agri benchmark

2014
Horticulture Report

understanding agriculture worldwide

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Global Supporting Partner

BAYER

1.1 Horticulture Report 2014 – Foreword from the editor

As a result of intense work during the past nearly three years we are happy to present the first *agri benchmark* Horticulture report.

What is *agri benchmark* Horticulture? It is an international network of researchers, advisors and selected agribusiness partners. The objective of the network is to analyse production systems of specialty crops. Costs of production are compared, benchmarked and reasons for differences are identified. As an active network we have annual meetings and regularly visit farmers as well as other stakeholders along the value chain in order to understand production systems.

So far the main focus of the network is to collect price and quantity data on production systems to allow economic analyses and comparisons. This establishes the basis to assess the international competitiveness of selected production regions. As not only the primary sector influences the competitiveness but also the functioning of the whole value chain, the latter will come into our focus in future, too. Additionally, analyses of environmental issues of production might become an area of interest, which we hope to be able to address with our data in the future.

In 2011, the *agri benchmark* Horticulture network activities started due to the establishment of cooperation between the Thünen Institute of Farm Economics, Braunschweig, Germany, and the agribusiness partner Bayer CropScience. Underpinned by an EU-COM project assessing the costs of compliance in the fields of food safety and environmental protection at farm level, we started to analyse the production of apples and wine grapes in Germany, France, Italy, Spain, Bulgaria, Australia, Chile, and South Africa. Most of the EU project partners are still on board.

In the first section of this report, you will find details on the *agri benchmark* Network, its partners (Chapter 1.3), and its concept and methods (Chapter 1.4).

In the second section we present our results: Chapters 2.1 and 2.2 show key figures on global apple and wine grape production, trade and the results of analysing our typical farm data for the years 2010 until 2012.

In section three we provide detailed background information on our crops and countries in the network: Chapter 3.1 presents a comparison of apple production structures and international trade in Germany and Italy. Then, in Chapters 3.2 and 3.3, we are happy to present the contributions from Jan Lombard, BFAP network, portraying the apple and wine grape industries in South Africa. We just recently started to include tomatoes as the first vegetable crop into our network: A first overview of tomatoes in Germany, Italy, Tunisia and Morocco is therefore given in Chapter 3.4. Secondary data in regard to structures of German carrot farms is analysed in Chapter 3.5.

One of the highlights for all partners is the annual network conference. In 2013 we started with the first *agri benchmark* Horticulture conference in Germany. In 2014, we will hold our conference in Italy and are looking forward to interesting discussions with our partners on apple, tomato and wine grape production and fantastic field trips.

Besides this printed report you can find updated information on the *agri benchmark* Horticulture and the other *agri benchmark* Networks on our website http://www.agribenchmark.org.

Finally, I do not want to miss thanking all network partners for their efforts to provide us with the typical farm data. In addition, I want to thank the authors Jan Lombard and Aïcha Mechri for their article contributions to this report. Much appreciation goes to my Thünen colleagues Hildegard Garming and Kathrin Strohm who enable the network to grow through their continuous commitment.

Walter Dirksmeyer

Coordinator
agri benchmark Horticulture

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1.3 Partners

Participants of the *agri benchmark* Horticulture Conference 2013

Horticulture Report editors

Walter Dirksmeyer, Hildegard Garming, Kathrin Strohm

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agri benchmark – understanding agriculture worldwide

agri benchmark is a global, non-profit network of agricultural economists, advisors, producers and specialists in key sectors of agricultural value chains. We use internationally standardised methods to analyse farms, production systems and their profitability. Our farm-level knowledge is combined with analysis of international commodity markets and value chains. In this way we are able to provide scientifically consistent and soundly based answers on strategic issues to decision-makers in policy, agriculture and agribusiness.

	Australia		Randy Stringer	The University of Adelaide – Global Food Studies, Adelaide, South Australia
			Wendy Umberger	
			Camilo Esparza Garcia	
	Chile		Ricardo Adonis	Fundación para el Desarrollo Fruticola, Santiago
	France		Alfredo Coelho	MOISA – Markets, Organisations, Institutions and stakeholders strategies Montpellier
			Etienne Montaigne	
	Germany		Hildegard Garming	Thünen Institute of Farm Economics Braunschweig
			Kathrin Strohm	
			Manfred Büchele	Kompetenzzentrum Obstbau-Bodensee, Bavendorf
			Elke Pollock	
			Wolf-Dietmar Wackwitz	Sächsisches Landesamt für Umwelt, Landwirtschaft und Geologie, Abteilung Gartenbau, Dresden
			Frank Eckhard	
			Dieter Hoffmann	Geisenheim University – Centre for Economy, Geisenheim

1.3 Partners

	Germany		Matthias Görgens	ESTEBURG	Esteburg – Fruit-Growing Centre Jork, Jork
			Svea Sievers	DLG	German Agricultural Society, Frankfurt
	Italy		Valeria Altamura	CRPV	Centro Ricerche Produzioni Vegetali (CRPV), Cesena
			Giorgio de Ros	FONDAZIONE EDMUND MACH	Fondazione Edmund Mach, San Michele all'Adige
	Morocco		Mohamed Boughlala		Centre Régional de la Recherche Agronomique (INRA), Settat
	South Africa		Jan P. Lombard	BFAP	BFAP – Bureau for Food and Agricultural Policy, Stellenbosch
			Mariette Kotze	HORTGRO	HORTGRO – Supporting the horticultural industry, Paarl
			Pieter van Niekerk	VinPro	VinPro, Paarl
	Spain		Alicia Langreo		Saborá, Estrategias Agroalimentarias, Madrid
	Switzer-land		Esther Bravin		Agroscope Changins-Wädensvil ACW, Wädenswil
	Tunisia		Aïcha Mechri	INAT	Institut National Agronomique de Tunisie (INAT), Tunis
			Ezzeddine Ben Mustapha Hichem Ben Lamine	APAD	Associacion Pour l'Agriculture Durable (APAD), Tunis

What is *agri benchmark*?

agri benchmark is a network of agricultural research and advisory economists aiming to create a better understanding of global agriculture. The key idea is to make transparent how specialty crop production is organised and evolving around the globe. Based on that, we calculate cost and revenues for the individual crops for the various locations.

When considering other existing farm data, three major shortcomings can be observed:

- They do not disclose technology used.
- They are not able to make transparent quantities and prices.
- Since they are organised with different methodology, results are not comparable across different countries.

What is a typical farm?

The way out is to establish what we call "typical farms." These farms are "hypothetical" farms that represent a typical farm in a given region. Everywhere in the world horticultural or speciality crops are produced in geographical clusters. These production regions are the priority regions in a country to establish the typical farm for the crop of interest.

In many countries, the major part of total output of a crop is produced by medium and large farms, although there are still many small farms. In contrast, we focus on farms that compete at international level and will survive in the long run.

Selection and establishment of typical farms is done by the *agri benchmark* partners – in many cases together with local advisors and farmers. In Chapter 4 you find an overview of our typical farms with detailed factsheets.

The letter code in the **farm name** indicates the country where the farm is located and the figures indicate the size in hectares, followed by a letter to indicate the production region within the respective country.

Coordination of *agri benchmark*

As far as concept and cooperation with scientific partners is concerned, *agri benchmark* is coordinated by the Thünen Institute of Farm Economics. The German Agricultural Society (DLG) manages financial issues and contracts with agribusiness.

How are prices derived?

Price data refers to the average prices for the year of harvest of the product. In this report, you find farm results from 2010 to 2012. Prices for products sold reflect different circumstances for different farms. If the typical farmer is selling most of his produce directly after harvest, the respective price is used. If, on the other hand, there is storage capacity available and hence the possibility for systematic marketing then an average price for the whole marketing period is used. Therefore, in the case of apples, output prices for 2011 may refer to average prices received from October 2011 to August 2012.

All prices are net farm gate prices, excluding VAT. That means farms located in remote areas with long distances to markets and/or poor infrastructure and logistics service markets normally receive lower farm gate prices than those located close to consumers, processing plants or harbours.

Yields of crops

As in the case of prices, yield data are from 2010 to 2012 as indicated in the text and figures.

Exchange rates used

In order to convert economic results in domestic currencies to Euro, conversion rates as documented in Annex A.2 have been applied.

Handling of other farm enterprises

So far, we have concentrated on specialised farms for our crops of interest. This is typical for fruit production in many countries. Where typically more crops are important on a farm, we only considered costs for the crop of interest. In case machinery or labour force is used by other enterprises, too, the respective cost share was estimated during focus group discussions. Whenever possible, machines and

1.4 Concept and data

labour forces employed in other enterprises are excluded from the whole calculation. In this report, other enterprises played a role mainly in the Italian apple and wine grape farms.

Permanent crops

Apples and wine grapes are permanent crops, with several years from planting to full harvest, and varying utilisation periods of the orchards or vineyards. Costs and revenues vary largely during these different age phases. In the typical farms, we account for this life cycle of the permanent crops by identifying the average share of acreage in the different age phases. For each age phase, the typical production system with all operations, related costs and eventual output during one year is modelled. This allows calculating and comparing the costs of specific age phases. For the general comparison of production costs across all age phases by crop or by variety (see Chapter 2), a weighted average is calculated.

Key calculation principles

In order to come up with a figure for total cost of production for individual crops, a number of economic assumptions and definitions have to made:

Depreciation is calculated by using repurchase prices for machinery and buildings, which is how much a certain item would cost when bought today. The depreciation period is defined by the national partners by applying usual economic lifetimes of capital goods. Thus, we do not apply depreciation for tax reasons. The depreciation is calculated straight linear.

Family labour is valued according to estimated opportunity costs: what would a typical grower be able to earn outside his farm if he or she was working elsewhere?

Cost for **hired labour** is including social security payments as well as any insurance directly related to the individual labour force.

Concept of land cost

Economic cost of **family owned land** is priced according to the most recent land rents in the typical region. Again, the idea is to use the alterative income to resources in case the farmer would quit farming.

Land cost equals the sum of land rents actually paid per hectare times the share of rented land in total arable land plus the average opportunity cost for family owned land times the share of owned land in total arable land.

Fixed cost and equity cost

Fixed costs such as labour cost, or machinery cost is allocated in three ways: (a) when production system data is available, machine runtime-hours are used to allocate this cost to individual crops; (b) for datasets without production system information, and for defined capacities that are not completely allocated through the production system information, allocation is done by using return shares of the crops. The latter concept is always used in order to allocate **overhead cost** such as building cost or accounting; (c) machinery costs that are not fully accounted for in the production system information are allocated by acreage share.

The **cost of equity** is calculated by using the interest rate on savings being the opportunity cost for farmers' capital.

Opportunity cost

Opportunity cost is the total of calculated cost with no cash expenditure such as cost for the growers' family own land, labour and capital.

Revenues

Revenues are calculated as gross revenue, multiplying the output and the respective prices. Where different qualities are produced and prices paid by quality, e.g. fresh table apples versus processing quality, the respective amounts of each quality are multiplied with their individual price. The figures presented in this report hence display the weighted average prices/revenues.

Some of our typical farms, in particular in European countries, receive coupled payments either from their national or regional government. These subsidies are then added to the market returns and sum up to the overall revenues of the farm.

2 Results *agri benchmark* Horticulture

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2.1 Apple results

Apples are among the most important fruits grown globally. According to FAO statistics, in 2012, apples ranked third in terms of production quantity, with 76 million tonnes global production. Higher production quantities were only reported for watermelons (105 million tonnes) and bananas (102 million tonnes). Apples are followed by oranges (68 million tonnes) and grapes, including wine grapes and table grapes (67.5 million tonnes).

