established organic systems due to the lack of access to premium prices during the official two-year (or longer) conversion period; potentially the largest penalty during conversion in the northern European context;
- the start-up costs for establishing new enterprises, including the purchase of livestock and costs of investment in buildings, fences, water supplies, manure handling systems and other facilities, in particular when converting from very specialized arable or livestock systems;
- cost of developing markets to access premium prices and obtaining them;
- increased fixed costs caused by new investments, labour use and certification charges;
- the costs of advice, training and other types of information gathering (including farm visits, study tours and conferences) as well as the costs of additional labour associated with the absence at training events;
- loss of income and additional costs due to the gathering of information and experience, trialing new crops and techniques, and mistakes resulting in higher than necessary yield reductions.

General statements about the income trends during conversion are not possible because of the diversity of farm types and their changes during the process (Freyer *et al.* 1994:255). It is likely that fixed costs increase due to the higher labour requirements (hired labour) and the higher machinery costs. The latter are caused by lower specialization and higher diversification on organic farms. Other fixed costs can be between 10 percent and 40 percent higher in Europe due to higher expenditure on marketing, certification, training and advice (Padel and Zerger, 1994:111). Fixed costs are also increased by new investments.

Not all investments can be assigned exclusively to conversion; they can also occur during changes in conventional farming systems. But it is likely that the converting farmer will be confronted with these necessary new investments. Destocking or the sale of quotas (sugar beet, milk), can fund those investments. Variable costs are under European and North American conditions typically 50-60 percent lower on organic than on conventional farms if farming with cereals and grain legumes and 10 to 20 percent lower for potatoes and horticultural crops (Stockdale *et al.*, 2000:295), although White (1996:380) found that growing costs were 69 to 91 percent higher in organic vineyards. Although higher seed and plant costs (due to price premiums for organically certified seeds and plants) can be incurred due to the greater use of more expensive legumes, green manure and cash crops, the costs of fertilizers and sprays are significant lower. On dairy farms the total variable costs are mostly 20-25 percent lower, mainly due to the reduced use of concentrates (Stockdale *et al.*, 2000:296). The reduced variable costs often help to maintain the farm's total gross margin despite the fall in output (Lampkin, 1994c:235)

Freyer *et al.* (1994:255) argued that increased costs of processing and marketing needed to be set against potential benefits in terms of increased prices. If premium prices cannot be achieved, a reduction in farm income is likely (Lampkin, 1994c:239). Stockdale *et al.* (2000:296) gave the following example: "If variable costs are only reduced by 50 percent, as is typical for organic cereal crops in northern Europe, a 33 percent premium would be needed to maintain the same gross margin, while the premium of 70 percent plus, currently available for many crops will result in higher gross margins and output than on conventional farms". During the conversion process it is unlikely for the farmer to achieve a premium of 70 percent. In the European context farmers rely on government subsidies or subsidies from the European Union. As indicated by Nieberg (1996:67), the extensification subsidies from the European Union account for 27 percent of the profit per hectare. Without these subsidies many farmers would have problems during the conversion period.

In Germany, cereal farms profit from conversion due to the good marketing possibilities. Fodder crops are more profitable than their conventional counterparts after the third conversion year (Nieberg, 1996:71). This latter study also determined that bigger farms with a larger labour force farm earn higher profit than smaller farms. However, the production of marketable crops such as vegetables, potatoes and wheat helps farmers to achieve a higher profit.

### **3.9 BARRIERS TO AND PROBLEMS AREAS OF CONVERSION**

#### **3.9.1 Barriers to conversion**

Conventional farmers have differing perceptions of the difficulties involved in the conversion to organic farming. These perceptions are sometimes real problems that the converting farmer has to face but sometimes they are only biases. Nevertheless they represent barriers for the conventional farmer. According to Padel and Lampkin (1994:297-298) these can include:

- lack of information and unhelpful or disparaging extension agencies, leading to misconceptions concerning practices, yield expectations, financial performance and risk;
- concerns about potential problems with weeds, pest and disease control, risk of yield losses or crop failure, feed shortages and a large increase in manual labour;
- difficulties gaining access to information which does exist but is only available through non-traditional sources, such as books, magazines, neighbours, family and friends and particularly other organic farmers;
- negative images of organic farmers as hippies or hobby farmers (this view is not as widespread as it once was, with the increasing recognition of organic farming as a viable option and enhanced credibility through the involvement of established agricultural institutions, in particular policy-makers);
- concern that the market for organic produce is limited and that large-scale conversion would lead to massive oversupply, a collapse in prices and reduced income, with the lack of technical, marketing and financial data contributing to an enhanced perception of limited feasibility and high risk which risk-averse farmers under financial pressure or high levels of indebtedness are not prepared to take on board.

Some of the barriers to the adoption of organic farming are also problems the farmer has to face during the conversion period as stated above. What these are is outlined in Section 3.9.2. The other perceptions against organic farming are not discussed in more detail because this study is focused on the conversion process.

### 3.9.2 Problem areas of the conversion process

Problems the farmer has to face during the conversion process differ in nature and are partly discussed in preceding sections of this chapter. Most of these problems are dependent on the social, institutional, political and natural environment of the farm and on the farm itself. These problems can include:

- yield reductions;
- problems with weed, pest and disease control;
- reduced livestock performance;
- few marketing opportunities, no premium prices;
- refusal of loans or insurance for organic production;
- lack of legislation, subsidies and certification bodies;
- lack of information and advice;
- labour overburden;
- higher input costs;
- lower farm income;
- internal problems (*e.g.* related to generation change).

Yield reductions are largely dependent on the climate and soil condition as well as on the intensity of the conventional system. If the climatic and soil conditions are favourable or if the conventional system was rather extensive, yields are likely to stay constant, decrease only to a small extent or even increase, as the study of Dabbert (1994) showed. The learning process is also a factor that affects yield, especially if crops are newly introduced on the farm. An increase in yields can take place over time, when more experience has been gained about the handling of the new crop. This also counts for established crops. Within the process of learning organic management practices, yields are likely to increase (Dabbert, 1994:292). The performance of livestock is highly related to the yield since a typical fault during conversion is to underestimate forage yield. If the yield is too low to meet the need for forage, purchased feed inputs are required, which are only allowed to a certain degree and will increase the costs of production (Freyer *et al.*, 1994:253).

High weed infestation is one of the major problems of conversion to organic farming, as well as being a problem of organic farming in general. Since no herbicides can be applied,

good management concerning crop rotation and time planning of drilling is necessary to control weeds. Newton (1995:82) argued that annual weeds can be kept down well by finger weeders. Perennial weeds have a greater influence on the reduction of yields and are difficult to control. The same applies for pests and diseases, especially in potatoes and cereals, since seeds cannot be treated and only biological control methods can be used.

Marketing opportunities can cause a problem in countries where organic farming and thus a market for these products is not yet established. Europe to a large extent has a well-established marketing system, where only remoteness from suitable processors or wholesalers could cause difficulties. If a market is not well developed and premium prices cannot be achieved, the producer usually has problems in compensating for his lower yield and maintaining his income level. According to a study undertaken by Kirner (2001:103) of the conversion of dairy farms in Austria, organically produced milk is less profitable than conventionally produced milk without a surcharge. White (1996:380) concurs concerning organically grown grapes. Henning *et al.* (1991:877) and Duram (2000:40) also referred to the instability of premium prices as a problem. Furthermore they identified the lack of common certification standards, labelling and the legal definition of organic farming as a major issue.

The lack of legislation is not such a great problem since the farmer can always rely on the regulations of the EU or the IFOAM. However, the lack of legislation shows that governments are not involved in organic farming and support is missing. Duram (2000:42) stressed in her study the complaints of farmers about government policies, which support large-scale conventional agriculture, lead to collaboration with agribusiness corporations and ignore organic farming. In this context subsidies are mentioned, which provide a base income and are important, especially during the conversion process. If no access is given to premium prices the farmer can compensate his lower income with governmental support. Without this support it can be difficult to obtain a sustainable farm income level.

The lack of certification bodies as well as the costs of certification is a problem. If the farmer decides on certification with an international organisation not based in South Africa, an inspector has to be requested. That is costly, dependent on the nearness of the inspector. In extreme cases airfare and accommodation has to be paid, in addition to the certification costs. As stated by Rigby *et al.* (2000:9), the fixed level of inspection/registration costs is a problem, particularly for small farmers. In general it can be said that larger farmers face less financial stress during conversion than smaller farms.

This appears to be due to the fact that the costs of labour decrease relative to the size, since typical additional work (*e.g.* bookkeeping, visits to seminars) has to be done independent of the size of the farm. On the other hand, the basic costs for registration and inspection are spread over larger units (Kirner, 2001:105).

Furthermore, the availability of practically orientated information and advice can cause difficulties. In a study undertaken by Midwest Organic (1995:1), 71 percent of the more than 850 respondents stated the lack of knowledge about organic production as a problem and 59 percent experienced the problem of the unavailability of information on this farming practice. Rigby *et al.* (2000:9) underlined the importance of informal networks of organic producers and states the danger of geographical isolation not only in terms of marketing but also in terms of information and advice on the practicalities of production. Countries without their own certification bodies and organic farming organisations have to deal with these problems.

An increase in labour demand is found on most farms during the conversion process. That can lead either to a labour overburden for the farmer and his family or to an increase in labour costs due to the employment of more labourers. A lower net farm income then results from the combination of lower yields, higher input costs, new investments and costs for certification and the accumulation of knowledge. This is amplified if no premium prices are available. Where premium prices are not achieved, Fisher (1989:89) calculated a gross margin which is 29 percent lower than the conventional standards.

Internal problems are related to intergenerational conflicts about the future of the farm and to conflicts between parties involved in the farming process (other family members, farm workers, managers or landlords).

### 3.10 SUMMARY

This examination of the elements of the conversion plan led to an analysis of the main changes which take place during conversion, such as crop rotation and fertilization. Weeds, pests and diseases can mainly be prevented by well-designed crop rotations. Chemical methods (based on the use of synthetic chemicals) to treat these problems are mostly not allowed, but organically acceptable sprays are available. The control of weeds must be maintained mainly with mechanical and thermo methods. Choosing resistant varieties can reduce pests and diseases. The first years of conversion require a higher input of nutrients. Animal and green manure play an important role since the use of synthetic fertilizers is not

allowed. Special attention must be paid to developing efficient handling techniques to avoid nutrient loss.

A decline in yields and lower livestock performance are likely to arise during the conversion process, due to the lack of knowledge and experience and the still low soil fertility. These effects can, however, be avoided if certain measures such as careful planning and the gathering of knowledge beforehand are applied. Yield reduction and lower livestock performance are not the only factors with a negative impact on the financial performance of the farm during conversion. A decline can also be caused by the loss of income due to the lack of access to premium prices or to the costs of advice and training. Careful planning is required here as well, to reduce the negative effects as far as possible.

The last section of this chapter deals with barriers to the adoption of organic farming and problems that can occur during the conversion process. Barriers to adoption are sometimes biases, such as a negative image of organic farmers as hippies or hobby farmers or problems the converting farmer is likely to face during the conversion process such as problems with yield and weeds. In most cases, especially if the farming system was intensive before conversion, yields drop and weeds pressure is higher. If premium prices cannot be achieved the reduction in yields is especially problematic and can lead to reduced farm income. Thus marketing opportunities play a major role in the success of the conversion process. In countries where organic farming is not yet established, the lack of markets, information, and advice and certification bodies can make a well-planned conversion difficult. Further difficulties are reduced livestock performance, internal problems or refusals of loans. Finally, the level of training of the farmer and his willingness to take the risk of conversion has a significant influence on the success of the conversion (Freyer *et al.*, 1994:249).

Conversion to organic farming is not just a change in the farming technique. It is a completely different approach to the farming system and requires a holistic way of thinking and thus planning. Although a conversion process might be planned thoroughly, problems can still occur depending on the social, natural, institutional and political environment of the farm.

# **CHAPTER FOUR**

## **METHODOLOGY**

## 4.1 INTRODUCTION

Since this study is one of the first done in the field of organic farming in South Africa, it was considered necessary to give a background on the methodological aspects of researching sustainable and organic farming systems. Important aspects and requirements are discussed as a basis to explain the choice of methods used in this study. Furthermore, they provide a background for the discussion of problems and limitations, which is essential in this case, since certain research requirements cannot be fulfilled.

## 4.2 GENERAL ASPECTS OF RESEARCHING SUSTAINABLE AND ORGANIC FARMING SYSTEMS

### 4.2.1 Researching sustainable farming systems

Researching sustainable farming systems, to which organic systems belong, requires a different approach from conventional agriculture research done in the past. According to MacRae *et al.* (1989:176) agricultural science has a long tradition of approaching scientific problems in a reductionistic manner. That means dividing problems into discrete, manageable pieces. All but a few factors influencing a system are held constant or are ignored. Although scientists are of the opinion that it is possible to integrate results from reductionist science into a system, Hanway, Busch and Lacy, Miller and Suzuki (cited in MacRae *et al.*, 1989:177) proved that in natural systems this is largely unsuccessful because relationships between important factors are ignored or not discovered. Useful results are not achieved by researching complex sustainable and organic farming systems if only a few variables are examined and then applied over a broad area.

A further obstacle associated with the research approach of the past is the measuring of knowledge. Scientists considered scientifically proven facts as knowledge. This opinion has changed towards the thinking that knowledge is what we experience and involves facts plus the socio-economic, cultural, political and emotional context in which we see them (MacRae *et al.*, 1989:180). In sustainable agriculture, the intuitive wisdom of experienced practitioners is combined with the analyses of scientists to understand both biological and sociological processes fully.

## 4.2.2 Research methods in organic farming

Researchers in organic farming have employed different methods to collect and analyse data. As stated by Padel and Lampkin (1994:306-306), these methods can be divided into empirical and modelling approaches. The empirical approach comprises the case-study approach, the cross-sectional analysis of survey data approach and the observation of processes on an experimental unit. The modelling approach consists mainly of budgeting techniques, optimisation techniques and dynamic simulations.

Comparisons of farms can be done horizontally or vertically (Schulze Pals, 1994:49). Which method is chosen depends on the aim of the comparison and on the amount of data that are available. Groups of farms or farm pairs are compared over a farming period (*e.g.* a year) in the horizontal method. Organic farms can be compared with each other or with conventional farms. Horizontal comparison is used when the merit of a farming system has to be examined and is suitable for smaller samples. It is important to compare farms that have a similar factor endowment such as farm size, production structure and others, as discussed below. If possible, and to make the comparison more valuable, the farms should represent average farms of the region (Schulze Pals, 1994:49).

The vertical method assesses one farm or a group of farms over more than one farming period (*e.g.* the whole conversion period). This is especially useful when the development of a farm over the conversion period has to be evaluated. According to Herrmann and Plakolm (1991:383), vertical analysis also allows for identification of the factors that are responsible for the success or failure of the conversion. In general the same requirements have to be fulfilled as for the horizontal comparison. In addition, data have to be collected over a longer period with the same composition of the samples to make the results valuable (Schulze Pals, 1994:51).

A few problems hinder the comparison of organic with conventional farming systems. One of the key issues that Lampkin (1994b:31) mentioned is the problem of dealing with conversion to a whole new system as opposed to modifications within a particular system. "Thus traditional agricultural research methodologies, involving the manipulation and comparison of a restricted number of variables, are inappropriate in a systems context where a large number of variables might impact on overall system performance" (Lampkin, 1994b:31).

The following questions, which go beyond the question of appropriate research methodologies, arise from this comparison:

- If a spectrum of farms exists, on what basis is the selection to be made so as to make the systems comparable?
- How can performance be measured?
- Which time period should be chosen?

The most important of these questions is, which ‘farms’ should be chosen to compare the two farming systems. One possibility is to choose farms with similar ‘factor’ endowment. The best way to measure this is by using non-system determined factors such as region, soil, topography, climate, market distance, marketing and managerial influences. The easiest way to do this would be to use average data from a sample of conventional farms in a region and to compare these with a sample of data from organic farms in the region, which farm in the same natural environment under similar conditions. Questions have, however, been raised in this regard, which can also be asked when pairs of organic farms are being compared. Offermann and Nieberg (1999:517), for example, asked:

- Where is the distinction between non-system and system-determined factors?
- Where are the links between the various factors like farm size and system, production structure and farming system?
- What is the influence of the managerial abilities of farmers?

In the case of a horizontal comparison, as discussed earlier in this section, research results can be distorted if the farms are not differentiated according to non-system determined aspects.

Wynen (1998) found it difficult to assess the likelihood of success in organic farming in general, no matter which method of comparison is chosen. As indicated by Wynen (1998:13), the following concerns need to be borne in mind when evaluating the feasibility of organic agriculture in a given environment:

- In practice, it will often be difficult to differentiate between the effect of different factors on a farming system, as it may be that the introduction of organic management is not the only change at the time (for example, a number of years with very (un) favourable weather conditions);

- Some parameters (such as yield) need to be averaged over a number of years, as factors other than the management system influence variability between years (for example, weather);
- Benchmark figures, which indicate the conditions before a change occurs in a system, are not always available. In such cases, they must be obtained before organic management is adopted but this is not always possible (especially when resources are scarce);
- Many of the changes may be observable only in the long-term, such as changes in yield or soil fertility;
- Because organic agriculture is such an under-researched area, conditions which initially seem difficult may be easy to cope with after some experience has been gained, and *vice versa*; and those who have no experience in thinking within the context of organic agriculture are not likely to be able to judge possibilities in organic agriculture accurately.

### **4.3 METHODOLOGICAL APPROACH USED IN THIS STUDY**

#### **4.3.1 Theoretical background**

Selecting the most appropriate method for collecting data is the key issue of research. In this study survey research is combined with case study research. The survey approach allows for a broad overview of the organic farming situation in South Africa and the problems farmers have to face during conversion. This method provides objective information and keeps the interviewer influence very low. It also allows a bigger sample size to make the data representative and to compare it with data from past research. However, the richness in detail is limited since questionnaires which are too long are not likely to be filled in. Furthermore the response cannot be discussed with the farmer personally and misunderstandings can occur if the questions are not well formulated.

The case-study approach gives a detailed insight into the situation of individual farms and helps in understanding the interrelationships and causalities better. According to Lampkin (1994b:38) this instrument is useful as a diagnostic tool to analyse why problems occur and what potential exists for improvement, which is exactly the focus of this study. It should be of multi-disciplinary nature to demonstrate how different factors – economics, biology, policy and social environment – interact. Being representative is the most important issue

when doing case studies. If a small number of cases is collected then the cases must be representative for the particular group that is evaluated. Otherwise any general lessons drawn from the results may be invalid (Maxwell, 1986:154). The goal of case studies is not to produce a large amount of data for statistical analysis, as is the case with surveys, but rather to increase the understanding of a farming system. To reach this goal Maxwell (1986:156) suggested a minimum of two farms in each farm type and a maximum of five.

#### **4.3.2 Data sources for the study**

As a first step in collecting data, contact details of organic farmers all over South Africa were gathered from different sources, since no database was available at this point. The contact details were collected mainly from one of the Ecocert certifiers in South Africa, the Bio-Dynamic and Organic Certification Authority (BDOCA), the Cape Organic Producer Association (COPA) and the Organic Agricultural Advisory Services. SGS South Africa was not willing to provide addresses but sent out the questionnaire to 18 of their members.

The questionnaire (see Appendix 2) was sent out to 93 farmers over the whole country, via either fax or e-mail to keep the costs as low as possible. Fewer farmers received the questionnaire than are listed in Table 1.1 since Table 1.1 reflects data from 2002 while the questionnaires were sent to addresses available in 2001.

Because of the limited number of organic farms in South Africa every farm was included where contact details were available. No differentiation between production systems, sizes of the farms or time under organic management was made. The same questionnaire was sent both to farmers in conversion and to fully organic farms since it was not possible to identify their status in advance.

A total response of 38 questionnaires was received but nine of them were either not from farmers farming organically or they were processors and retailers and thus not in the target group for this survey. Of all replies 29 were used for the analysis, which is a response rate of 31.2 percent. Comparative data from different sources was used in the analysis. For the comparison with conventional structures, sources such as the National Department of Agriculture (2001) and the Buro vir Markte an Media (1997) were employed. Studies of Fischer (1989), Schulze Pals (1994), Duram (1997), Lockeretz (1995), Rantzau *et al.* (1990) and others supplied information on organic farming systems in other countries.

The farmers for the case studies were chosen according to the information given in the initial questionnaire and their willingness to be available for further, more detailed information. The farms had to be located in the Western Cape, which reduced the number of potential participants to 16. It was decided on three main production systems, which were table grapes, pome fruit and vegetables. Two farms were interviewed for each production system. Originally it was planned to include only farms which were at least in their second year of conversion. Due to the lack of respondents this was not possible to realize. Two farmers had to be included who were in their first year of conversion.

### **4.3.3 The survey procedure**

In the middle of August 2001 the questionnaires were sent to the farmers by fax or e-mail accompanied by a covering letter, which stated the importance of the study (see Appendix 1 and 2). The farmers were given two weeks to complete the questionnaire. After this period only 15 questionnaires were sent back completed. Since this response rate was regarded as relatively low, a friendly reminder was sent to the farmers who had not replied. After this reminder an additional 23 responses were received. A total of 29 responses could be used as stated in Section 4.3.2. All the data were handled confidentially although the farmers had the option to choose whether their details could be used for further research. All but one farmer agreed to this.

The six-page questionnaire was designed to collect mostly qualitative, but to a small extent also quantitative data. It included questions about the decision process that led to the start of the conversion process, their farming situation before and after/during conversion as well as socio-demographic questions. A special focus was placed on the problems during the conversion process as well as on the most important changes that took place during this time. Most of the questions were closed questions with room for comments, which was seldom used. Open-ended questions were included to gain a better insight into the South African situation and to give the respondent space to point out factors which were specific and relevant for the farm. Some of the farmers replied unsatisfactorily or not at all to these questions.

Table 4.1 provides an overview of how the farms and the certified areas were distributed over the provinces and what the main products were. Most of the certified farms were located in the Western Cape, which reflects a similar percentage to the overall situation, shown in Section 1.3.1.

**Table 4.1:** Characteristics of certified farms in the provinces

Province <sup>1</sup>	Number of farms	Total area in ha	Total certified area in ha	Organic area in ha	Area in conversion in ha	Main products
Western Cape	16	3 241	1 187	389	798	Wine, table grapes, vegetables, fruit
Northern Cape	1	4 000	4 000	4 000	0	Nuts, livestock
KwaZulu Natal	2	203	63	63	0	Citrus, vegetables
Gauteng	3	36	36	36	0	Vegetables
Limpopo	1	350	30	0	30	Avocados
Mpumalanga	3	921	691	553	138	Vegetables, avocados
Eastern Cape	1	4 000	1 200	1 200	0	Tea
Free State	2	1 254	1 164	800	364	Fruit, cash crops
<b>Total</b>	<b>29</b>	<b>14 005</b>	<b>8 371</b>	<b>7 041</b>	<b>1 330</b>	

1: No responses were received from farmers in North West.

Source: Own questionnaire

#### 4.3.4 Case studies

For the gathering of information for the case studies, a comprehensive questionnaire was designed (see Appendix 3). Farm visits were arranged between October and November 2001. Individual visits took between 3 and 6 hours since farm tours were most often included.

The data collected were mainly of a qualitative nature and covered several areas of the farming activities. Information was accumulated about general farm characteristics and aspects of farming such as area, soils, climatic conditions, irrigation and farming experience. This data helped to draw a first picture of the farm and to compare the basic conditions of the six farms. Part C of the questionnaire asked for the general aspects of the conversion to organic farming including membership and rating of organic farming organisations and conversion planning. Only additional questions were asked since all of the farmers had already completed the survey questionnaire.

A section on livestock was included but was not relevant for any of the farmers. In Part E the participants had to answer queries about crop production area and practices as well as yields. Special focus was put on the economic aspects of the farm. Information on labour and machinery requirements, investments, costs, income and production were gathered.

This was later used in the analyses to give a picture of the feasibility of the organic farming operations. The last conventional year, the three years of conversion and the first organic year were examined, where data were available. In the last section of the questionnaire the farmer's opinion was asked on social aspects, the South African situation, problems and risks.

## **4.4 DATA ANALYSIS**

### **4.4.1 Survey analysis**

Most of the data analyses were done in an exploratory manner; only the chi-square tests were applied in two cases and a paired-distribution t-test in one case. The data were compared with either data on the general commercial farming situation (including conventional and organic farmers/farm) as in the case of age and education structures, farm sizes and organisation, or the findings of other studies done in this field were used. Most of these findings have already been discussed in Chapter 2 and 3. Hypotheses formulated there were tested for the South African case.

### **4.4.2 Case study analysis**

No statistical analyses were done on the data gathered in the case studies, because of the low number of farmers included. All the data was analysed in a descriptive manner. Horizontal as well as vertical comparisons were made. Horizontally aspects such as production techniques were compared within each production system. Across the production systems, elements such as investment and factor endowment were compared. The horizontal comparisons included also the analysis of social aspects, problems and opinions about the South African situation in organic farming. This approach was used to assess the differences between the different systems and show the various influences on the conversion process.

More emphasis was put on the vertical comparison. For this purpose data were collected from the last conventional year together with data from the conversion period and the first organic year, where available. The reason was to show the development of each farm over the years and point out the changes which took place during this time with respect to agronomic and economic changes such as labour, machinery and financial performance. Again farms were compared both within the production systems and across systems. This

led to results about the performance of the different farms in a production system as well as to answers about the accomplishment of different production systems during the conversion process.

Industry data of commercial farms were not used in the comparison since the surveyed farms were not located in the same area and the sample was too small. Thus the comparison to industry data would have given a distorted and not representative picture of the performance of certified farms in the conversion process. If the sample size had been larger and farms within the same area had been surveyed, comparison with industry data would be a useful tool.

#### **4.5 PROBLEMS AND LIMITATIONS**

Several problems occurred which influenced the decision process on the research procedure. They were mainly caused by the low number of farms under organic production. Since this industry is fairly young in South Africa, no database existed on farms under organic production. Contact detail had to be collected from different sources, while organizations were not always willing to cooperate. The small number of addresses limited the research from the beginning. Although the response rate of around 30 percent can be rated as relatively high, the number of farmers who responded was still low at 29. This reduced the representativeness of the survey results.

Because the initial questionnaire was posted, only a small number of questions were included, since a questionnaire that is too long was not likely to be filled in. Therefore it was not possible to deal with aspects in detail, confirm answers and clarify issues in a personal discussion. Another problem was the open-ended questions. Some of the farmers gave only short comments without details or did not complete the questions at all. On the other hand, interviewer bias was avoided due to the lack of personal contact with the interviewed farmers.

The small number of responding farmers also posed a problem for the case studies. The decision on which farms to use for the second part of the study was made on the basis of the questionnaires. Since the Western Cape was chosen as study area, the number of farms to select from was reduced to 16. Therefore, except for the table grape enterprises, it was not possible to choose farmers located in the same region and thus have similar non-system-determined factors as required by Schulze Pals (1994) and discussed in Section 4.2.2. When the decision about the production systems was made the length of time under

conversion and the availability of data played a major role. Most of the farms were in their first year of conversion and were not able to assess, especially, the economic impact of conversion. No choice was given regarding the farmers in the production systems pome fruit and vegetables since no data of other farmers was available. This also explains the reasons for the short period under conversion as in the case of pome fruit and partly table grapes. It was also not possible to choose farms that had started with the conversion process in the same year. The small number of organic farmers explains this. With regard to the data made available by the farmers it was problematic that three of the six farmers also still farmed using conventional practices on a part of the farm. On none of the farms was a clear distinction made between the two production systems and estimates had to be used to identify yields, inputs, costs and income of the production in conversion. The farmers with long-term crops were also not able to make a clear distinction between their non-bearing and bearing trees/vines concerning aspects such as labour, machinery and costs. Thus the data used are average values of non-bearing and bearing trees/vines although it would have been necessary to use separate data in order to get more accurate results.

Hence the results of the case studies were distorted and should be seen as examples of farms in conversion and not as typical for the Western Cape and the industry. Another limitation was the potential for interviewer bias caused by the personal contact between farmer and interviewer. Especially the last part of the study was strongly influenced by the guidance of the interviewer since data for the open-ended questions were gathered in open discussions. The interviewer tried to maintain a consistent level of guidance during interviews. However, this is a further source of distortion.

## **CHAPTER FIVE**

# **ANALYSIS OF THE CONVERSION TO ORGANIC FARMING IN SOUTH AFRICA: SURVEY RESULTS**

## **5.1 INTRODUCTION**

South Africa's organic farming community consisted of around 250 members at the beginning of 2002. Increasing coverage of this way of farming by the media supports the view that organic farming is a growing industry. In order to meet the specific demands of organic farmers in all fields (marketing, consulting, research, *etc.*) it is, therefore, necessary to investigate the differences between organic and conventional farmers in terms of their socio-demographic characteristics. Furthermore, it is necessary to evaluate farm structure and operations in deciding which farms are farming organically. Knowledge about their motivations helps to gain insight into why farmers decide to convert their businesses to organic farming.

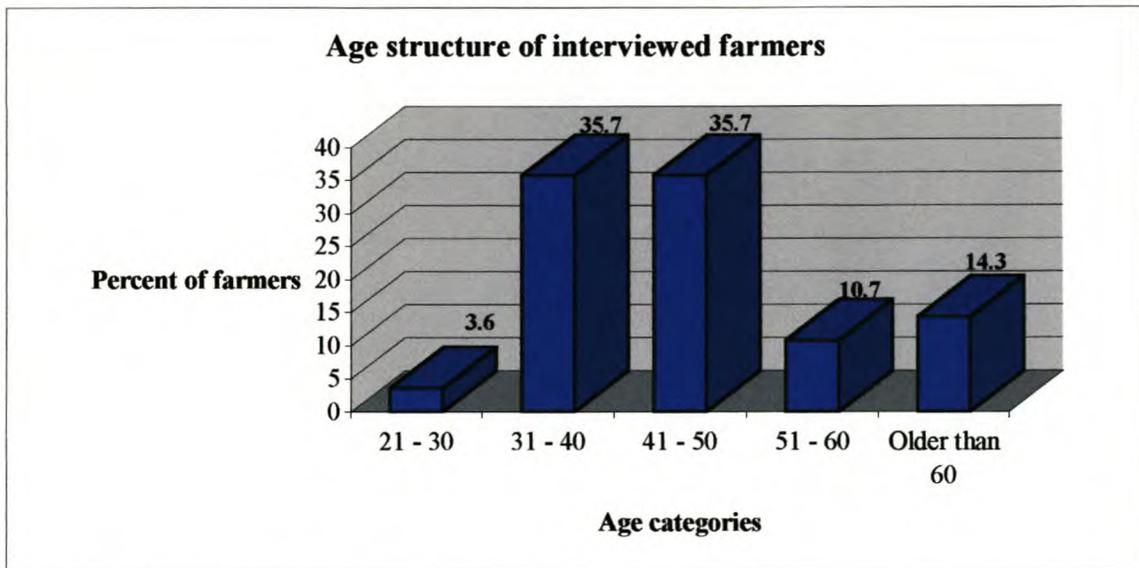
These aspects are discussed in the following chapter, together with the identification of the information sources that farmers used and the problems they had to deal with during the conversion process. The focus was on identifying reasons for these problems in order to be able to give recommendations for addressing these difficulties in the last chapter. Since similar studies done in this field focused mainly on farmers in North America, Europe or New Zealand, another focus of this study was to determine the generalisability of these findings to the South African context.

## **5.2 ANALYSIS OF THE CHARACTERISTICS OF INTERVIEWED FARMERS AND THEIR FARMS**

### **5.2.1 Socio-demographic characteristics of the interviewed farmers**

#### *5.2.1.1 Analysis of the age structure*

28 of the 29 interviewed farmers answered the question about their age group. The distribution of the farmers in these age groups can be observed in Figure 5.1. Most of the farmers belonged to the age group 31 to 40 and 41 to 50. Only four were older than 60 years.



**Figure 5.1:** Age structure of interviewed farmers

Source: Own questionnaire

In order to compare this data with a reference group consisting of commercial farmers (including conventional and certified farmers), the farmers were grouped according to the system shown in Table 5.1. 39.3 percent of the farmers were younger than 41 years, 35.7 percent between 41 and 49 and 25 percent 50 years and over. Compared to the reference group, certified farmers<sup>1</sup> are younger on average. Although the differences in age are not as obvious as in other studies (Rantzau et al, 1990, Schulze Pals, 1994, Fischer, 1989, Duram, 1997, Lockeretz, 1995) this provides a limited support for the hypothesis (Section 2.3.1) that organic farmers are younger than their commercial counterparts.

**Table 5.1:** Comparison of age groups between interviewed farmers and a reference group

Age in years	Interviewed farmers		Reference group	
	Percentage	n	Percentage	n
Younger than 41	39.3	11	29.8	50
41 to 50	35.7	10	39.9	67
Older than 50	25	7	30.4	51

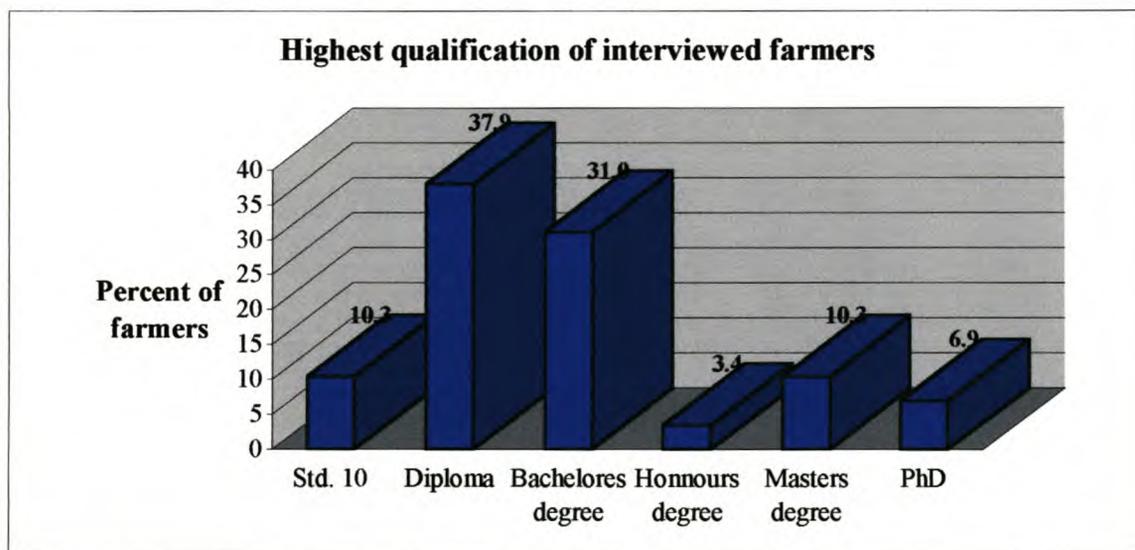
Sources: Own questionnaire and Van der Westhuizen and Viljoen (1999)<sup>2</sup>

<sup>1</sup> The term ‘certified farmers’ includes converting farmers and organic farmers. If a distinction was made between these groups the terms ‘organic farmers’ and ‘converting farmers’ were used.

<sup>2</sup> Although not representative for South African farmers this source was used since no recent data were available from the Statistics South Africa. The most recent data from the Agricultural Census dated back to the 1980s and was thus not used.

### 5.2.1.2 Analysis of the education level

All farmers replied to the question about their highest qualification. The results can be seen in Figure 5.2. Only three of the 29 farmers have no tertiary education, 11 have a diploma from a college or technikon, and the remaining 15 went to university for further education, four of them having an education not related to agriculture such as nursing, civil and metallic engineering and commerce. Three farmers gave no information about their field of education.



**Figure 5.2:** Educational structure of interviewed farmers

Source: Own questionnaire

Table 5.2 compares the highest levels of education of the interviewed farmers with a conventional reference group. These data shows that certified farmers were generally more highly educated than conventional farmers, with 89.7 percent of the farmers having a tertiary education in the form of a diploma or a university degree compared to 50 percent of conventional farmers in 1997 and 57 percent in 1998 (Eksteen and Snyman, 1999:30). Although the number of conventional farmers with a University qualification increased from 21 in 1997 to 27 percent in 1998 (Eksteen and Snyman, 1999:30), the organic farmers, with 51.8 percent, are clearly more highly educated.

This supports the hypothesis in Section 2.3.2 and also corresponds with the findings of Padel (2001:43-44), who evaluated her data according to the innovation theory as discussed in Section 2.3.2. In the case of the surveyed farms this can be applied since organic farming is a new industry in South Africa and farmers converting to organic farming can still be seen as innovators.

**Table 5.2:** Comparison of highest qualification between interviewed farmers and a reference group

Highest qualification	Interviewed farmers		Reference group	
	Percentage	n	Percentage	n
Less than Std 10	0	0	3	59
Std. 10	10.3	3	39 <sup>1</sup>	771
College/university partially completed	0	0	9	178
Diploma	37.9	11	29 <sup>2</sup>	573
University degree	51.8	15	21	415

1: Agricultural school and other high school

2: Agricultural college and technical qualification

5 percent of the conventional farmers had another than above-mentioned education and could therefore not be located to one of these groups.

Sources: Own questionnaire and Buro vir Markte en Media (1997)

### 5.2.1.3 Occurrence of off-farm employment on the surveyed farms

27 of the interviewed farmers answered the question about whether he or his spouse was working off-farm. Only one farmer had no spouse. Three possible answers were given for each farmer and spouse:

- No off-farm employment
- Part-time employment
- Full-time employment

On 15 farms neither farmer nor spouse were involved in off-farm employment, on three farms the farmer was not working off-farm while the spouse was working in another field either full-time or part-time (see Table 5.3). Three farms were managed with the farmer working off-farm (part-time and full-time) and the spouse not being involved in off-farm work. On five farms both farmer and spouse were working either full or part-time in a business outside the farm. The farmer without spouse was working partly off-farm. Thus, on 44.4 percent of all farms an additional income was generated with off-farm work by at least one member of the family (farmer or spouse).

**Table 5.3:** Off-farm employment of interviewed farmers and their spouses

	<b>Farmer not working off-farm</b>	<b>Farmer working full-time off-farm</b>	<b>Farmer working part-time off-farm</b>	<b>Spouse not working off-farm</b>	<b>Spouse working full-time off-farm</b>	<b>Spouse working part-time off-farm</b>
<b>Number of farmers</b>	18	4	5	18	5	3

Source: Own questionnaire

## 5.2.2 Analysis of key farm characteristics

### 5.2.2.1 The farm size in comparison

To estimate the differences in farm size between certified and commercial farms in general in South Africa, the certified farms<sup>1</sup> were divided into two groups. The first group consisted of farms with horticulture as their main business and the second group included farms with mixed farming operations. Since no knowledge about the farm income of the surveyed farms existed, a classification into production groups could not be made according to the percentage of the gross income generated by the farming operation, but only on a hectare base. Data from the Abstracts of Agricultural Statistics (National Department of Agriculture, 2001) were chosen to represent a reference group, including all commercial farms in South Africa. Since all farms in the Western Cape were mainly horticultural operations the corresponding data for commercial (conventional and certified) farms was used. Table 5.4 displays the differences in the results.

**Table 5.4:** Comparison between sizes of surveyed farms and the reference group in ha

<b>Province</b>	<b>Certified farms (ha)</b>			<b>Reference group (ha)</b>	
	<b>Average</b>	<b>Range</b>	<b>n</b>	<b>Average</b>	<b>n</b>
Western Cape	202.6	24-525	16	531.8	3 336
<b>Total</b>	<b>482.9</b>	<b>3-4 000</b>	<b>29</b>	<b>1 427.4</b>	<b>57 980</b>
Horticulture	185.9	3-525	24	484.9	8 039
Mixed farming	484.7	200-1 000	3	769	5 711

Sources: Own questionnaire and National Department of Agriculture (2001)

In the Western Cape the certified farms were 62 percent smaller than their conventional counterparts. The certified farms showed a wide variation in size, with the smallest farm consisting of 24 ha and the largest being 525 ha in size. A look at the average farm size of

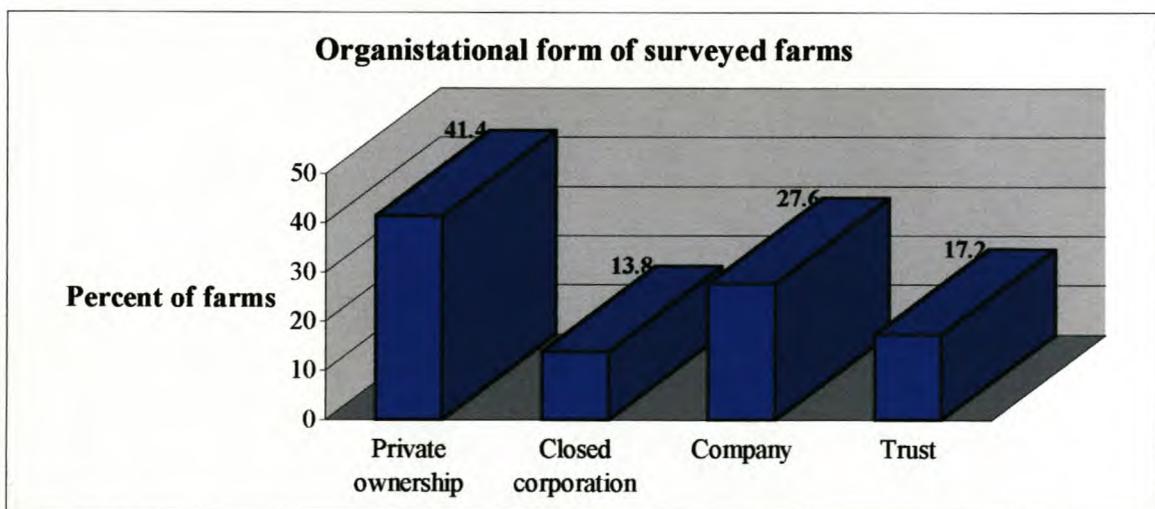
<sup>1</sup> The term 'certified farms' includes farms in conversion and organic farms. If a distinction was made between these groups the terms 'organic farms' and 'farms in conversion' were used.

all certified horticultural holdings revealed the same differences in size. However, the representativeness of these results is reduced by the discrepancy in farm size within the group of certified farmers. To reduce the disturbance of the results to a certain extent the two extensive 4 000 ha holdings were included only where the total number of certified farms was compared with the total number of farms of the reference group to show the divergences. Certified mixed farming operations were more than double the size of the farms specialised in horticulture and were 37 percent smaller than conventional farms. The small number of farms included in this sample had a negative influence on the representativeness of the results.

The results, especially concerning the horticultural operations, nevertheless supported the hypothesis made in Section 2.3.3 and the theory of Padel (2001:44-45) discussed there. Thus it can be expected that sizes of certified holdings will increase with the development of organic agriculture in South Africa.

#### 5.2.2.2 Evaluation of the differences in the organisational form

To determine the way in which the surveyed farms were run, four options were given to choose from. No farmer used the alternative option to state another form of organisation. Figure 5.3 illustrates the outcome.



**Figure 5.3:** Organisational forms of surveyed farms in percent

Source: Own questionnaire

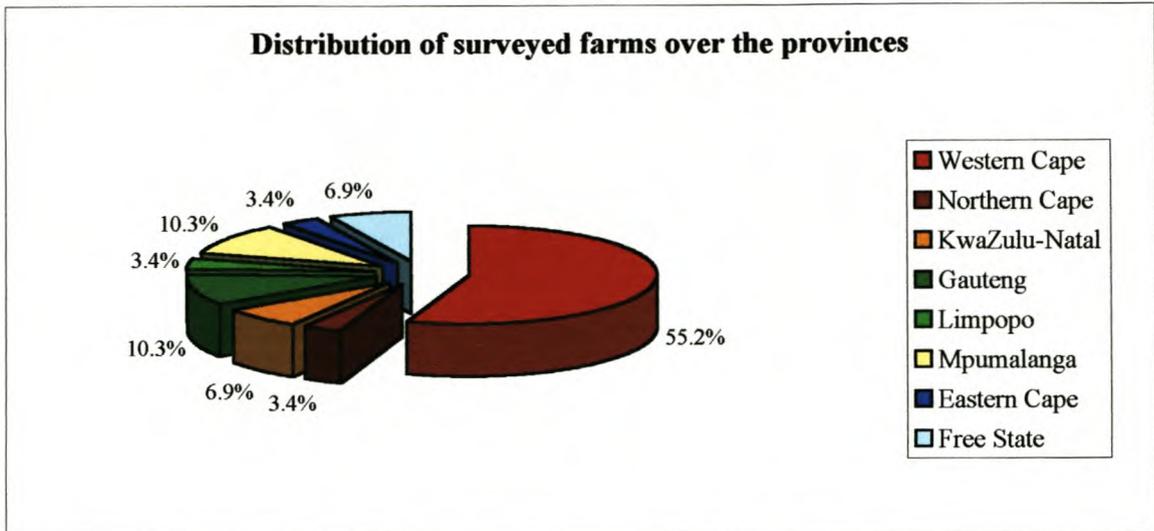
More than 40 percent of the farms were managed under private ownership, while nearly 28 percent were companies. Slight differences therefore exist between certified and commercial (conventional and organic) farms. According to the Buro vir Markte en Media (1997) in 1997, 66 percent of all farms were managed as one-man businesses and 11

percent as partnerships. This number rose to 68 percent one-man businesses in 1998 (Eksteen and Snyman, 1999:30). Companies made up only five percent of all farms, whereas the number of farms organised as a trust increased between 1995 and 1998 to 13 percent. Seven percent of the conventional farms were organised as closed corporations in 1998 (Eksteen and Snyman, 1999:30).

### *5.2.2.3 Dominant farming enterprises and distribution over the provinces*

According to the classification explained in Section 5.2.2.1, the dominant enterprises of the surveyed farms were horticultural. 24 of the farms were pure horticultural production units with no or only a small number of livestock. The main enterprises were vegetables, deciduous fruit and wine and table grapes. The remaining five farmers had mixed farming operations that made it impossible to classify them. These farms consisted mainly of deciduous fruit and vegetable production combined with cash crops and livestock production. One of the farmers had wild-grown honeybush tea as his main business and a number of livestock. This distribution showed, like Table 1.1 in Section 1.3.1 that horticultural enterprises are more likely to be converted than cash crops and livestock. The reasons could include the lack of knowledge and support, as well as the lack of a developed national market for these products.

The province most highly represented in the survey in terms of number of farms was the Western Cape, with 55.2 percent, as can be seen in Figure 5.4 (see also Table 4.1). The main reason is that 46 percent (see Figure 1.1) of the total number of certified farms are located in the Western Cape. Furthermore, the sources for addresses played an important role. A large percentage of addresses were made available from COPA and the Ecocert inspector in the Western Cape, which explains the high number of interviewed farms in the Western Cape.



**Figure 5.4:** Distribution of certified farmers over the provinces\*

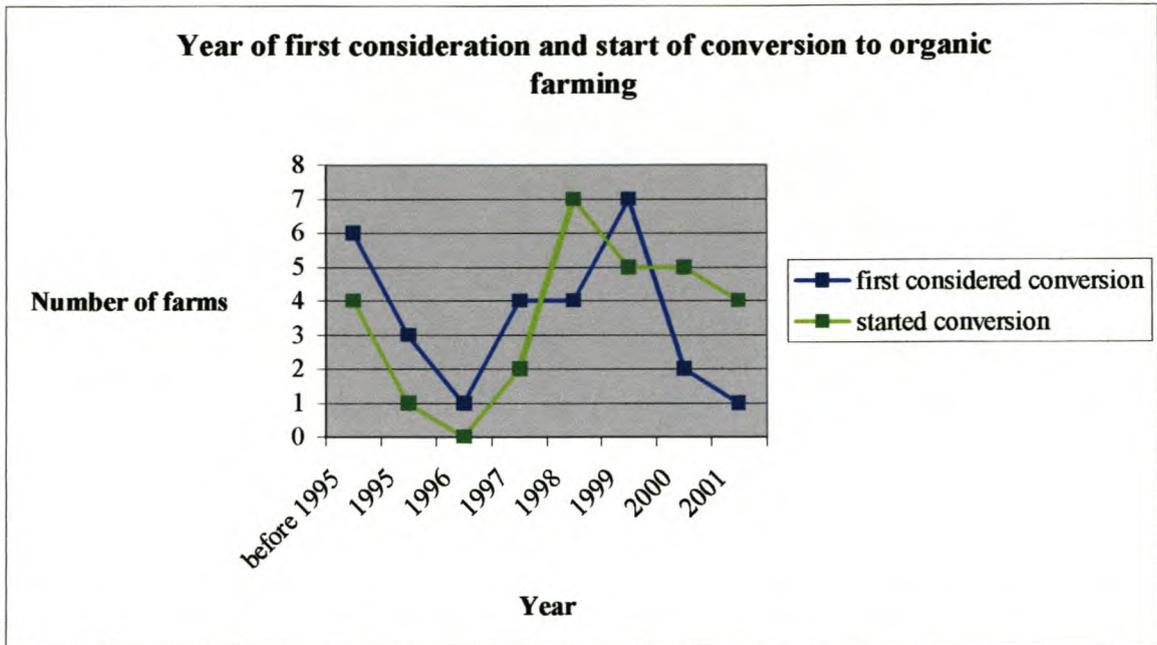
Note: No responses were received from farmers in North West

Source: Own questionnaire

### 5.3 ANALYSIS OF THE DECISION PROCESS

#### 5.3.1 Year of consideration and start of the conversion

In Figure 5.5 two time-lines are displayed. The first shows the year in which the farmers first considered organic farming as an alternative to their conventional farming practice. The second line shows the year the farmers actually started to convert their farm. This year is the first year of certification. Six farmers considered converting to organic farming before 1995. The first case dates back as early as 1955. This farmer was also the first to convert his farm in 1969. Two of these early farmers considered a change in the 1970's, but started converting only in the beginning and the other only at the end of the 1990's. In one early case the farmer considered conversion in 1994, but then took over a farm that had already been converted in 1989.

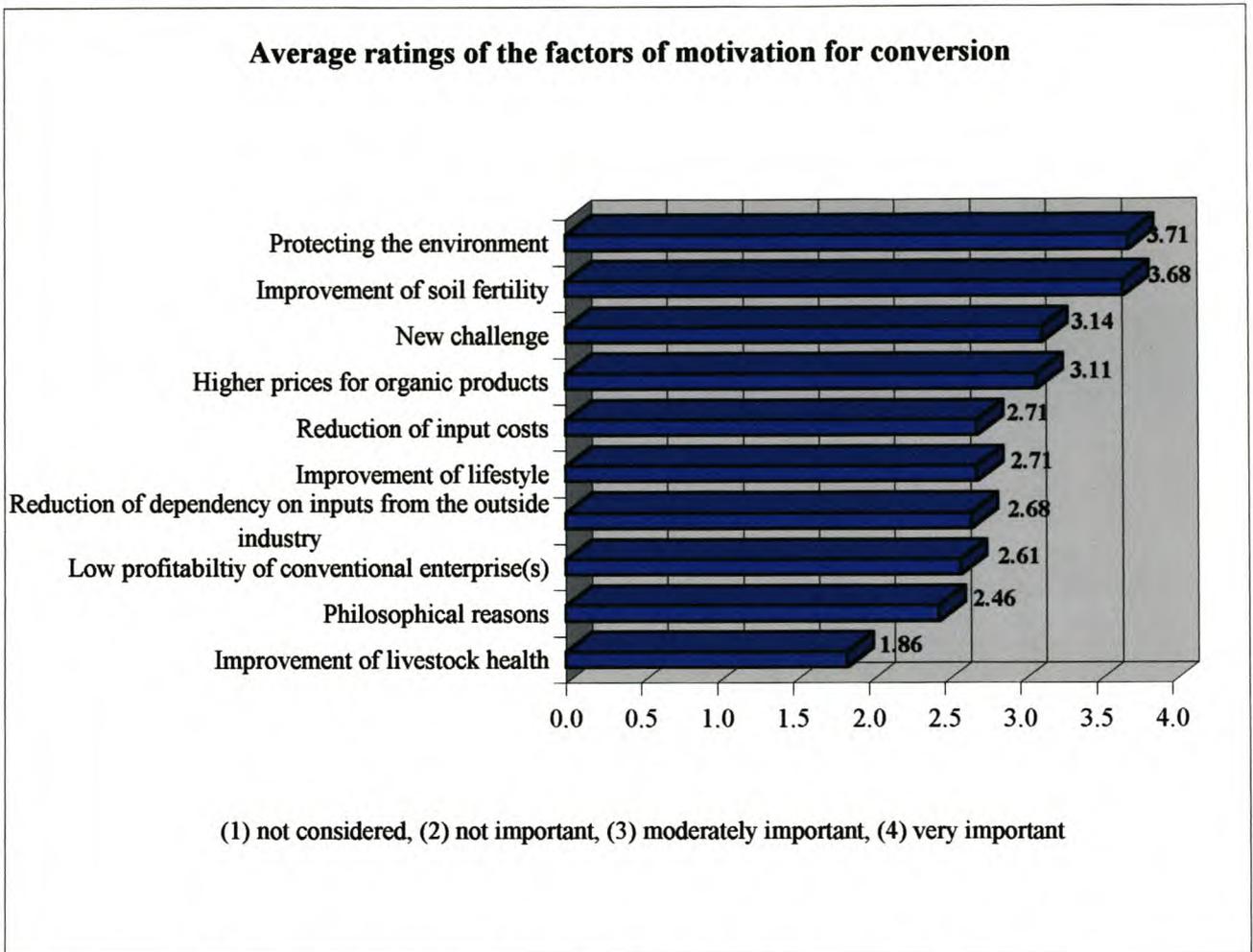


**Figure 5.5:** Year of first consideration and start of conversion to organic farming  
*Source:* Own questionnaire

The strong fluctuations in the chart can be explained mainly by the small number of surveyed farms and is not due to a decrease in interest in organic farming. The decrease in the number of farmers who considered organic farming in the years 2000 and 2001 is caused by the fact that most of the farmers allowed a time gap of more than two years between this first consideration and the definite start of the conversion period. There is undeniably an upward development of this form of farming as the numbers up to the year 2000 showed. And since organic farming is a fairly new business in South Africa, not much information is available and the markets are not yet fully developed, a further increase can be expected.

### 5.3.2 Analysis of the motivation factors responsible for the decision to convert

Different motivations were responsible for the decision of the interviewed farmers to convert to organic farming. The farmers were asked to rate different motivation factors according to their importance during the decision process. Figure 5.6 displays the outcome of this rating.



**Figure 5.6:** Motivation of interviewed farmers for the decision to convert to organic farming

Source: Own questionnaire

Protecting the environment and improving the soil fertility were the two major driving forces in the decision process. This complies partly with the findings in the literature, discussed in Section 2.4.3, especially concerning soil fertility. Similar findings about environmental issues were recorded only by Fisher (1989). Organic farming as a new challenge motivated more of the interviewed farmers in South Africa than in other countries. Financial reasons such as higher prices or the reduction of input costs played a minor to average role in the decision, which is similar to the literature findings. However, the low profitability of conventional farming systems had no big influence on the decision, which is confirmed by the fact that only eight of the surveyed farmers were, according to the statement of the farmers, not farming on a profitable basis before conversion. Therefore it seems that farmers converted because of the added financial attractiveness of organic farming rather than as a solution to an unprofitable farming situation. The lowest rating was for the improvement of livestock health. This was because the majority of interviewed

farmers did not farm with livestock. The farmers who had livestock included on their farm rated this factor as moderately to very important for their decision to convert.

To determine whether the interviewed farmers differed in their motivations from farmers in other countries, a chi-square test was applied with data from Fisher (1989), who evaluated the motivations of New Zealand farmers. The chi-square test is useful when analysing data that occurs as frequencies and when assumptions of parametric tests, such as homogeneous variances or large enough samples to represent the population, are violated.

Furthermore the chi-square test allows one to determine whether the distribution of frequencies occurs as expected. The null-hypotheses stated that no differences exist between the interviewed farmers and the reference group. The results of the test can be observed in Table 5.5.

**Table 5.5:** Results of the chi-square test for motivation factors

Motivation factor	Chi-square test value	5%-level critical value
Protecting the environment	0.14	5.99
Improvement of soil fertility	0.50	5.99
<b>Improvement of lifestyle</b>	<b>7.68</b>	<b>5.99</b>
Higher prices for organic products	3.72	5.99
New challenge	0.31	5.99
Philosophical reasons	4.96	5.99
<b>Reduction of input costs</b>	<b>12.33</b>	<b>5.99</b>

Sources: Own questionnaire and Fisher (1989)

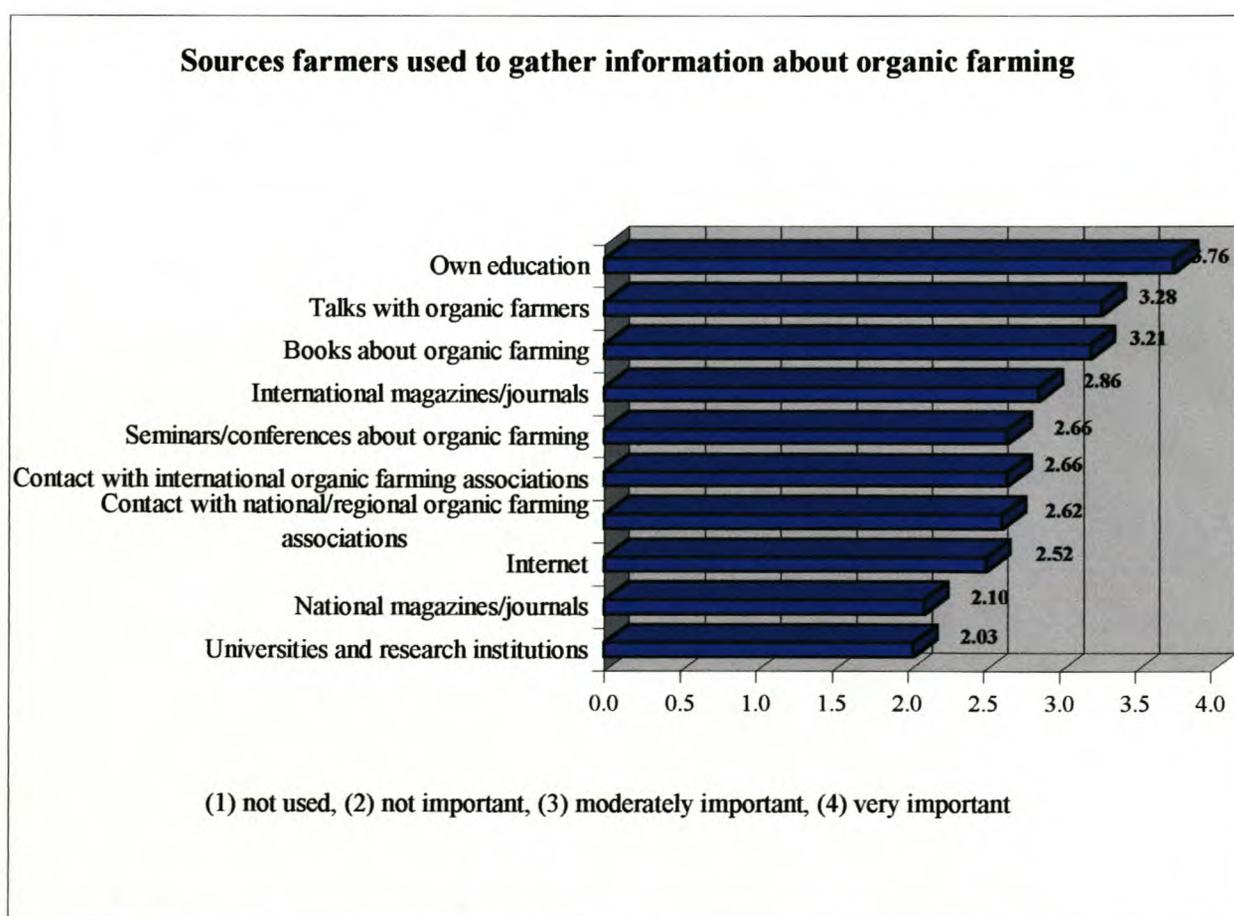
Since the compared surveys did not cover the same motivation factors, only the identical ones were selected for the test. Furthermore since the surveys worked with different numbers of rating levels (three compared to four), the levels two and three of the above ratings had to be merged in order to make the results comparable. This affects the value of the outcome in a negative way and has to be kept in mind. The null-hypotheses could be rejected only in two cases on a five percent significance level. For New Zealand farmers the improvement in lifestyle and especially the reduction of input costs played a bigger role in the decision process than for the interviewed farmers. The latter supports the belief that the interviewed farmers are not as financially motivated as farmers surveyed in other studies. Although the improvement in lifestyle was rated rather low in both cases, it had more influence on the farmers in New Zealand. This, and the fact that a significant difference on the 10 percent level was found, allows one to deduce that the interviewed

farmers were motivated by practical reasons rather than idealistic reasons. The remaining factors were rated similarly by the different groups and showed no significant differences.

### 5.3.3 Evaluation of the sources used to gather information about organic farming

Other than for the motivation factors no data were available that would have allowed a statistical analysis of the differences between the findings of studies done in other countries and the results of this survey. Thus the comparison is only descriptive and not statistically tested.

The farmers were asked to rate information sources according to their relevance in gathering information about organic farming. The results are visualized in Figure 5.7.



**Figure 5.7:** Rating of sources used by the interviewed farmers to gather information about organic farming  
 Source: Own questionnaire

The interviewed farmers rated their own education, talks with other organic farmers and books about organic farming as the most important sources of information and these were the only three that were rated on average higher than moderately important. This complies

partly with the findings in the literature discussed in Section 2.4.2. In both the studies of Fisher (1989) and Schulze Pals (1994:100), own education played a less important role in the acquiring of knowledge for the farmers than in the case of South African certified producers, who rated it as the most important source.

The rating of the importance of international magazines and journals and contact with international organic farming organisations compared with their national counterparts provides an indication of the situation of organic farming in South Africa. The low rating of national magazines and journals showed that organic farming is a sector that is still regarded as fairly unimportant and thus not covered well by the local press. The work of national organic farming organisations such as COPA and OAASA provide at least a contact point for local organic farmers, but their low rating shows that they are not of great value to the interviewed farmers.

Universities and research institutions played no role at all in the process of information accumulation. This result also provides evidence of the small national involvement in organic agriculture, which is responsible for some of the most serious problems discussed in Section 5.6.1.

#### **5.3.4 Description of the certification bodies used by interviewed farmers**

Only one of the 29 interviewed farmers was not yet certified, but was awaiting certification. Of the six active certification bodies in South Africa, five were represented in the survey. As revealed in Table 5.6, Ecocert had the largest share with 41.4 percent of the surveyed farms. This reflects the increase in Ecocert certified farms as shown in Table 1.2 in Section 1.3.1. A reason for the large share could be that Ecocert was the first certifying body in South Africa (Kupka, 2002:18). Furthermore the organisation is accredited in the EU and from December 2002 on, in the USA and Japan (Kupka, 2002:18), and thus allows for exporting to these countries, which is an important factor especially in the horticultural sector. One of the farmers certified with Ecocert has chosen an additional certification with the Swiss organisation Knospe to allow for export to Switzerland, since it is not a member state of the EU.

**Table 5.6:** Distribution of surveyed farms over the certification organisations active in South Africa

Certification body	Number of certified farms	Percentage of certified farms
Ecocert	12	41.4
SGS <sup>1</sup>	7	24.2
Soil Association	4	13.8
BDOCA	4	13.8
Afrisco	1	3.4
Not certified	1	3.4
Total	29	100

1: Of the seven farms certified by SGS three had a combined certification with BioGro, New Zealand.

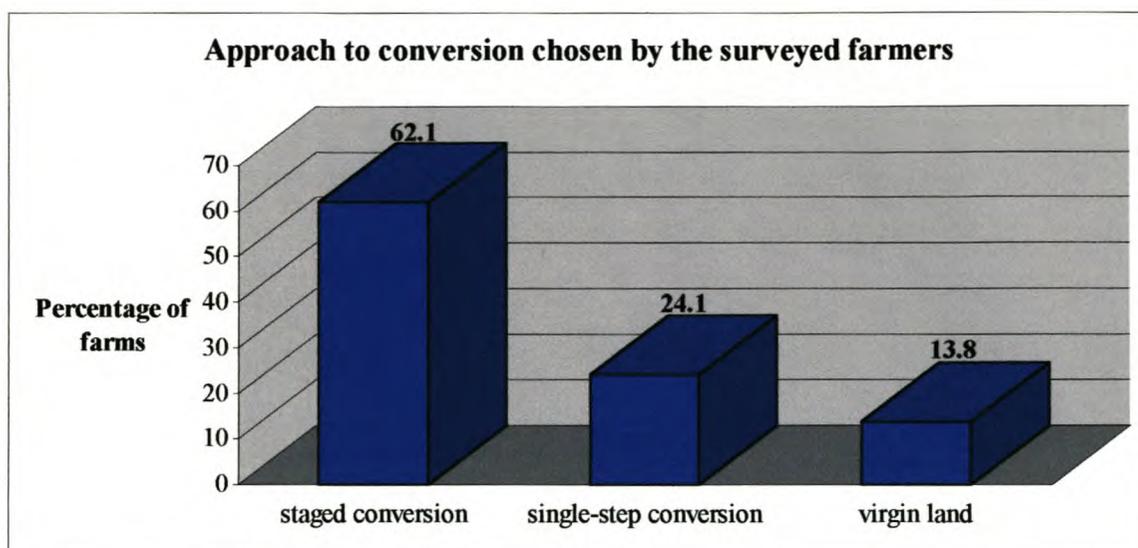
Source: Own questionnaire

The second most represented organisation was SGS, also for reasons of accreditation in the EU and the USA and because they are the local inspectors for BioGro, a certification body from New Zealand, three of the farmers were certified by. One of the four farmers certified with Soil Association has his compost separately certified with SGS. The Organic Advisory Services made addresses of the British Soil Association available for this study, which caused a relatively higher percentage of Soil Association certified producers in this survey than the total number shown in Table 1.2 in Section 1.3.1. Membership of the British Soil Association is, however, inconvenient due to the fact that inspectors are not locally available but have to fly in from the UK.

Only one of the interviewed farmers used Afrisco as certification body. As Afrisco was established only in June 2001 and the questionnaires sent out in August 2001, this body supplied none of the addresses acquired from other bodies.

### 5.3.5 Examination of the approach to conversion and the reasons for the decision

Figure 5.8 shows the distribution of the surveyed farms over the different forms of conversion. Staged conversion was chosen by 62.1 percent of the farmers. Only 24.1 percent decided to convert their farm in one step. 13.8 percent, four of the farmers, did not have to convert since they started farming on virgin land. One of them certified only parts of his farm and still plans to certify the rest in the near future.



**Figure 5.8:** Approach to conversion chosen by the surveyed farms in percent

Source: Own questionnaire

Of the seven farmers who converted in a single step only one did not convert his whole farm and does not plan to do so either. His reason was that the remaining area of his farm consists of natural veld without production.

Three of the 18 farmers who converted in stages had parts of their farm already under organic production while the rest is in conversion. Ten still plan to convert the rest of the farm or at least some more hectares. In total 708 ha were still intended to be converted. Different aspects were mentioned when the farmers were asked why they did not convert their entire farm at once (the number in brackets indicates the number of times farmers stated that reason):

- Fear of not being able to deal with the outbreak of pests for which no organic remedies are available at present (4).
- Markets are not developed yet (2).
- Economic feasibility must first be proven (3).
- Lack of knowledge (1).
- The conventional production carries the certified production through the time of conversion (1).

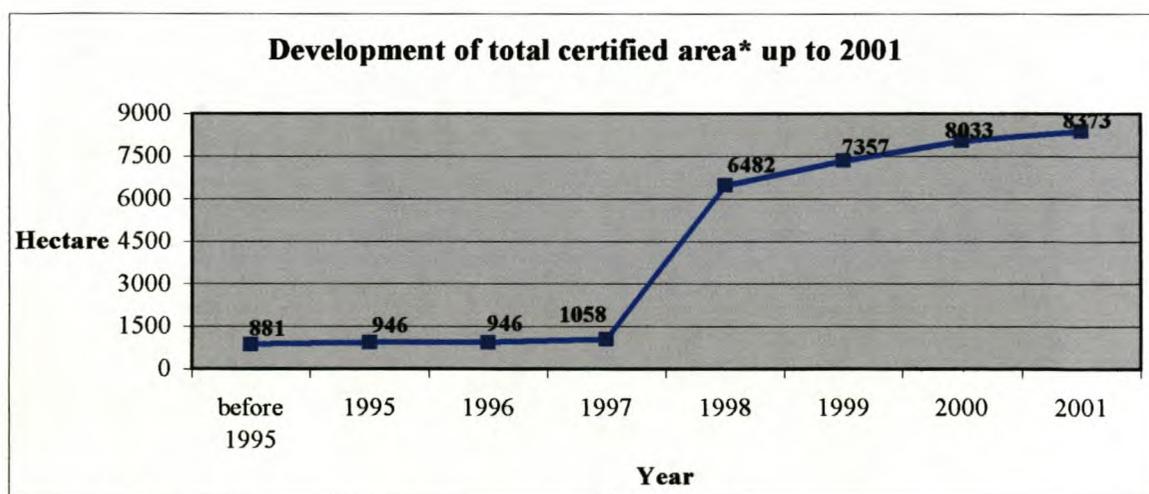
Five did not plan to convert the rest of the farm. They mentioned the following reasons for this:

- Input costs are too high.
- The remainder of the farm is fynbos.
- Not enough time for extra labour and management available.
- Not enough compost available.
- Crop can only be grown successfully with the use of chemicals.
- Local mill cannot accommodate organic production.