Since the first FAO global statistics became available in 1963, apple production has more than tripled from 22 million tonnes. The main driver of this increase has been apple production in China, with rapid expansion of production, particularly from the late 1980s (Figure 2.1.1). Other major producers are the USA, Russia and the Caucasus region, as well as the South American countries Chile, Argentina and Brazil. In Europe, Turkey, Poland and Italy are the largest apple producing countries.

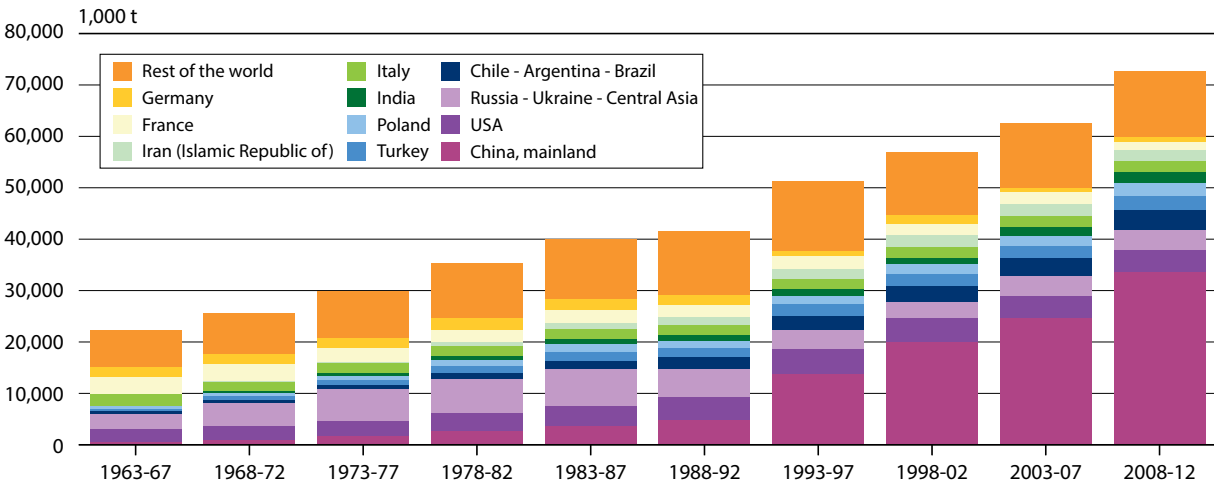
A look at the trade statistics (UN Comtrade 2014) shows that most of the large producers are also exporting countries, however with different shares. China, Poland, Italy, the USA and Chile exported about similar amounts of 800,000 to 1 million tonnes in the last years (Figure 2.1.2). On the side of the trade partners, Russia has been a major importer of apples in the past decade with more than 1 million tonnes annually since 2008. Germany is second on the list of major apple importers, followed by the United Kingdom and the Netherlands (Figure 2.1.3).

Description of typical apple farms

In the *agri benchmark* Horticulture Network, five countries have been participating so far, four of them part of the top-20 of global apple producers: Italy, Chile, Germany and South Africa (Figure 2.1.4). Additionally, Switzerland takes part with one typical farm. Farm sizes differ widely in the countries and also between regions. In Italy and Switzerland, the typical farms are particularly small compared to the other countries in the network. In Germany, both small and large farms are included. While the southern region near Lake Constance is characterised by rather small farms, farm structures tend to be larger in the northern region of "Altes Land". The very large farm with 183 ha of apple orchards is typical for the specific region in Saxony in Eastern Germany, with its origins in the formerly large cooperative structures[1]. In the Southern Hemisphere, in Chile and South Africa, both medium and rather large farm sizes are found in the regions that focus on producing apples for export.

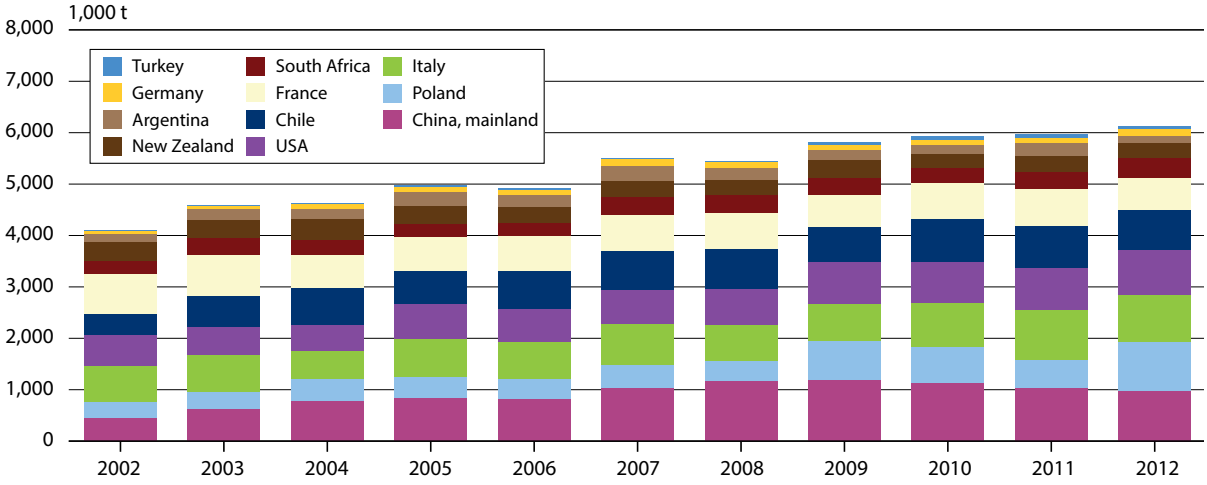
[1] Please note that data for Saxony are available for 2011 only. In the figures showing costs for 2012, costs for this farm were extrapolated from 2011 data.

2.1.1 Global apple production, 1963–2012 (five year averages)



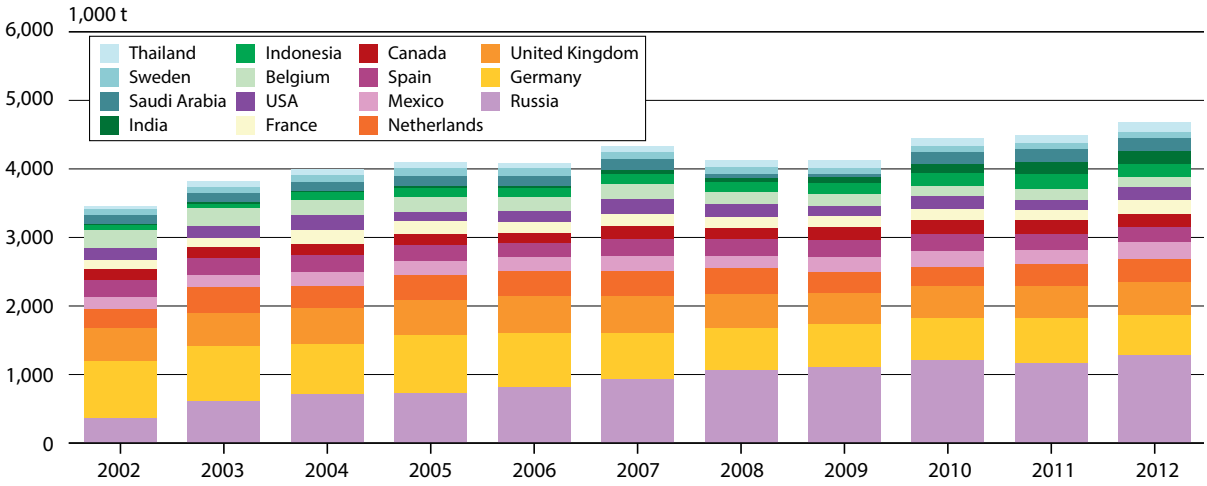
Source: FAOSTAT (2014).

2.1.2 Apple exports of major producing countries, 2002–2012



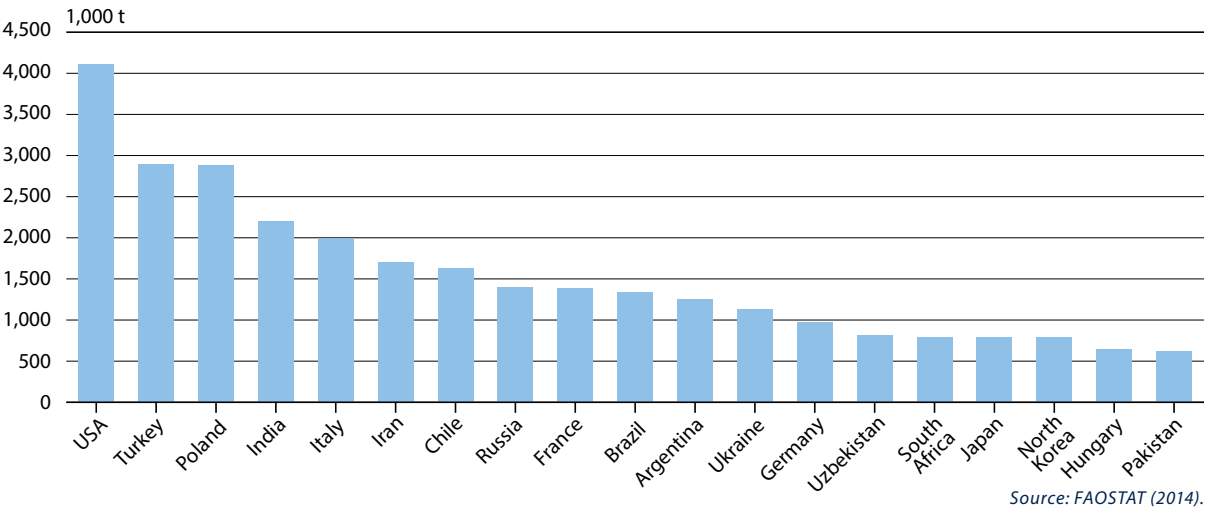
Source: UNComtrade (2014).

2.1.3 Apple imports of major importing countries, 2002–2012



Source: UNComtrade (2014).

2.1.4 Top-20 of global apple producing countries, 2012 (excluding China)



Source: FAOSTAT (2014).

2.1 Apple results

The portfolio of apple varieties grown on the typical farms is adapted to climate conditions. 'Elstar' and 'Jonagold' are common varieties in the European farms with increasing importance towards the North. Typical varieties for regions with more sun and higher temperatures are, e.g., 'Golden Delicious', 'Gala' and 'Fuji' (Figure 2.1.5). The factsheets in Chapter 4.1 provide further details on the specific features of the typical apple farms.

An important characteristic of an apple farm is the age structure of its orchards. A high share of older apple trees may lead to high current yields and profits; however, constant renewal of plantations is important to sustain productivity in the long run. Also, continuous improvement of varieties and changing market demands are relevant issues to be considered in planning orchard utilisation periods. The shortest average utilisation period reported for the typical farms is 18 years, as, e.g., in Northern Germany, Thurgau in Switzerland and Trentino in Italy (Figure 2.1.6). On the opposite side of the spectrum, the oldest apple trees are cultivated in Chile, where traditional low-density orchards can be used for up to 40 years. Yet, a change of production system in Chile can already be observed for the larger Chilean farm CL-80-OH, with an average utilisation period of 23 years and about 5 % of the area covered with trees in their first year of establishment (Figure 2.1.6).