## 5.4 DESCRIPTION OF THE AREA UNDER CERTIFICATION

### 5.4.1 Development of the certified area

Organic farming as a new industry has developed only over the past few years, as discussed in Chapter 1. The area under organic certification has grown annually. In Figure 5.9 the increase in area under certification of the surveyed farms can be seen. The first farmers had already started to convert their farms before 1995 (see Section 5.3.1). The growth was constant except for the big increase in 1998, caused by the conversion of one 4 000 ha farm in the Northern Cape and one of 1 200 ha in the Eastern Cape. There seems to be a definite upward trend in the area under certification since a large number of farmers still plan to convert parts of their farms. 708 ha will be converted within the next few years.

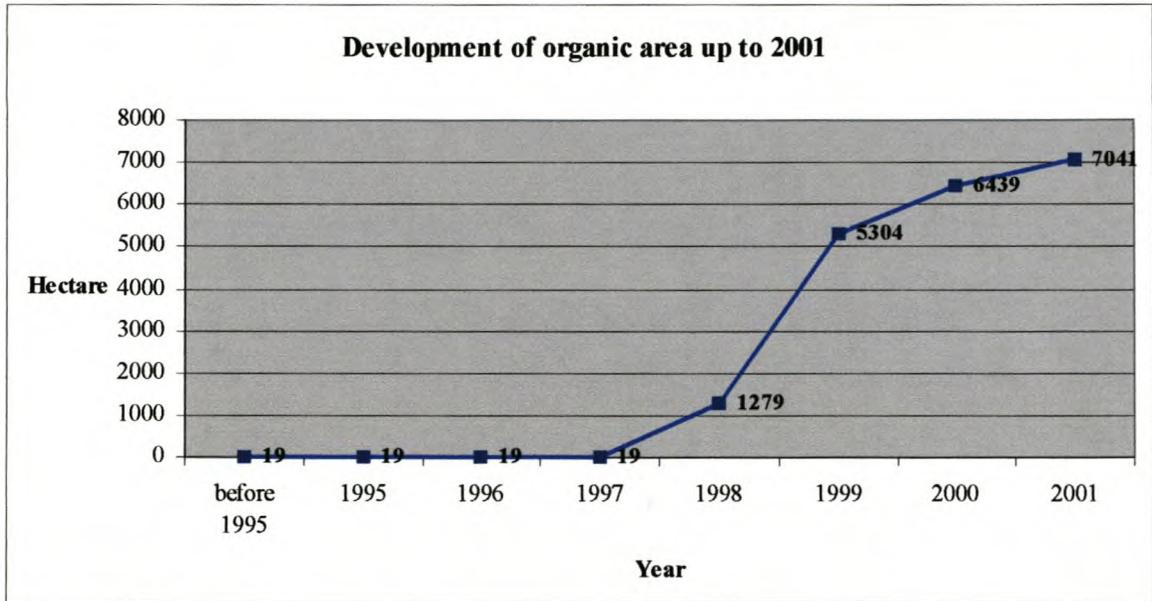


**Figure 5.9:** Development of total certified area up to 2001

\*: The certified area includes area in conversion and organic area.

Source: Own Questionnaire

The development of the area under organic production shows a similar trend with a time lag caused by the different durations of the conversion periods (see Figure 5.10). The farmers who started farming on virgin land or who did not use any kind of chemical before the change had no conversion period. Otherwise the conversion period on average took two to three years, depending on the certification body.



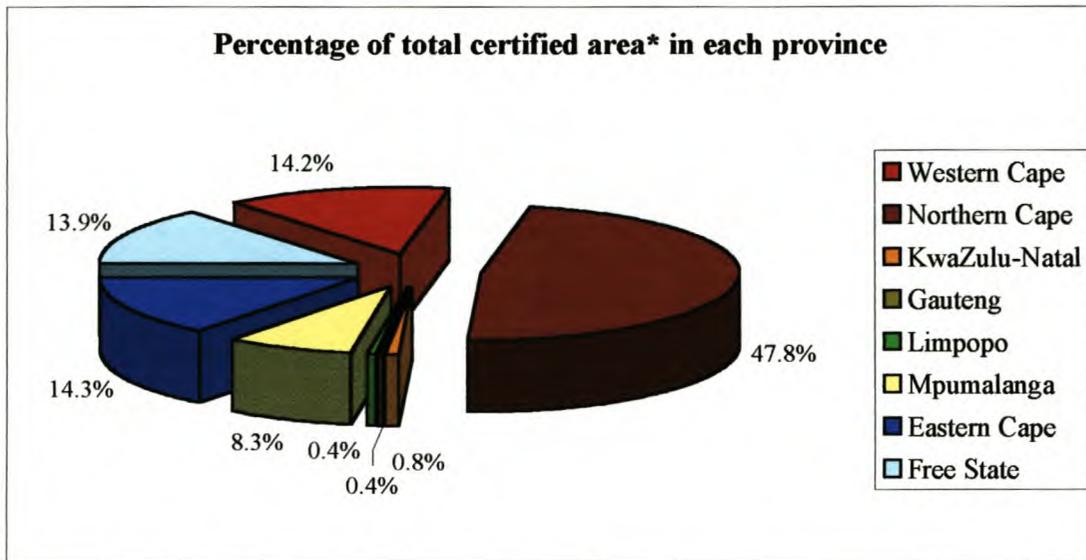
**Figure 5.10:** Development of organic area up to 2001

Source: Questionnaire

## 5.4.2 Analysis of the current situation

### 5.4.2.1 Total area

In Figure 5.11 the total area under certification in each province is shown. According to this figure the Northern Cape was the province with the largest certified area in the survey with 4 000 ha, followed by the Eastern Cape with 1 200 ha. These figures have to be handled with care since they reflect the total area including veld and farmyard and ‘waste’ land (roads, etc.).



**Figure 5.11:** Percentages of total certified area in each province

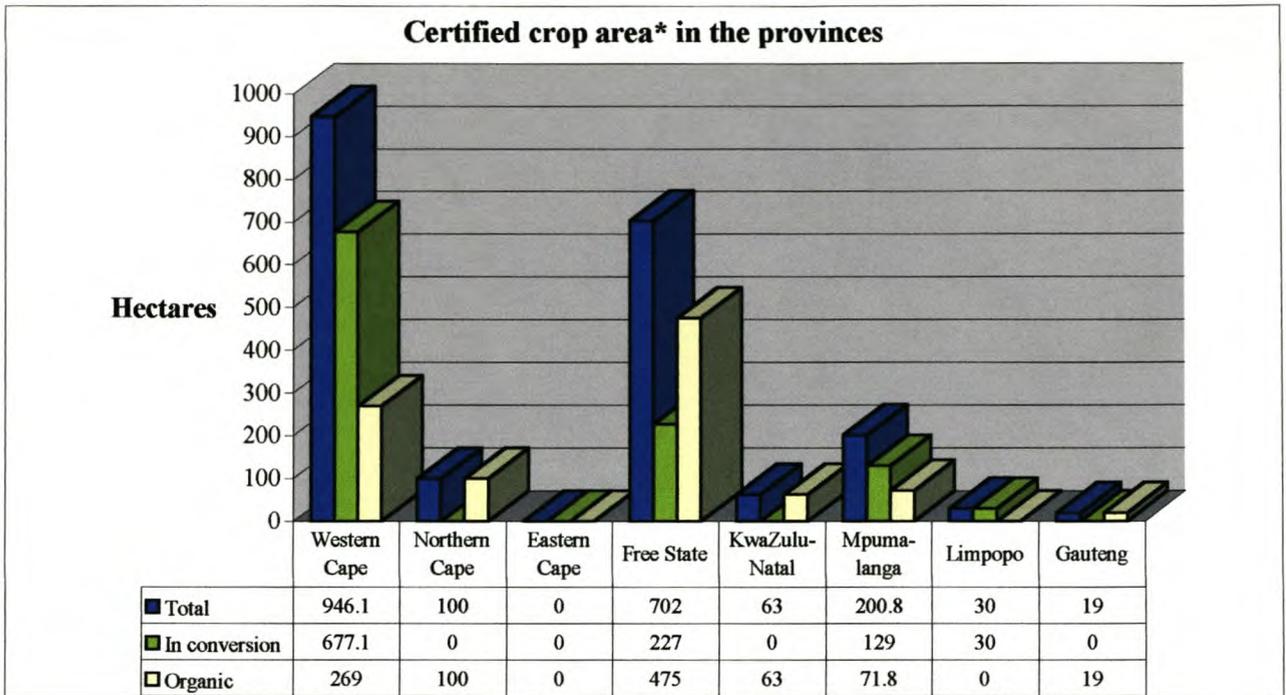
\*: The certified area includes area in conversion and organic area.

Source: Own questionnaire

With 1 188.7 ha, the Western Cape had 14.2 percent of the total certified area, only slightly more than the Free State with 1 164 (13.9 percent). The 691 ha certified area of Mpumalanga accounted for 8.3 percent of the total. KwaZulu-Natal (63 ha), Gauteng (36 ha) and Limpopo (30 ha) had only small percentages.

#### 5.4.2.2 Cultivated area

Looking at the certified area under cultivation without veld, farmyard and waste land gives a clearer picture of the distribution of areas in the provinces. Figure 5.12 illustrates that the Northern Cape had only 100 ha crops under certification, which equals 5.9 percent of the total cropland under certification. In this case the Western Cape had the largest share with 946.1 ha, or 45.9 percent, which complies with the findings of Callear (2002), discussed in Section 1.3.1. The largest crop area under organic production in this survey was found in the Free State with 475 ha out of a 702 ha certified area (34.1 percent of the total certified crop area). 200.8 ha of Mpumalanga’s 691 ha total certified area was under crop production with the smaller share of 71.8 ha being organic. This province thus had a 9.7 percent share of the total certified crop area. The smallest certified crop areas were found in KwaZulu-Natal with 63 ha (3.1 percent), Limpopo with 30 ha (1.5 percent) and Gauteng with 19 ha (0.9 percent). The Eastern Cape, which had the second largest total certified area had no crop land at all, but only naturally grown vegetation.



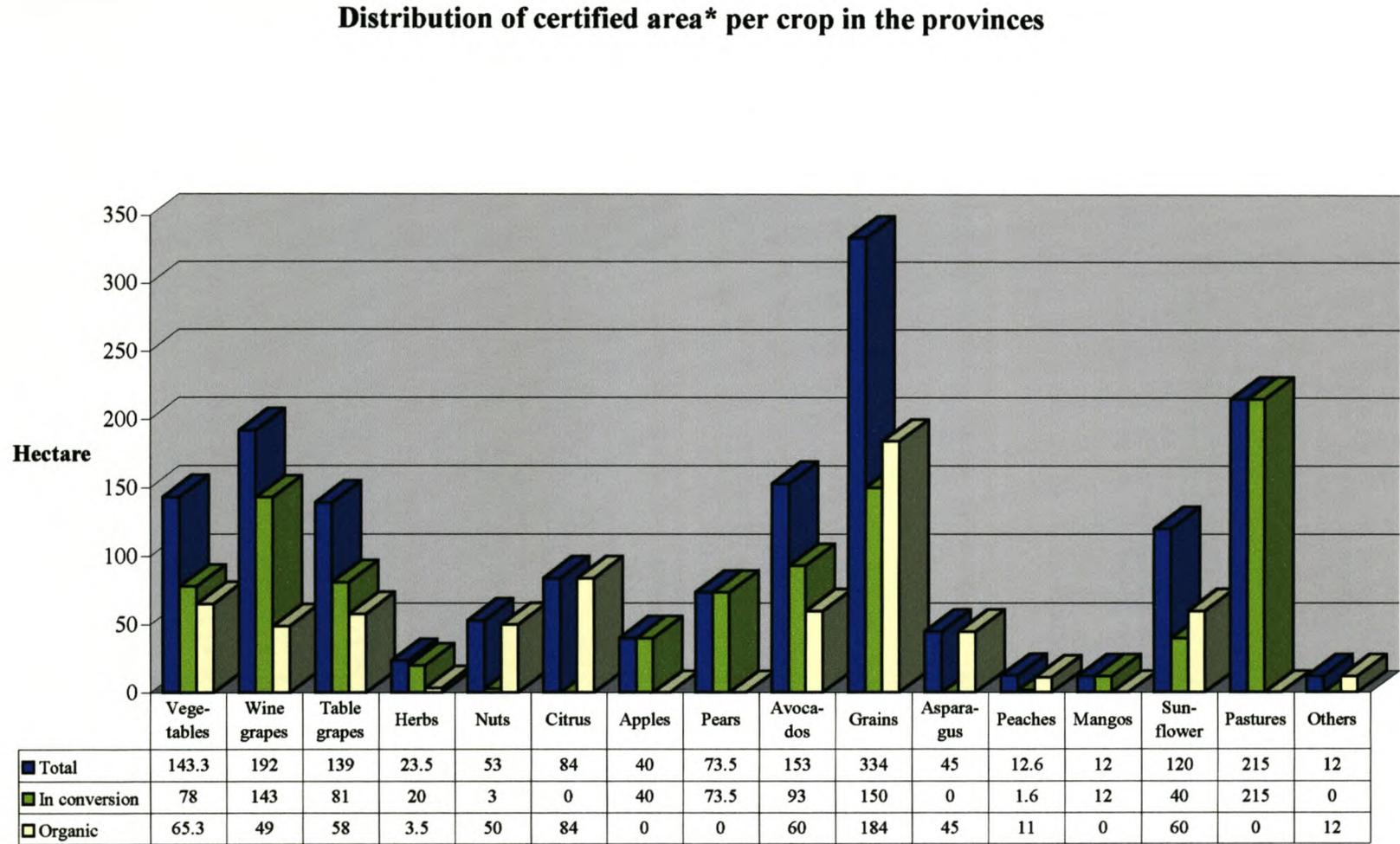
**Figure 5.12:** Distribution of certified crop area (excluding permanent pastures, farmyard and waste land) in the provinces

\*: The certified area includes area in conversion and organic area.

Sources: Own questionnaire

#### 5.4.2.3 Land use

The focus of certified production is still on horticultural products, not only in this survey, but also in the overall picture given by Callear (2002) as discussed in Section 1.3.1. Although grains and pastures engaged the largest area under certified production (see Figure 5.13) this was only due to the fact that these crops must be planted on a larger scale than horticultural products in order to be economically feasible. Horticultural products comprised the largest area led by wine grapes with 192 ha, followed by avocados with 153 ha, vegetables with 143.3 ha and table grapes with 139 ha. Deciduous fruit also had a big share with 84 ha of citrus, 73.5 ha of pears, 40 ha of apples and 12.4 ha of peaches. Other important crops were asparagus, nuts, mangoes and herbs. Olives and berries were also included in the production.



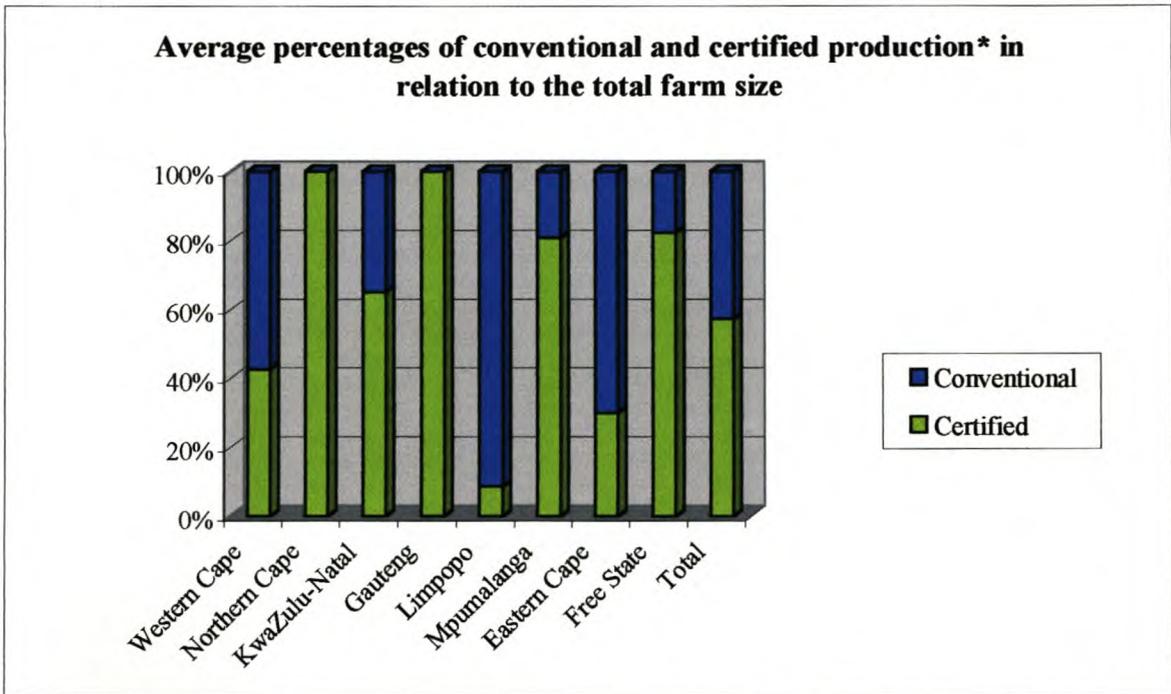
**Figure 5.13:** Distribution of certified area per crop in the provinces

\*: The certified area includes area in conversion and organic area.

Source: Own questionnaire

5.4.2.4 Share of conventional and certified production in relation to the farm size

Figure 5.14 refers to the average share of certified production on the total farm size. In Gauteng as well as in the Northern Cape, 100 percent of the farming operations were certified and already under organic production (see Figure 5.15). The farms in the Free State and Mpumalanga had a high percentage of certified production, with 82.3 percent and 80.8 percent respectively.

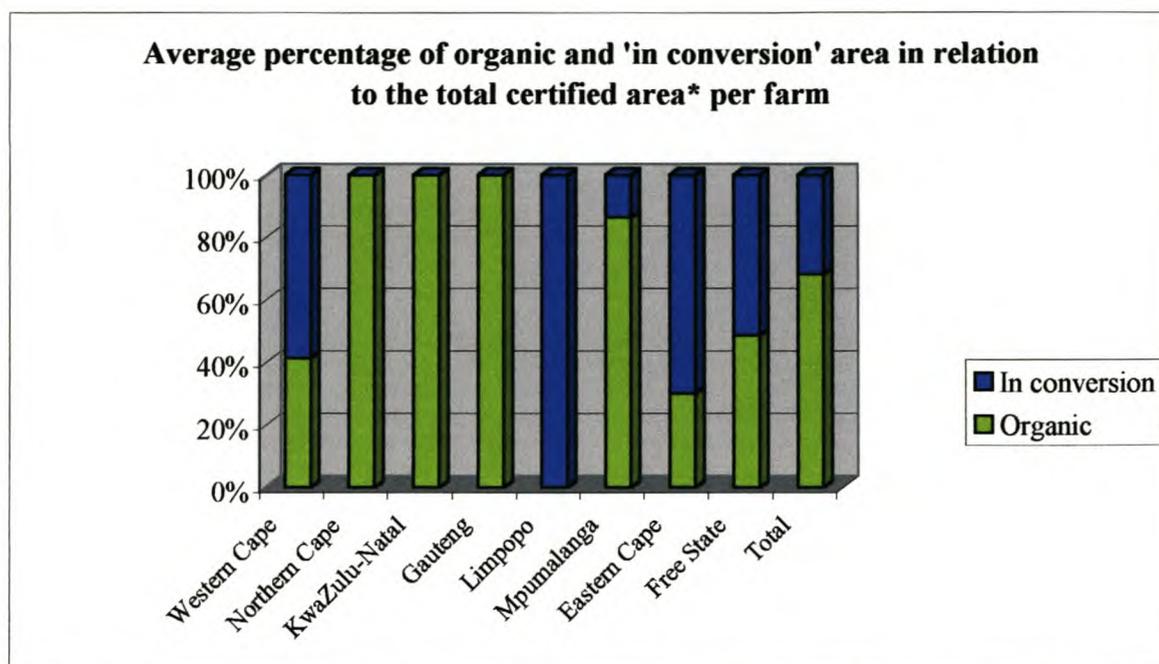


**Figure 5.14:** Average percentages of conventional and certified production areas in relation to the total farm size

\*: The certified production includes production in conversion and organic production.

Source: Own questionnaire

Looking at the distribution of organic and certified areas the Free State had an average proportion of organic production with 40 percent, while Mpumalanga had the third largest share with 69.9 percent. In KwaZulu-Natal on 65 percent of the total farm size certified crops were growing. As Figure 5.15 reveals, this area was organically certified whereas in the Western Cape, with 42.6 percent certified area, only 17.6 percent of this area was under organic production. The only farm surveyed in the Eastern Cape had a 30 percent certified area, which was already completely under organic production. The smallest share was found on the farm in Limpopo, with 8.6 percent certified, which was still under conversion.



**Figure 5.15:** Average percentage of organic and ‘in conversion’ area in relation to the total certified area per farm

\*: The certified area includes area in conversion and organic area.

Source: Own questionnaire

## 5.5 CHANGES CAUSED BY THE DECISION TO CONVERT

### 5.5.1 Changes in the enterprise structure

In question 11 of the questionnaire the farmers were asked to state the important changes that took place during the conversion process. Changes in enterprises were of special interest here to see whether the farmers had changed their farming operation considerably (*e.g.* higher diversification, introduction of livestock, *etc.*).

Only 17 of the 29 farmers answered the question on changes in their enterprises. Three stated specifically that no change in enterprises had taken place. Two farmers sold their livestock, which is surprising since the holistic idea of organic farming sees animals as an important part of a well functioning and closed cycle as discussed in Chapter 2. A complete change in enterprises took place on eight of the farms, one having developed a completely new enterprise mix. This included the incorporation of vegetables in the production cycle, the change from extensive farming to intensive vegetable farming, the start of commercial vegetable farming and the start of production under irrigation. One farmer diversified his production and included a wider variety of fruit while another farmer started adding value to his primary products. Unfortunately no detailed information was given on the aspects of value adding.

A different aspect stressed by a number of farmers was the change in use of chemicals. A completely new outlook on insect control was named as an important difference as well as the use of alternatives to chemical substances. One farmer emphasized the increase in the variety and number of natural predators and bird life.

A look at the enterprises and structures of the farms before and after certification provided strong support to the impression that no change in enterprises took place in the cases where the farmers did not answer this question.

### **5.5.2 Differences in the organisational approach**

19 of the farmers answered the question on organisational changes during conversion. Four stated that no changes took place in their organisational structure. One indicated changes but did not give any detailed information. The involvement of more labour was noted by four farmers and will be discussed in more detail in Section 5.4.3. Two farmers started producing their own compost, which, as one of them found, had a great impact on the awareness of the community (product was made available for sale).

Another central matter was the change in labour relations. Three farmers saw the greater health awareness of the worker and the involvement of each person on the farm as an important modification. Two farmers started with their own research on soil fertility and other aspects of organic farming. The reason is assumed to be the small amount of information on this topic available in South Africa, as discussed in Section 5.4.1.3. By introducing packing and processing plants on their farm, two farmers cut out middlemen in the production and marketing chain.

No evidence could be found to prove the expectation that no change in organisation took place on the farms where the farmers did not answer this question.

### **5.5.3 Differences in labour input**

The number of regular labourers per farm and per hectare determined the change in labour input during the conversion period. In Section 5.5.2 it was shown that farmers saw increased labour input as an important organisational change. Table 5.7 presents support for this statement.

**Table 5.7:** Changes in the number of regular labourers employed on the interviewed farms

	Average number of workers per ha total area	Average number of workers per farm	Range	n
<i>Total</i>				
Before conversion	0.32	34.3	1-150	27
During/after conversion	0.73	37.7	2-150	29
Conventional	0.01	-	-	-
<i>Western Cape</i>				
Before conversion	0.38	40.56	2-150	16
During/after conversion	0.42	45.81	6-150	16

Source: Own questionnaire

On the Western Cape data a paired-difference t-test was applied with the null-hypotheses stating that the number of farm workers per hectare stayed the same before, during and after conversion to organic farming. This hypotheses was rejected since the t-value was 2.10, located in the critical region  $t > 1.753$ .

No statistical analysis could be done on the total data since the variations between the farms were too large and did not allow for valuable results. Thus an increase in labour can be observed, but it cannot be statistically proven. These outcomes support the general expectations and the findings of the literature, which stated that labour most often increases during the conversion from conventional to organic farming, as discussed in Section 3.8.1.

#### 5.5.4 Changes in the marketing strategy

25 of the 29 farmers had already marketed their products before conversion, either nationally, internationally or both, while the other four farmers started the marketing with the beginning of the conversion process. A combination of both ways of marketing was the most common, at 64 percent (see Table 5.8). While higher-grade fruit was mainly marketed internationally, lower grade fruit, meat and vegetables were distributed on the national market. The four farmers marketing only internationally were growing deciduous fruit and wine and table grapes, which are typical export products. Nationally marketed products were vegetables, milk, meat and cash crops such as wheat, maize and sunflowers.

**Table 5.8:** Ways of marketing before conversion

Marketing form	Number of farmers	Percent of farmers
Nationally	5	20
Internationally	4	16
Nationally and internationally	16	64

Source: Own questionnaire

When asked about their current marketing channels, farmers had four options to choose from:

- Nationally as organic product(s);
- Internationally as organic product(s);
- Nationally as conventional product(s);
- Internationally as conventional product(s).

Only one of the farmers had not started to market her products yet since production was still at a very low level. All the other farmers answered the question and can be divided into three groups:

1. Marketing only conventionally;
2. Marketing only organically;
3. Marketing conventionally and organically.

The first group consisted of five farmers who all started converting between 1998 and 2001. One of them was still awaiting certification, which was the reason that he was not marketing organically. None of the farms was fully organic yet and the farmers were most likely struggling to find a market for their 'in conversion' products, as discussed in Chapter 3. The certification organisations also do not provide a label for these products thus the farmers have to wait until they have completed the conversion before products can be marketed organically.

The second group consisted of nine farmers who had already completed the conversion process. Their products were marketed nationally as well as internationally. Vegetables were only marketed on the national market. Wine and table grapes, nuts, herbs, tea and mushrooms were marketed nationally and internationally. Since the national market is still relatively small, the international market is an important source of income and in future will be the main target market. Well-developed structures exist, especially in Europe and the

USA and the huge demand, which cannot be covered locally, is an incentive to produce for the international market.

Group three consisted of 14 farmers. Eight of them had completed the conversion and could thus market their products on the organic market. The fact that they also marketed products conventionally could be for different reasons. Either the farmers still had conventional products to sell, or no market existed yet for their organic products, as in the case of maize. For other products such as mangoes, litchis and citrus, where an international organic market exists, problems could have occurred with the quality of the product. For example, one farmer reported skin colour problems with his Valencia oranges.

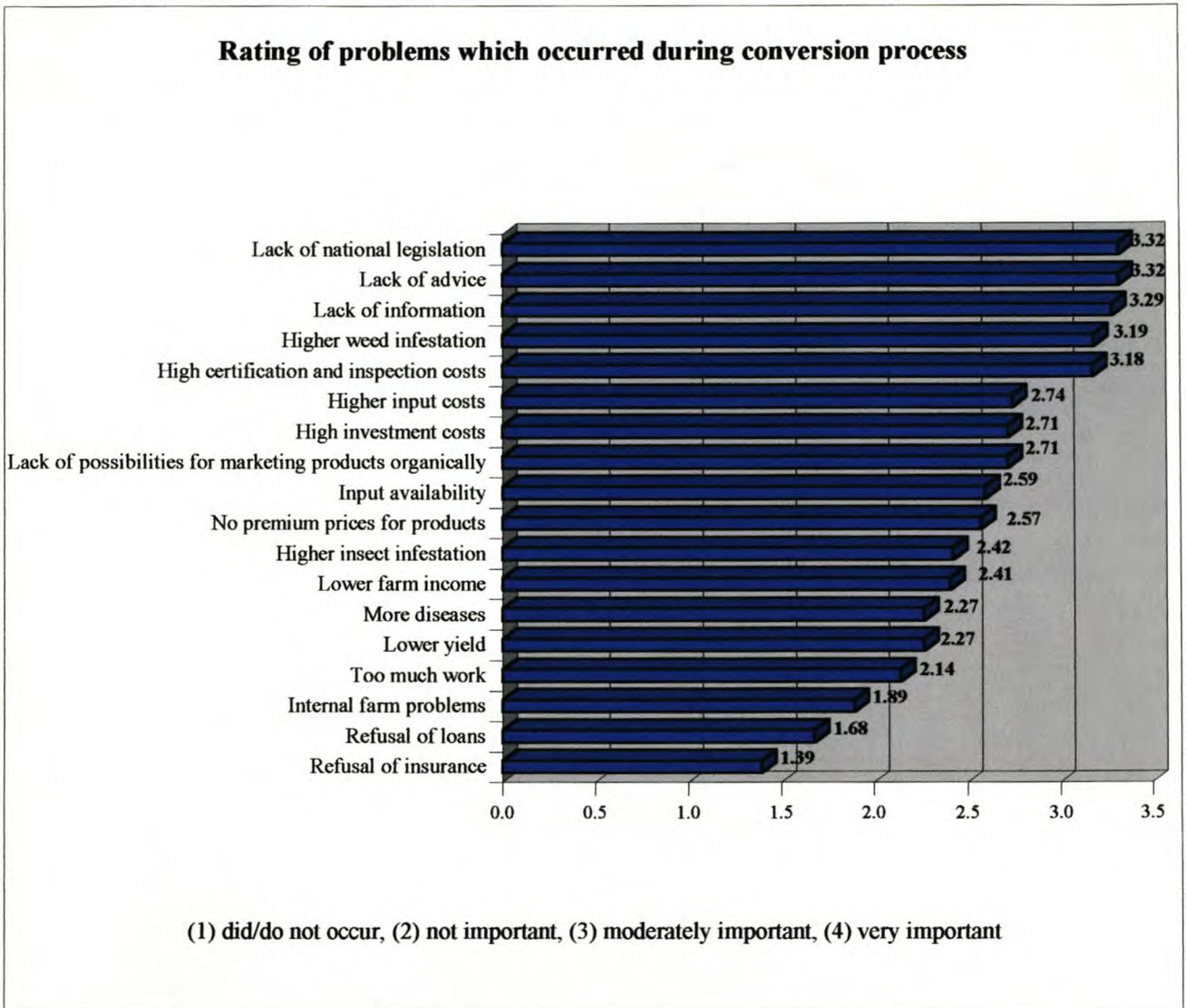
The remaining six farmers were already marketing part of their product on the organic market, internationally as well as nationally, although they had not completed conversion yet. All organisations have an extra label for 'in conversion' products, which allows the farmers the possibility of marketing their products for a higher price on the organic market before the conversion is completed. Nationally an option exists to sell 'in conversion' products organically on local farmers' markets or through box schemes. The reasons for marketing products conventionally were the same as stated above. In addition, one farmer pointed out specifically that he was still marketing some of his products conventionally due to higher prices on the available conventional market.

## **5.6 ANALYSES OF THE PROBLEMS AND PERFORMANCE OF FARMS DURING CONVERSION**

### **5.6.1 Problems arising from the conversion process**

#### *5.6.1.1 General problem areas*

During the process of conversion farmers are confronted with several problems. In Section 3.9.2 the findings of the literature were discussed and their relevance to the conversion process examined. In this study the farmers were asked to rate several problems adapted from the literature and the expectations of the South African situation according to four degrees of importance. Figure 5.16 shows the results of the survey.



**Figure 5.16:** Ratings of problems which the farmers had to face during the conversion process

Source: Own questionnaire

As already stated in Section 1.6, the lack of national legislation was rated as the most serious problem, together with the lack of advice. Since the draft for national legislation was produced 2001 this problem seems to have been addressed. During the personal interviews with farmers who took part in the case studies, it was discovered that they believed this draft is unsuitable under South African conditions, and was too closely orientated to EU Regulations. Lack of advice was also a major problem, as was already observed in Section 5.3.3. Since organic farming is a new sector in South African agriculture, the involvement of advisory services, the national press and official agricultural institutions is still small.

The results also confirmed the literature findings in Section 3.9.2, which named high weed infestation as one of the major problems during the conversion period. Higher insect

infestation and more diseases were, however, rated as less important problems. Financial obstacles during the conversion were relevant. Relatively high costs of initial certification and the annual inspection, which are dependent on the certification body and also partly on the size of the farm, are also seen as problematic. For example the BDOCA, which is the cheapest certification body in South Africa, charged a R250 registration fee and an annual inspection fee of R500. In addition costs of R1.50 per kilometre and R100 per hour travelled and R150 per hour for inspection have to be added (Kupka, 2002:18).

These costs can often not be recouped, especially during the conversion period, as farmers often lack possibilities for marketing their products or achieving premium prices. This is partly supported by the findings of Section 5.5.4, which showed that a percentage of farmers still market conventionally and provides evidence of an underdeveloped market for organic products in South Africa.

In contrast with the literature findings, the interviewed farmers experienced hardly any problems with the reduction in yields and the increase in workload. The reason for the latter could be the easier availability of a labour force in South Africa compared to the European and American cases, where labour is expensive and most farms are managed by families alone with no labour input from outside. The refusal of loans was named by only five farmers as problematic and can thus not be seen as a threat to the conversion period. The same applied to the refusal of insurance and problems internal to the farm.

#### 5.6.1.2 Problems caused by different intensity levels of farming practices before conversion

To evaluate the differences in the rating of problems, the farms were divided into three groups according to their intensity<sup>1</sup> of farming practice before conversion (see Table 5.9).

**Table 5.9:** Intensity level of farming practice before conversion

Intensity level	Number of farms
Rather intensive	14
Rather extensive	11
Virgin land	4

Source: Own questionnaire

A chi-square test was then performed on the categories 'rather intensive' and 'rather extensive'. The category 'virgin' was not included since only four farmers were in this

<sup>1</sup> Rather intensive: high input of chemical fertilizers, intensive tillage, etc..  
 Rather extensive: low input of chemical fertilizer, minimum tillage, etc..

category. The Null Hypotheses stated that no difference existed between the different farming levels over the categories before conversion. Table 5.10 displays the results of the test in the categories where differences were expected.

**Table 5.10:** Results of the chi-square test comparing different levels of intensity

<i>Factor</i>	<b>Chi-square test value</b>	<b>5% level critical value</b>
Lower yields	3.25	7.82
Higher weed infestation	1.16	7.82
Higher insect infestation	0.95	7.82
<b>More diseases</b>	<b>8.25</b>	<b>7.82</b>
Lower farm income	1.38	7.82

*Source:* Own questionnaire

The different farming levels before conversion differed only significantly with regard to more diseases. Farmers who used intensive farming practices before conversion had a problem with increased diseases to a larger extent than farmers who used extensive practices. No significant difference could be found in any of the other factors. That does not support expectations and literature, which found differences in yields especially between farmers who had previously farmed intensively and extensively.

## **5.6.2 Performance of farming during conversion**

### *5.6.2.1 Changes in yields*

Asked if they were satisfied with their present organic farming results, seven farmers answered that it was still too early to assess. Eight farmers were not or only partly satisfied with the yields of their crops. Insect and disease damage were the major reasons for lower yields. A need is seen for the improvement of yields.

The remainder of the farmers were satisfied with the yield. Two specifically mentioned higher yields than under conventional production. Insect and disease damage was also stated here as major threats resulting in crop losses.

The different results in crop performance could be caused by factors discussed in Section 3.7.1. The lack of information is definitely a factor in the South African context. Yields are likely to improve over time, when more knowledge has been accumulated.

### 5.6.2.2 Financial performance

For eight farmers it was still too early to see if the financial performance of their organic operation was satisfactory or not, while four farmers did not answer this question. The remaining farmers gave a wide variety of responses to this question. Seven were not satisfied with the financial performance, citing as reasons poor international markets (pome fruit), research costs and crop loss due to pests. The other farmers reported a good to excellent financial performance.

The big differences in performance could have different reasons. First of all, the financial output in the first years of conversion is often lower than before because of reasons discussed in Section 3.8.2. The lack of access to premium prices caused by the underdeveloped markets is a particular problem in the South African context. Furthermore start-up costs are a drawback as in the case of one farmer, who established a new business. Good financial performance, on the other hand, could be related to a reduction in input costs combined with premium prices. An additional positive impact on the financial situation was made by higher yields, which was the fact in all but two cases as observed in Section 5.5.1.

### 5.6.2.3 Other aspects of performance

Eleven farmers gave further information about their performance under organic production, including satisfactory performance in livestock production. Problems with weeds, insects and climate were mentioned in addition to a difficult first year in general. One of the farmers would welcome a higher demand for his product. As positive effects, better marketing possibilities and better health of soil, livestock and humans were stated.

## 5.7 POSSIBILITIES OF IMPROVING THE SITUATION OF ORGANIC FARMING IN SOUTH AFRICA

The proposals farmers made in answer to the question of what could make conversion to organic farming in South Africa easier and more attractive reflected the main problems and shortcomings as discussed in Sections 5.6.1.

A large percentage of the farmers expected that suitable national legislation would result in an improvement of the situation of organic farming in South Africa. They criticized the fact that the current legislation was based on philosophical ideas and on the EU standards rather

than on the natural conditions in South Africa. Stronger legislation was also called for in the area of the misuse of chemicals and genetically modified organisms (GMOs). Similar problems to those connected with the national legislation existed with the certification organisations. At the time this survey was done one national certification body was being established (Afrisco) and one was in existence (BDOCA) in South Africa. Many of the farmers complained that only certification bodies with European or other overseas standards were available and problems existed in dealing with problems specific to South Africa. Kupka (2002:16) found similar responses. The need for a national certification body was great. In the future an improvement is expected since Afrisco, as a national certification body, has been established and has joined up with Ecocert to improve local certification (Kupka, 2002:17). The lowering of high certification costs, one of the most frequently mentioned problems especially during the conversion process (see Section 5.6.1), was also seen by the farmers as an important factor in increasing interest in the conversion to organic farming.

Support from the government in the form of 'soft loans' during the conversion period, subsidised capital, funds and greater general acceptance were also needed. As already discussed in Section 5.6.1, it can be seen here again that financial factors are one of the largest hurdles in conversion to organic farming.

Several farmers expressed a need for more information and research under local conditions. This reflects the situation depicted in Section 5.6.1, with the lack of information recorded as one of the main problems of local farmers. They called for more information on alternatives for chemicals for the treatment of pests and diseases, technical procedures and practices and greater marketing opportunities. In this context training and seminars and the involvement of research institutions like the National Department of Agriculture, technikons and universities were seen as important measures to improve the situation of organic farming.

Since organic farming is a fairly new industry, people see an opportunity to profit financially in particular by offering services and advice although their knowledge and experience are often non-existent. Farmers frequently stressed that too many 'experts' tried to make money by offering quick solutions to problems without the requisite knowledge and experience.

Farmers pointed out that it is also necessary to promote organic products to increase marketing possibilities and consumer demand. The call for premium prices which reflect

the value of organic products and which help cover the often higher input costs, was great. The organisation of export activities was furthermore perceived as being essential.

## 5.8 SUMMARY

This chapter has dealt with the analyses of data, as well as the evaluation and discussion of the survey results. Several questions about the interviewed farmers and their perceptions as well as production structures have been addressed.

The interviewed farmers were distributed over all the provinces in South Africa with the exception of the Northwest province. Most of the farms (16) were located in the Western Cape, which also had the largest crop area under certification. Numerous findings of the literature regarding personal and farm-related differences between certified and conventional farmers were confirmed. The interviewed farmers were in general younger than the farmers of the reference group (consisting of conventional and certified farmers), with 39 percent being younger than 41, compared to 29 percent of conventional farmers. The higher education level of organic farmers confirmed the positive relationship between education level and the adoption of sustainable farming practices (Lockeretz and Wernick, 1980 and Egri, 1999). 44.4 percent of the farmers generated an additional income with off-farm work by either the farmer or the spouse.

Only slight differences were observed between the organisational structures of the surveyed farms and the structures of conventional farms. As also found in other studies, the certified farms were smaller than conventional farms, especially horticultural holdings, although a wide variation in the farm sizes existed. Most of the farms were horticultural holdings with products such as table and wine grapes, vegetables, citrus, deciduous and exotic fruit. A small percentage of the farms converted cash crops and livestock to organic practices. The reasons include the still relatively small demand nationally but also internationally and in the case of livestock the lack of the necessary infrastructure.

Only some of the farmers converted their whole farm to organic farming or chose a single-step conversion. The lack of knowledge about practices and economic feasibility as well as the financial support of the conversion period by conventional enterprises were named as reasons.

Several reasons played a role in the process that led to the decision to convert to organic farming. In contrast with the literature findings, the interviewed farmers were not mainly

motivated by financial reasons, but more by concerns about the environment and soil fertility. Philosophical reasons played only a minor role. Information sources which supported this process and helped farmers to gather knowledge about organic farming were mainly their own education, talks with other organic farmers and books addressing organic farming issues. The minor importance of national magazines and journals and of universities and research institutions was evidence of the small degree of national involvement.

A change in enterprises during the conversion period mainly took the form of the introduction of new enterprises on the farm and a changed approach to pest and disease control. Organisationally the employment of more labour was named as well as changes in labour relations (education, direct involvement). An increase in labour could be statistically proven only in the case of the Western Cape since the overall data showed too many variations. As expected on the basis of the literature findings, an increase in labour use was found in the Western Cape. The changes in marketing were evidence of the lack of possibilities for marketing products organically or 'in conversion', especially on the national level. More than half of the farmers marketed their products either only on the conventional market or on both the organic and the conventional market, although all certification organisations provide an 'in conversion' label.

The minor national involvement mentioned above also caused several of the problems farmers rated high in this survey such as lack of advice, information and suitable national legislation. As expected, higher weed infestation was also one of the main obstacles in the conversion period, together with financial problems such as high certification, input and investment costs. Surprisingly no significant differences were found by comparing different levels of farming intensity before conversion. It was only discovered that farmers who had farmed more intensively before conversion had more problems with diseases. The expected yield reduction could not be proven.

With regard to their organic farming results, most of the farmers were satisfied with their performance concerning yield. For a quarter of the farmers it was still too early to assess the effects and some crops had suffered from insect and disease damage. The financial performance was partly satisfactory but in some cases was reduced by crop losses or poor international markets.

The analysis of the suggestions the farmers made to improve the situation for organic farming in South Africa reflected the problems and shortcomings observed in the earlier

sections of this chapter. The quest for suitable national legislation and a certification body with standards applicable to the South African situation was strong. Furthermore, the farmers asked for more national involvement in the form of information supply, research and government support and better marketing opportunities.

## **CHAPTER SIX**

# **ANALYSIS OF THE PLANNING PROCESS AND TECHNICAL CHANGES DURING THE CONVERSION TO ORGANIC FARMING IN THE WESTERN CAPE**

## 6.1 INTRODUCTION

The lack of information about the methods and the performance of converting farmers in the South African context is one of the main hurdles for farmers who have decided to take the step towards organic production. This was found in the evaluation done in the preceding chapter.

With the aim of making a contribution to this much-needed information, this chapter deals with an in-depth evaluation of the conversion process of six farmers in the Western Cape. Three production systems were chosen, namely pome fruit, vegetables and table grapes, with two farms in each system to detect differences between the operations and their performance. The data for the evaluation were collected by means of a detailed questionnaire (see Appendix 3) and covers aspects of the planning process as well as technical aspects. To meet the request for multi-disciplinary research on organic farming systems, the evaluation of the economic performance and social aspects follows in Chapter 8. However, the comparability of the data is limited due to the differences in location, year of starting and length of the conversion process. Reasons discussed in Chapter 4 made it impossible to choose more closely comparable farms.

## 6.2 DESCRIPTION OF SURVEYED FARMERS AND FARMS

### 6.2.1 Characteristics of farms

The characteristics of the farms are summarised in Appendix 4.

#### Farm A

Farm A is located in the magisterial district of Ceres, a region where mainly deciduous fruit is produced. The area lies around 500 meters above sea level, surrounded by mountains, which provide a protection against wind. The average temperatures are 28°C in the summer and 12°C in the winter with an annual rainfall of 550mm. Frost can occur at night during the winter months. The contour of the farm is rolling with no problematic physical characteristics such as strong winds or rocks. The focus is on producing pome-fruit, with pears as the dominant activity. 50 head of cattle play a minor role within the total farming operation.

Due to the fact that a sustainable way of farming with a minimum input of chemicals was started as early as 1983, the soil was in a good condition at the beginning of the conversion period. Before the conversion period started there was sufficient N, P and K in the soil, but

micro-nutrients, humus and biological activity, which would result from a high number of earthworms, microbes, nematodes and fungi, had decreased to low levels.

As a result of the change in production methods, the soils now show no shortages in P, K, Ca or micro-elements. The earthworm population is high and a well balanced and sufficient number of other organisms are present in the soil.

### Farm B

Farm B is located in the magisterial district of Caledon near the village of Elgin. In this area deciduous fruit is produced. The area lies around 300m above sea level. The average temperatures are 25°C in the summer and 12°C in the winter with an average rainfall of 900mm. 55 percent of the annual rainfall occurs between May and August (Boland-substreek-ontwikkelingsprogram, 1990). Frost can occur at night during the winter months. The contour of the whole farm is steep with strong winds over the dam surface, which favours evaporation. The focus is on the production of deciduous fruit with apples as major activity. No livestock are included in the farming operation.

The condition of the soil regarding nutrient levels, fertility and drainage was satisfactory before conversion. The biological activity as well as the percentage of humus in the soil, however, was low. This improved during the first year of conversion. Thus no problems existed with insufficient levels of N and P in the soil. K shows sporadically low values, which is controlled by extra fertilizing. The same applies for the trace elements.

### Farm C

Farm C is located in the magisterial district of Clanwilliam, approximately 10 km inland from Lamberts Bay. The area lies around sea level and is characterised by very sandy soils. The average temperatures in summer are 30 °C, in winter 6 °C, with an average annual rainfall of 200 mm, mainly in the winter. Slight frost can occur at night. The contour of the farm is flat with problems of extreme winds and low rainfalls. Only vegetables are produced with a wide variety of different types. No livestock are kept.

Due to the extremely sandy conditions of the soil, the fertility is very low. P is available in sufficient quantities, but there is a lack of N and K as well as minerals, especially Cu, Br and Mg. The conditions before conversion were poor since no fertilizer had been applied. Now the focus is on increasing the organic matter to change the characteristics of the soil. This is aimed at reducing the soil's vulnerability to wind and water erosion and improving its water-holding capacity.

### Farm D

Farm D is located in the magisterial district of Caledon, approximately 5 km outside of Rivieronderend, an area where mainly wheat and livestock are produced. The area lies around 300m above sea level, with the northeasterly side surrounded by mountains. The average temperatures are 25 °C in summer and 15 °C in winter with an annual rainfall of 750 mm. Frost can occur during night in the winter months. 23 percent of the farm is flat, 18 percent rolling and 59 percent steep. Problematic factors are the high percentage of rocks in the ground and strong winds. The production focus is on fruit and vegetables with citrus as major activity. 60 cattle and 60 sheep are kept for diversification purposes and the supply of green manure. Economically they are of minor importance.

Before conversion the soil showed low levels of P, K and N and high levels of Mg. The drainage was poor, but artificial drainage was introduced during the conversion period. Due to the change in soil management, which is discussed at a later stage, there are no longer problems with nutrient levels. Only N levels remain low.

### Farm E

Farm E is located in the magisterial district of Tulbagh, where wheat, table and wine grapes are produced. The area lies around 250 m above sea level with a mountain range on the northern side. The average temperature is 30°C in summer and 15°C in the winter with an annual rainfall of 600 mm. Frost can occur in the winter months at night. Strong winds are a problem. The contour of the farm is flat. The dominant activity is table grapes, but other enterprises such as wine grapes and vegetables are integrated into the production process for diversification purposes.

Before conversion the microbiological activity of the soil was very low. There was no problem with drainage, because of the sandy soils. None of the main nutrients were at a low level. The water holding capacity of the soil was low.

Since the start of the conversion the microbiological activity of the soil has improved dramatically. The use of compost and the build up of organic matter has also improved the water holding capacity of the sandy soil.

### Farm F

Farm F is also located in the magisterial district of Tulbagh. The area lies around 250 m above sea level with a mountain range on the northern side. The average temperature is 30°C in summer and 15°C in the winter with an annual rainfall of 600 mm. Frost can occur

in the winter months at night. The contour of the farm is mainly flat with a small part of 20 ha in steep terrain. Wind is a problem as well as a high percentage of rocks, which makes weed control difficult. The dominant activity is table grapes, but other enterprises are integrated into the production process, like wine grapes and vegetables.

A variety of different soil types exist on Farm F. 34 ha are loam with high fertility, medium drainage and a depth of around 1 000 mm. 70 ha consist of sand, whereas the 50 ha of black sand have a high fertility, medium drainage and a depth of approximately 1 800 mm. The white sand, which covers 20 ha, has low fertility but good drainage, with the same depth as the black sand. On 56 ha, sand and rocks are dominant with a medium fertility, good drainage and a depth of more than 2 000 mm.

## **6.2.2 Characteristics of farmers**

### Farm A

Father (senior partner) and son (junior partner), both with a BSc in Civil Engineering own the farm as a trust. The family have owned the farm since 1947 and the senior partner took the farm over from his parents in 1968. Both partners are involved in the farming activities full-time and are supported by a farm manager.

### Farm B

The owner manages the farm as a trust. His background is an MSc in Forestry. In 1982 he and his wife took the farm over from his parents-in-law. Farmer B has farming experience of 19 years. Additional income is generated by part-time off-farm work by the farmer, whereas his wife works full time on the farm.

### Farm C

Farm C is located in the magisterial district of Clanwilliam, approximately 10 km inland. The farmer and his wife own the farm as a closed corporation. Both of them are working full time on the farm. The educational background of the farmer is a BComm. He has farming experience of 12 years and bought a part of the original farm in 1998 from his parents.

### Farm D

The farmer and his wife own the farm as a company. Both are involved in the farming business full-time, supported by two farm managers. The farmer has an MSc Agric and farming experience of 7 years. The farmer was raised on a citrus farm in Kwazulu Natal and bought the farm from the previous owner in 1994.

### Farm E

The farmer and his brother own the farm as a private business. The farmer took the farm over from his parents in 1995 but already has farming experience of 10 years, since he was involved in the farming operation from an earlier stage. He is involved in part-time off-farm work and holds a BComm degree.

### Farm F

The farmer and his brother own the farm as a private business. The farmer took the farm over from his parents in 1996. He has a BComm degree in Agricultural Economics and farming experience of 5 years. Additional income is generated from part-time off-farm work.

## **6.3 KEY ELEMENTS OF THE CONVERSION PROCESS**

### **6.3.1 Time frame of the decision process and approach to conversion**

Due to reasons discussed in Section 4.5 and in the introduction to this chapter, the interviewed farmers started their conversion in different years and also chose different approaches to conversion (see Appendix 4).

### Farm A

Although Farmer A has been focusing on a natural and sustainable way of farming since the beginning of the 1980's, the official conversion process only started in 2000. Farmer A converted his farm in a single step and chose BioGro, a certifier from New Zealand, as certification organisation. BioGro makes use of local SGS inspectors for the annual control inspections, as described in Section 1.3.1. Farmer A foresaw problems with European certification bodies, especially regarding the treatment of pests and diseases, which differ from those in Europe.

### Farm B

Farmer B decided to convert his farm at the beginning of 1999 and started the official conversion process at the beginning of the following year. He also chose BioGro from New Zealand as certification organisation, as his consultant advised him, and is converting in stages.

### Farm C

The conversion processes started after Farm C was split from the main farm in 1998. As certification body, Farmer C chose Ecocert, a European organisation located in Germany (see Section 1.3.1), because of the co-operation with an organic farm in Stellenbosch, which was certified by this organisation. The farm was converted in a single step.

### Farm D

A slow movement away from the use of chemicals graduated into a staged conversion process in 1997, following the regulations of Ecocert. Ecocert was chosen because it provided the most convenient services at that stage.

### Farm E

Farmer E is converting his farm in stages. In 1996 the first vineyard of 2 ha was converted on a trial basis. In 1998 the conversion started on a larger area. The British Soil Association was chosen as a certification body, because, in the opinion of the farmer, it is most trusted by supermarkets in the U.K, the main export destination of his products.

### Farm F

The conversion process started in 1999 and the British Soil Association was chosen as certification body. Farmer F named the same reasons for his selection as Farmer E since he also exports his products mainly to the UK. He is also converting his farm in stages and plans to have the whole farm under organic production by 2005.

### 6.3.2 Conversion planning

None of the farmers designed a detailed conversion plan (as discussed in Chapter 2). Table 6.1 shows the elements each farmer included in the plan.

**Table 6.1:** Elements included in the conversion plan

	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F
<b>Time planning</b>	x	x	x	x	x	x
<b>Technical planning (fertilization, tillage, etc.)</b>	x	x	-	x	x	x
<b>Financial planning</b>	-	-	x	-	-	-
<b>Other elements (Labour, marketing, etc.)</b>	x	-	-	-	x	-

x: included in the plan

-: not included in the plan

Source: Own questionnaire

All farmers designed a time plan since the certification bodies requires this, before the farm can be initially certified. This time plan includes basically the decision on the method of conversion (single step or staged) and, in the case of a staged conversion, a timetable for the conversion of the area. Farmers A, B, D, E and F also planned technical aspects of the conversion process. Farmers A, E and F planned the introduction of a compost plant on their farm, while Farmer D designed the use of green manure.

The financial side of the conversion was planned only by Farmer C, including economic targets and investments. Other aspects incorporated into the conversion plan were research, input availability, training, infrastructure and marketing, by Farmer E. Farmer A planned labour requirements and training. Farmers A, B, C and F were supported in the planning by a consultant, while Farmers D and E received no support. Only in the case of Farm A did the certification body provide help during the planning process.

The lack of knowledge and of supporting people with experience in the financial sector could be reasons for the fact that only Farmer C developed a financial plan before conversion. Since three of the farmers hold a B.Comm degree and it should be expected that they have experience in financial planning the reason for the lack in pre-planning could be that they did not realise the necessity for detailed planning. The farmers created a technical and a time plan since it was required by most of the certification bodies. It is expected that a more sophisticated planning of the conversion process, including technical and economic aspects, would support the farmers and uncover critical areas beforehand.

### 6.3.3 The role of organic farming organisations

All of the interviewed farmers were members of one of the national organic farming organisations, COPA and OASSA, with exception of Farmer F (see Table 6.2). Only two were involved in international organisations such as marketing or certification organisations.

**Table 6.2:** Membership in organic farming organisations

	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F
<b>National organisations</b>	x	x	x	x	x	-
<b>International organisations</b>	x	x	-	-	-	-

x: member

-: no member

Source: Own questionnaire

Table 6.3 reveals that especially the national organisations did not provide much support for the farmers. They were partly useful for the contact with other organic farmers and up-to-date information. No help in marketing was given and advice on production and conversion was available only on general aspects of organic farming. The lack of knowledge of specific crops and South African conditions, as well as rivalry between the organisations was criticised and supports the findings of the previous chapter.

**Table 6.3:** Number of farmers getting support from national and international organic farming organisations

	National organisations		International organisations	
	Yes	No	Yes	No
<b>Advice on production</b>	1	4	0	2
<b>Advice on conversion</b>	1	4	1	1
<b>Up-to-date information</b>	2	3	2	0
<b>Training and seminars</b>	1	4	0	2
<b>Marketing</b>	0	5	1	1
<b>Contacts with other farmers</b>	3	2	1	1

Source: Own questionnaire

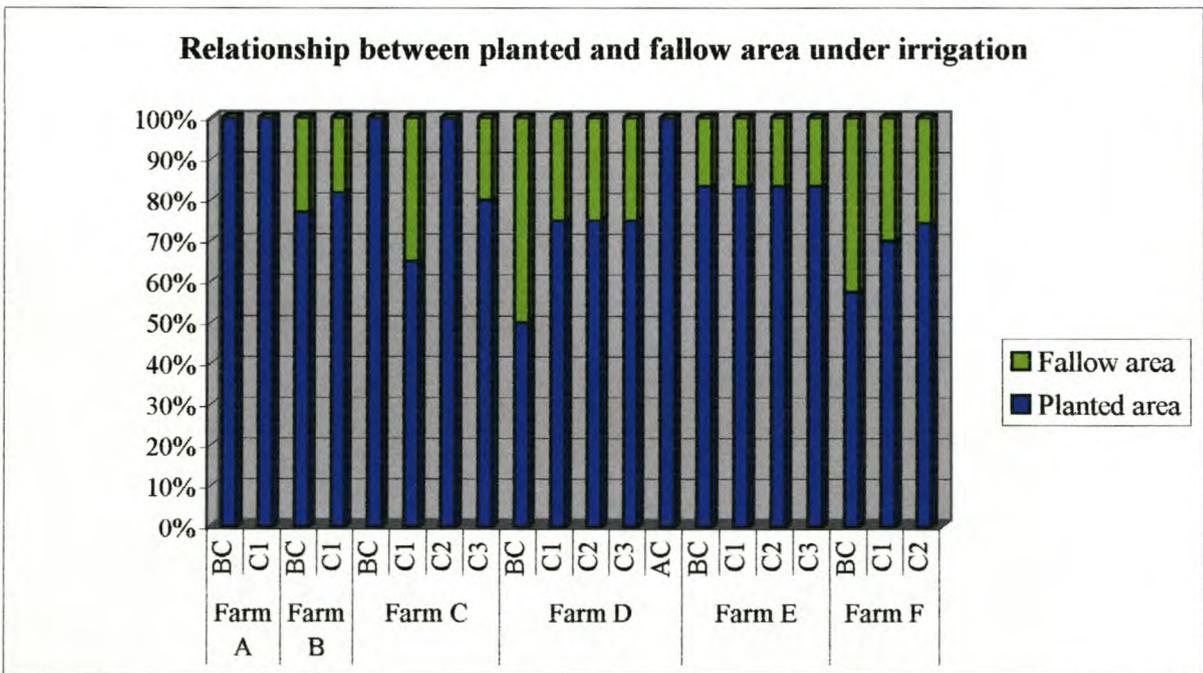
International organisations were especially useful in connection with up-to-date information; otherwise they provided no noteworthy support. This reflects the findings of the survey in Section 5.3.3.

6.4 DESCRIPTION OF FARM LAND AND PRODUCTION AREAS

6.4.1 Total area

The six farms surveyed differed widely in farm size as mentioned in Section 6.2.1. Appendix 5 displays the percentages of the total area covered by irrigated and dryland, veld and farmyard and waste land. It is obvious that Farm C and Farm D have large areas of veld, which makes the actual area for production relatively small in relation to the total area. The dryland areas of Farms A, D and E were also relatively large, however no cash crops were produced on these areas. Farms A and D had small areas under planted pastures for the grazing of small numbers of livestock.

Figure 6.1 takes a closer look at the area under irrigation, since this is the area of interest for this study. It shows to what extent the irrigated area was and is used and where potential still exists for an extension of the crop-producing area.



**Figure 6.1:** Relationship between planted and fallow area under irrigation on the surveyed farms

BC: before conversion (last conventional year);  
 C1: first conversion year  
 C2: second conversion year  
 C3: third conversion year;  
 AC: after conversion (first fully organic year)  
 Source: Own questionnaire

Farms A and E did not change the size of the planted areas during the conversion period. Farmer A made use of the entire irrigated area for the cultivation of orchards, while Farmer E still had potential to increase the planted area without introducing a new irrigation

system. On the other farms the area under irrigation was gradually increased during the conversion process. On Farm C fluctuations were caused by the introduction of additional irrigation systems in the first conversion year (C1), which increased the total area under irrigation from one to five hectares with a subsequent reduction in area under production in the third conversion year (C3).

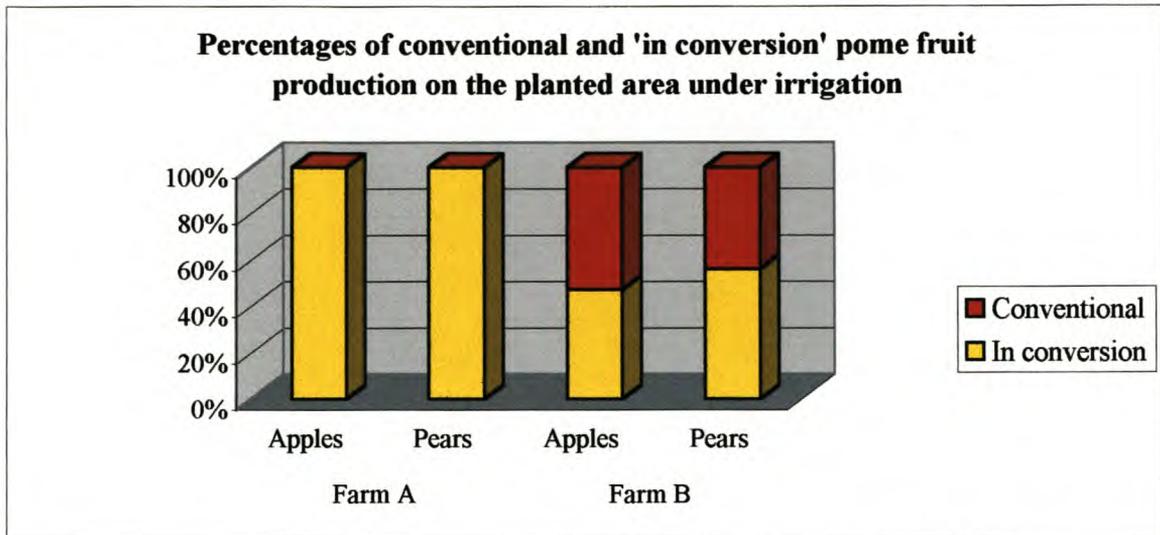
Some of the farmers had additional enterprises on their farms besides the crops discussed in the following section. Farmer B planted 1.6 ha of peaches in the first conversion year, while Farmer D had 24 ha of citrus, 5 ha of plums and 3 ha of nectarines under production in the first year after conversion (AC). Farmers E and F both farmed additionally with vegetables (48.3 ha and 31.8 ha) and wine grapes (74.9 ha and 38 ha) in the last and the second years of conversion respectively. All farmers had either part of or the full area in conversion under organic production.

#### **6.4.2 Cultivated area**

In the discussion of the cultivated area of the surveyed farms, attention is paid only to the crops important for this study. These were apples and pears, represented by Farms A and B, vegetables on Farms C and D and table grapes on Farms E and F. Differences exist between the farms in total area under crop production, as well as in the percentages of conventional, 'in conversion' and organic production areas. The reasons for this were discussed in Chapter 4 and in the introduction to this chapter.

##### *6.4.2.1 Pome fruit production*

Apples and pears were produced on a total area of 87.9 ha on Farm A and 22.1 ha on Farm B. Farm A's area was divided into 20.2 ha of apples and 67.8 ha of pears. All of this area was under conversion as displayed in Figure 6.3. The apple orchards were all at a non-bearing stage, consisting of the varieties Granny Smith, Fuji, Sundowner and Pink Lady. 82.6 percent of the pear orchards were under full production. These included the varieties Packham's Triumph, Clapp's Favourite, Bon Chretien, Beurre Bosch, Oom Sarel, Catherina, Doyenne Du Comice, Forelle, Josephine, Starkrimson, Golden Russet Bosch, Anne Favourite and Flamingo.



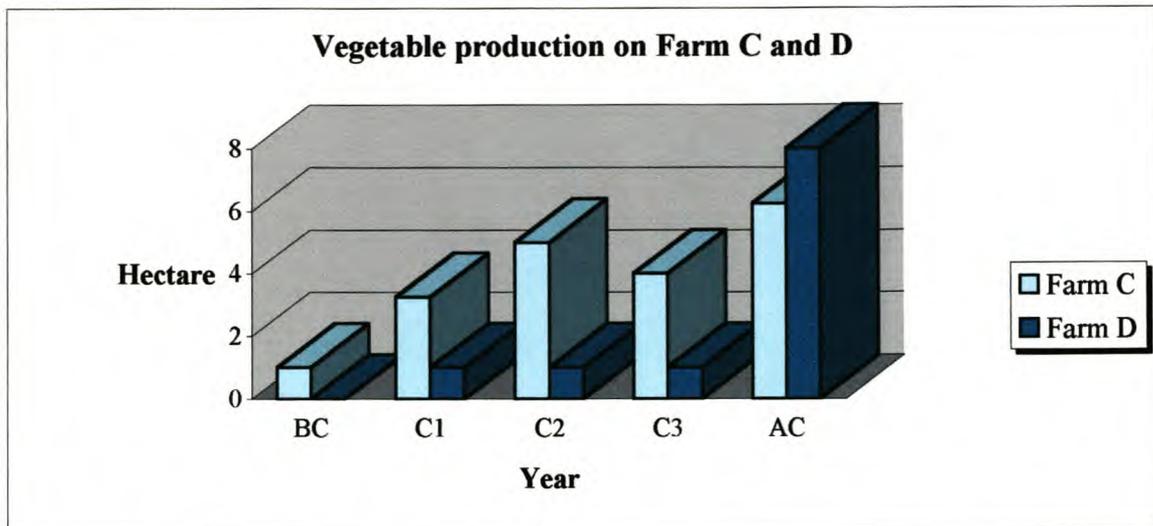
**Figure 6.3:** Percentages of conventional and 'in conversion' pome fruit production on Farms A and B

Source: Own questionnaire

Farmer B increased the area under apple production from 18.8 ha to 20.1 ha during the first year of conversion to meet the demand for apples on the overseas market. 96.3 percent of the varieties Golden Delicious, Granny Smith, Starking, Royal Gala, Braeburn, Pink Lady and Sundowner were in full production. The area under pear production, with 1.9 ha, stayed the same and was in full production in the last conventional and the first conversion year. Varieties planted were Packham Triumph, Bon Rouge and Beurre Hardy. Nearly 40 percent of the apple production and 50 percent of the pear production was under conversion in the first year, as displayed in Figure 6.3. For the future, an increase of the area under conversion is planned until the farm is fully organic.

#### 6.4.2.2 Vegetable production

The production of vegetables on Farms C and D was fully in conversion from the first year and received organic approval in 2001. The area on Farm C increased from 1 ha in the last conventional year to 6.3 ha in the first organic year (see Figure 6.4). During this time an increase in crop variety took place and in 2000 mainly carrots, onions, potatoes, butternuts and leeks were planted.



**Figure 6.4:** Vegetable production during the conversion period on Farms C and D

BC: before conversion (last conventional year);

C1: first year in conversion

C2: second year in conversion

C3: third year in conversion

AC: after conversion (first fully organic year)

Source: Own questionnaire

Farm D kept one ha of vegetables under production until the first fully organic year, where it was increased to 8 ha, as shown in Figure 6.4. An increase in varieties also took place on this farm to meet consumer demands and improve the crop rotation. In the first organic year mainly potatoes, carrots, onions, lettuce and butternuts were planted.

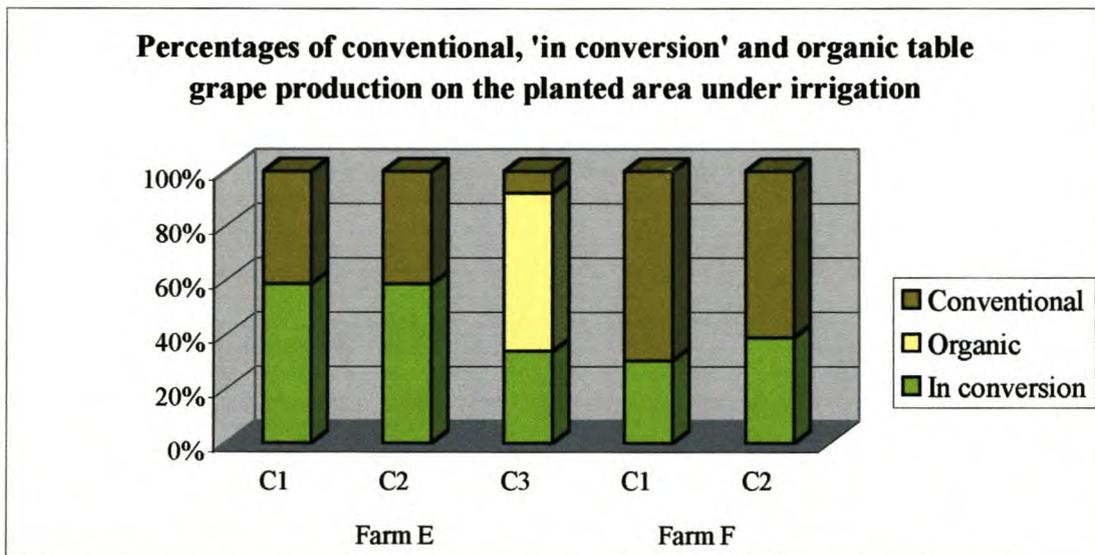
#### 6.4.2.3 Table grape production

The table grape production on Farms E and F, as in the case of Pome fruits on Farm B, includes conventional crops as well as crops in conversion. Farm E had no increase in area during the conversion period and had farmed 126.8 ha under table grapes since the last conventional year. 96.7 percent (122.6 ha) were in full production since a small area was replanted in the second year of conversion. The varieties Bonheur, Don Ben Hannah, Sonita, Regent, Sunred, Alphonse, Red Globe, Regal and La Rochelle were included in the production.