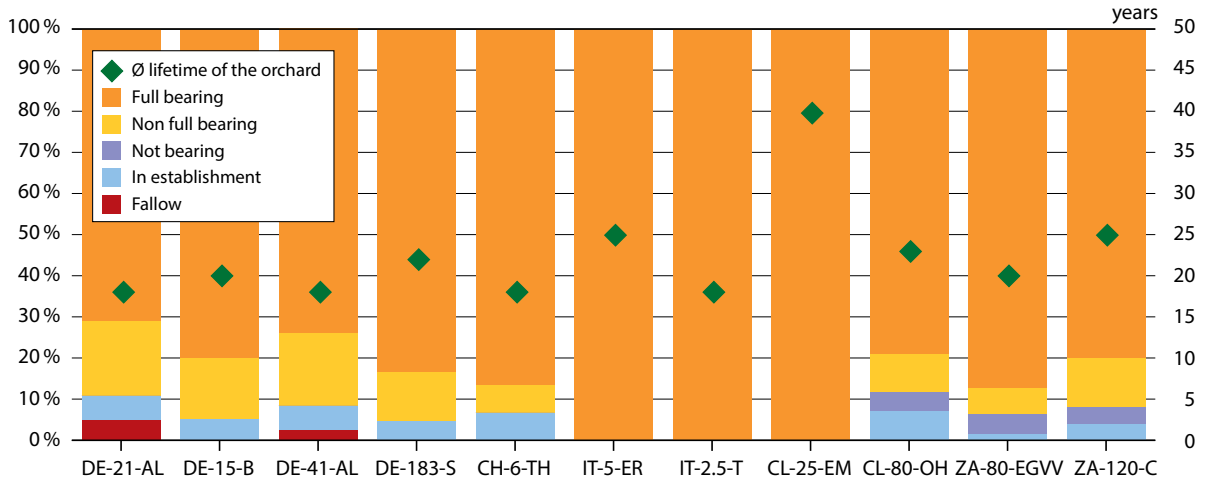
Total costs and profitability

There are clear differences in the level of production costs of apples between the European countries and the Southern Hemisphere countries. Costs per hectare are particularly low in Chile, with less than 8,000 EUR/ha, but also in South Africa with around 10,000 EUR/ha, as compared to 12-15,000 EUR/ha in Germany and 20-29,000 EUR/ha in Italy and Switzerland (Figure 2.1.7). However, revenues show a similar pattern, they are highest in Italy and rather low in Chile and South Africa. Since revenues are based on farm gate prices for the producers, the short market distance is an advantage for European producers, who mainly sell on local and domestic markets. Chile and South Africa are clearly export-oriented, thus the large distance to the consumers impacts on farm gate prices. The picture becomes even clearer when looking at the costs and revenues per tonne of apples. Here, the differences in farm gate prices are very clear, with around 200 EUR/t in Chile and South Africa, whereas prices in Europe vary between 300 and more than 500 EUR/t (Figure 2.1.8). Price differences between the years have a significant impact on profits in Germany

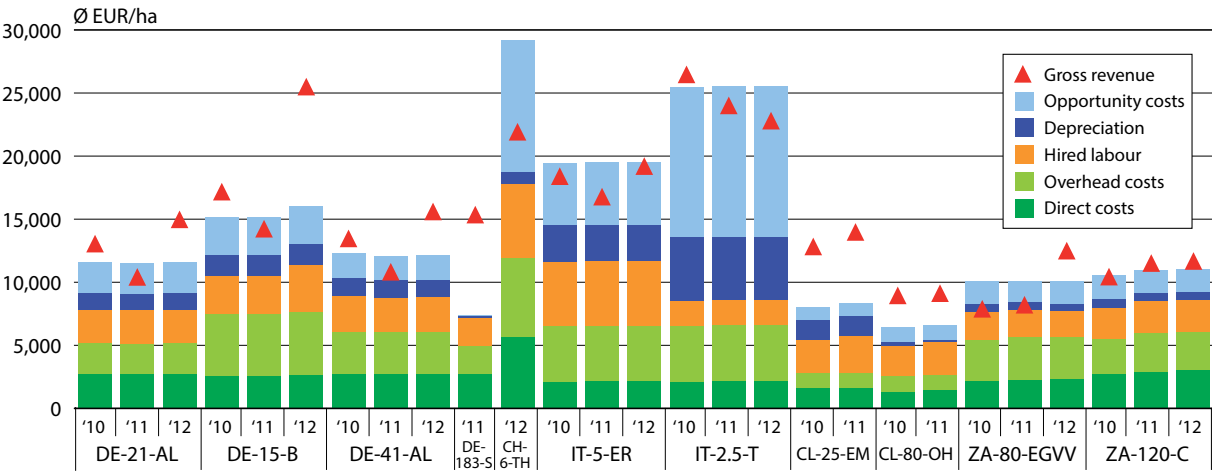
2.1.5 Overview: 11 typical apple farms in five countries

	Country	Region		Average yield 2011	3 top apple varieties grown
			ha	t/ha	
Europe	Germany	Altes Land (AL)	21	31	Elstar, Jonagold, Braeburn
		Altes Land (AL)	41	32	Elstar, Jonagold, Braeburn
		Bodensee (B)	15	46	Jonagold, Elstar, Gala
		Saxony (S)	183	54	Idared, Elstar, Pinova
	Italy	Emilia-Romagna (ER)	5	49	Fuji, Pink Lady, Modi, Gala
		Trentino (T)	2.5	60	Red/Golden Delicious, Gala, Renetta
	Switzerland	Thurgau (2012) (TH)	6	53	Golden Delicious, Gala, Jonagold
Non-EU	Chile	El Maule (EM)	25	63	Gala, Fuji, Granny Smith
		O'Higgins (OH)	80	52	Granny Smith, Gala, Pink Lady
	South Africa	EGVV	80	53	Golden Delicious, Granny Smith, Gala
		Ceres (C)	120	54	Red and Golden Delicious, Pink Lady

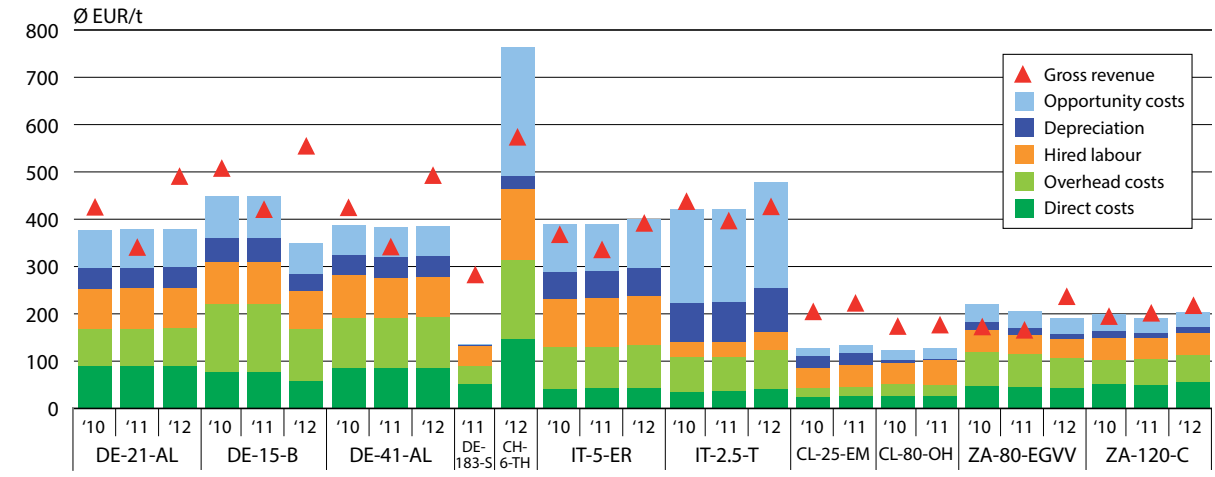
2.1.6 Age structure of typical apple farms



2.1.7 Total apple production costs per hectare, 2010–2012



2.1.8 Total apple production costs per tonne, 2010–2012



and Italy. 2011 was a rather difficult year of low average prices, and only the typical farm DE-183-S achieved full cost recovery. The situation improved in 2012, when yields were stable in Germany, but prices increased. For Italy, the price also increased; however, 2012 yields were lower, leading to a higher average cost, which was not fully compensated by the price change.

The Swiss typical farm seems to fall out of the range, both with respect to costs as well as revenues. This is clearly related to market regulation as well as national legislation on labour use and wages. Please refer to Annex A.1 for the further explanation of terms used in the figures and text.

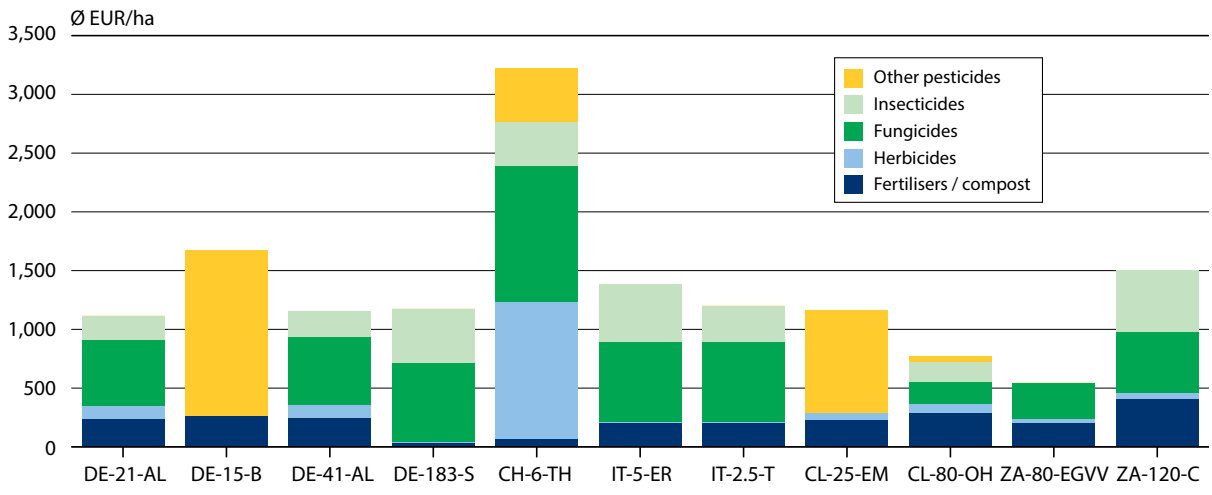
Inputs, operating and opportunity costs

The costs for inputs such as pesticides, herbicides and fertilisers are on approximately a similar level in the different countries (Figure 2.1.9), except Switzerland, where input prices are rather high. Fertiliser costs tend to be low with around 200 EUR/ha for most typical farms.