On Farm F the area under table grape production increased during the conversion period, from 30 ha in the last conventional year to 49 ha in the second year of conversion. These newly planted vineyards were converted, while the old vines were kept under conventional production. In the first year of conversion 69.8 percent (30 ha) of the table grapes were in production, while in the second year it was 61.2 percent (30 ha). All of these grapes were

managed conventionally. Varieties used in the production were Prime Seedless, Regal Seedless, Thomson’s Seedless, Crimson Seedless, Victoria and Sultana.

Figure 6.5 gives an indication of the percentage of ‘in conversion’ and organic production areas on the total area. On Farm E, 58.3 percent of the production was in conversion in the first and second years of conversion and, since the conversion period was only two years, this area received full organic accreditation in 2001. In that year a further 42.6 ha were also integrated into the conversion process.



**Figure 6.5:** Percentages of conventional and ‘in conversion’ table grape production on Farms E and F

C1: first year in conversion  
 C2: second year in conversion  
 C3: third year in conversion  
 AC: after conversion (first fully organic year)  
 Source: Own questionnaire

Farm F converted 13 ha newly planted vines in the first year and added an additional 6 ha of newly planted vines to the conversion process in the second year of conversion. Thus 25 percent of the current production is in conversion and it is planned to convert the whole area by 2005.

## 6.5 ANALYSIS OF THE CHANGES IN PRODUCTION TECHNIQUES

### 6.5.1 Intensity before conversion

Two farms (A and C) were already farming at a low intensity level before conversion, as displayed in Table 6.4. The remaining farms used chemicals intensively, while minimum tillage was applied. Especially on the farms with long-term crops (all except C) the use of mineral fertilizers, fungicides, insecticides and herbicides was high.

**Table 6.4:** Intensity levels before conversion

Factor	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F
Mineral fertilizer use	3	1	2	1	1	1
Herbicide use	2	1	3	1	1	1
Fungicide and insecticide use	2	1	2	1	1	1
Tillage	3	3	2	2	2	2

1: high intensity, intensive tillage

2: low intensity, minimum tillage

3: no use, no tillage

Source: Own questionnaire

Farms B, E and F still used chemical inputs on their conventional areas, whereas they were terminated on the areas in conversion.

### 6.5.2 Cultivation techniques

On the farms with long-term crops (A, B, D, E, F) cultivation was only done once. Before the crops were planted the soil was ripped deep with bulldozers, and lime or rock phosphates were applied. Since all orchards and vineyards were established before conversion, no further cultivation was done. Only Farmer D used rotating equipment to cultivate the rows between the trees every second year to reduce weed and compactions.

Areas under vegetable production (Farms C, D, E and F) were ploughed before planting and after the harvest, under conventional production. During conversion the tillage was cut down. Farm C reduced the ploughing to once a year. Before planting, the soil was prepared with a rotating tool to work in plant material and weeds and to prepare the seedbed. Farmer E introduced legumes in his crop rotation and ploughed only before the planting of the vegetables.

### 6.5.3 Seed and plant input

Plant input for long-term crops was necessary only when orchards and vineyards were established. None of the farmers extended the area under production during the conversion process, thus no changes in plant input could be observed. In the case of vegetables, only Farmer D changed the seed input. He reduced the number of seeds per ha by 60 percent compared with the conventional production, to prevent diseases. Due to the lack of supply, conventional seeds or seeds from own production were used on all farms with vegetables.

### 6.5.4 Fertilization

The use of fertilizers was drastically reduced, to move from chemical remedies to compost and organic products on all farms. Compost played a big role here since all farms operated without livestock. Farmer A reduced the use of raw chicken manure gradually and replaced it in the second year of conversion with the use of compost from own production (30m<sup>3</sup>/ha once a year). This amount was applied on the pear as well as the apple orchards. Farmer B substituted the chemicals with the use of straw and rotten sawdust as mulch (300 bales/ha and 2t/ha once a year respectively) and compost from own production as well as purchased compost (up to 30m<sup>3</sup>/ha twice a year). The compost was fungi-based, as required for fruit trees. Cover crops and the use of lime on a maintenance level were additional activities to improve soil fertility and overcome the lack of nutrients at the beginning of the conversion. It was planned to reduce the input of compost over time to 20 m<sup>3</sup>/ha once a year.

On Farm C there were problems, especially with the low N and K levels and the minimal amount of organic matter in the soil. To enhance soil fertility, green manure was planted during the conversion period. Together with the use of potassium sulphate (200 kg/ha, 4 times a year), RAM (a worm extract containing eggs) and EM (effective micro-organisms in liquid form) were used on the vegetable fields. In addition one t/ha of guano was used twice in the first year of conversion and increased to four times a week in the second year of conversion to counteract the low levels of nutrients. Since low organic matter is still a big problem on the very sandy soils of Farm C, the improvement of soil fertility requires special attention even after the conversion period and green manure is therefore still a part of the crop rotation. In addition, composted chicken manure is used (0.5 t/ha, every 3 weeks).

Farmer D had problems especially with the nitrogen levels of the soils in his citrus orchards and used 10 litres of composted chicken or cattle manure per tree once a year

directly after the harvest in winter. Additionally a nitrogen-rich hoof and horn mixture was used in spring. Several problems occurred with the use of animal manure as fertilizer. Since composted manure has an imbalance in ratios of N and other elements, it caused some secondary foliar deficiencies of trace elements. These were controlled by the use of foliar sprays. Another problem of composted manure was the slow release of nitrogen during the summer instead of late winter and early spring. This resulted in a poor blossom flush and high leaf nitrate levels, which prevented colour development, especially in early varieties such as satumas.

On Farms E and F similar conditions existed before conversion. On the sandy-loamy soils, the microbiological activity was low. All soils had poor drainage and waterholding capacity. Before conversion a standard NPK fertilizer was applied with 120 kg/ha N, twice a year. During the conversion period 20 m<sup>3</sup>/ha compost out of own production was applied on the vineyards twice a year. 500 l/ha compost tea was integrated into the irrigation together with seaweed extract to improve soil fertility and prevent insect and disease damage. The seaweed extract was used only at the beginning of the conversion period until the required level of nutrients was reached. In addition, Farmer E used 400 kg/ha guano three times a year in the vineyards. On blocks with a low pH level, 1 t/ha of calcitic lime was applied. Farmer F applied these amounts only once a year. They were reduced after the conversion period to 200 kg/ha, twice a year. Farmer E brought the amount of compost down to 20 m<sup>3</sup>/ha, once a year after conversion. On the vegetable fields, 20m<sup>3</sup>/ha compost and 400 l/ha compost tea were applied during the conversion period together with 50 kg/ha guano. These measures dramatically increased the microbiological activity and the waterholding capacity of the soil.

### **6.5.5 Weed management**

On all farms the use of chemical weedkillers was replaced with mechanical weed management techniques. Problems with weeds only existed on Farms A, B, C and D, as Table 6.5 shows. Grasses caused the most problems. In the case of fruit trees the weed infestation is the highest in orchards with trees between three and seven years of age. Young trees as well as old trees, because of their full canopy, have few weeds.

**Table 6.5:** Problematic weeds occurring during the conversion

Weed	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F
Natural grasses	+	+	+	-	-	-
Kikuyu	-	-	-	+	-	-
Nut grass	-	-	-	+	-	-
Hutch grass	-	-	-	+	-	-

+: occurred,

-: did not occur

Source: Own questionnaire

Weeds in orchards and vineyards were controlled with a combination of mulching, mowing and hand weeding. Mulch was applied, depending on the speed of the rotting process, once every one to three years. Straw was the main product used for this purpose. Additionally the weeds were mowed two to four times a year, depending on the degree of infestation, and were left in the orchards/vineyards for additional mulching. If labour was available, hand weeding was done once to twice a year. These measures were also applied on Farms D and E after the conversion period, although Farm D experienced a decrease in weeds. The weed infestation on the vegetable fields was controlled by ongoing hand weeding two to three times per growing season.

**6.5.6 Insect and disease management**

Diseases and harmful insects were less of a problem than weeds on all farms. Soil-borne diseases like eelworm or phytophthora were suppressed by the increased microbiological activity of the soil. Table 6.7 shows the occurrence of problematic diseases on the surveyed farms.

**Table 6.7:** Problematic diseases occurring during the conversion

Disease	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F
Downy mildew	-	-	-	-	+	+
Powdery mildew	-	-	-	-	+	-
Botrytis	-	-	-	-	+	-
Apple and pear scab	+	-	-	-	-	-
Scale	-	-	-	+	-	-
Fusicaladium	+	-	-	-	-	-

+: occurred,

-: did not occur

Source: Own questionnaire

On Farm A the fungal disease fusicaladium was the main problem during the conversion period. It was controlled by the use of compost tea, which was sprayed in a concentration of 1:30 (1 000 l/ha, once a week). In addition, other microbiological compounds such as neem oil were applied once a week if necessary. Farmer D tried to keep even organic pesticides out of the orchards and focused on the development of a rich and diversified orchard fauna during conversion. If necessary, mineral oil is applied in winter on scale-infested trees. Other preventive means in insect and disease management are the use of compost tea every two weeks (750 l/ha), seagro and kelpak fortnightly in the spring and neem oil once a season.

The fungal diseases powdery and downy mildew occurred on Farms E and F, but did not cause major problems during conversion. Sulphur spray once every ten days, and copper (max 3 kg/ha per season) were used together with compost tea (200 l/ha) to manage outbreaks.

The codling moth is one of the major threats for pome fruit production. It occurred on both Farm A and B, as illustrated in Table 6.8. In the vineyards the mealy bug was the main harmful insect.

**Table 6.8:** Problematic insects occurring during the conversion

Insect	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F
Mealy bug	+	+	-	-	+	+
Fruit fly	-	-	-	+	-	-
Codling moth	+	+	-	-	-	-
Snout beetle	-	+	-	-	-	-
American bollworm	+	-	+	-	-	-
Leaf miners	-	-	+	-	-	-
Locusts	-	-	+	-	-	-
Snails	-	-	-	+	-	-

+: occurred,

-: did not occur

Source: Own questionnaire

The main measure for fighting codling moth and fruit fly on Farms A and B was the use of mating-disrupting female hormones. These were dispersed through the orchards to prevent the mating of these insects. Another way of dealing with higher insect infestation was the diversification of natural predators, mainly through the planting of herbs with different blossoming and pollen producing times.

Farmer C used several biological measures such as *Bacillus thuringensis*, citrus oil and EM when necessary to deal with an outbreak of insect infestation. Farmer D controlled fruit fly by using closed baited traps hung in every tree. Snails were first handled with methaldehyde in closed traps, which were later replaced by the use of peking ducks. Furthermore biological sprays were applied when necessary (like neem oil and compost tea). Farmers E and F both applied compost tea and natural oils every ten days against mealy bug in their vineyards.

### **6.5.7 Crop rotation**

Crop rotation on the farms with vegetables (C, D and E) did not follow a strict plan. Included in the rotation were lupines, cowpeas and wheat (Farm E), which were planted in turn with the vegetables to help the nitrogen budget and to replace organic matter. Farms C and D also increased crop diversity, firstly to meet market demands and secondly to allow a more balanced crop rotation. The main crops of Farm C during the first year of conversion were carrots, onions and butternuts. In the second and third year beans, potatoes, garlic, squash, sweet potatoes and beetroot were added. During conversion Farmer D changed from the planting of only green pepper and butternuts to a wider variety, including gem squash, spinach, tomatoes, lettuce, broccoli, cauliflower, carrots, beetroot, peas, beans and pumpkins. Onions were planted every two years, carrots and potatoes every four years and peas every six years on the same land to prevent the outbreak of pests. White clover was used by Farmer D for undersowing to bind N and protect against weeds.

### **6.5.8 Trellising and pruning techniques**

Farmers A and B did not change any of the trellising or pruning techniques on their apple and pear trees. In the production of table grapes, only Farmer F changed his pruning techniques. He reduced the wood per tree and spread the shoots more widely over the plant. The change to this technique allowed more air movement and was thus a measure in the pest management.

### **6.5.9 Cover crops**

Cover crops were planted on all farms with long-term crops, for several reasons. They support the oppression of weeds, retain moisture and add nutrients and organic matter to the soil. They are also hosts to useful predators and thus ensure a balanced fauna in the orchard and vineyard. All farmers use mainly clover as cover crop since this plant is able to bind N from the air. In addition fescue, wheat and natural grasses are grown between the trees and vines. Farmer A also planted fennel directly at the stem of the trees to attract predators. The cover crops were usually mowed once or twice a year as necessary and left as mulch in the orchards/vineyards.

## **6.6 CHANGES IN YIELDS DURING CONVERSION**

### **6.6.1 Pome fruit production**

During the conversion period the improvement of soil fertility can no longer be achieved with the use of chemical fertilizer but has to be based on the fostering of microorganisms and the optimising of the soil conditions by applying organic fertilizers such as manure and compost. Since the increase of soil fertility is a process that takes place gradually over the whole conversion period and even afterwards, it is likely that yields will drop when chemical fertilizers are taken out of the system. Furthermore, the yield depends on a number of other factors including orchard age, planting density, apple variety, production location, irrigation practices, and annual growing conditions.

In the case of Farmer A a change in yields could not be determined since all his orchards were at a non-bearing age in the first year of conversion (C1). The apple orchards were either replanted or newly introduced in 1997, which was the result of three main factors. A change in demand for certain varieties caused Farmer A to introduce more trees of the varieties Pink Lady and Sundowner. Furthermore, he had problems in the peach orchards with the oriental moth for which no natural predator existed. Therefore, he stopped the production of peaches and changed these orchards to apples and pears. Another factor was a new summer water supply from the irrigation scheme made available in 1997, which caused an increase of the area under fruit production from 66 ha to 88 ha. As a result, the production of apples only started in 2000, as indicated in Table 6.9.

Farm B had mostly fully established apple orchards at the beginning of the conversion period. In the first year of conversion Farmer B planted an extra one ha with the variety

Braeburn and 0.73 ha with the variety Sundowner to meet the demands of the overseas market. Thus only 91.3 percent of his orchards were under full production. Table 6.9 reveals that he experienced no drop in yields during his first year of conversion and even achieved an increase in class two apples. The infestation with several insects, including snout beetle and codling moth, as discussed in Section 6.5.6, had no negative impact on the yield. Higher temperatures in the summer of 2000 instead supported the production level.

As discussed in Section 4.5, no separate data were available on non-bearing and bearing trees in the case of long-term crops. Thus the yields refer to an average value including non-bearing and bearing trees.

**Table 6.9:** The the change in yields of the apple production on Farm A and B in t/ha

Production Classes	Farmer A (t/ha)		Farmer B (t/ha)	
	BC	C1	BC	C1
Class 1	0	0.03	24.75	24.75
Preserve	0	0	-	-
Class 2	0	0.14	11.25	13.5
Class 3	0	1.16	9.0	6.75
<b>Total</b>	<b>0</b>	<b>1.33</b>	<b>45</b>	<b>45</b>

Source: Own questionnaire

The percentage of pears under production increased from 55.77 percent in 1997/1998 to 65.38 percent in the first year of conversion on Farm A. The area under production was increased between 1993 and 1997 due to the reasons discussed above. Table 6.10 indicates an increase in yields from conventional production to the first year of conversion. The reason for this increase is not necessarily the shift to organic production, since Farmer A had already applied organic principles before conversion. The increase in bearing trees raised the yield to a certain degree. Furthermore, the low rainfall in 1999, with only 80 percent of the average amount in the Ceres area, could have had an influence on production.

**Table 6.10:** The change in yields of the pear production on Farm A and B in t/ha

Production Classes	Farmer A (t/ha)		Farmer B (t/ha)	
	BC	C1	BC	C1
Class 1	7	11	22	22
Preserve	7	3	-	-
Class 2	4	13	14	14
Class 3	6	12	4	4
<b>Total</b>	<b>25</b>	<b>40</b>	<b>40</b>	<b>40</b>

Source: Own questionnaire

The development of the yields of pears on Farm B followed a similar pattern to that of the apples. Neither an increase nor a decrease in yields was experienced. A look at Table 6.10 identifies an equal distribution of yield between the different production classes. Thus neither farmer experienced the often-mentioned decrease in yields with the shift to organic farming. This could have been a result of good management and favourable weather conditions.

### 6.6.2 Vegetable production

Vegetable production on Farms C and D started only with the beginning of the conversion process. On Farm D the first conversion year was used for trials, thus no crops were harvested. Comparable data on yields were available only for onions and carrots. Table 6.11 and 6.12 show the results of this comparison.

**Table 6.11:** The change in yields of the onion production on Farm C and D in t/ha

	C1	C2	C3	AC
<b>Farmer C</b>	8	8	6	7.2
<b>Farmer D</b>	-	0	10	20

Source: Own questionnaire

The first two years (C1 and C2) of the conversion period brought relatively good results for the production of onions on Farm C. In the following two years the yields decreased by 25 and 10 percent respectively. The reasons included the sandy soils on the farm with their extremely low fertility. The organic matter had not been significantly increased by then. A further problem was the infestation with locusts every second year. This and the problems with low rainfall over the previous four years, the bad quality of the borehole water and wind erosion were seen as reasons for the lower performance.

Farmer D increased his yields steadily over the two years of production due to the increase in soil fertility and organic matter in the soil. A growth in yield was expected on both farms with an increase in soil fertility.

The same is applicable for the production of carrots, where an increase in yield was experienced on both farms over the years. Although the sandy soils of Farm C are favourable for carrots, the low nutrient levels, especially of N, K and trace elements, caused problems and kept the yields relatively low compared with Farm D.

**Table 6.12:** The change in yields of the carrot production on Farm C and D in t/ha

	C1	C2	C3	AC
Farmer C	10	-	24	26
Farmer D	-	-	30	60

Source: Own questionnaire

### 6.6.3 Table grape production

In the production of table grapes neither of the two farmers experienced a drastic decrease in yields. Only the normal seasonal changes occurred, as Table 6.13 shows. Farmer E's grapes were fully bearing at the time of conversion. Only a slight decrease in yields was experienced. The introduction of new grapes in the conversion process was responsible for the further decrease in the last conversion year. Farmer F converted only newly planted and thus non-bearing vines. Hence the yields displayed in Table 6.13 are those from conventional crops. The converted table grapes had the first small harvest in the second year of conversion.

**Table 6.13:** The change in yields of the table grape production on Farm E and F in t/ha

	BC	C1	C2	C3
Farmer E	16.5	15	15	13
Farmer F <sup>1</sup>	15	15	15	-

1: only conventional crops

Source: Own questionnaire

A reason for the relatively smooth change from conventional to organic production could be the support both farmers received from their advisor and the sufficient availability of compost out of own production to meet nutrient shortages.

## 6.7 SUMMARY

This chapter provided a background to the farms and farmers interviewed for this part of the study to help understand the processes which took place during the conversion period. Furthermore, planning and technical aspects were discussed.

Three production systems were included in this study, with two farmers in each production system. These included pome fruit (apples and pears), vegetables and table grapes. The farmers started conversion in different years and were thus at different stages of their conversion process. This, the varying sizes of the farms and their different locations within the Western Cape made comparisons difficult, but still provides a picture of the techniques and performances of these farmers in the South African context.

A lack of planning was discovered in the analysis since all farmers did only the time planning required by the certification body. Four of the framers decided to convert their farms in stages (one without conventional production), while two of the farmers chose a single step conversion. Technical as well as economic planning was done by only some of the farmers. A lack of support, especially from national and international organic farming organisations, was mentioned in this context.

Major changes were undertaken concerning all technical aspects of the farming business. A move away from the intensive use of chemicals in pest and disease control meant challenges for all of the farmers. Only Farmer A had already followed sustainable farming before conversion. The intensive use of compost to build up the low soil fertility and a balancing of nutrients with natural methods such as cover crops and compost tea were some of the core issues. Large amounts of compost had to be applied, especially during the first year of conversion. These were reduced when soil fertility increased.

Mealy bug, downy and powdery mildew, apple scap and the infestation with grasses were some of the major problems encountered on most of the farms, depending on their enterprises. A frequent spraying program with natural oils, EM and compost tea was used for control purposes, while hand weeding and mulching played a major role in the control of weeds. Generally a higher weed infestation was allowed due to positive effects such as green manure protecting against erosion and moisture loss and the attraction of beneficial insects.

Yield reduction was not a problem on all but one of the farms. This could be accredited to good management practices and relatively low problems with insect and disease infestation. Farm C, which experienced problems with crops, also had problems with the

levels of organic matter and soil fertility, due to very sandy soils and high erosion problems. Slight decreases in yields were experienced on one of the table grape farms and could be attributed to the normal reduction in the beginning of the conversion period.

In conclusion it could be said that detailed planning of the conversion process beforehand would increase the possibility of a successful conversion. This is true especially in the South African context where a sound network of support and information is still lacking to provide the farmer with assistance during the process. However the performance of these few farmers so far showed that the conversion to organic farming is manageable.

## **CHAPTER SEVEN**

# **ANALYSIS OF THE ECONOMIC CHANGES AND PROBLEM AREAS DURING THE CONVERSION TO ORGANIC FARMING IN THE WESTERN CAPE**

## **7.1 INTRODUCTION**

During the decision phase preceding the start of the conversion process one of the main issues of consideration is the economic performance of the farm during this phase as well as initial investment costs and possible problems areas. Several findings of the literature, as described in Chapter 3, provide statements about the performance of farmers during the conversion period in Europe, the USA, New Zealand and other developed countries. Since it is not possible to predict clearly from these results the influence that conversion will have on factors such as labour and machinery input, variable and fixed costs and gross margins, it is impossible for the South African farmer to use these findings as a guideline. Thus it is necessary to pay attention to the performance of South African farmers in the conversion period, not only technically but also economically and to evaluate the problems and risks which occur in this environment.

After discussing the planning process and technical changes which took place during the conversion in the previous chapter, this chapter deals with the economic performance of the six case study farms. Included in this analysis is the determination of conversion specific investments, changes in labour and machinery input and costs and income. The latter deals with variable and fixed costs and compares the farms' performances using the gross margin<sup>1</sup> and the net farm income. No industry data were used for comparison due to reasons discussed in Section 4.4.2. The last part of the chapter deals in detail with problem areas and shortcomings of the conversion to organic farming in the South African context.

## **7.2 EVALUATION OF INVESTMENTS**

### **7.2.1 Investments made during the conversion period**

Only investments which occurred during the conversion period are mentioned in determining the investments made by the farmers for conversion purposes. It was assumed that no conversion-specific investments were done before this time. Table 7.1 provides an overview of the kind and extent of investments made. It was also necessary to examine which of the investments were specific to the conversion period, as opposed to investments made independent of the conversion in order to sustain general farming activities.

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<sup>1</sup> Due to the nature of the data gathered for this studies the correct term would be 'margin above specified costs'. The term 'gross margin' is used throughout this chapter for convenience purposes.

**Table 7.1:** Investments made since the beginning of the conversion period

	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F
<b>Total area (ha)</b>	330	50.78	150	436	500	220
<b>Cultivated land (irrigated and dry) (ha)</b>	246.2	29	35	120	450	135
<b>Total investments (R)</b>	900 000	0	570 000	300 000	850 000	3 000 000
<b>Machinery (R)</b>	750 000	0	320 000	220 000	100 000	0
<b>Fixed improvements (R)</b>	150 000	0	250 000	80 000	750 000	2 800 000
<b>Other (R)</b>	0	0	0	0	0	200 000
<b>Financed through</b>	Cash	Na	Loan	Loan	Cash and loan	Cash and loan
<b>Specific for conversion (%)</b>	100	Na	0	100	100	100
<b>Investments per ha cultivated land (R)</b>	3 656	0	16 286	2 500	1 889	22 222

Na: not applicable

Source: Own questionnaire

Only Farmer B did not invest in any kind of new machinery or fixed improvements. All other farmers invested in machinery and/or fixed improvements in order to be able to farm organically or to improve their farming activities. Farmer A invested in a compost plant together with the necessary machinery to produce fertilizer for his farm and as additional source of income, since the compost was sold locally. The investments were financed by money that was generated by the selling of unnecessary machinery and about 30 ha of land to beginner farmers. All these investments can be allocated entirely to the conversion process.

Farmer C invested only in non-conversion-specific items. Since the farm consisted only of veld and dryland before he took parts of it over, the installation of an irrigation system was necessary as well as the drilling of a borehole and the clearing of veld area to make it arable. Further investments were a packshed, a storage room and a farm stall, which cannot be completely allocated to the conversion process. Farmer D also invested in a packshed and a packing machine but allocated this to conversion, since own packing became necessary only during the conversion process.

Farmers E and F together invested in a compost plant with additional equipment and compost tea tanks. In addition, Farmer F invested in a cold room for organic fruit and in an export and marketing company which specialised in organic fruits. Thus all the investments can be allocated entirely to the conversion process. The largest number of investments per hectare of cultivated land (irrigated and dryland) were made by Farmer F,

mainly on the cold room and by Farmer C, because of the lack of infrastructure on his farm.

### 7.2.2 Planned investments

Table 7.2 shows the future investments planned by the farmers during the conversion period. Farmer B, who did not invest anything until 2002, planned the introduction of a small juice plant on his farm for fruit that could not be sold on the local or international market. The extracted juice will be sold on local farmer markets together with a large amount of his fruit. An extension of the farming activity is planned on Farm C, which includes investments in new irrigation and the improvement and extension of the packshed.

**Table 7.2:** Planned investments specific for conversion

	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F
<b>Investments total (R)</b>	0	45 000	80 000	0	0	0
<b>Machinery (R)</b>	0	0	50 000	0	0	0
<b>Fixed improvements (R)</b>	0	45 000	30 000	0	0	0
<b>Other (R)</b>	0	0	0	0	0	0
<b>Investments per ha cultivated land (R)</b>	0	1 552	2 286	0	0	0

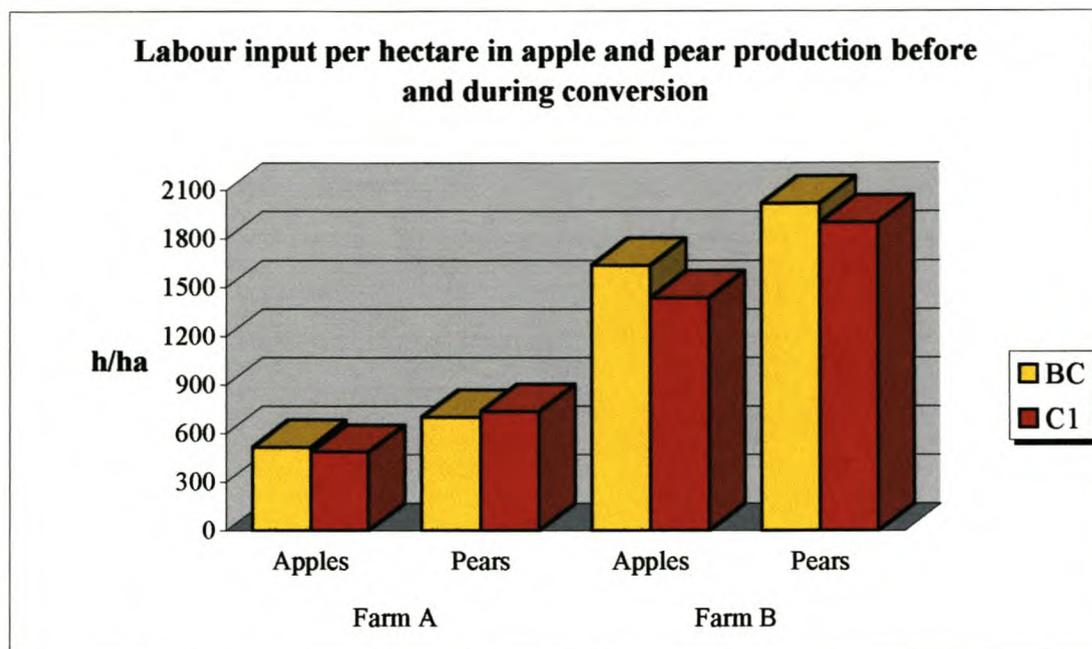
Source: Own questionnaire

## 7.3 CHANGES IN LABOUR INPUT

To determine the changes in labour input on the surveyed farms, regular labour and contract labour are displayed together in person-hours per hectare of area under production. This gives a clearer picture of how much labour was actually allocated to each production system. As discussed in Section 4.5 it was not possible to separate data on non-bearing and bearing trees in the case of long-term crops. Thus the labour input data refer to an average value including non-bearing and bearing trees/vines. The percentages for non-bearing and bearing trees for the two pome fruit farms were discussed in Section 6.4.2.1. The values for the table grape farms were examined in Section 6.4.2.3.

### 7.3.1 Pome fruit production

The labour input on the two pome fruit farms showed only a slight decrease during the first year of conversion (C1) compared to the situation before conversion (BC) as displayed in Figure 7.1. The labour input for pear production on Farm A only increased a little.

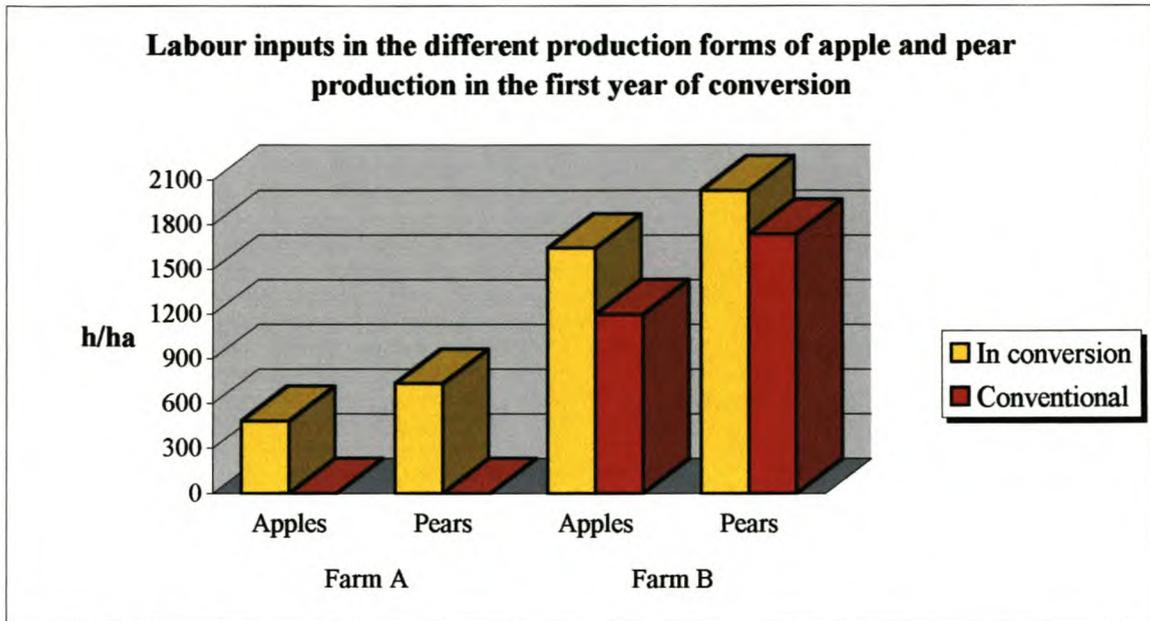


**Figure 7.1:** Labour input in the total pome fruit production before and during conversion on Farms A and B in man-hours per hectare  
 Source: Own questionnaire

On Farm A this decrease resulted mainly from the reduction in the number of regular labourers from 27 to 17, due to financial reasons. The number of contract workers used for harvesting and other peak time periods, stayed the same at 30. Higher spraying requirements caused the slight increase in labour input for pear production, which was not the case for apples since the trees were still at a non-bearing stage.

Farmer B retained the same number of labourers on his farm during the conversion, with 15 regular and 5 contract workers. The decrease in labour input in both production systems can be explained by lower rates of spraying in the conventional production area and the increase in the apple production area without employing more workers.

Figure 7.2 reveals the differences in labour input between certified and conventional production. Since Farmer A had the whole area in conversion no differences could be observed.

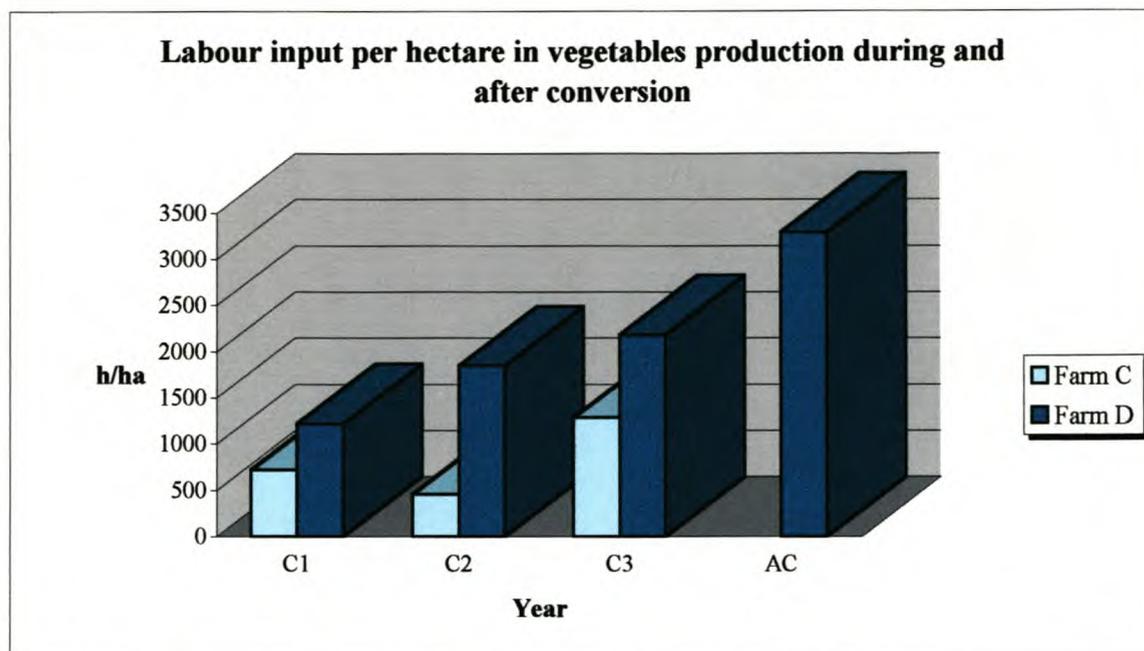


**Figure 7.2:** Differences in labour input between the conventional production systems and the systems in conversion during the first year of conversion in man-hours per hectare  
 Source: Own questionnaire

By looking at the labour input on Farm B it can clearly be observed that certified production requires a higher labour input than conventional methods. The higher input (37 percent for apples and 17 percent for pears) can be explained by the more frequent spraying and labour-intensive hand weeding as weed control measures.

**7.3.2 Vegetable production**

On Farms C and D no conventional vegetables were produced from the first year of conversion. During this time Farmer C decreased his number of regular labourers from one to zero due to a lack in reliability. Contract labour was employed according to the number of hectares planted and the intensity of the crops. Farm D experienced an increase in the number of contract labourers, which, however, cannot be totally allocated to vegetable production since some of the long-term crops also required an increase in labour input because they were entering the bearing stage. Figure 7.3 shows the changes in labour input since the beginning of the conversion period. No vegetables were produced before conversion on either of the farms.



**Figure 7.3:** Labour input during and after the conversion period in vegetables production on Farms C and D in man-hours per hectare

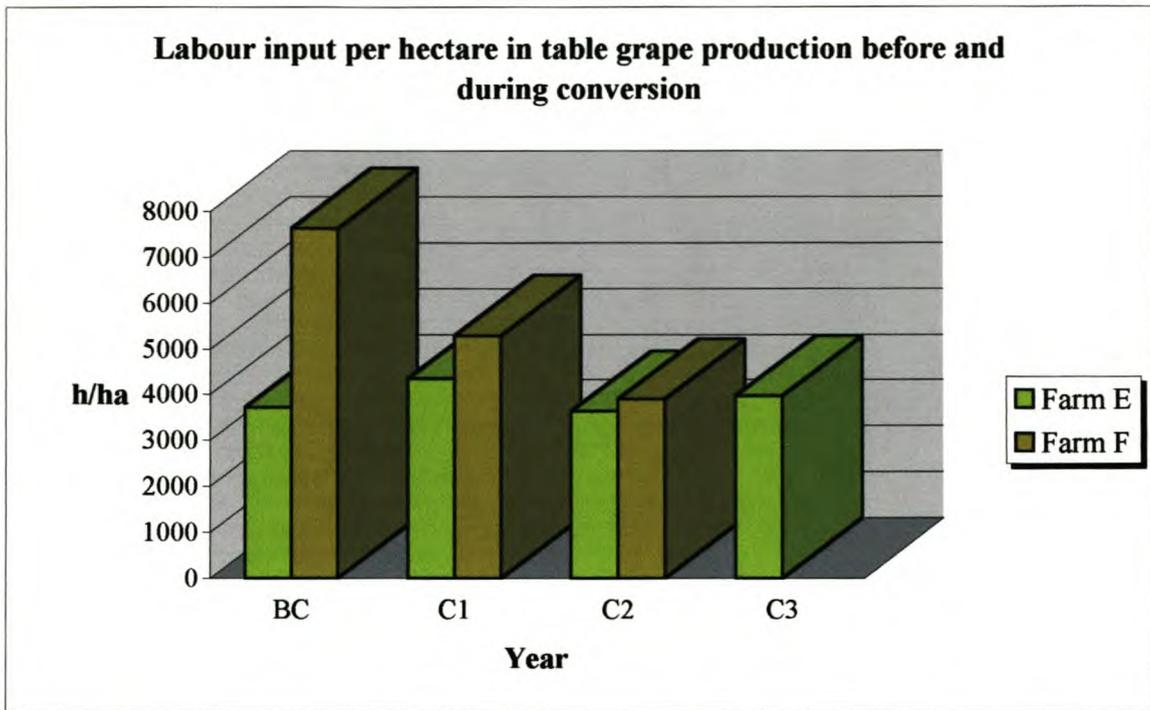
Source: Own questionnaire

Farm C's labour input decreased in the second year of conversion (C2) mainly due to the low yields in production, while the increase in the third year of conversion (C3) can be explained mainly by the increase in yield and the more diversified production.

The labour input on Farm D stayed constant throughout the conversion period. A slight increase in labour was experienced only in the first year after conversion (AC) due to the increase in area and diversification. The differences in labour input on the two farms was caused mainly by the low machinery input in favour of higher labour input on Farm D (due to a higher degree of diversification, as also explained in Section 7.4.2).

### 7.3.3 Table grape production

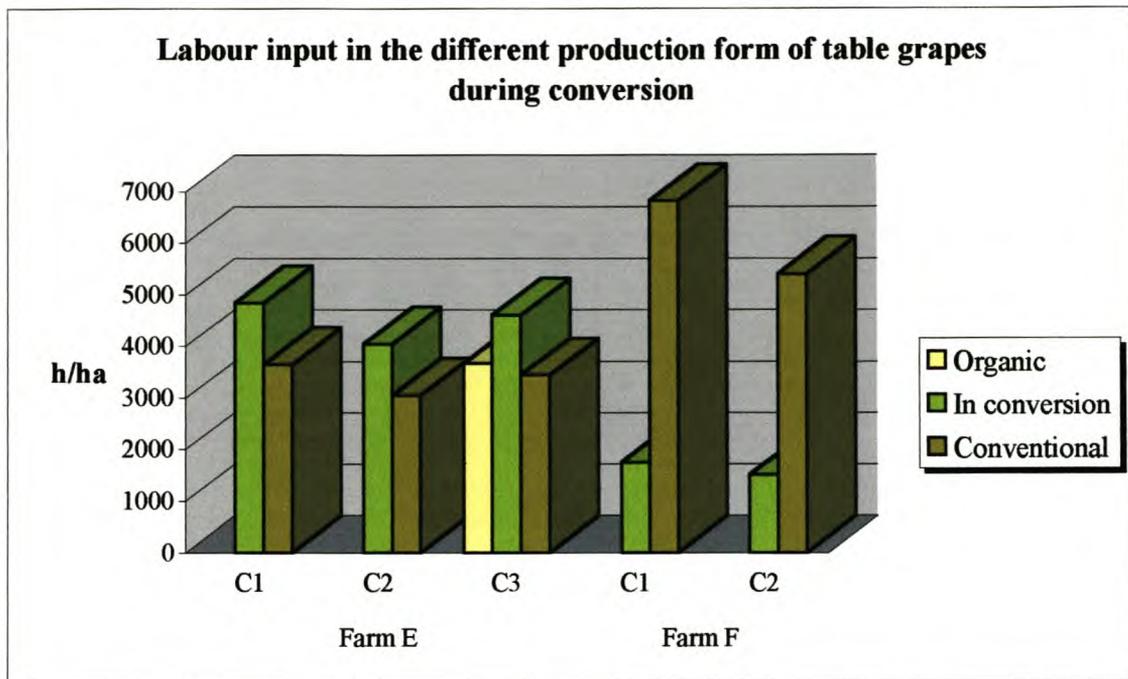
None of the table grape farmers made changes in the number of labourers employed. Figure 7.4 displays the changes in labour input before and during conversion. On Farm E no significant increase or decrease was observed during the changes. The slight decrease in labour from the last conventional year to the first year in conversion could be due to a higher input of fertilizer in this year and due to a change in the spraying techniques towards more frequent applications. The ensuing decrease and increase in the second and third years could be caused by normal changes in pest, disease and weed infestation.



**Figure 7.4:** Labour input in the total grape production before and during conversion on Farms E and F in man-hours per hectare  
 Source: Own questionnaire

Farm F experienced an obvious decrease in labour input from the last conventional year to the first year in conversion. This was caused by the planting of new vines in the last year of conversion, which subsequently required low labour input during the first conversion years. The decrease in the second year was also caused by the increase in percentage of non-bearing vines as a proportion of the total hectares under table grape production.

Figure 7.5 shows the differences in labour input between the conventional and organic areas and the areas in conversion. It also provides a better indication of how the labour input really changed. On Farm E the labour input on the areas under conversion is approximately 30 percent higher than on the areas under conventional production. The same reasons can be applied here as for the production of apples and pears. The more frequent spraying and weeding by hand increased the labour input, especially during the conversion period until the system was established, the soil regenerated and natural predators introduced to the vineyard. This is supported by the lower input in labour on the area under organic production compared to the area in conversion.



**Figure 7.5:** Differences in labour input between the conventional and organic production systems and the systems in conversion during the conversion period  
 Source: Own questionnaire

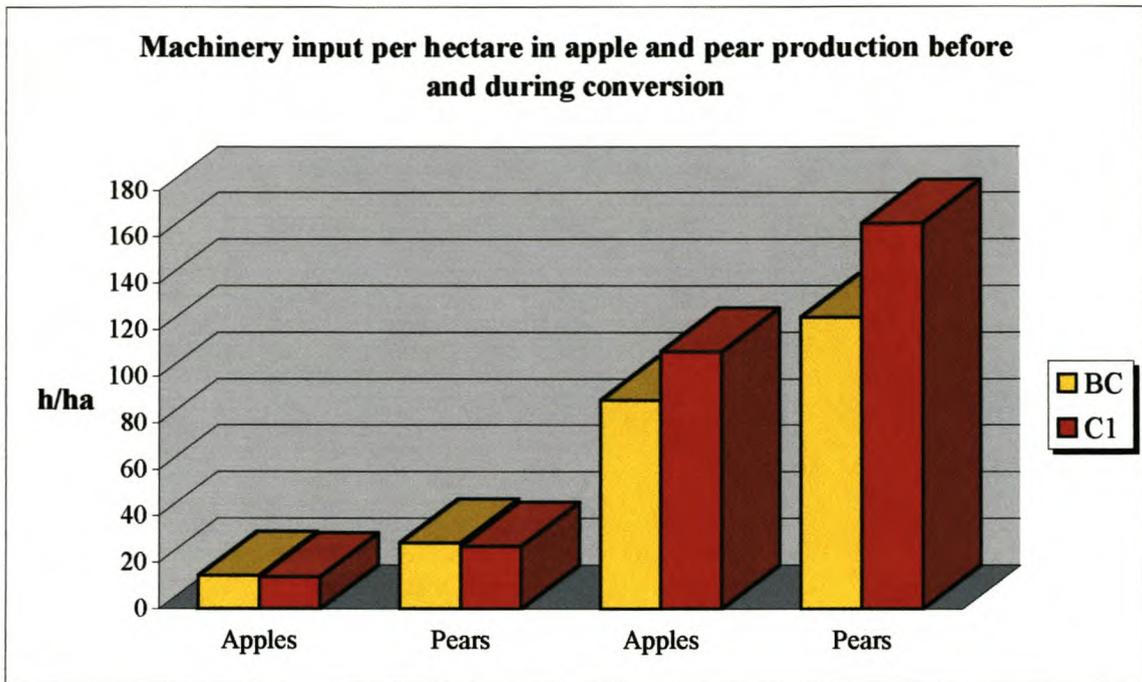
On Farm F these findings cannot be supported due to the above-mentioned fact that all vines in conversion were newly planted and required far less labour due

#### 7.4 CHANGES IN MACHINERY INPUT

The machinery input on the surveyed farms was also measured in hours per hectare under production to show the actual input for each production system. As discussed in Section 4.5, and already mentioned in the case of labour input, no separate data were available on non-bearing and bearing trees in the case of long-term crops. Thus the machinery input data refer to an average value including non-bearing and bearing trees/vines. As already stated in Section 7.3, the percentages for non-bearing and bearing trees for the two pome fruit farms were examined in Section 6.4.2.1. The values for the table grape farms were discussed in Section 6.4.2.3.

##### 7.4.1 Pome fruit production

Only Farm A showed a slight decrease in the machinery input, while Farmer B experienced an increase during the conversion period as illustrated in Figure 7.6.

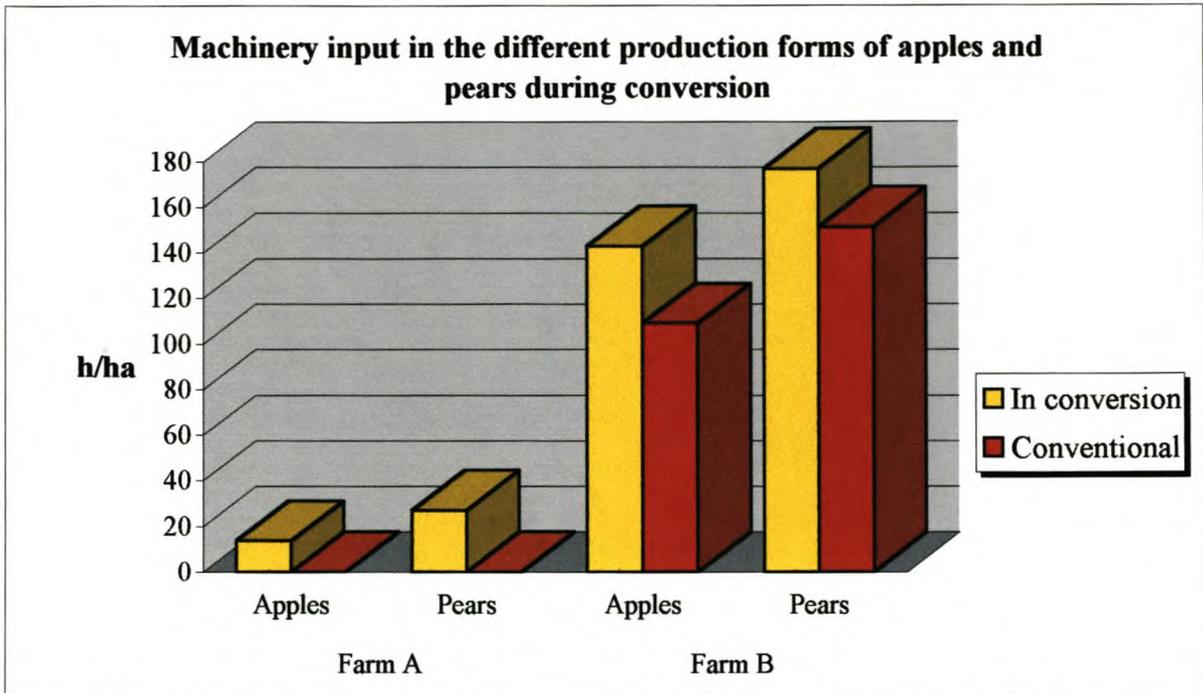


**Figure 7.6:** Machinery input in the total pome fruit production before and during conversion on Farms A and B in machinery-hours per hectare

Source: Own questionnaire

The main cause of this increase was frequent spraying for pests and diseases as well as fertilization compared to conventional production. The reason for the decrease on Farm A was the reduction of spraying due to the fact that the farmer tried to interrupt natural processes as little as possible.

Figure 7.7 reveals the differences in conventional and certified production for Farm B since Farm A was completely in conversion as already discussed in Section 7.3.1. A 30 percent higher machinery input for apple production and a 16 percent higher input for the pear production was experienced in the first year of conversion due to the reasons discussed above.

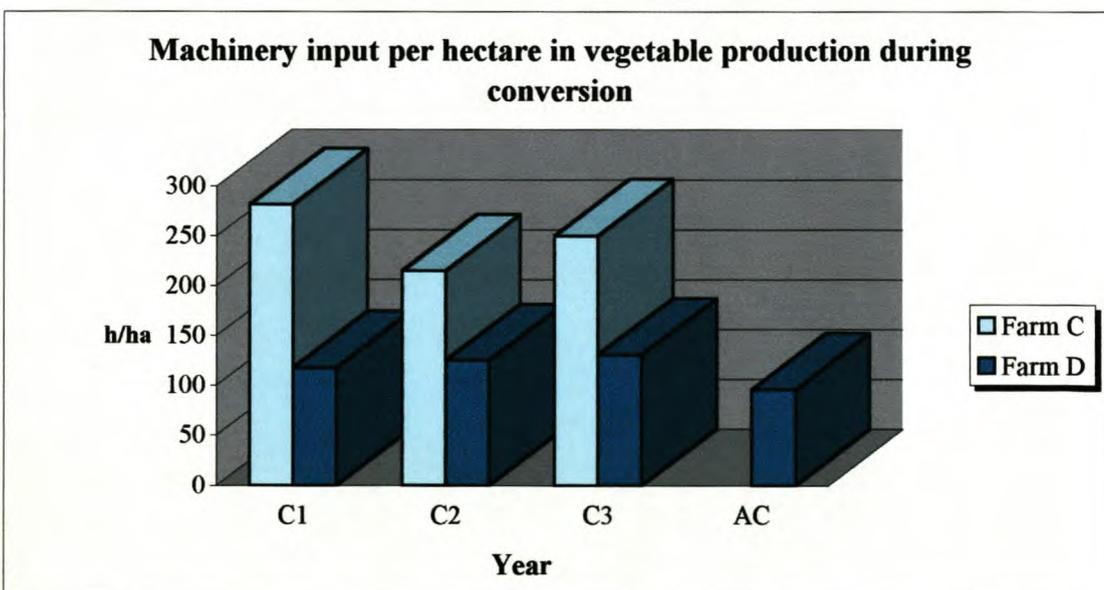


**Figure 7.7:** Differences in machinery input between the conventional production systems and the systems in conversion during the first year of conversion in machinery-hours per hectare

Source: Own questionnaire

### 7.4.2 Vegetable production

The machinery input in vegetable production during and after conversion on Farm C and D followed a similar pattern to the labour input on these farms, as shown in Figure 7.8.



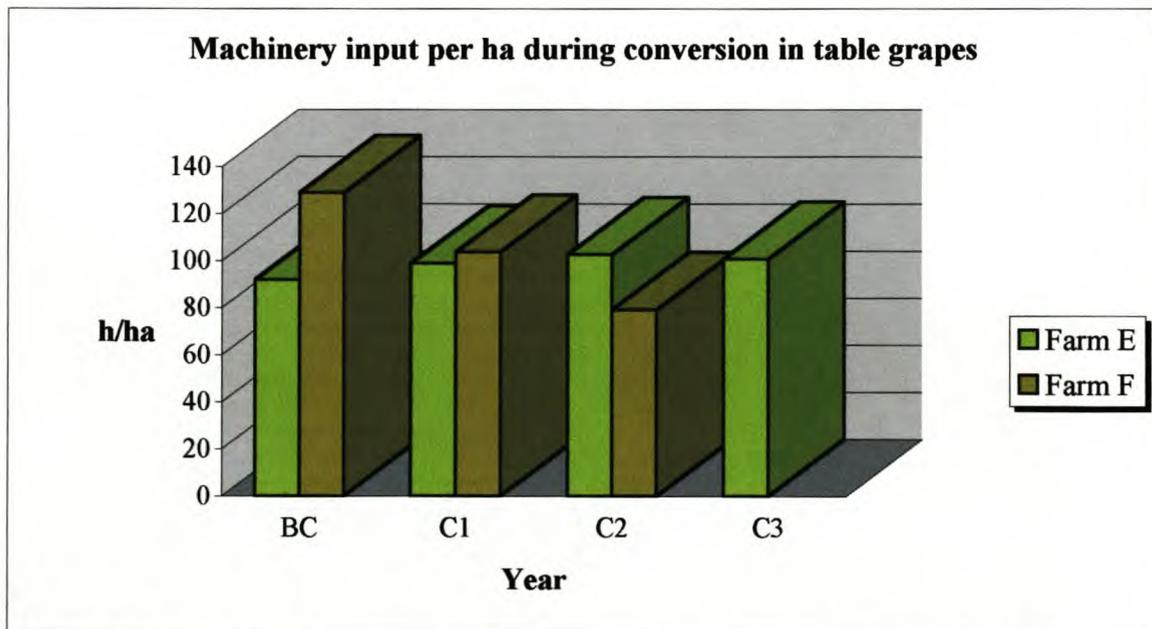
**Figure 7.8:** Machinery input in vegetable production during conversion on Farm C and D in machinery-hours per hectare

Source: Own questionnaire

Farm D's lower machinery input was the result of financial restrictions and a higher level of diversification and was compensated for by a higher labour input, as discussed in Section 7.3.2. The slight decrease in the second year of conversion and the subsequent increase in the third year can be attributed to the same factors as the fluctuations in labour input. Farmer D experienced a slight decrease in machinery input, especially in the first year after conversion, due to an increase in area and higher diversification of production.

### 7.4.3 Table grape production

Similar findings were made for the production of table grapes. On Farm E the labour input increased slightly in the first years of conversion and decreased towards the end of the conversion period, as shown in Figure 7.9. Since these changes were relatively small, they need not be exclusively attributed to the conversion period, but also to higher pest and disease infestation and thus more frequent applications.

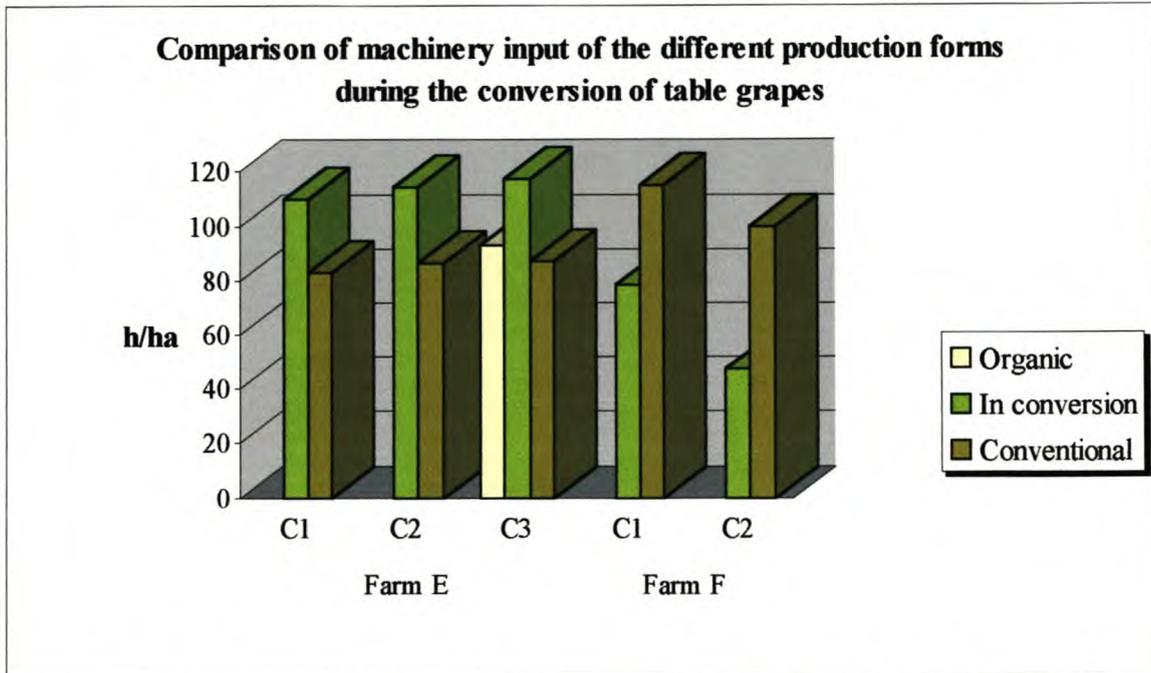


**Figure 7.9:** Machinery input in total table grape production before and during conversion on Farm E and F in machinery-hours per hectare

Source: Own questionnaire

The decreasing and lower machinery input on Farm F compared to Farm E was caused by the increase in area with newly planted table grapes on Farm F, which require little work. Figure 7.10 shows the differences in machinery input for conventional and organic production and production in conversion. It reveals what was also found in the case of pome fruit, namely that the machinery input for products in conversion was higher on a per

hectare base than for conventional table grapes. It shows further that the machinery input decreased after the conversion period for similar reasons as in the case of labour.



**Figure 7.10:** Differences in machinery input between the conventional and organic production systems and the systems in conversion, during the conversion period in machinery-hours per hectare

Source: Own questionnaire

The machinery input for the production in conversion decreased on Farm F from C1 to C2 because of the 6 ha table grapes which were planted additionally. They required only a small amount of machinery input. This is also the reason that the input for the ‘in conversion’ production was smaller than for the conventional production.

### 7.5 VARIABLE COSTS AND GROSS MARGINS

The gross margin for the respective enterprises was chosen as an indicator for the analysis of the financial performance of the surveyed farms. This was calculated by subtracting the directly allocatable variable costs from the gross income of the enterprise and allows for easier comparison of single enterprises. However, the results of this comparison must be seen in a critical light since only directly allocatable variable costs were included, like labour (including regular and seasonal labour<sup>1</sup>), machinery (measured by the use of fuel, oil and lubricants), seeds, plants, fertilizer, packing, transport, marketing and pest, weed and disease control. This way of calculating the gross margin is not the general accepted

<sup>1</sup> Regular labour is normally not included in directly allocatable variable costs. Because of the nature of the data received from the farmers it was included here.

way, but was chosen here since it was seen as necessary to include regular labour due to its important influence on the financial changes during the conversion period. Another reason for this decision was that most of the farmers did not make a distinction between seasonal and regular labour. Which costs were included was dependent on the data of each farmer and was adjusted in all three groups. Furthermore the comparison of gross margins assumes that each enterprise is independent from all other farming activities, technically as well as financially. An additional limitation of the calculation of gross margins is that it is useful to identify production systems that are expected to be successful during and after conversion, but does not give an efficient answer as to whether farming organically has an advantage in the context of the whole farm. To cover this aspect, a short look is taken at the net farm income, which includes also specific fixed costs.

The differences in years in which the conversion was started on the surveyed farms caused distortions in the comparability of the prices of input costs and crops. To eliminate this influence, the price indices calculated by the National Department of Agriculture (2001) were used and all costs and income displayed at constant 2001 values.

In the discussion of variable costs and gross margins for long-term crops, no distinction could be made between non-bearing and bearing trees, although this would be necessary for exact results. None of the farmers provided separate data for these two groups as discussed in Section 4.5. The percentages for non-bearing and bearing trees for the two pome fruit farms were discussed in Section 6.4.2.1. The values for the table grape farms were examine in Section 6.4.2.3.

### **7.5.1 Pome fruit production**

Farms A and B both experienced changes in gross margins during their change from the last conventional year to the first year in conversion. Table 7.3 displays the differences in variable cost and gross income for the apple production per hectare. The low gross margins for apple production on Farm A were caused by the fact that none of the trees were in production in the last conventional year and only a small part in the first year of conversion. The increase in costs was the result mainly of the higher input of fertilization to improve soil fertility during the first year of conversion. Price changes had a further impact on the increase in costs. If the costs are adjusted to constant 2001 values, the total costs for the last conventional year were only 13 percent lower.

**Table 7.3:** Variable costs and gross margins of apple production in conversion compared to conventional production in R/ha (2000/2001)

	Farm A		Farm B		
	Conventional (BC)	In conversion (C1)	Conventional (BC)	In conversion (C1)	Conventional <sup>1</sup> (C1)
<b>Variable costs (R/ha)</b>					
Labour	4 099.90	5 493.70	12 054.50	12 879.20	9 828
Machinery	153.30	204.40	1 473.70	2 138.20	1 631.60
Fertilization	405.90	1 073	1 002.20	8 86.90	823.30
Pest management	828.00	379	3 450.00	784.60	4 587.30
Weed management	85.70	0	2 86.40	0	501.10
Packing material and transport	0 <sup>2</sup>	0	11 227	18 805.30	18 806.70
<b>Total</b>	<b>5 572.80</b>	<b>7 150.10</b>	<b>29493.80</b>	<b>35 494.20</b>	<b>36 178.00</b>
Gross income (R/ha)	0	49.10	32126.20	40 633.90	29 781.80
<b>Gross margin<sup>3</sup> (R/ha)</b>	<b>-5 572.80</b>	<b>-7 101.10</b>	<b>2632.50</b>	<b>5 139.70</b>	<b>-6 396.20</b>

1: Remaining conventional production in the first year of conversion.

2: No and very low production, thus no costs for packing material and transport occurred.

3: Margin above specified cost.

Source: Own questionnaire

Farm B experienced a decrease in the gross margin for total (conventional and in conversion) apple production, as is shown in Appendix 6. The main reason for the increase in the total pear production costs were higher packing costs. A look at Table 7.3 reveals that conventional production had higher variable costs than the production in conversion since the costs for pest and weed management were higher, although labour and machinery costs were lower. If the real costs at constant 2001 values were calculated for Farm B, the total costs of R33 306.40 per hectare reveal that the increase in costs was not only connected to the increase in prices for input costs, but also to an increase in weed management and packing costs in particular. In total, the variable costs of the conventional production were two percent higher. This and the access to premium prices for the products in conversion resulted in the better performance of the certified production.

The extreme discrepancy between the costs of Farms A and B was caused mainly by the decrease in spraying and hand weeding on Farm A, as discussed in Sections 7.3.1 and 7.4.1 and the lack of packing costs due to no (BC) and very low (C1) production, which accounted for a large percentage of Farm B's costs. Thus not only the cost of spraying

substances but also the labour and machinery costs were greatly reduced on Farm A. A comparison of the real costs (at constant 2001 values) of Farm A and Farm B was not done, because conversion started in the same year on both farms.

Table 7.4 reveals a decrease in variable costs for pear production on Farm A, mostly due to the reduced spraying programme, and an increase for Farm B. Appendix 6 shows the total (conventional and in conversion) variable costs and gross margins for the pear production on both farms.

**Table 7.4:** Variable costs and gross margins of pear production in conversion compared to conventional in R/ha (2000/2001)

	Farm A		Farm B		
	Conventional (BC)	In conversion (C1)	Conventional (BC)	In conversion (C1)	Conventional <sup>1</sup> (C1)
<b>Variable costs (R/ha)</b>					
Labour	6 213.20	6 163.10	14 876.70	17 250.70	11 930.60
Machinery	303.50	404.50	1 818.70	2 863.90	1 980.70
Fertilization	416.80	598.10	1 236.90	986.90	1 313.50
Pest and disease control	2 935.30	2 128.80	4 257.70	873	7 318.80
Weed control	80.00	0	353.50	0	799.50
Packing material and transport	4 948.50	5 212.50	13 855.40	24 800.60	25 028.10
<b>Total</b>	<b>14 897.30</b>	<b>14 506.90</b>	<b>36 398.90</b>	<b>46 775.10</b>	<b>4 8371.20</b>
Gross income (R/ha)	12 620.70	18 851.10	51 723.40	51 430.70	35 569.60
<b>Gross margin<sup>2</sup> (R/ha)</b>	<b>-2 276.50</b>	<b>4 344.20</b>	<b>15 324.50</b>	<b>6 202.90</b>	<b>-7 392.80</b>

1: Remaining conventional production in the first year of conversion.

2: Margin above specified cost.

Source: Own questionnaire

The variable costs increased for both the conventional and the ‘in conversion’ production on Farm B. A part of this increase was caused by an increase in commodity prices but at R39 942.80 per hectare, the nominal costs for the last conventional year were still lower. Other reasons for the increase were mainly the higher packing costs caused by the larger amounts of fruit exported. Pest and weed management costs increased too, especially for the conventional production. Although the production in conversion on Farm B had higher labour and machinery costs due to more frequent spraying and hand weeding, the variable costs were still 3.3 percent lower due to the absence of costs for weedkilling chemicals and

lower costs for fertilization and pest management since a large amount of compost and compost tea came out of own production.

The gross margin on Farm A experienced an upwards trend in the first year of conversion due in part to the slightly lower costs, but mainly due to an increase in income generated by 60 percent higher yields. The gross margins for both the conventional and the 'in conversion' production on Farm B were lower in the first year of conversion than the year before. Lower fruit prices and an increase in costs as discussed above were the reason for this development. The production in conversion still experienced a better and positive gross margin, however, due to lower costs and a price premium of approximately 40 percent for these products. Thus it shows that the conversion process can mean a decrease in variable costs and is able to achieve a higher gross margin than conventional production, if new marketing channels are developed and premium prices are then achieved.

### **7.5.2 Vegetable production**

The production of vegetables on Farms C and D only started with the conversion to organic farming. Furthermore the whole area was converted and thus no comparison with conventional production can be made. The analysis was focused on the development of costs and gross margins during the conversion process. All vegetables planted in the specific year on the farms were included in the calculations since no data were available on separate crops.

In the first year of conversion both farms experienced a negative gross margin since no yield was harvested from the fields (see Table 7.5). In the subsequent years Farmer C still had problems generating a positive gross margin. This was caused by an increase in costs; especially labour, seed and fertilizer, machinery, and transport. In contrast, the gross income from production did not increase in the same proportion due to a lack of access to premium prices.

Farmer D increased his gross income per hectare steadily, although variable costs increased during the conversion. Higher yields and a higher diversification of the production resulting in higher packing, labour, seeds and fertilizer needs were largely responsible for increased costs. In the first year after conversion the costs decreased due to an extension in area.

**Table 7.5:** Variable costs and gross margin of certified vegetable production<sup>1</sup> in R/ha (year ending in Feb)

	Farm C			Farm D			
	C1 1999	C2 2000	C3 2001	C1 1998	C2 1999	C3 2000	AC 2001
<b>Variable costs (R/ha)</b>							
Labour	1 949.10	1 320	4 237.50	3 200	5 000	6 300	10 850
Machinery	2 700.40	2 303.80	3 752.30	1 200	1 200	1 400	1 437.50
Seed and fertilizer	6 050.50	6 489.20	7 010.90	1 500	3 000	4 000	1 625
Pest and disease control	0	513.30	0	300	300	300	37.50
Packing and transport	420.90	532	2 695.30	1 000	1 000	10 000	2625
<b>Total</b>	<b>13 118.90</b>	<b>13 157.30</b>	<b>19 696</b>	<b>9 197</b>	<b>12 498</b>	<b>23 999</b>	<b>1 8575</b>
Gross income (R/ha)	0	6 481.00	11 425.40	0	60 000	76 666.70	133 500
<b>Gross margin<sup>2</sup> (R/ha)</b>	<b>-13 118.90</b>	<b>-6 676.30</b>	<b>-8 270.60</b>	<b>-9 197</b>	<b>47 502</b>	<b>52 667.70</b>	<b>11 4925</b>

1: Including all vegetables planted in the specific year.

2: Margin above specified cost.