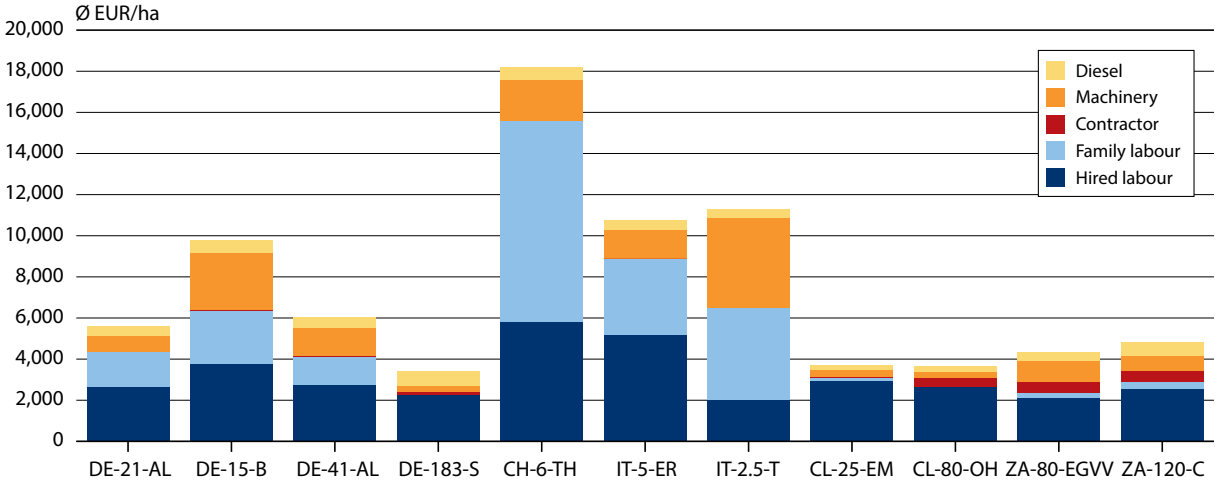
The major operating costs are the costs for hired and family labour. A clear difference can be observed between the smaller farms in Germany, Italy and Switzerland, where family labour engages not only in administration but in all crop management operations, and the larger farms, where the share of family labour is very low (Figure 2.1.10). In Chile, and also in the German farm in Saxony (DE-183-S), farms are managed by hired administrators, relying on permanent and seasonal hired labour for crop management. In the typical farms in South Africa, family labour concentrates on administration and farm management, hence most of the labour costs are for permanent and seasonal hired labour. Machinery costs are much higher in Europe, where wages are high and mechanisation is used to substitute labour. An exception is the Saxony farm, where investment in machinery has been low and most of the machines are being used for much longer than standard utilisation periods. Particularly for the smaller Italian farms, machinery usage is below optimum capacity, hence costs are rather high. External services from specialised contractor work are mainly used in South Africa and Chile, for a number of tasks including pollination, soil preparation and planting, installation of the irrigation or even pruning and manual thinning.

Low wages in the Southern Hemisphere countries as compared to the European countries are a main driver of labour use (Figure 2.1.11), and related to labour productivity. Nevertheless, partners expect a significant increase of labour costs in both South Africa and Chile in the near future, hence efforts to increase labour productivity will be necessary. In Germany and Italy,

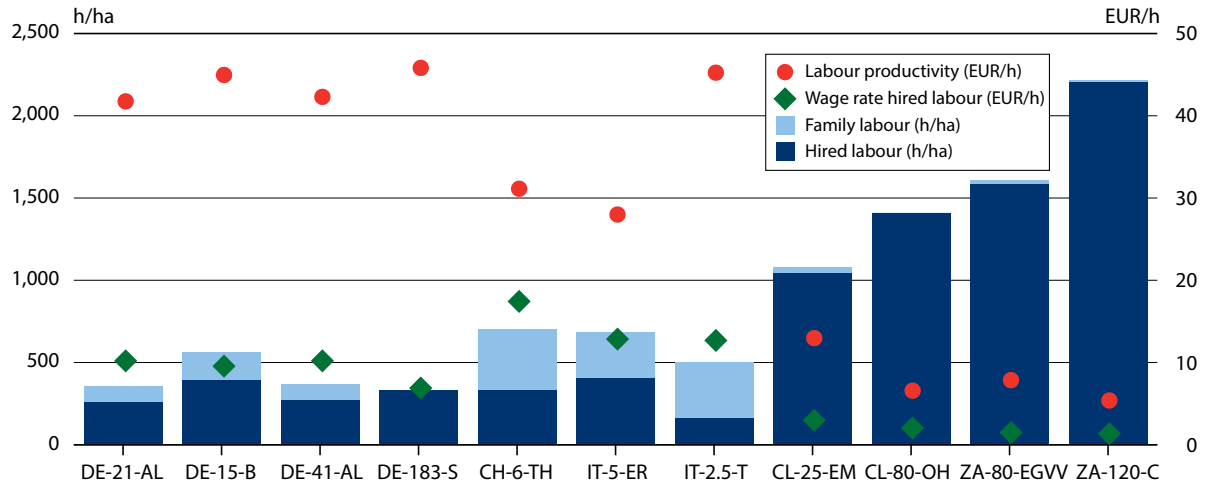
2.1.9 Input costs, 2012 (CL: 2011)



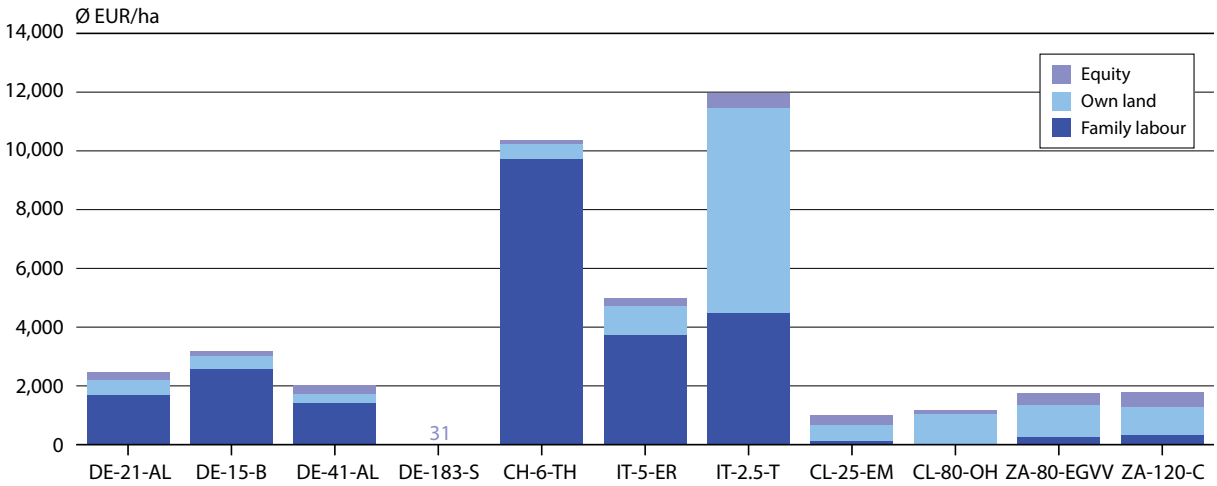
2.1.10 Operating costs, 2012 (CL: 2011)



2.1.11 Labour use and labour productivity, 2012 (CL: 2011)



2.1.12 Opportunity costs, 2012 (CL: 2011)



differences in total labour use per hectare can partly be explained by yield differences, since harvest is the most labour intensive operation. Also, in the typical farm in Lake Constance region (DE-15-B), handling of hail nets increases labour needs compared to the farms in Altes Land. In the Saxony farm (DE-183-S), machine-aided harvesting is carried out, reducing labour use effectively.

The valuation of family labour costs is based on wages for comparable jobs or on official calculatory cost estimates (in the case of Germany, see ZBG). Thus, family labour input is part of the opportunity costs, which also include the costs for using own land or own capital (Figure 2.1.12). Land costs are particularly high for the Italian farm in Trentino (IT-2.5-T), where the apple production is limited to rather small valleys, directly competing with alternative uses such as tourism and wine grapes.

Yields, revenues and profit

The overall productivity and different profitability indicators are illustrated in Figure 2.1.13. The figure shows clearly again the differences in cost and price levels between European and Southern Hemisphere countries, as well as the different cost structures with regard to opportunity costs and use of family labour. However, with regard to profits, differences between the years seem to be higher than the differences between the countries. Except for Chile, all typical farms realised both profits and losses between 2010 and 2012. Price variability has had a greater impact on profitability than yield differences. As shown in Figure 2.1.14, yields have been relatively stable in the three years, with some variation at Lake Constance, in Italy and South Africa. Yet for the data updates for 2013, lower yields are expected in Germany.

The specification of typical production systems for different varieties allows direct comparison between producing regions. 'Royal Gala' is a popular internationally traded variety grown by all typical farms in South Africa, Chile, Italy and Switzerland. In Germany, 'Royal Gala' can only be produced in the southern region, where sufficient sunshine and summer temperatures are available (Figure 2.1.15).

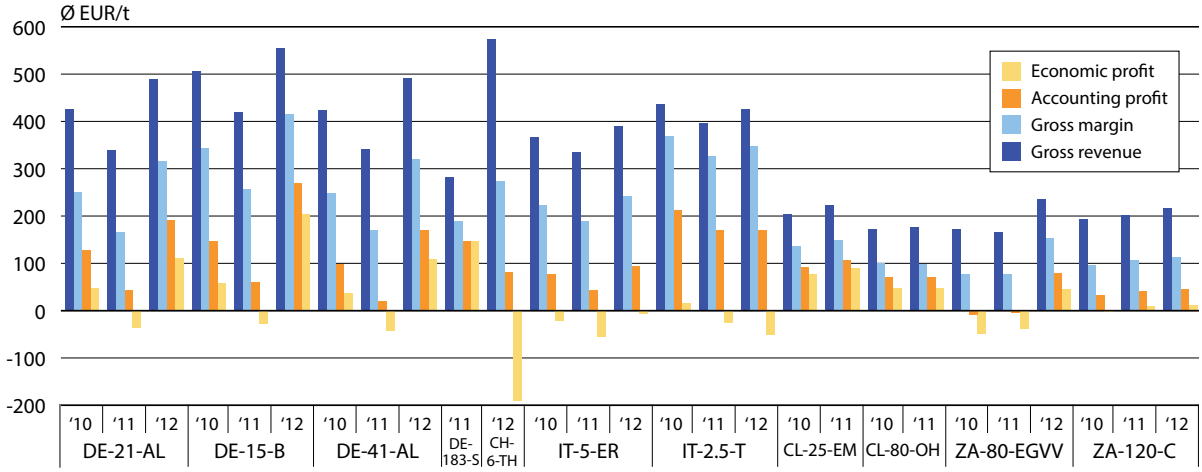
Hildegard Garming

References

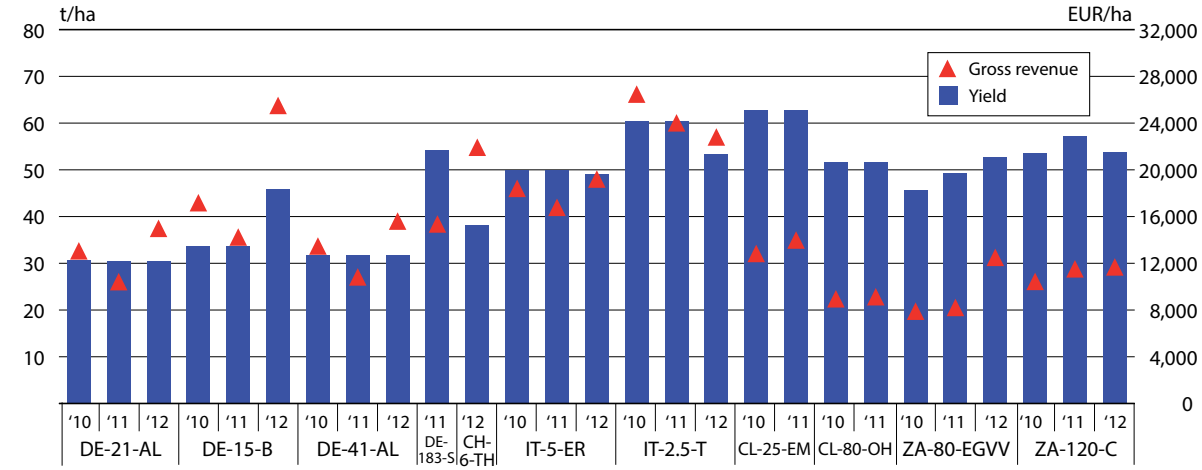
FAOSTAT (2014), database on apple production,
(online: http://faostat.fao.org/site/636/DesktopDefault.aspx#ancor)

UN Comtrade, (2014): United Nations Statistical Division: Commodity Trade Statistics Database
(online: http://comtrade.un.org/)