Source: Own questionnaire

Table 7.5 does not give an accurate picture if the costs of Farm C and D are compared since Farm D entered the conversion process a year earlier than Farm C. Table 7.6 displays the real costs and gross margins, taking the increase in prices into account. The variable costs can now be compared directly for the different years of conversion. This illustrates that Farmer C had higher variable costs only in the first year of conversion, which can be attributed to the high use of fertilizer due to very low soil fertility. In the rest of the years under comparison the costs were lower because of lower labour and packing costs.

**Table 7.6:** Real variable costs and gross margins of the vegetable production on Farm C and D at constant 2001 values in R/ha

R/ha	Farm C			Farm D			
	C1	C2	C3	C1	C2	C3	AC
Variable costs	14 500.70	13 256.10	19 696	9 359.10	13 143	25 422.10	18 575
Gross income	0	9 015.50	11 425.40	0	10 3079.30	10 6648.50	133 500
<b>Gross margin</b>	<b>-14 500.70</b>	<b>-4 240.60</b>	<b>-8 270.60</b>	<b>-9 359.10</b>	<b>89 936.30</b>	<b>81 226.40</b>	<b>11 4925</b>

Source: Own questionnaire

In conclusion it can be said that it is difficult to generate a positive gross margin during the conversion period and even afterwards if, as in the case of Farm C, the natural resources,

especially water and soil, present limitations and no premium prices can be achieved. Raising the gross margin can thus be achieved only if these problems can be resolved.

### 7.5.3 Table grape production

In the table grape production both farmers experienced fluctuations in costs during the change from conventional to organic farming. Looking at the total structure of costs and gross margins (including conventional, 'in conversion' and organic production) in Appendix 7 no trend can be discerned towards higher or lower variable costs. The same is the case for gross margins on Farm F. Farm E experienced an upward trend after a drop in the gross margin in the first year of conversion. Table 7.7 specifically shows the development of variable costs and gross margins for conventional, 'in conversion' and organic production on the farms before and after conversion. It shows about 30 percent higher variable costs for the crops in conversion than for the conventional ones over the years in conversion. The organic production in the last year of conversion had already shown slightly lower variable costs, which indicated a downward trend in the costs towards an established organic system. The main reasons included the reduction in fertilizer input for the improvement of soil fertility and also a reduced labour and machinery input. Variable costs of production in conversion in the last conversion year showed an increase compared to the preceding year, which can be explained by the general increase in costs, for the conventional production as well, and the introduction of an additional 42.6 ha in the conversion process.

On Farm F an analysis of the variable costs and gross margins of table grapes under production was not possible, since all crops were non-bearing and required only minimal inputs and generated no yield. An increase in costs in the second year of conversion, however, shows the growing input requirements of the crops as they approached bearing age. In Table 7.8 the real costs at constant 2001 values were calculated. This allows a better comparison between the two farms and shows how much of the increase in variable costs and the gross margin was production related.

An increase in variable costs from the last conventional to the first 'in conversion' year on Farm E is an indication of the increased input of fertilizer, machinery for frequent spraying, and labour, and especially for hand weeding. This is also supported by the increase in costs in the third year of conversion where additional hectares were added to the system in conversion. During the course of the conversion period these costs decreased

with the increasing establishment of the organic system, which resulted in lower costs for the organic system after the conversion period.

Furthermore, due to the access to premium prices on the European market, the income and thus the gross margin of the 'in conversion' production increased over the period. The gross margin in the second year of conversion was about three times higher than at the beginning of the process and increased further under full organic production by nearly 30 percent due to a decrease in costs, although yields decreased. Thus in the case of Farm E the gross margin for the 'in conversion' products was higher than for conventional production, although the conversion period meant higher costs. This assumes that a good marketing system is developed and premium prices can be achieved. The study of the changes on Farm F showed that the parallel production of conventional and 'in conversion' grapes supported the process, especially as grapes were newly planted and generate no income. As soon as the grapes start coming into production and a premium can be achieved, as in the case of Farm F, the gross margins will soon outdo that of conventional production, especially if the natural system is established.

**Figure 7.7:** Variable costs and gross margins for the table grape production on Farms E and F before and during conversion in R/ha (year ending in June)

	Farm E								Farm F				
	Cvtl. <sup>1</sup> (BC)	In conv. <sup>2</sup> (C1)	Cvtl. (C1)	In conv. (C2)	Cvtl. (C2)	Organic (C3)	In conv. (C3)	Cvtl. (C3)	Cvtl. (BC)	In conv. (C1)	Cvtl. (C1)	In conv. (C2)	Cvtl. (C2)
	1998	1999	1999	2000	2000	2001	2001	2001	1999	2000	2000	2001	2001
<b>Variable cost (R/ha)</b>													
Labour	9 852.60	13 240	9 976.90	1 1681.20	8 802.30	12 222.40	15 318.30	11 454.60	20 933.10	7 664.40	18 820.40	8 363.40	15 890.60
Machinery	935.90	1 058.30	797.50	1 224.10	922.40	1 401.20	1 756.20	1 313.20	1 297.50	670.10	1 645.50	606.70	1 152.80
Fertilizer	800.70	651.10	490.60	890	670.60	1 248.60	1 564.80	1 170.20	1 989.70	666.50	1 636.50	921.10	1 750
Calk	221.20	379.70	286.10	0	0	0	0	0	212.20	32.60	80.20	0	0
Pest and disease control	2 654.20	2 5340	3 144.70	1 873.30	2 144.90	2 334.90	2 460	3 014.40	3 134.90	759.90	1 866	1 421.40	2 700.80
Seeds and plants	661	586.50	441.90	1 203.50	906.90	1 125.60	1 410.70	1 054.90	1 074.00	311	763.70	2 105.30	4 000
Packing material	8 320.30	8 083.50	8 191.70	9 065.90	9 187.30	7 849	7 890.60	8 218.40	3 946.60	0	1 4015.20	10 526.30	20 000
<b>Total</b>	<b>23 446</b>	<b>26 533.10</b>	<b>23 329.40</b>	<b>25 938</b>	<b>22 634.40</b>	<b>26 181.70</b>	<b>30 400.60</b>	<b>26 225.70</b>	<b>32 587.90</b>	<b>10 104.50</b>	<b>38 827.50</b>	<b>23 944.20</b>	<b>45 494.20</b>
Gross income (R/ha)	37 528.30	34 073.30	25 675.60	49 479.90	37 285.10	56 593.90	5 4015.10	47 735.10	67 315.10	0	58 731.80	47 541.80	90 329.40
<b>Gross margin (R/ha)</b>	<b>14 082.30</b>	<b>7 540.20</b>	<b>2 346.20</b>	<b>23 541.90</b>	<b>14 650.70</b>	<b>30 412.20</b>	<b>23 614.50</b>	<b>21 509.40</b>	<b>34 727.30</b>	<b>-10 104.50</b>	<b>19 904.30</b>	<b>23 597.50</b>	<b>44 835.30</b>

1: Cvtl.=Conventional, 2: In conv.= In conversion

Source: Own questionnaire

**Figure 7.8:** Real variable costs and gross margins for the table grape production on Farms E and F before and during conversion at constant 2001 values in R/ha

R/ha	Farm E								Farm F				
	Cvtl. <sup>1</sup> (BC)	In conv. <sup>2</sup> (C1)	Cvtl. <sup>3</sup> (C1)	In conv. (C2)	Cvtl. <sup>3</sup> (C2)	Organic (C3)	In conv. (C3)	Cvtl. <sup>3</sup> (C3)	Cvtl. (BC)	In conv. (C1)	Cvtl. <sup>3</sup> (C1)	In conv. (C2)	Cvtl. <sup>3</sup> (C2)
Variable cost	27 819.30	31 044	26 961.40	28 728.90	24 823.20	25 557	32 030.60	23 951.70	39 042.90	11 618.30	43 055	23 944.20	45 494.10
Gross income	41 757.70	32 090	24 181.10	45 713	34 446.60	56 593.90	54 015.10	47 735.10	63 397	0	54 260.50	47 541.80	90 329.40
<b>Gross margin</b>	<b>13 938.40</b>	<b>1 046</b>	<b>-2 780.30</b>	<b>16 984.10</b>	<b>9 623.40</b>	<b>31 036.80</b>	<b>21 984.60</b>	<b>23 783.40</b>	<b>24 354.10</b>	<b>-11 618.30</b>	<b>11 205.50</b>	<b>23 597.50</b>	<b>44 835.30</b>

1: Cvtl.=Conventional,

2: In conv.= In conversion

3: Remaining conventional production in the first, second and third year of conversion.

Source: Own questionnaire

## 7.6 ANALYSIS OF THE NET FARM INCOME

Since the analysis of the gross margin does not provide any indication of the performance of the overall farming business, the net farm income per ha has been calculated and analysed in this section. Included were not only variable costs but also specific fixed cost items such as certification fees, repairs, depreciation and others, including variable costs that could not be allocated to a specific production system.

The farms were compared according to the net farm income of the whole farm including also enterprises which were not discussed in the preceding sections. It was also not possible to distinguish between conventional production systems and systems in conversion. The farm budgets can be viewed in Appendix 8 to 13 and were calculated in Rand per hectare cultivated land.

All the except Farmer B farmers experienced a decrease in fixed costs Farmer B had unusually high repair costs in the first conversion year. This is surprising since any increase was expected to be due to high certification and depreciation costs for new investments. However, the reasons could be found in lower repair costs for vehicles and machinery or the reduction in travel expenses or in specifically high expenses in the last conventional year.

Net farm income rose on Farms A, C and D in the first conversion year, mainly due to an increase in production and access to premium prices. Farms B, E and F's lower net farm income was caused by higher fixed costs (Farm B) and lower production and product prices.

In the process of conversion Farm C experienced fluctuations in net farm income, caused by higher variable and fixed costs and a decrease in area under production in the third year of conversion. These higher costs could not be compensated for by the higher income, which led to a negative net farm income. Farm D, however, was able to increase net farm income throughout the conversion period in spite of an increase in costs. Farm E also experienced fluctuations due to an increase in costs and lower product prices, while Farmer F was able to raise the net farm income in the second year of conversion.

It is difficult to say what influence the conversion to organic farming had on the net farm income in these cases, since this is dependent not only on the performance of the production in conversion but also on the performance of the conventional systems. Furthermore an increase in input prices as well as costs such as repairs can increase the costs related to organic production. An analysis is easier in the cases of Farms C and D

where the production was completely in conversion/organic. The fixed costs were not necessarily higher and a positive farm income was highly dependent on the gross income, as is the case for the gross margins discussed in Section 7.5.2. If, as on Farm C, fixed costs are very high due to the establishment of the new farming operations and is combined with a lack of premium prices, the production in conversion produces a negative farm income. However, since the establishment of this new operation can be accounted for, the high fixed costs for the organic production are not necessarily the reason for the poor performance.

## **7.7 EVALUATION OF SOCIAL IMPLICATIONS AND PROBLEMS OF THE CONVERSION**

### **7.7.1 Reactions of off- and on-farm community**

Besides the planning of farming techniques and economic aspects, farmers were faced with social implications, and several risks and problems were experienced during the conversion period. Important were the reactions of the off-farm community and, even more, the reactions of family and labourers. The success of the conversion period is often strongly dependent on the support of the family and, to a certain extent, of the off-farm community.

All surveyed farmers experienced a very critical off-farm community. Three of the farmers saw their communities as very sceptical in the beginning, but also interested in the changes. Farmer B mentioned specifically that his community started to ask questions and was complimentary. The other farmers had to face a very negative community. Neighbours expressed fears of insect infestation from the organic farms and did not believe in alternative methods to control pests and diseases. Farmer A mentioned that his community was 'not keen' on organic farming. Despite these reservations, no farmer experienced serious difficulties which would have threatened his operation.

The response of families and labourers on the farm differed from outside reactions. Only Farmer C mentioned that his workers did not care whether he was farming organically or not. The reason could be that he worked mainly with seasonal labourers and only a small percentage of the workers were permanently employed on the farm. Farmer F experienced critical workers in the beginning as well as sceptical parents from whom he took over the farm. Through training and education and good results with the new farming methods, he was able to create a positive change in attitude in his on-farm community. On the other farms family and workers were very involved with the new idea of farming organically.

Especially the fact that chemicals were no longer used was welcomed by everybody on the farm, in particular the workers. Education, training and the delegation of responsibilities played a major role on all the farms. Workers on Farm B even started to educate people in their communities about the advantages of organic farming.

### 7.7.2 Problem areas and risks

Problems of a different nature also had a negative impact on the conversion period for the surveyed farmers. While a lack of information and advice, as already discussed in Section 5.6.1, was problematic, as well as high certification costs, other factors were also mentioned by the farmers. A lack of understanding of organic farming made it difficult to get financial support from banks. This also had an influence on the marketing opportunities and the lack of premium prices for organic products, since most consumers were not educated about the advantages of products grown organically. Farmer C described the situation of the organic movement in South Africa as chaotic and pointed out in particular the rivalry that took place between parties involved. Since organic farming is such a young industry in South Africa, many try to make a profit instead of building up an active network to support each other.

High weed infestation and the handling of diseases caused further problems as well as the need to compensate for nutrient deficiencies in the soil. Farmer E also mentioned the low quality and availability of inputs for table grapes and raw materials for the production of compost. Low yields were in particular problematic for Farmer C, caused by the low fertility of his sandy soils and low annual rainfall. Due to the remoteness of his farm, high transport costs were a further crucial factor for his production. Only Farmers A, C and F had problems with the certification body. These were caused mainly by a lack of understanding of the natural conditions and of the organic industry in South Africa. This affected in particular the use of methods to fight pests and diseases that are not problematic in the European or the New Zealand context.

Asked how they perceived the risk of converting to organic farming, the surveyed farmers mentioned mostly the higher risk of crop loss due to the preventive rather than curative methods of pest and disease management. This also included the post-harvest risk. Furthermore financial risk including investments and marketing were seen as crucial. Sufficient research and planning were seen as essential in this context.

The farmers saw the lack of self-sufficiency with regard to compost and straw as a shortcoming in their planning and approach to conversion. Farmer B would have introduced a larger compost plant on his farm if he had been able to finance it. Farmer C would have invested more time in market research and Farmer F would have chosen a longer period of conversion. Only Farmers A, D and E were fully satisfied with the progress of their conversion process.

### **7.7.3 Suggestions for the improvement of the situation for converting farmers in the South African context**

In Section 5.6.1 it was ascertained that the lack of local legislation and a local certification body was seen as problematic for the organic farming industry in South Africa. The surveyed farmers, however, had certain reservations about the impact of South African legislation and a certification body on the country's industry. With regard to the legislation, it was believed that it would create more trust in organics only if the word 'organic' could be protected by clear definition. The fact that the current draft for national legislation is predominantly based on EU standards was perceived as problematic for organic production, especially with respect to climatic conditions and the control of pests and diseases. Only legislation based on South African conditions combined with recognition of the EU, USA and/or Japanese standards would standardise production, make certification more consistent and allow national and international marketing.

The farmers varied in their attitude to the introduction of a South African certification body such as Afrisco. Farmers C, D and E expected that such a certification body would have a positive influence, especially on the marketing and the decrease of certification costs. With promotion and education, a national organisation could increase the trust in organic products and increase consumers' knowledge of this industry. Farmer E also saw an advantage in the availability of certification for small-scale farmers.

The other farmers interviewed had a critical attitude with regard to a national certification body. They gave as reasons for this attitude doubts about integrity and recognition, in particular in the export market. Farmer B would have preferred to retain certification from an outside body which is well known and well established in the market. These were important factors, in particular if export of products was planned. Farmer F furthermore expected no decrease in certification costs from such a development since the

infrastructure in South Africa's organic industry is still too small and additional costs such as membership fees of IFOAM would be distributed over only a few producers.

Besides the introduction of national legislation, the farmers called for the involvement of the government and its institutions especially in the fields of subsidies, research and education. Financial support in particular during the conversion period and the provision of information concerning organic farming under South African conditions were seen as essential. Especially research should receive attention since no knowledge existed of the performance of organic farming in South Africa and literature is based on the European and American context where the climatic conditions as well as the marketing opportunities and the education of the consumers differs vastly. Furthermore they expected that the promotion of organic farming and the education of consumers concerning nutrition and health would increase the demand and reduce the problems related to the marketing of organic products.

## **7.8 SUMMARY**

This chapter compared the key economic issues of the six surveyed farms in each of the three production groups with each other. Aspects included were investments, labour and machinery input and costs and income. All of these factors were based on the area under production since only specific enterprises per farm were analysed.

Because of the small number of farmers, their different starting points, time under conversion and their dissimilar locations within the Western Cape, the representativeness of the results was very limited. All but one farmer made relatively big investments at the beginning of the conversion period which could be mainly related to the change. These were necessary to support the system technically or to create new marketing options.

Changes in labour and machinery input were experienced differently on all farms. The numbers of labourers was not increased as had been expected from the findings of the literature but were kept the same or decreased due to financial limitations. The labour input per ha under production decreased on both of the pome fruit farms from the last conventional to the first 'in conversion' year. However, the labour input was higher on the production in conversion than the conventional production due to an increase in labour intensive tasks such as hand weeding and spraying. The machinery input increased overall and showed the same patterns as labour in the first year, for similar reasons.

The vegetable farms were both completely in conversion and, although one of the farms had a drop in labour input in the first year of conversion, they experienced an increase towards the end of the conversion. Thus no general statement could be made about the development of the labour input, although the tendency is towards a higher labour input. The case for the machinery input reveals a similar pattern. However, it was found that an increase occurred with higher diversification, while an extension of area caused greater effectiveness and thus a decrease in inputs.

Labour and machinery input on the two table grape farms followed the same patterns, with an increase on the one farm during the first year, followed by a downward and then an upward trend caused by the introduction of more area into the conversion process. The input on the area in conversion was around 30 percent higher than on the conventional areas and decreased in the first year of fully organic certification to only around 7 percent higher inputs. This supports the findings of the literature, which described an increase of labour and machinery input during the conversion with a downward trend towards an established organic system. The decrease in labour and machinery on Farm F was caused by the planting of new grapes at the beginning of the conversion period and thus gave no clear picture.

An increase in variable costs was experienced on all farms in the first year of conversion, caused mainly by higher labour and machinery costs. A decrease towards the established organic system took place on all but one farm, which was suffering from difficult environmental conditions. Only Farm B had lower variable costs for the production systems in conversion than for the conventional ones. The development of the gross margin and the net farm income was highly dependent on access to premium prices and was higher than the conventional in the cases where these higher prices were achieved. If that was not the case, as for Farm C, it was difficult to obtain a positive net farm income. Fixed costs were increased by the certification fees and the depreciation of new investments. However, these higher cost were balanced out by the reduction of other costs such as repairs. Thus no impact of conversion period on the net farm income could be observed.

The surveyed farmers experienced numerous problems during their conversion period, which supported several of the findings of Chapter 5. Worthy of mention here are especially the limited possibilities for reacting to ad hoc problems such as high disease or insect infestation, which can result in crop losses, due to the preventive nature of the

organic system. Further frequently mentioned problems were the rivalry between parties involved in organic farming such as organic farming consultants and organisations and the lack of support and knowledge. Not much improvement was expected from South African legislation and certification, especially if not combined with intensive consumer education.

Thus in conclusion it can be said that the conversion to organic farming is a financially difficult time where costs are generally higher than under conventional production. It is not a solution for a farming operation which is not well functioning, but rather exacerbates problem areas. A smooth change from a conventional to an organic system is mostly dependent on whether premium prices can be obtained for organic produce.

# **CHAPTER EIGHT**

## **CONCLUSIONS AND RECOMMENDATIONS**

## 8.1 INTRODUCTION

Organic farming worldwide is growing at a rapid rate, estimated by the International Federation of Organic Agriculture Movement (IFOAM) to be between 20 and 30 percent annually. South Africa is also following this trend, and has experienced an increase in the number of organic farmers and the variety of organic products available over recent years. However, organic farming is still a fairly new sector in this country with relatively little experience, especially with regard to problems in successfully completing the conversion process, which is a problematic period for the farmer.

It is for these reasons that this study's intention has been to analyse features of organic farmers in South Africa and problems associated with the conversion from conventional to organic farming. To meet the request for multi-disciplinary research, technical, economic, institutional and social factors influencing the conversion process have been examined, with a special focus on the Western Cape. This chapter gives a review of the methodology used in this study, as well as the main conclusions drawn from the survey and the case studies. A review of the literature findings is not given again since they were used in the analyses of the collected data. Based on these conclusions, recommendations for the support of the conversion to organic farming in South Africa as well as suggestions for further research are given.

## 8.2 METHODOLOGY

A multi-disciplinary approach was used in both parts of this study, which was appropriate given the range of problems identified as important. For the first part of the empirical study the survey method was applied, which gave a broad overview of the organic farming industry and the problems of the conversion process in South Africa. The data was collected by means of postal questionnaires. 29 out of 93 questionnaires were returned completed, and included in the study. They included questions about the decision process that led to the start of the conversion process, the farming situation before and after/during conversion as well as socio-demographic questions. A special focus was placed on the problems experienced during the conversion process as well as on the most important changes that took place during this time.

In the second part of the empirical study the case study approach was used to collect more specific and detailed information on the conversion process. Three production systems were chosen, namely pome fruit, vegetables and table grapes, all located in the Western

Cape. Two farmers were interviewed for each production system. The data were collected by means of farm visits, where a detailed questionnaire was completed and a guided interview took place. The focus was placed on technical, economic and social aspects and problem areas and included the last conventional as well as all the years in conversion and the first fully organic year on one farm.

Several problems occurred which set limitations to the methods used and the representativeness of the findings. In the first part of the empirical study the small number of farmers who responded to the questionnaire presented the main problem. Further problems were related to the open-ended questions, which were often completed by the farmers without sufficient detail or not at all.

The case study approach was limited by a number of different factors, which influenced the results substantially. Because of the low number of responses to the survey questionnaire from the Western Cape it was not possible to choose farmers who met all the research requirements. Only in the case of table grapes was it possible to select farmers in the same region and thus with similar non-system determined factor endowments. Furthermore was it not possible to choose farmers with the same starting year and the same length of time under conversion. Therefore the results must be seen as examples of the performance of farms during the conversion process and not necessarily as typical for the Western Cape and the industry.

## **8.3 MAIN CONCLUSIONS**

### **8.3.1 Survey results**

The analysis of the survey resulted in a number of findings. It confirmed several of the literature findings such as a younger age and higher education for organic farmers compared to their conventional counterparts. Until 2002 most of the farms converted were horticultural holdings with table and wine grapes, vegetables, citrus, deciduous and exotic fruit. Because of a lack of knowledge about organic farming practices and their economic feasibility, most of the farmers converted either in steps or only parts of their farms.

Differences from the literature were found regarding the motivation for the shift to organic agriculture. It was found that South African farmers are not so strongly motivated by financial factors but rather by a concern about environment and soil fertility. A minor role in supporting this decision process was played by national magazines and journals as well

as by universities and research institutions, which showed the low national involvement in organic agriculture at this stage in South Africa. Books about organic farming and own education played the biggest role.

Several changes, such as the employment of more labour, took place on most of the farms. An increase in the number of labourers during the conversion process was statistically significant, especially for the Western Cape. The small changes in marketing patterns were evidence of an underdeveloped national market for 'in conversion' and organic products and also of the difficulties of exporting products, especially to the European market.

The main problems during the conversion process for the farmers included the absence of national legislation and a certification body as well as a lack of advice and information. Further obstacles were higher weed infestation and financial burdens such as high costs for certification, investments and inputs. No differences were found in comparing different levels of farming intensity before conversion, with the exception of higher disease infestation.

It was discovered that there is a strong need for more national involvement in organic farming. This included the introduction of suitable national legislation, information supply, research, government support and better marketing opportunities.

### **8.3.2 Case study results**

The analysis of the planning process before conversion on the six interviewed farms showed only a limited amount of planning by all the farmers. Only time planning and a decision on the type of conversion were done beforehand. Two of the farmers also designed a technical and an economic plan before the beginning of the conversion process. This revealed a lack of planning effort caused not only by managerial shortcomings but also mainly by a lack of support during the planning process. National and international organisations played only a small role in support of the farmers during the conversion process, which is borne out by these findings.

The conversion process caused several changes on all farms with regard to the technical farming aspects such as fertilization, pest and disease control and the use of seed. During the first year of conversion this included a shift away from chemical fertilization towards the use of compost and green manure, as well as the use of higher amounts of these in order to improve the organic matter and fertility of the soil. As a more established organic

system was achieved, these higher inputs were reduced. Chemical inputs were also substituted in pest and disease management by the use of EM, natural oils, compost teas and natural methods such as the use of predators and mating disruption. Weeds played an important role in this context since the acceptance of a higher number of weeds in the orchards was especially useful, not only for the prevention of erosion and evaporation, but also to host beneficial insects. Labour intensive hand weeding controlled harmful weeds, especially in vegetables. Higher weed, insect and disease infestation occurred on all the farms but did not have any major influence on yields.

Most problems with low yields were encountered on soils with low organic matter and fertility, which showed the importance of the improvement of these factors during the conversion period. Otherwise the farmers experienced no or only slight decreases in yields, in contrast with what was expected from the findings of the literature. However, due to the preventive rather than reactive nature of pest and disease control in organic farming, the risk of an increased and problematic infestation is high if the climatic conditions are favourable.

In the economic aspect of the conversion process it was found that, in correspondence with the literature findings, high investments were done at the beginning of the conversion period. These investments were mostly related to the conversion process and necessary for the support of the new system or for the diversification of marketing channels.

No general statement can be made with regard to the development of the labour input. It was found that pome fruit and table grapes in conversion had a higher labour and machinery input than their conventional counterparts. This was caused by labour intensive tasks such as hand weeding and more frequent spraying. A decrease was experienced after the conversion was completed due to less spraying and weeding being required as a result of the establishment of a balanced organic system. On the vegetable farm no trend was discovered. However, it was found that labour and machinery input increased with an increase in diversification and decreased with an increase of area under production.

An increase in variable costs was generally incurred, with the exception of one farm. This increase was caused mainly by the higher input in labour and machinery. Towards the end of the conversion period the variable costs decreased due to factors similar to those found in the case of labour and machinery input. The change in the gross margin was highly dependent on access to premium prices. All but one farm achieved these higher prices during the conversion period already and were thus able to compensate for the higher

variable costs. However, the gross margin of the 'in conversion' operations increased only compared to those of the conventional production, where the variable costs were lower. Towards the end of the conversion period this development was revealed and as is to be expected in a fully organic system. the fixed costs were increased by the certification fees and the depreciation of new investments. However, these higher cost were balanced out by the reduction of other costs such as repairs. Thus no impact of the conversion period on the net farm income could be observed.

Problems occurring during the conversion period and revealed in the analysis of the surveys were supported by the findings of the case study analysis. The limited possibilities of reacting to the outbreak of pests and diseases uncovered a problem area of organic farming as such but also showed the lack of knowledge about conversion to organic farming under South African conditions. The introduction of national legislation and certification body were seen as critical due to the lack of recognition of the South African conditions and export possibilities. The findings of the case study support those of the survey. Both revealed a need for government involvement in the form of, for example, subsidies as well as an increase in research under South African conditions and the publication of information. Education of consumers was seen as an essential tool in improving marketing possibilities.

#### **8.4 RECOMMENDATIONS FOR THE SOUTH AFRICAN CONTEXT**

Several recommendations arise from a multi-disciplinary study such as this. Since other studies (*e.g.* Mahlanza, 2001) have already covered certain aspects, the recommendations given here are only those drawn directly from the findings of this research. Some of these recommendations are not specifically related to the conversion period but are aimed at supporting the organic industry in South Africa as a whole. As the development of organic farming will be most successful if approached on the basis of joint efforts by farmers, consumers, traders, politicians and scientists, the following individual recommendations have to be seen in the context of the whole.

#### 8.4.1 Legislation, certification and support

Although the absence of national legislation was the highest-rated problem during the conversion process, it was found that this is not entirely the case anymore. National legislation is on the way, with the second draft regulation under the Agricultural Product Standards Act of 1974 already published during 2001. This critique, however, should rather be channelled towards the applicability of the legislation to South African standards, since farmers have perceived a problem in this regard. It seems that suitable national legislation would have to combine a recognition of the requirements of EU, USA and/or Japanese standards in order to allow export to these countries, with a true recognition of specific South African circumstances.

Additional regulations developed by certification bodies in South Africa (as done also by certification bodies in the EU like Demeter, *etc.*) should then be based on these standards, maintaining the same standards or higher. Although it was found that farmers prefer to rely on certification bodies which are well established and well known in the export market, the development of a national certification body such as Afrisco is still seen as necessary. Especially for small-scale farmers and farmers producing for the local market, the introduction of such an organisation would lower certification costs and ease the conversion period due to the suitability of the standards for the South African context. However, with regard to exports, the standards of this organisation would have to be accepted by the target countries. It is expected that the introduction of common legislation and national certification bodies will lead to a growth in the organic sector and a broadening of public recognition and acceptance. This would be achieved especially by a focus on consumer education and the development of a common logo, which could be recognized by the producers and would create trust.

A critical topic is the financial support of organic farming, especially during the conversion period. Since it was found that the conversion period for most farmers is a time of financial constraint and risks, support during this time is seen as necessary. This could include the introduction of support for investments, *e.g.* in the form of soft loans or a subsidy of certification costs during the conversion period. These supports could be embedded in national programmes, which focus on the promotion of an increase in sustainability of agricultural production. The probability of the implementation of such support programmes in South Africa is problematic. In the EU context, and also in USA context, financial means are available to introduce such programmes, as is the case in these

countries. In South Africa, due to the political situation, it is doubtful that the state has the financial capacity and the will to implement such programs at this stage. The focus of the South African agricultural policy is rather on urgent aspects such as land reform. Due to the complexity of this problem, the probability of the introduction of support programs for organic farming systems in the future has to be investigated in a separate study.

#### **8.4.2 Promotion and marketing**

Organic farming is strongly influenced by the developments of a particular society since it is set on a broad social base (Michelsen, 2001b:7). Thus the education of consumers towards a healthier diet as well as environmental awareness is an essential tool. At the same time organic farming could be promoted as a means to meet these changing perceptions. Government should play a major role in this together with organic farming organisations and certification bodies. An introduction to the principles of organic farming and the influences of organic production and products on the environment and health could be included. Long-term issues as well as short-term effects should be stressed to explain the higher prices of organic products. The introduction of a common logo, which is easily recognizable, as discussed in the previous section, could support this process. This is also important to guarantee access to premium prices during the transition phase already, which is of utmost importance.

Furthermore supermarkets play a major role, depending on their presentation of organic products in the shop. A wide variety as well as the introduction of a shop-in-shop system would attract consumers.

#### **8.4.3 Advice, extension and information**

Organic extension work could and should provide farmers with information about organic farming and the planning process that precedes the conversion period. Extension services provided by governmental and private organisations should support the farmer during the process of decision-making as well as during the conversion period itself.

The three organic producer organisations in South Africa, COPA, OAASA and BDOCA, play only a limited role at this stage due to financial constraints and a lack of information. To improve the status of these organisations, intensive networking between people involved in the organic farming movement is essential to exchange knowledge and

experience. Services could include the publication of magazines (as is the case already), production guidelines, advisory services and farm days.

The conventional agricultural extension services should also play a role since they are available to all farmers, have a good infrastructure and are trusted by the farmers. Furthermore private consultants and research institutions such as the ARC should provide services to farmers in conversion and also after the conversion process. Interaction between organic and conventional extension services should be promoted on the level of creative conflict, with both competition and mutual respect under a joint perception of some but not all common interests (Michelsen *et al*, 2001:12) to allow creative solutions and the promotion of the development of organic agriculture. Ideally these extension services should receive funding through public and private sources.

Furthermore, intensive networking on all levels is important to develop suitable marketing channels and make them accessible to all organic producers since premium prices are essential in contributing to the success of the conversion period and, later, the organic system.

#### **8.4.3 Training and education**

Training opportunities provided to the farmers and formal education at colleges, technikons and universities play important roles as well. These include short courses such as recently offered by the Spier Institute, OAASA and other organisations, additional technical qualifications for farmers and modules at colleges, technikons and universities. Even at a high school level, optional courses in organic agriculture could be offered to introduce students to the various options.

Organic seminars and courses are necessary not only for the accumulation and sharing of knowledge but also for the promotion of networking between parties involved in the movement. The introduction of courses at colleges, technikons and universities is seen as crucial. The generation that will have a major impact on the growth of the organic farming industry in South Africa will be educated there.

#### 8.4.4 Research

Until this stage farmers have been the driving force in the development of organic farming in South Africa. However, due to problems occurring during the conversion period, several barriers are created against further development. Thus the involvement of public and private research institutions is vital to provide answers to these problems within the South African context and to develop a system of active research and spreading of information.

Since no organisations exist in South Africa to specialise in research in the field of organic farming, the mainstream public and private sectors should get involved in this process. Research should cover all aspects of organic agriculture as little has been done to date.

This study has discovered the need for research in several fields, including technical, economical and social aspects. One of the main aspects requiring attention is the researching of methods to control weeds, pests and diseases particular to the South African environment. This includes the development of new products, *e.g.* for the treatment of mealy bug or apple scab. Since high weed infestation causes major problems during the conversion, special attention should be paid to the researching of methods to deal with this high infestation. This could interact with the research on suitable crop rotations and cover crops since they are essential tools in pest and disease management.

Economic research is a further central field that needs attention. Since this study has given only an introduction to the impact of the conversion to organic farming on the financial performance of farmers in the Western Cape, more in depth work is required, also in other parts of the country. This could include a detailed economic analysis of the whole conversion process on a larger number of farmers with the same factor endowment, compared to conventional farmers with similar conditions. Furthermore it could be examined whether a slower movement away from conventional towards more sustainable but not yet fully organic systems would not be a better way to go under the current conditions in South Africa.

In addition, consumer perceptions and marketing possibilities should be researched. Since the access to premium prices is still a problem for organic farmers, especially during the conversion period, market potentials have to be determined. This would include the evaluation of consumer groups which would buy organic produce and the analysis of different marketing channels. Furthermore this would include the development of strategies to increase consumer awareness, trust and thus demand.

Research on the public costs and benefits of organic farming is required to determine appropriate public policies for the support of organic farming systems, especially during the conversion period. The contribution of organic farming to the development of sustainable and environmentally friendly agricultural systems should be evaluated as well as the impacts of a widespread conversion to organic farming on public costs and benefits. For further discussion on this aspect of organic farming see also Mahlanza (2001).