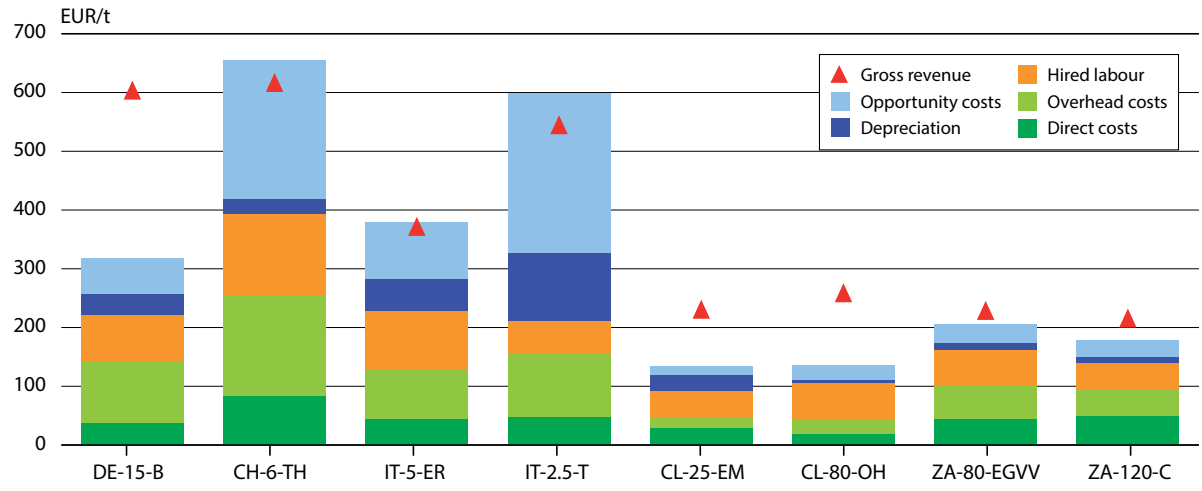
2.1.13 Profitability indicators per tonne, 2010–2012



2.1.14 Yield and gross revenue, 2010–2012



2.1.15 Royal Gala total costs and revenues per tonne, 2012 (CL: 2011) (only full bearing trees)



2.2 Wine grape results

A first overview of global wine production can be found in the databases of FAOSTAT, where wine production data are available from 1963 onwards (FAOSTAT, 2014). Over the past 50 years, global wine production increased from about 27 million tonnes at the beginning of the 1960s until the early 1980s with peaks of up to 35 to 37 million tonnes of wine annually (Figure 2.2.1). During the last 20 years however, global production reduced again to about the initial level and averaged between 25 and 30 million tonnes per year.

Since the 1960s the three major producers, France, Italy and Spain, have been dominating global wine production, together accounting for 47 to 57 % of global production. It can be seen that over time the production volumes, and also relative production shares, in France and Italy diminished. During the mentioned period, France and Italy reduced their production from 6 to 7 million tonnes annually (each 22 to 24 %) to less than 5 million tonnes (17 %). In contrast, Spain managed to increase its production to more than 3 million tonnes, now representing about 13 % of global production.

The USA more than tripled its wine production and continuously increased its market share from 3 % to 10 %. China's wine production was recorded for the first time in 1978. Over the past years it reached more than 1.5 million tonnes. It now accounts for 6 % of global wine production, thus ranking 5th in total production. While Chile could augment its production to more than 1 million tonnes, Argentina's production dropped by one third to less than 1.5 million. Even though the production of Australia and New Zealand grew almost eightfold, and South Africa's production more than doubled, their wine production amounts to only around 1 million tonnes each and thus reaches a share of 4 to 5 % globally. Over the last decades, Germany's production has been fluctuating between 0.9 and 1 million tonnes.

The data shows that traditional wine producing countries have manifested their position although new countries outside Europe have become more important. In this way the wine production of other countries in the rest of the world reduced from 26 % to 17 % and the sector became more concentrated.

Corresponding to the shifts between countries in wine production, international trade has also changed in the past. An analysis of UN Comtrade data reveals that worldwide, both wine exports and imports increased during the last decade (Figure 2.2.2; Anderson and Nelgen, 2011).

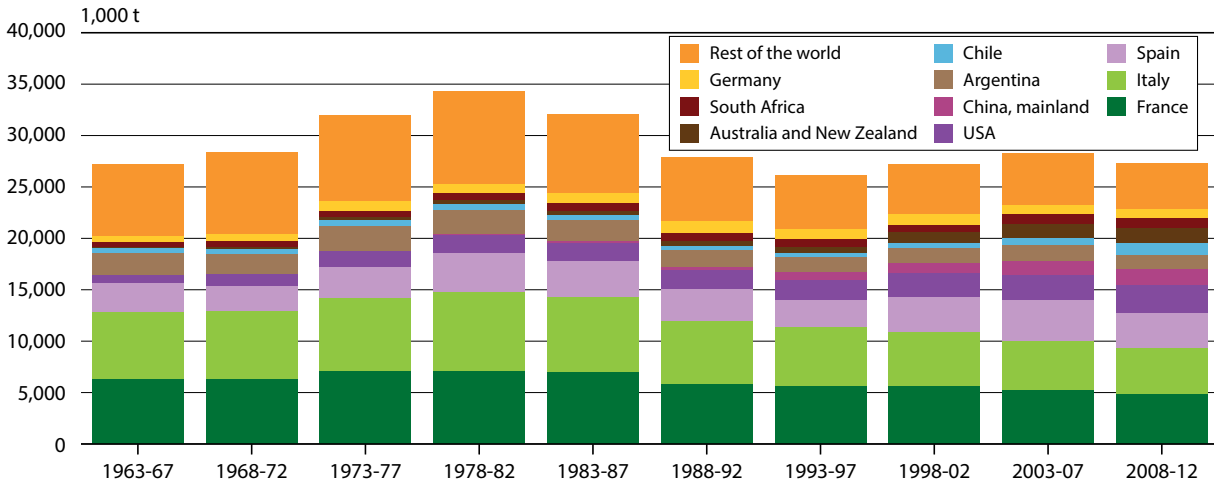
The three major wine producers France, Italy and Spain are at the same time the largest wine exporters with volumes fluctuating between 1 and 2.5 million litres. As their imports are rather limited, all show a positive trade balance. Although wine consumption in New World countries is partially growing, it is still at a rather low level and thus enabling countries such as Chile, Australia, New Zealand and South Africa to export 50 to 70 % of their national wine production (Anderson and Nelgen, 2011).

Global wine imports are dominated by only nine countries that together import two thirds of the globally traded wine volumes. Though Germany, USA and France all produce wine in large quantities, at the same time they import relevant wine volumes in order to satisfy their large national consumptions. Russia and China are the two only non-OECD countries in that group of important wine importers. Both countries possess a growing middle and upper class which fosters a growing wine demand. In 2012, China imported almost 400 million litres of wine, which is 13 times more than 10 years ago.

Description of typical wine grape farms

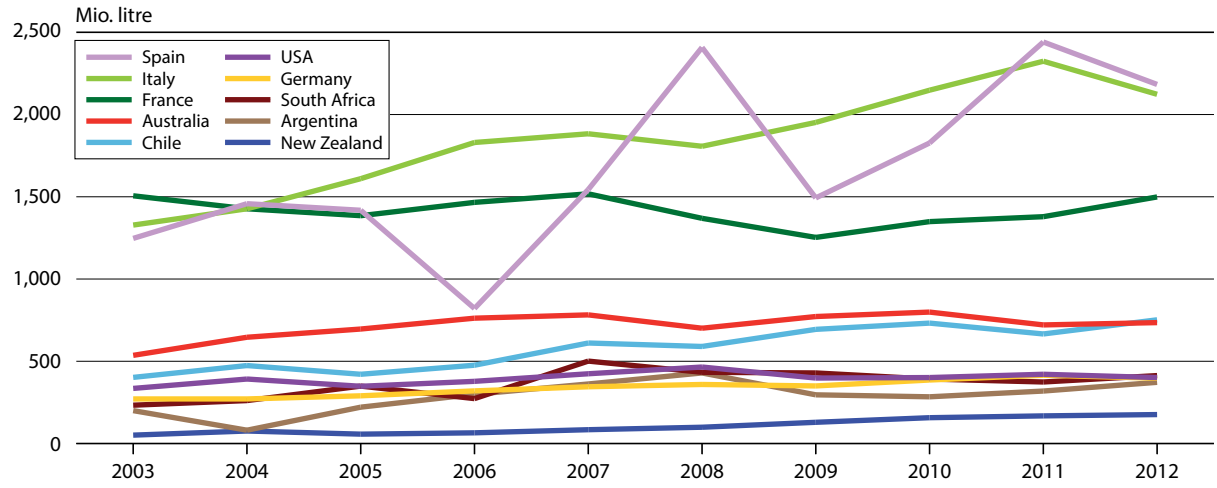
The *agri benchmark* network so far covers eleven different wine production regions in six countries in Europe, South Africa and Australia (Figure 2.2.3). In most participating countries two typical farms have been established, in Germany so far only one and in Spain even three. The size of the typical farms ranges between 5 ha in the Italian Emilia-Romagna and 130 ha in the La Mancha region of Spain. The cultivated vine varieties are very diverse and include both international (Cabernet Sauvignon, Shiraz, Merlot, Chardonnay) as well as local varieties such as Carignan in France, Riesling in Germany, Sangiovese and Prosecco in Italy, Tempranillo and

2.2.1 Global wine production, 1963–2012 (five year averages)



Source: 5 year averages based on FAOSTAT (2014), correction made for Germany in 2012.

2.2.2 Wine exports of selected important countries, 2003–2012



Source: UNComtrade (2014), wine of fresh grapes including fortified wine, exports to world.

2.2 Wine grape results

Airen in Spain as well as Chenin Blanc in South Africa. Out of the 12 farms established so far, 10 farms produce wine grapes and sell them to cooperatives or other buyers, mainly under contract or on the spot market. The remaining two farms further process the wine grapes on farm into bulk wine (FR-20-L) and packaged wine (IT-10-V). However, wine making is not considered in the analysis. The factsheets in Chapter 4.2 provide further details on the specific features of the typical wine grape farms.

An important characteristic of a wine farm is the age structure of its vineyards. A high share of older vineyards may lead to high current yields and profits; however, constant renewal of vines is important to sustain productivity in the long run. Also, continuous improvement of varieties and changing market demands are relevant issues to be considered in planning vineyard utilisation periods. The shortest average utilisation period reported for the typical farms is 25 years, as, e.g., in Germany, Italy and South Africa (Figure 2.2.4). Also in France this duration was mentioned, however it can also go up to 40 years, which is the more typical utilisation period recorded for the Australian farms. The data for the Spanish farms could not yet be collected in detail and therefore they show theoretically 100 % full bearing vineyards. However, in reality they also renew part of the vineyards on a regular basis. Nevertheless, the costs for establishing new vineyards have been accounted for, though in a different way than in the other farms (see explanation in Chapter 1.4).

Total costs and profitability

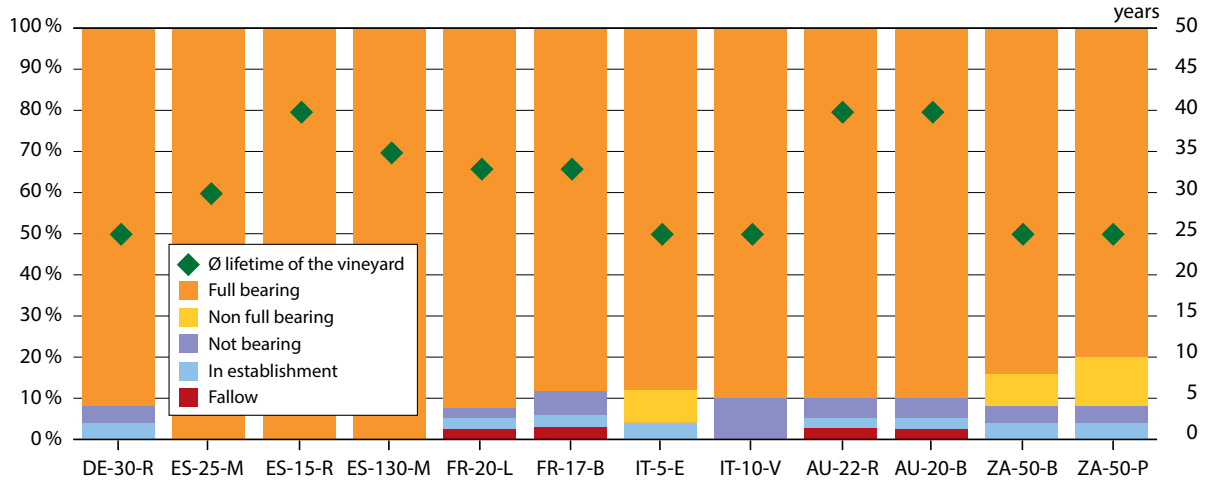
Overall profitability of wine grape production has been rather low for the typical farms (Figure 2.2.5 and 2.2.6). The total production costs, calculated as farm averages across all vine varieties and also all age phases, are very variable across the countries and even between the different regions within a country. While the three Spanish farms produce at lowest costs between 2,300 and 3,200 EUR/ha (290 to 500 EUR/t), the most expensive grape producers, i.e., Italy, Australia and Germany, reach costs between 8,000 and 9,900 EUR/ha (800 to 1,100 EUR/t).

Only one Italian (IT-10-V) and one Spanish (ES-15-R) farm cover their total cost of production, including opportunity costs, and thus generate an entrepreneurial profit from wine grape production in 2011. However, almost all farms cover their cash costs (direct and overhead costs, hired labour and depreciation) and

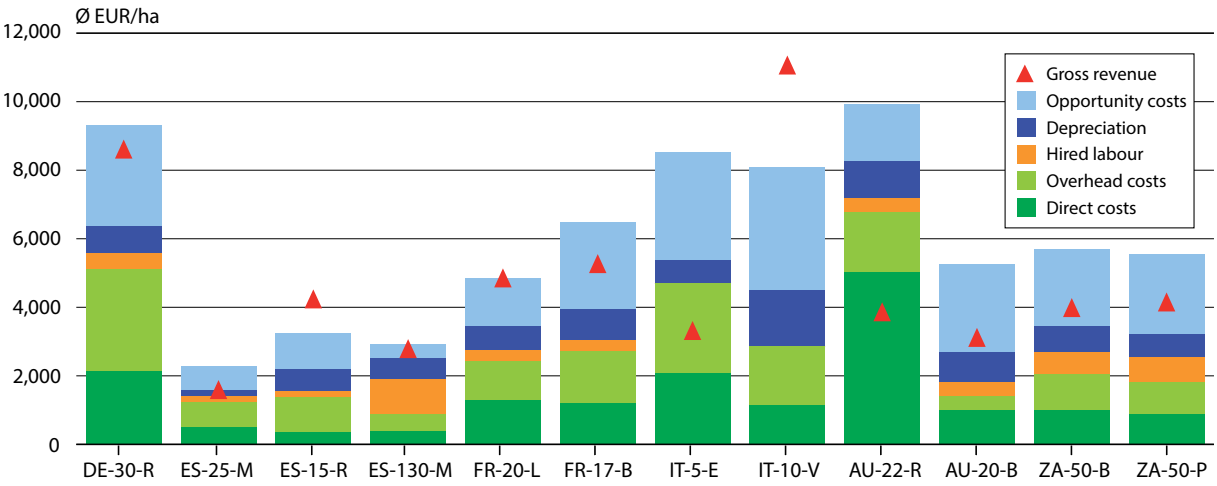
2.2.3 Overview: 12 typical wine grape farms in six countries

	Country	Region		Production 2011	3 most important varieties
			ha	t	
Europe	Germany	Rheinhessen (R)	30	349	Müller Thurgau, Riesling, Dornfelder
	Italy	Emilia-Romagna (E)	5	38	Sangiovese
		Veneto (V)	10	151	Prosecco, Pinot Grigio, Cabernet S.
	France	Languedoc (L)	20	184	Shiraz, Merlot, Carignan
		Bordeaux (B)	17	123	Merlot, Cabernet S. + F.
	Spain	La Mancha (M)	25	173	Tempranillo, Airen
		La Mancha (M)	130	1,316	Tempranillo, Shiraz, Merlot
		Rioja (R)	15	98	Tempranillo
Non-EU	Australia	SA-Riverlands (R)	22	415	Chardonnay, Shiraz, Cabernet S.
		SA-Barossa (B)	20	103.5	Chardonnay, Shiraz, Cabernet S.
	South Africa	Breedekloof (B)	50	923	Chenin Blanc, Colombar, Shiraz
		Paarl (P)	50	558	Chenin Blanc, Cabernet S., Shiraz

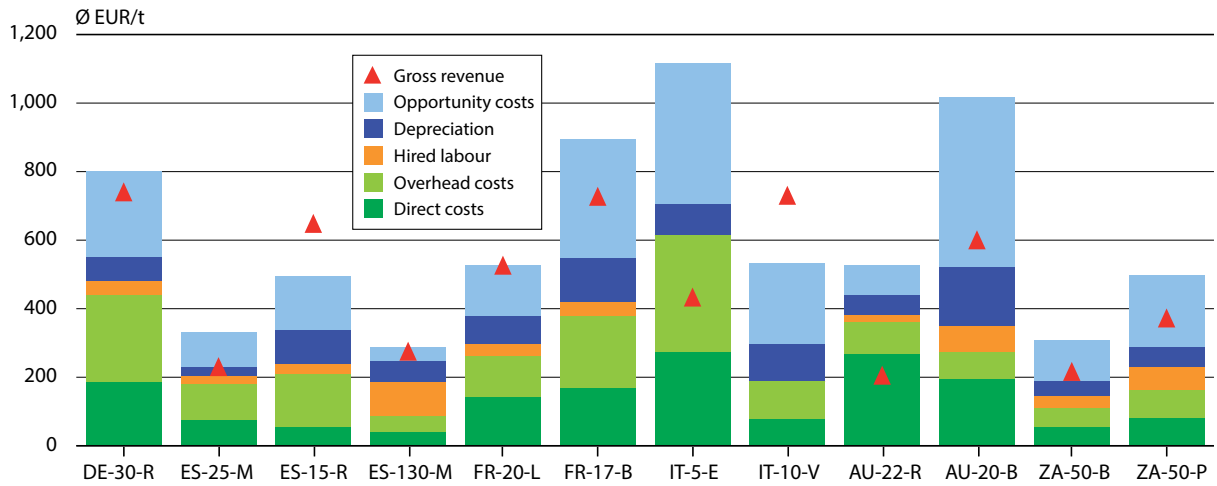
2.2.4 Age structure of typical wine grape farms



2.2.5 Total wine grape production costs per hectare, 2011



2.2.6 Total wine grape production costs per tonne, 2011



at least a part of their opportunity costs. For the Italian farm in Emilia-Romagna prices were particularly low with about 380 EUR/t for its only grape variety, Sangiovese. At the same time direct cost are high, driven by the highest pesticide costs (Figure 2.2.7), and thus this typical farm only covers its direct costs in 2011.

The other typical farm with very high economic losses in 2011 is the irrigated Australian farm AU-22-R, which is situated in the Riverlands. The second Australian farm AU-20-B is located in a different water catchment and hardly incurs any irrigation costs. Between 2006 and 2011, the Riverlands experienced an extraordinary drought. In order to secure minimum water flows in the river, the government cut the allowance to withdraw irrigation water to only 18 to 67 % depending on the year. Due to unreliable offers for renting water rights, farmers generally preferred buying permanent rights. To secure their production and the survival of their vineyards, farmers were forced to buy additional water rights at very high costs. Thus, in the year 2011 the total variable costs allocated to irrigation were calculated at nearly 3,900 EUR/ha, representing 68 % of the overall direct cost (Figure 2.2.5). Please refer to Annex A.1 for the further explanation of terms used in the figures and text.

Inputs, operating and opportunity costs

The costs for inputs such as fungicides, other pesticides and fertilisers are on rather different levels in the different countries (Figure 2.2.7). One of the lowest pesticide inputs was registered for the Australian farm in the Barossa valley (55 EUR/ha) which participates in quality schemes and targets a higher price level as compared to the other Australian farm. The Spanish farms spend between 43 and 158 EUR/ha on various pesticides whereas the Italian and German farms spend 900 to 1,000 EUR/ha. In European countries fungicide costs represent the majority of pesticide costs with on average 71 %. In South Africa the different pesticide costs could not be distinguished and are therefore aggregated under “other pesticides”. Almost all farms apply fertiliser or compost on their fields or plant cover crops on the strips between the vine rows to increase the organic matter (8 to 208 EUR/ha).

A major part of operating costs (Figure 2.2.8) is the costs for hired and family labour. Both Italian farms are the only ones not paying any hired labour to hired labour since all work on farm is done by family labour. Most farms hire contractor services for grape harvest and partially also for the establishment of new vineyards. However, the Barossa farm is an exception here since for quality reasons they harvest manually. Farms in South Africa are in transition because at the moment they use both machines and hired labour during harvest. As labour is becoming more expensive, mechanisation may increase also there. However, the social impact of firing people also needs to be considered. Lowest machinery costs were calculated for the Spanish farm ES-130-M, the largest farm in our sample, which can realise economies of scale.

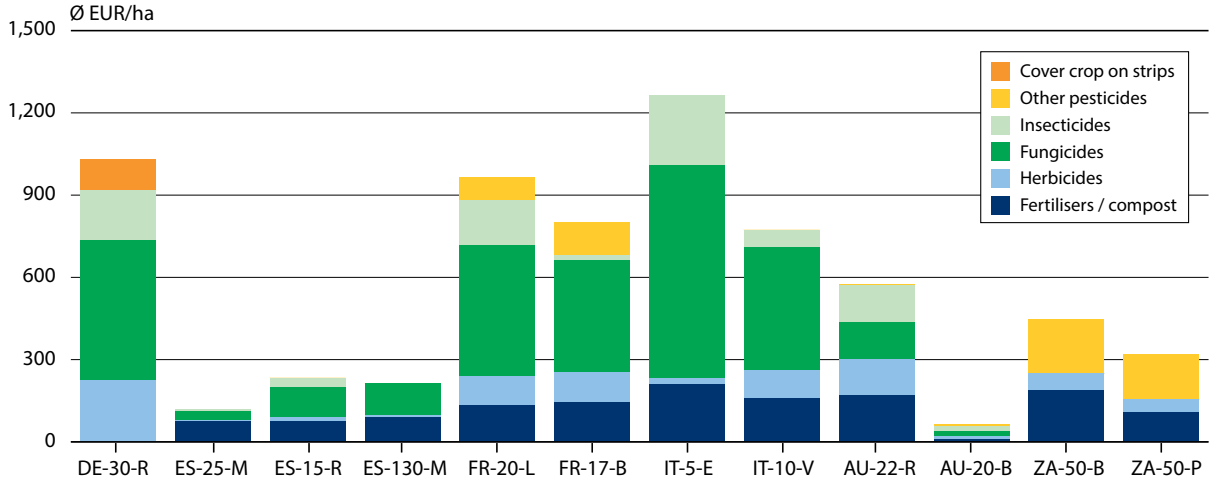
Low wages in South Africa as compared to the European countries and Australia are a main driver of labour use (Figure 2.2.9), and related to labour productivity. The hired labour in South Africa comprises both, permanent and seasonal workers. One of the reasons for low labour productivity in South Africa is the non-efficient use of permanent personnel during seasons with low activities. Due to a very high gross return the Veneto farm shows the highest labour productivity (74 EUR/h).