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# **APPENDICES**



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**UNIVERSITEIT VAN STELLENBOSCH  
UNIVERSITY OF STELLENBOSCH**

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August 2001

Dear Mr.,

Organic farming in South Africa is still in its infancy. Little information is available on the condition in South Africa and research is necessary in this field. Enclosed you find a questionnaire asking information about your past and current farming situation. This questionnaire is part of a study undertaken in the Department of Agricultural Economics at the University of Stellenbosch. The study deals with the conversion process to organic farming and aims to identify problems concerning this process to make organic farming in South Africa more attractive.

Since we assume that you are farming organically or you are in conversion to organic farming it would be of great help if you could share your experiences by filling in this questionnaire. It won't take much time and would support the attempt to create a better environment for organic farming in South Africa.

Please email or fax the completed questionnaire to me if possible not later than the beginning of September. In case you have any questions please do not hesitate to contact me. If you provide an email address or a fax number I will send you a summary of the study as soon as it is finished. Thank you very much for your assistance and effort.

Yours sincerely

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Departement Landbou-ekonomie

Fakulteit Landbouwetenskappe

Universiteit van Stellenbosch

Department Agricultural Economics

Faculty of Agricultural Sciences

University of Stellenbosch

## Conversion to Organic Farming - Questionnaire

**Please answer the following questions:**

1. In which year did you first **consider** organic farming as an alternative? 19 \_\_\_\_\_

2. How important was each of the following factors as a motivation to convert to organic farming?

Not considered (1), Not important (2), Moderately important (3), Very important (4)

- a. Protecting the environment
- b. Improvement of soil fertility
- c. Improvement of lifestyle
- d. Improvement of livestock health
- e. Low profitability of conventional enterprise(s)
- f. Higher prices for organic products
- g. New challenge
- h. Philosophical reasons
- i. Reduction of dependency on inputs from the outside industry
- j. Reduction of input costs
- k. Others (please specify)

	1	2	3	4

3. How important was each of the following sources of information about organic farming for you?

Not used (1), Not important (2), Moderately important (3), Very important (4)

- a. National magazines/journals
- b. International magazines/journals
- c. Books about organic farming
- d. Internet
- e. Seminars/conferences about organic farming
- f. Contact with national/regional organic farming associations
- g. Contact with international organic farming associations
- h. Talks with organic farmers
- i. Universities and research institutions
- j. Own education
- k. Others (please specify)

	1	2	3	4

4.1 In which year did you start converting your farm to organic farming? 19 \_\_\_\_\_

4.2 If you are farming already fully organically, in which year did you complete conversion? 19 \_\_\_\_\_

5. What area of your farm did you convert to organic farming? \_\_\_\_\_ ha out of \_\_\_\_\_ ha (total)

6. What area do you still plan to convert? \_\_\_\_\_ ha

7. If you did/do not convert the whole farm, what are the reasons for that?

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8. Did you convert your farm in a single step or in stages? \_\_\_\_\_

9.1 Is your farm certified?

- Yes (please carry on with question 9.2)  
 No (please carry on with question 9.3)

9.2 By which certification organisation is your farm certified? \_\_\_\_\_

9.3 Why is your farm not certified? \_\_\_\_\_

10. Please answer the following questions according to the situation of your farm **before** conversion.

#### 10.1 Area

Total land area in ha	Cultivated land in ha								Permanent pastures (veld) in ha	Farm yard and waste land in ha
	Irrigated				Dryland					
	Crops	Planted pastures	Fallow	Others	Crops	Planted pastures	Fallow	Others		

#### 10.2 Enterprises

Livestock (please specify, with numbers)	Crops (please specify, with ha)	Others

#### 10.3 Intensity level of crop farming practice

- Rather extensive (low input of chemical fertilizers, minimum tillage, etc.)  
 Rather intensive (high input of chemical fertilizers, intensive tillage, etc.)

Comment: \_\_\_\_\_

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#### 10.4 Marketing

How did you market your products?

- National (please specify the product(s)) \_\_\_\_\_  
 International (please specify the product(s)) \_\_\_\_\_

Comment: \_\_\_\_\_

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**15.4 Enterprises**

	<b>Livestock</b> (please specify, with numbers)	<b>Crops</b> (please specify, with ha)	<b>Others</b>
<b>Organic</b>			
<b>In conversion</b>			
<b>Conventional</b>			

**15.5 Marketing**

How do you market your products?

- National as organic products (please specify the product(s)) \_\_\_\_\_  
 International as organic products (please specify the product(s)) \_\_\_\_\_  
 National as conventional products (please specify the product(s)) \_\_\_\_\_  
 International as conventional products (please specify the product(s)) \_\_\_\_\_

Comment: \_\_\_\_\_  
 \_\_\_\_\_

**15.6** In which magisterial district is your farm located? \_\_\_\_\_

**15.7** What is the organisational form of your farm?

- Private ownership  
 Closed corporation  
 Company  
 Trust  
 Other (please specify) \_\_\_\_\_

**15.8** How many regular labourers are presently working on your farm? \_\_\_\_\_

**15.9** Are you or your spouse working off-farm?

You:

- No  
 Yes, part time  
 Yes, full time

Spouse:

- No  
 Yes, part time  
 Yes, full time

16. Are you satisfied with your present organic farming results? (please explain shortly)

Yields: \_\_\_\_\_

Livestock performance: \_\_\_\_\_

Financial output (profit): \_\_\_\_\_

Others: \_\_\_\_\_

17. Would you be available for further, more detailed information?

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

Following contact details are optional to fill in:

Surname	
Name	
Address	
E-mail	
Telephone + Fax	
Cellphone	

My contact details can be used for further research:

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

**NB: If you send the completed questionnaire as e-mail, please make sure that you first save it as file on your hard drive or disk and then attach it to your message.**

***Thank you very much for your help and your effort to fill in this questionnaire!***

**Conversion to Organic Farming – Detailed Questionnaire**

**The information provided by you in this questionnaire will be treated as confidential and will under no circumstances be made available to a third person.**

Record number:

Surname	
Name	
Farm name	
Address	
E-mail	
Telephone + Fax	
Cellphone	



3.2 Have you had any soil tests done recently?

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

3.3 What are the main nutrient levels (N, P, K) of your soil?

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3.4 In what condition was your soil before conversion regarding nutrient levels (specify), fertility and drainage?

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#### 4. Temperature and rainfall

4.1 Please give following information about the temperature on your farm

Minimum temperature	Maximum temperature	Average winter temperature	Average summer temperature	Frost (yes/no)

4.2 Average rainfall per year: \_\_\_\_\_ mm

4.3 Did you experience extreme (abnormal) condition regarding temperature and rainfall during the last 5 year on your farm?

Year	Temperature in °C	Rainfall in mm

**5. Contour**

5.1 What is the contour of most of your farm?

	Ha
Flat	
Rolling	
Steep	

**6. Irrigation**

6.1 Which water sources do you use for irrigation?

Water source	Quantity in m <sup>3</sup>	Quality	Availability

6.2 Which irrigation systems do you use?

Irrigation system	Ha	Enterprise

**7. Special physical characteristics**

7.1 Are there any notable physical characteristics (wind, erosion, temperature, rocks, etc.) on your farm that affects your production?

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**B. General aspects of farming**

1. In which year did you start farming on your farm? 19\_\_\_\_\_

2. How many years of farming experience do you have? \_\_\_\_\_ years

3. Was the farm managed by family or by others before you started farming?

- Father/mother
- Uncle/aunt
- Other (please specify) \_\_\_\_\_

**C. General aspects of the conversion to organic farming**

**1. Certification body**

1.1 By which certification organisation is your farm certified? \_\_\_\_\_

1.2 What were the reasons for choosing this specific certification body?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**2. Organic farming organisation**

2.1 Are you a member of a national or/and an international organic farming organisation?

National organisation	International organisation	Member since (year)

2.2 What kind of support do you get from these organisations?

- a. Advice on production
- b. Advice on conversion
- c. Up-to-date information
- d. Training and seminars
- e. Marketing
- f. Contacts with other farmers
- g. Others (please specify)

National                      International

National	International

2.3 What are the shortcomings of these organisations and where would you expect more support?

National

organisation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

International

organisation: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**3. Conversion planning**

3.1 Did you develop a multi-year plan before you started with conversion?

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

3.2 Which points were included in this plan?

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3.2 Did you get help with designing the plan (advisor, certification body, etc.)?

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**D. Livestock**

1. Which livestock enterprises did you have on your farm **before** conversion (please specify with numbers)?

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2. Which livestock enterprises do you have on your farm at present?

	<b>Livestock</b> (please specify, with numbers)
<b>Organic</b>	
<b>In conversion</b>	
<b>Conventional</b>	

3. What are the reasons for the changes in your livestock enterprises?

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**E. Crop production****1. Area before and after conversion****1.1 Please specify the area before conversion**

	Area in ha
<b>Irrigated</b> (specify crops)	
<b>Dryland</b> (specify crops)	
<b>Veld</b>	
<b>Farm yard and waste land</b>	

**1.2 Please specify the area in conversion**

	Area in ha
<b>Irrigated</b> (specify crops)	
<b>Dryland</b> (specify crops)	
<b>Veld</b>	
<b>Farm yard and waste land</b>	

1.3 Please specify the area **fully organic**

	Area in ha
<b>Irrigated (specify crops)</b>	
<b>Dryland (specify crops)</b>	
<b>Veld</b>	
<b>Farm yard and waste land</b>	

## 1.4 What were the reasons for the changes in your crop enterprises?

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2. Crop rotation2.1 How was your crop rotation designed **before conversion?**

Irrigated	Dryland

2.2 How is/was your crop rotation designed **during conversion?**

Irrigated	Dryland

**2.3 How is your crop rotation designed for the fully organic enterprises?**

Irrigated	Dryland

**2.4 What changes in your crop rotation do you plan with respect to your final rotation, if you are still in conversion?**

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**3. Catch crops and undersowing****3.1 What kind of catch crops do you use in your rotation?**

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**3.2 For what purpose do you use them?**

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**3.3 What kind of undersowing do you use?**

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**3.4 For what purpose do you use it?**

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**5. Intensity before conversion**

5.1 How was the intensity of your production techniques with regard to following aspects?

(1) = high intensity, (2) = low intensity, (3) = no use

Factor	Intensity level
Mineral fertilizer	
Herbicide use	
Fungicide and insecticide use	
Tillage	

**6. Cultivation techniques, seed input, fertilizer use, insect, weed and disease management before and during conversion**

6.1 Please give information on the following categories before and during conversion and specify the amount of input (kg, l, m<sup>3</sup>, etc.) and the repetition of treatments for every crop

Category	Before conversion	During conversion			After conversion
		first year	second year	third year	
Cultivation techniques and soil preparation for long term crops					
Seed and plant input					
Fertilizer use					
Weed management					
Insect and disease management					

6.2 Why did you change your cultivation techniques?

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6.3 What practises do/did you use to improve your soil fertility during conversion and how do you overcome the problem of the lack of certain nutrients?

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6.4 Do/did you experience a higher weed infestation during conversion?

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

6.5 If yes, which were the main weeds you had problems with?

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6.6 Do/did you experience a higher disease infestation during conversion?

<input type="checkbox"/>	Yes
<input type="checkbox"/>	No

6.7 If yes, which were the main diseases you had problems with?

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6.8 Did you experience a higher insect infestation during conversion?

Yes  
 No

6.9 If yes, which were the main insects you had problems with?

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7. Yields

7.1 How did the yields of your fully bearing long-term crops change?

Crop	before conversion (last year) tons per ha	during conversion tons per ha			after conversion (first year) tons per ha
		first year	second year	third year	

7.2 Were the non-bearing period and the period until the trees were fully bearing longer during conversion than before conversion?

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## 1.2 What is/was your labour input before, during and after conversion?

	Before conversion	During conversion	After conversion
Hours per ha specified for every crop			

## 1.3 If you employed more labourers during conversion, for which purpose do/did you use this additional labour?

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2. Machinery

## 2.1 What is/was your machinery input before, during and after conversion?

	Before conversion	During conversion	After conversion
Total hours			
Average hours per ha			
Hours per ha specified for every crop			

## 2.2 What are the reasons for changes?

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3. Investments

3.1 Please give the following information about investments you made since the beginning of the conversion period

	Name of investment	Value	Specific for conversion (yes/no)	Financed through (own, loan, etc.)
Fixed improvements				
Machinery and vehicles				
Other				

3.2 Which investments are still planned during the conversion period and what will the costs be for these investments?

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3.3 Did you sell any machinery, vehicles, fixed improvements, land etc., which were not used during conversion? Which are these and what was their value?

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## 3.4 Please complete this inventory list (presently)

	Size	Number	Age in years	Lifespan in years	Replacement value new in Rand
<b>Fixed improvements</b>					
Main house					
Worker houses					
Sheds					
Packing sheds					
Stables					
Dams					
<b>Machinery and vehicles</b>					
Motor cars					
Bakkies					
Trucks					
Tractors					
<b>Implements</b>					
Livestock	--		--	--	
<b>Total</b>	--	--	--	--	

**4. Costs**

4.1 Please give information on the following variable costs before, during and after conversion for each crop

Crop: \_\_\_\_\_

	Before conversion (last year) in R/ha 19	During conversion in R/ha			After conversion in R/ha 19
		first year 19	second year 19	third year 19	
Seeds and plants					
Fertilizer					
Sprays					
Packing material					
Crop insurance					
Seasonal labour					
Casual labour					
Water					
Hired transport					
Marketing costs					
Others (please specify)					
<b>Total</b>					

## 4.2 Please give information on the following other costs before, during and after conversion

	Before conversion (last year) in R/ha 19	During conversion in R/ha			After conversion (first year) in R/ha 19
		first year 19	second year 19	third year 19	
Electricity					
Fuel, oil and lubricants					
Repairs and maintenance, vehicles and machinery					
Insurance (vehicles and machinery)					
Depreciation (vehicles and machinery)					
Depreciation (fixed improvements)					
Regular labour (including non-cash payments)					
Insurance (fixed improvements)					
Repairs and maintenance (fixed improvements)					
Certification fees					

Consultation					
Membership fees					
Security					
Telephone, cell phone and post					
Land rent					
District council fees					
Others (please specify)					
<b>Total</b>					



**G. Other Aspects**

**1. Social**

1.1 How did your off-farm community react on your conversion to organic farming?

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1.2 How did your on-farm community (family, labourers) react on your conversion to organic farming?

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**2. South African situation**

2.1 What would the introduction of a South African legislation for organic farming change in respect to the following aspects:

Production:

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Marketing:

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Certification:

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2.2 What would the introduction of a South African certification body change in respect to the following aspects:

Production:

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Marketing:

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Certification costs:

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2.3 In what way would you like the government and its institutions to get involved in organic farming?

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**3. Problems and risks**

3.1 What are/were the specific problems you have/had to deal with during the conversion process?

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3.2 Did you experience specific problems with your certification body concerning the fulfilment of the regulations under South African conditions?

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3.3 How do you see the risk of converting to organic farming?

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3.4 What would you do differently if you start now with the conversion to organic farming?

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3.5 How do you think do the conditions for conversion to organic farming in South Africa differ from the conditions in countries like Germany?

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4. Are you formally or informally involved in the promotion of organic farming in South Africa (please explain shortly)?

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5. Farm

5.1 What are the reasons for the changes in your enterprise mix during conversion?

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5.2 Is the ideal organic farm system according to your opinion bigger or smaller as your current farm size?

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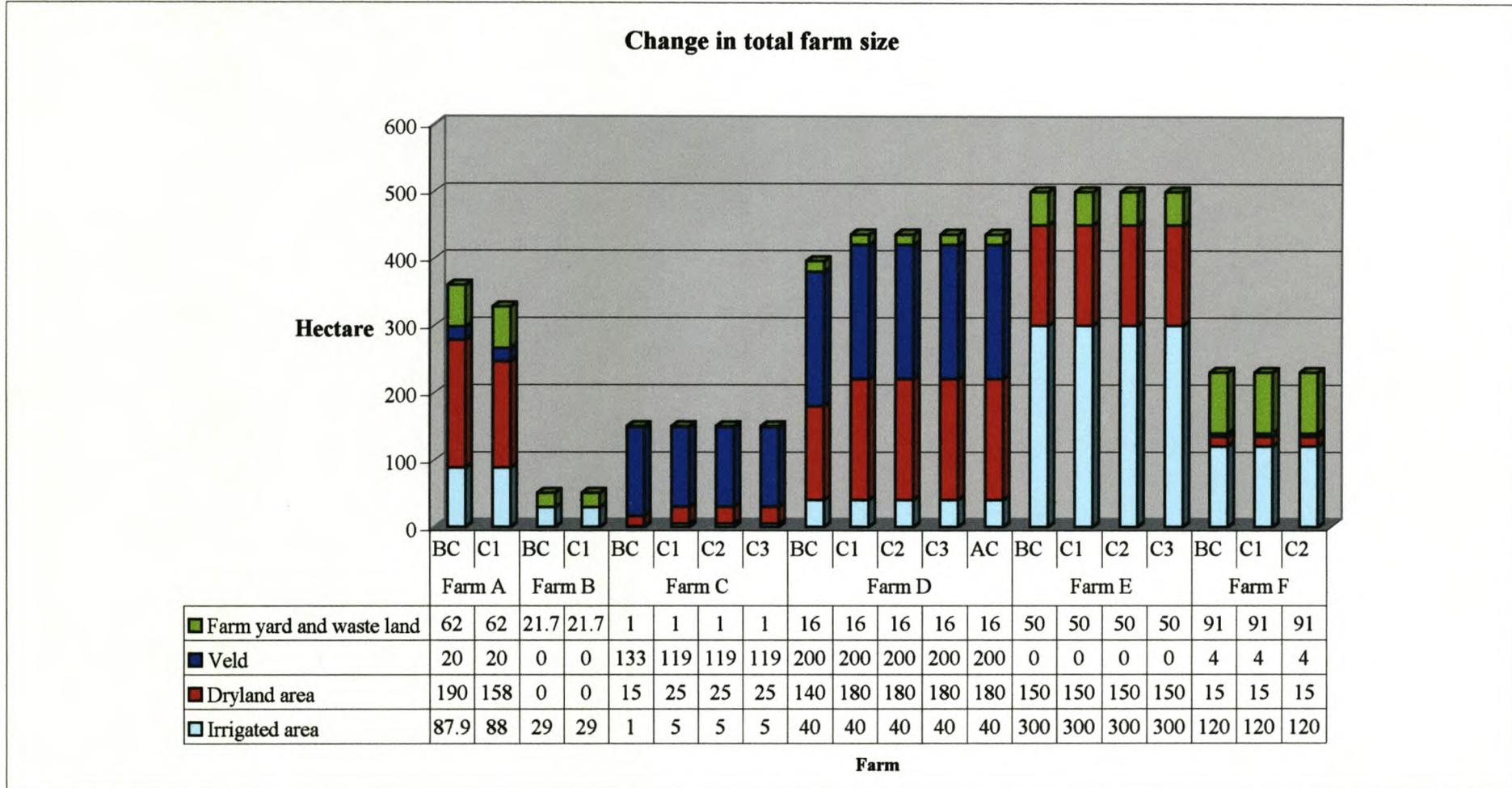
***Thank you very much for your help and your effort to fill in this questionnaire!***

**Appendix 4: Farm characteristics of surveyed farms**

Nr.	Features	Farm A	Farm B	Farm C	Farm D	Farm E	Farm F
1	Magisterial district	Ceres	Caledon	Clanwilliam	Caledon	Tulbagh	Tulbagh
2	Ø Temperature C° • Summer • Winter	20 28 10	21 30 12	18 30 6	20 25 15	22.5 30 15	22.5 30 15
3	Frost	Yes	Yes	Yes	Yes	Yes	Yes
4	Ø Rainfall mm	500	700	200	750	600	600
5	Contour ha • flat • rolling • steep	328.1	50.8	150	100 80 256	500	200  20
6	Special physical characteristics	Non	Non	Extreme wind, low rainfall	Rocks, wind	Wind	Rocks, wind
7	Main soil types	Gravelly-loam to loam	Sand, sandy loam	Sand	Loam, clay	Sand, loam-clay	Loam, white and black sand
8	Irrigation system	Microjets	Microjets (27 ha) Al pipes (3 ha)	Sprinklers	Microjets (32 ha, fruit), Sprinkler (7 ha vegetables)	Drip	Drip (140 ha) Microjets (20 ha)
9	Production systems	Apples, pears	Apples, pears, peaches	Vegetables	Vegetables, plums, clementines, nectarines	Table grapes, wine grapes, vegetables	Table grapes, wine grapes, vegetables
10	Total ha	328.1	50.8	150	436	500	230
11	Livestock	50 cattle	non	non	non	non	non
12	Education	BSc Civil Engineering	MSc Forestry	BComm	MSc Agric.	BComm	BComm Agric. Econ
13	Started farming in	1968	1982	1998	1994	1995	1996
14	Farming experience	33 years	19 years	12 years	7 years	10 years	5 years
15	Farm managed before by	Parents	Parents in law	Parents	non	Parents	Parents
16	First year of conversion	2000	2000	1998	1997	1997	1999
17	Certification body	Bio Gro, SGS	Bio Gro	Ecocert	Ecocert	British Soil Association	British Soil Association

Source: Own questionnaire

**Appendix 5:** Changes in total farm size and distribution of the areas before during and after conversion on the surveyed farms



Source: Own questionnaire

**Appendix 6.1: Costs and gross margins of total apple production in R/ha (2000/2001)**

Variable costs (R/ha)	BC		C1	
	Farm A	Farm B	Farm A	Farm B
Labour	4 099.90	12 054.50	5 493.70	11 270.30
Machinery	153.30	1 473.70	204.40	1 871.10
Fertilization	405.90	1 002.20	1 073	853.40
Pest management	828	3 450	379	2 790.60
Weed management	85.7	286.40	0	264.30
Packing material and transport	0	11 227	0	18 807
<b>Total</b>	<b>55 72.80</b>	<b>29 493.80</b>	<b>7 150.10</b>	<b>35 856.70</b>
Gross income (R/ha)	0	32 126.20	49.10	34 911.40
<b>Gross margin(R/ha)</b>	<b>-5 572.80</b>	<b>2 632.50</b>	<b>-7 101.10</b>	<b>-945.30</b>

Source: Own questionnaire

**Appendix 6.2: Costs and gross margins of total pear production in R/ha (2000/2001)**

Variable costs (R/ha)	BC		C1	
	Farm A	Farm B	Farm A	Farm B
Labour	6 213.20	14 876.70	6 163.10	14 921.80
Machinery	303.50	1 818.70	404.50	2 477.30
Fertilization	416.80	1 236.90	598.10	1 129.90
Pest management	2 935.30	4 257.70	2 128.80	3 694.70
Weed management	80	353.50	0	350
Packing material and transport	4 948.50	13 855.40	5 212.50	24 900.20
<b>Total</b>	<b>14 897.30</b>	<b>36 398.90</b>	<b>14 506.90</b>	<b>47 473.80</b>
Gross income (R/ha)	12 620.70	51 723.40	18 851.10	44 487.40
<b>Gross margin (R/ha)</b>	<b>-2 276.50</b>	<b>15 324.50</b>	<b>4 344.20</b>	<b>-3 583.30</b>

Source: Own questionnaire

**Appendix 7: Costs and gross margins of table grape production in R/ha**

Variable costs (R/ha)	Farm E				Farm F		
	BC 1997	C1 1998	C1 1999	C3 2000	BC 1998	C1 1999	C2 2000
Labour	9 852.60	11 881	10 482.20	13 202	20 933.10	15 447.70	12 971.90
Machinery	935.90	949.70	1 098.50	1 513.50	1 297.50	1 350.60	941
Fertilization	800.70	584.20	798.60	1 348.70	19 89.70	1 343.30	1 428.60
Calk	221.20	340.70	0	0	212.20	65.80	0
Seeds and plants	661	526.30	1 080	1 215.80	1 074	626.80	3 265.30
Pest and disease management	2 654.20	2 788.80	1 986.60	2 431.90	3 134.90	1 531.60	2 204.70
Packing material and transport	8 320.30	8 129.30	9 117.20	7 893.40	3 946.60	9 778	16 326.50
<b>Total</b>	<b>23 446</b>	<b>25 199.90</b>	<b>24 563.10</b>	<b>27 605.40</b>	<b>32 587.90</b>	<b>30 143.80</b>	<b>37 138</b>
Gross income (R/ha)	37 528.30	30 575.90	44 401	55 016.90	67 315.10	40 975.70	73 738.20
<b>Gross margin (R/ha)</b>	<b>14 082.30</b>	<b>5 376</b>	<b>19 837.90</b>	<b>27 411.40</b>	<b>34 727.30</b>	<b>10 831.80</b>	<b>36 600.20</b>

Source: Own questionnaire

**Appendix 8: Budget Farm A**

<b>Year</b>	<b>BC</b>	<b>C1</b>
Area cultivated in ha	87.9	87.9
<b>Variable costs in R/ha</b>		
Labour	5 733.20	6 011
Machinery	520.10	2 850
Fertilization	414.60	707
Pest management	2 454.10	1 728
Weed management	81.40	0
Packing material and transport	162.30	474
<b>Total</b>	<b>9 365.70</b>	<b>11 770</b>
<b>Fixed costs<sup>1</sup> in R/ha</b>	<b>12 008.90</b>	<b>10 331.20</b>
<b>Total costs in R/ha</b>	<b>21 374.60</b>	<b>22 101.20</b>
<b>Gross income in R/ha</b>	<b>9 734.80</b>	<b>14 588</b>
<b>Gross margin in R/ha</b>	<b>-369.10</b>	<b>-2 818</b>
<b>Net farm income in R/ha</b>	<b>-11 639.80</b>	<b>-7 513.20</b>

1: No detailed data on fixed costs was available.

Source: Own questionnaire

**Appendix 9: Budget Farm B**

<b>Year</b>	<b>BC</b>	<b>C1</b>
Area cultivated in ha	22.4	23.7
<b>Variable costs in R/ha</b>		
Labour	12 045.20	11 385.30
Machinery	1 472.50	1 890.20
Fertilization	1 001	862
Pest management	3 447.30	2 819
Weed management	286.20	267
Packing material and transport	11 218.30	18 998.90
<b>Total</b>	<b>29 471.10</b>	<b>36 222.80</b>
<b>Fixed costs in R/ha</b>		
Insurance	488	497
Electricity	1 213.70	1 225.50
Repairs and maintenance (vehicles and machinery)	1 606.50	3 247.70
Repairs and maintenance (fixed improvements)	139.40	320.90
Depreciation (vehicles, machinery and fixed improvements)	582.80	217.60
Certification fees	0	261.10
Telephone, cell phone and post	140.80	150.50
<b>Total</b>	<b>4 171.20</b>	<b>5 920.30</b>
<b>Total costs</b>	<b>33 642.30</b>	<b>42 143.10</b>
<b>Gross income in R/ha</b>	<b>34 342.40</b>	<b>35 317.30</b>
<b>Gross margin in R/ha</b>	<b>4 871.30</b>	<b>-905.50</b>
<b>Net farm income in R/ha</b>	<b>699.70</b>	<b>-6 825.80</b>

Source: Own questionnaire

**Appendix 10: Budget Farm C**

<b>Year</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>
Area cultivated in ha	3.25	5	4
<b>Variable costs in R/ha</b>			
Labour	1 949.10	1 320	4 237.50
Machinery	2 700.40	2 303.80	3 752.30
Seed and fertilization	6 050.50	6 489.20	7 010.90
Pest and disease management	0	513.30	0
Packing material and transport	420.90	532	2 695.30
<b>Total</b>	<b>13 118.90</b>	<b>13 157.30</b>	<b>19 696</b>
<b>Fixed costs in R/ha</b>			
Insurance	610.1	476.0	673.3
Electricity	1 109.5	1 700.8	1 053.3
Repairs and maintenance (vehicles and machinery)	6 538.2	4 175.5	4 520.3
Depreciation (vehicles and machinery) <sup>1</sup>	3 831.8	1 849.2	2 795.9
Certification fees	1 023.3	1 217.1	1 715.1
Telephone and post	1 970.3	1 226.2	1 707.4
<b>Total</b>	<b>15 083.20</b>	<b>10 644.80</b>	<b>12 465.30</b>
<b>Total costs</b>	<b>28 202.10</b>	<b>23 802.10</b>	<b>32 161.30</b>
<b>Gross income in R/ha</b>	<b>0</b>	<b>6 481</b>	<b>11 425.40</b>
<b>Gross margin in R/ha</b>	<b>-13 118.9</b>	<b>-6 676.3</b>	<b>-8 270.6</b>
<b>Net farm income in R/ha</b>	<b>-28 202.10</b>	<b>-17 321.10</b>	<b>-20 735.90</b>

1: No fixed improvements existent on Farm C

Source: Own questionnaire

**Appendix 11: Budget Farm D**

<b>Year</b>	<b>BC</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>AC</b>
Area cultivated in ha	20	30	30	30	40
<b>Variable costs in R/ha</b>					
Labour	2 800	3 066.70	4 416.70	5 083.40	6 275
Machinery	1 500	1 000	1 000	1 166.70	1 250
Seeds and plants	5 000	1 700	1 733.30	1 766.70	1 500
Fertilization	1 550	950	966.70	1 133.30	1 425
Pest and disease management	1 350	1 010	943.30	910	307.50
Weed management	0	0	0	333.30	0
Packing material and transport	0	400	1 066.70	3 433.30	5 950
<b>Total</b>	<b>12 200</b>	<b>8 126.70</b>	<b>10 126.70</b>	<b>13 826.70</b>	<b>16 707.50</b>
<b>Fixed costs in R/ha</b>					
Insurance	900	600	600	666.60	550
Electricity	2 500	1 666.70	2 000	2 333.30	2 000
Repairs and maintenance (vehicles and machinery)	2 500	1 666.70	1 666.70	1 666.70	1 250
Depreciation (vehicles, machinery and fixed improvements)	636.40	817.40	887.30	903.50	831.20
Certification fees	0	233.30	233.30	233.30	175
Telephone, cell phone and post	400	333.30	333.30	400	450
<b>Total</b>	<b>6 936.40</b>	<b>5 317.40</b>	<b>5 720.60</b>	<b>6 203.40</b>	<b>5 256.20</b>
<b>Total costs</b>	<b>19 136.40</b>	<b>13 444.10</b>	<b>15 847.30</b>	<b>20 030.10</b>	<b>21 963.70</b>
<b>Gross income in R/ha</b>	<b>1 200</b>	<b>7 000</b>	<b>22 433.30</b>	<b>30 655.60</b>	<b>32 437.50</b>
<b>Gross margin in R/ha</b>	<b>-11 000</b>	<b>-1 126.70</b>	<b>12 306.60</b>	<b>16 828.90</b>	<b>15 730</b>
<b>Net farm income in R/ha</b>	<b>-17 936.40</b>	<b>-6 444.10</b>	<b>6 586</b>	<b>13 826.70</b>	<b>10 473.80</b>

Source: Own questionnaire

**Appendix 12: Budget Farm E**

<b>Year</b>	<b>BC</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>
Area cultivated in ha	250	250	250	250
<b>Variable costs in R/ha</b>				
Labour	7 215.50	8 704.30	7 678.70	9 671
Machinery	960.40	973.40	1 133.10	1 561.30
Seeds and plants	669.50	533	922.90	930.90
Fertilization	1 878.80	1 345	1 219.30	2 059
Calk	121.70	187.50	0	0
Pest and disease control	2 114.20	2 180.10	1 569.60	1 921.40
Packing material	6 823.50	6 552.90	7 366.90	7 008.90
<b>Total</b>	<b>19 783.50</b>	<b>20 476.30</b>	<b>20 190.40</b>	<b>23 152.40</b>
<b>Fixed costs in R/ha</b>				
Insurance	69.60	77.60	213.20	160.60
Electricity	1 488.30	1 209.10	1 164	1 459.60
Repairs and maintenance (vehicles and machinery)	1 747.60	1 487.60	1 171	1 549.20
Repairs and maintenance (fixed improvements)	0	3.30	442.60	333.20
Depreciation (vehicles and machinery)	2 801.10	3 151.70	2 325.60	3 230.30
Depreciation (fixed improvements)	1 554.20	1 935.10	1 206.30	1 273.50
Certification fees	7.10	4.40	48.20	87.40
Telephone, cell phone and post	44.20	52.20	144.60	194.70
<b>Total</b>	<b>7 712.10</b>	<b>7 921</b>	<b>6 715.50</b>	<b>8 288.50</b>
<b>Total costs</b>	<b>27 495.60</b>	<b>28 397.30</b>	<b>26 905.90</b>	<b>31 440.90</b>
<b>Gross income in R/ha</b>	<b>32 550.90</b>	<b>29 676.20</b>	<b>32 281.20</b>	<b>33 874.10</b>
<b>Gross margin in R/ha</b>	<b>12 767.40</b>	<b>9 199.90</b>	<b>12 090.80</b>	<b>10 721.60</b>
<b>Net farm income in R/ha</b>	<b>5 055.30</b>	<b>1 278.90</b>	<b>5 375.30</b>	<b>2 433.20</b>

Source: Own questionnaire

**Appendix 13: Budget Farm F**

<b>Year</b>	<b>BC</b>	<b>C1</b>	<b>C2</b>
Area cultivated in ha	92.0	111.9	118.8
<b>Variable cost in R/ha</b>			
Labour	9 363.50	7 925.40	6 955.5
Machinery	682.40	810.90	587.9
Seeds and plants	382.20	262.40	1 464.4
Fertilization	1 088.60	837.90	926.1
Calk	103.80	37.90	0.0
Pest and disease management	1 435.30	803.80	1 208.9
Packing material and transport	2 029.20	4 507.20	7 950.6
<b>Total</b>	<b>15 085</b>	<b>15185.60</b>	<b>19 093.3</b>
<b>Fixed costs in R/ha</b>			
Insurance	408.60	255.50	73.2
Electricity	607.90	580.30	698.7
Repairs (vehicles and machinery)	2 452.50	543.20	311.4
Repairs (fixed improvements)	221.60	161.50	33.7
Depreciation (vehicles, machinery and fixed improvements)	2 898.70	156.30	346.7
Certification fees	0	210.50	213.50
Telephone and post	211.60	171.80	219.2
<b>Total</b>	<b>6 800.90</b>	<b>2 079.10</b>	<b>1 896.40</b>
<b>Total costs</b>	<b>21 885.90</b>	<b>17 264.70</b>	<b>20 989.70</b>
<b>Gross income in R/ha</b>	<b>33 811.40</b>	<b>22 850.80</b>	<b>37 087.80</b>
<b>Gross margin in R/ha</b>	<b>18 726.40</b>	<b>7 665.2</b>	<b>17 994.50</b>
<b>Net farm income in R/ha</b>	<b>11 925.50</b>	<b>5 586.10</b>	<b>16 098.10</b>

Source: Own questionnaire