The valuation of family labour costs is based on wages for comparable jobs or on official calculatory cost estimates. Thus, family labour input is part of the opportunity costs, which also include the costs for using own land or own capital (Figure 2.2.10). Land costs are particularly high for the German, the Italian, the South African farms and the Australian farm in Barossa where land is scarce, competing with other uses or is very productive.

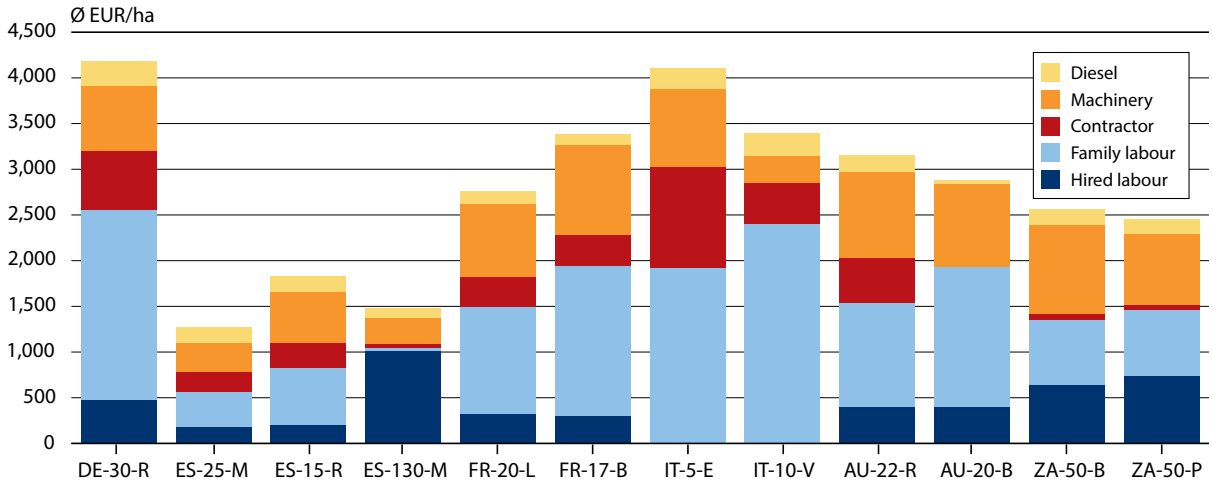
Yields, revenues and profit

The overall productivity and a cascade of different profitability indicators are illustrated in Figure 2.2.11. Given the high costs of irrigation, even the gross margin of the Australian

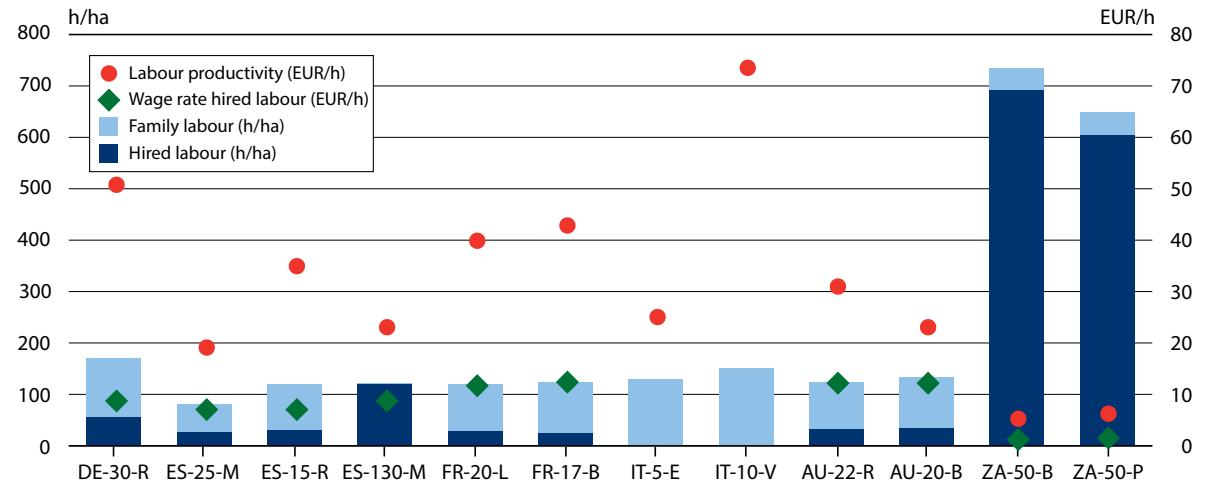
2.2.7 Input costs, 2011



2.2.8 Operating costs, 2011



2.2.9 Labour use and labour productivity, 2011



2.2 Wine grape results

Riverlands farm is negative. A negative accounting profit is shown also by the Italian farm in Emilia-Romagna which means parts of depreciation and overhead costs are not covered. As many farms are not in a position to cover their opportunity costs, the economic profit is often close to zero or even negative.

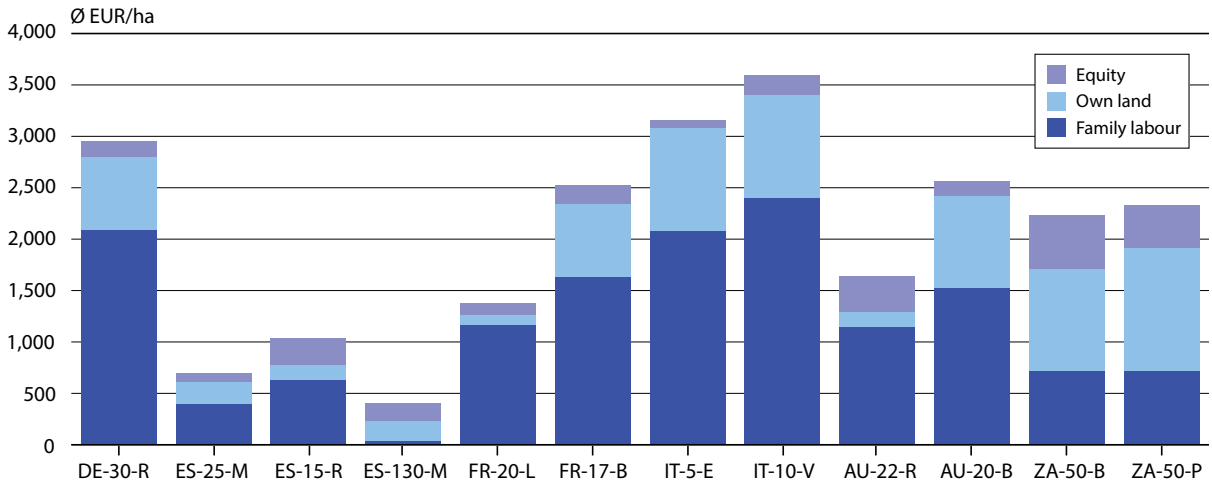
For a number of farms, such as in Italy and South Africa, we have managed to obtain updated results. The small time series for the years 2010 till 2012 (Figure 2.2.12) makes differences between the years, in particular regarding gross revenue, evident.

Wine grape yields vary largely across the typical farms and between varieties. White wine grape yields tend to be slightly higher than yields of red vine varieties (Figure 2.2.13). As the focus of the analysis is on the production of wine grapes and not on the processed wine, figures are shown in t/ha.

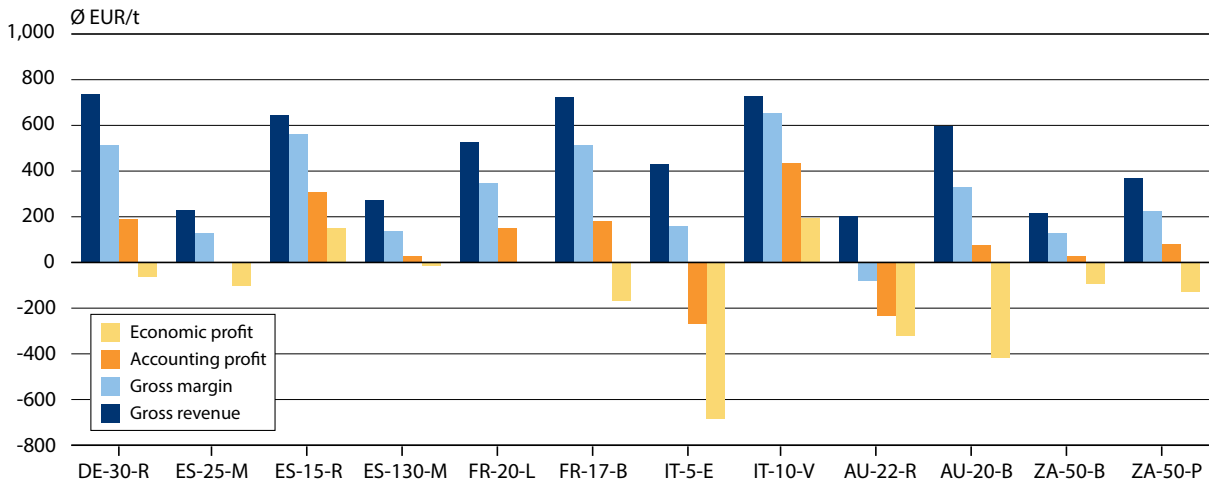
In 2011, the yields of the white vine varieties range between 4.5 t/ha (Airen, ES-25-M) and 25 t/ha for Chenin Blanc in South Africa. The yields of the six red vine varieties analysed are closer together and range between 5 and 20 t/ha.

The specification of typical production systems for different varieties allows direct comparison between producing regions. 'Cabernet Sauvignon' is a popular internationally traded variety

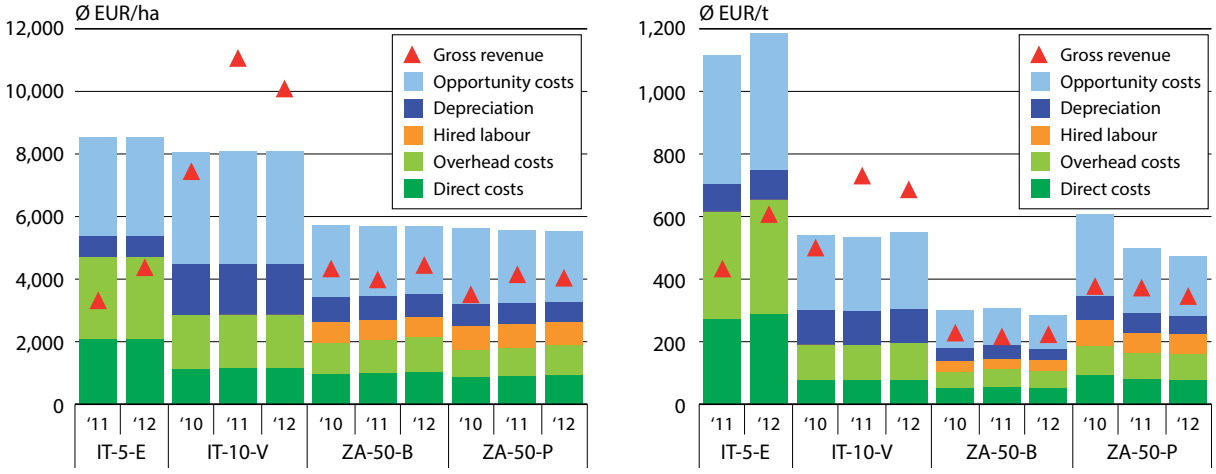
2.2.10 Opportunity costs, 2011



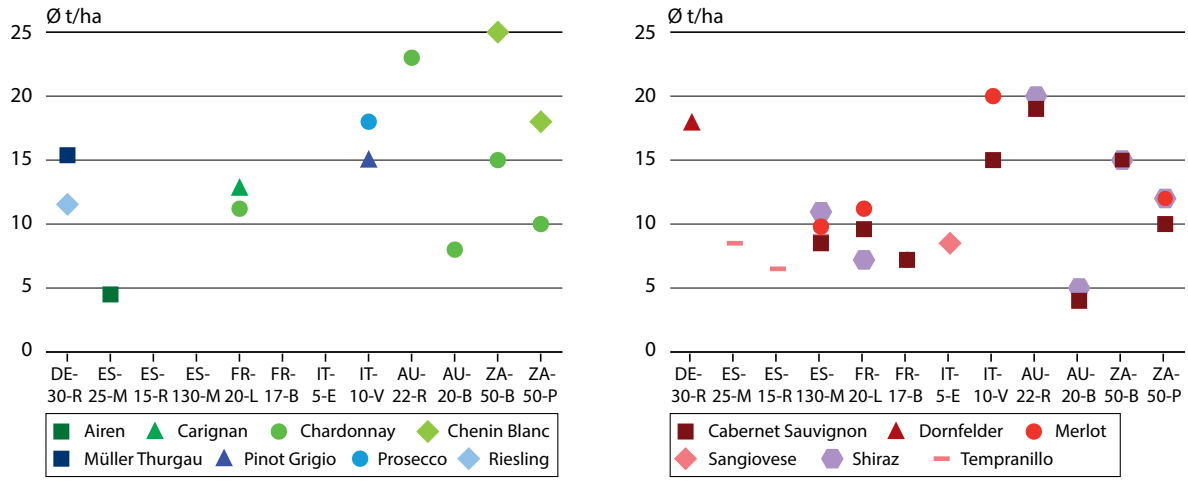
2.2.11 Profitability indicators per tonne, 2011



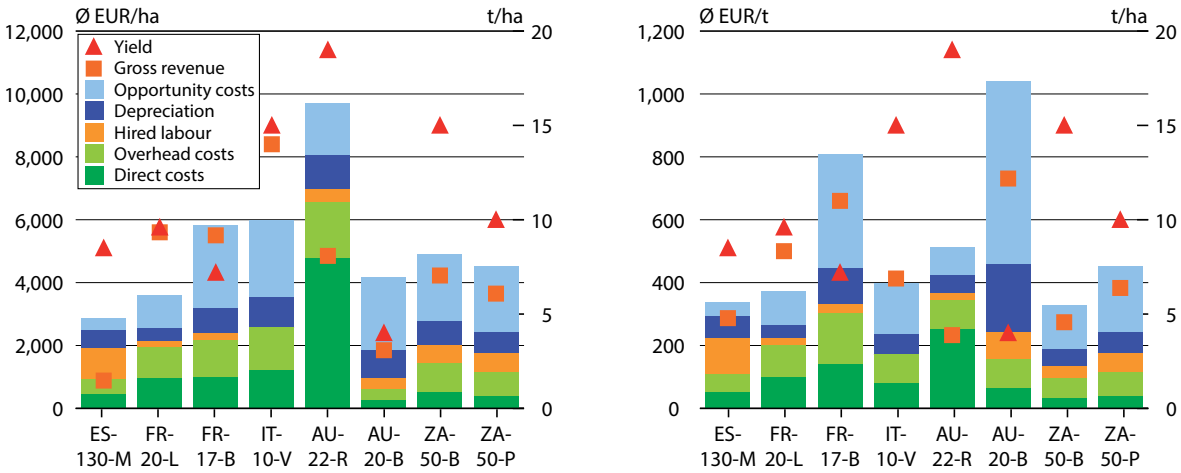
2.2.12 Total wine grape production costs, 2010–2012



2.2.13 Yield white and red wine varieties, 2011 (only full bearing vines)



2.2.14 Cabernet Sauvignon total costs and revenues, 2011 (only full bearing vines)



grown by four European and all non-European typical farms (Figure 2.2.14). Even though the calculation now was based only on the full bearing vines and neglecting the young vineyards in establishment, the profitability is still comparable to the one shown at whole farm level and across all varieties (Figure 2.2.5 /2.2.6).

Kathrin Strohm

References

Anderson, K. and Nelgen, S. (2011), "Global Wine Markets, 1961 to 2009: A Statistical Compendium", Adelaide: University of Adelaide Press.
(Freely available e-book at: www.adelaide.edu.au/press/titles/global-wine)

FAOSTAT (2014), database on wine production.
(online: http://faostat.fao.org/site/636/DesktopDefault.aspx#ancor)

UN Comtrade, (2014), United Nations Statistical Division: Commodity Trade Statistics Database, Commodity Code 2204. (online: http://comtrade.un.org/)

3 Our *agri benchmark* Horticulture crops and countries

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3.1 Apples: Production in Germany and Italy – distribution and trends

Introduction

Apples are grown on 70 % of the tree fruit production area in Germany and are the most consumed fruit with 19.5 kg per capita and year. In the past years, total harvest of apples in Germany varied between 800,000 and 1 million tonnes, grown on an area of about 32,000 ha (Statistisches Bundesamt, several years, and 2012a). The major part of production is sold on domestic markets and meets about 60 to 65 % of apple demand (AMI 2012). In Italy, apples are produced on nearly double that area, 60,000 ha yielding around 2 to 2.4 million tonnes per year. Hence, Italy shares the position of being the largest apple producing country in the European Community with Poland, where a similar amount of apples, around 2 million tonnes, is produced annually, (FAOSTAT, 2013). Italy exports around 46 % of the annual production. Main export destination is Germany with 26 % of total production, i.e., more than half of all exports. At the same time, Italy is the most important foreign supplier of apples to Germany, with 37 % of total apple imports (UN Comtrade, 2014). With similar harvesting seasons, German and Italian apple producers compete directly on the German market.

Therefore, this article compares production structures with respect to the geographical distribution, farm sizes and developments in terms of structural change in Germany and Italy, as well as international trade flows.

Statistical data bases

The main data sources on apple production and farm structures are the agricultural statistics of the national statistical institutes of Germany (Statistisches Bundesamt) and Italy (Istat):

Germany:

- Fruit tree census in 2002, 2007 and 2012a (Statistisches Bundesamt): Statistics on the farm structures based on a full census of farms with tree fruit areas of 0.5 ha or more. The lower boundary of farm sizes included in the census was 0.3 ha before 2007, hence the numbers of farms are not directly comparable with previous years.
- Production statistics: annual estimates of area under apple trees and apple production by German federal states (Statistisches Bundesamt, several years).

Italy:

- Agricultural census in 2000, 2010 (Istat): Statistics on the farm structures based on a full census of farms with fruit tree areas of 0.1 ha or more.
- Production statistics: annual estimates of area under apple trees and apple harvest by Italian provinces (Istat, several years).

For information on international trade and prices, the following statistics were used:

- Agrarmarkt Informations-Gesellschaft (AMI, 2012): Annual balances for the fruit market in Germany, prices paid by producer organisations.
- Chamber of Commerce, Industry and Agriculture of Bologna (Camera di Commercio, Industria, Artigianato e Agricoltura di Bologna (Cam. Commercio, 2013)): Statistics on farm gate prices for apples by variety in Italy.
- United Nations Statistical Division, UN Comtrade (2014): international trade statistics, exports and imports of fresh apples (product code 080810).

Farm structures and structural change

With about 31,000 ha, apple acreage in Germany has remained stable over the past 10 years. The average apple harvest between 2002 and 2012 was 940,000 t/year, varying according to weather conditions by around 17 % (Statistisches Bundesamt, several years). The year 2012, when the most recent fruit tree census was conducted, can be considered a rather representative year with respect to yields (Figure 3.1.1). There are clear geographical clusters of apple production in Germany. The region near Lake Constance (in Baden-Württemberg) and the region of "Niederelbe" in Northern Germany, including parts of Lower Saxony and Hamburg, each produce about 30 % of the total apple harvest.

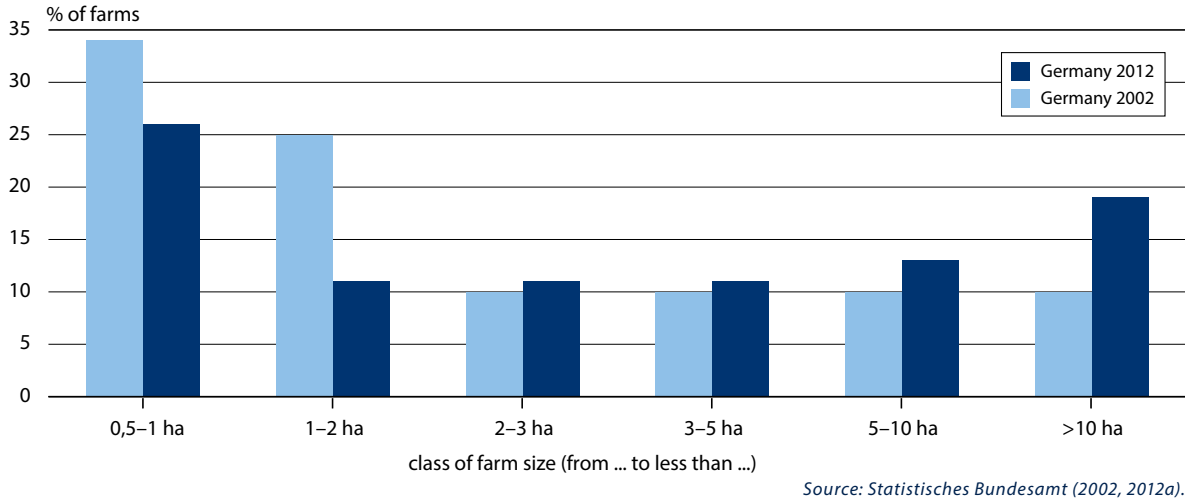
Further clusters are found along the river Rhine, in the federal states of North Rhine-Westphalia,

3.1.1 Apple acreage and production in Germany by federal states, 2012

	Acreage		Production	
Federal state	ha	%	t	%
Germany, total	31,640	100.0 %	972,405	100.0 %
Baden-Württemberg	10,172	32.1 %	293,050	30.1 %
Bavaria	1,124	3.6 %	35,018	3.6 %
Brandenburg	1,131	3.6 %	35,710	3.7 %
Hamburg (HH)	1,093	3.5 %	33,462	3.4 %
Lower Saxony (NI)	8,163	25.8 %	274,261	28.2 %
Niederelbe (HH + NI)	9,256	29.3 %	307,723	31.6 %
Mecklenburg-West Pomerania	1,422	4.5 %	46,491	4.8 %
North Rine-Westfalia	1,682	5.3 %	51,246	5.3 %
Rhineland-Palatinate	1,682	5.3 %	22,499	2.3 %
Saxony	1,355	4.3 %	92,473	9.5 %
Saxony-Anhalt	858	2.7 %	27,398	2.8 %
Thuringia	1,165	3.7 %	40,324	4.1 %

Source: Statistisches Bundesamt (2012).

3.1.2 Size of apple farms in Germany, 2002 and 2012 (Share of farms in different size classes)



Source: Statistisches Bundesamt (2002, 2012a).

Rhineland-Palatinate and Baden-Württemberg, as well as along the river Elbe in Saxony. The latter represents only 4.5 % of total acreage, yielding however 9.5 % of total apple production, indicating above average yields in this region.

The comparison of farm size distributions in the fruit tree census of 2002 and 2012 clearly shows the continuous structural change in German apple production (Statistisches Bundesamt 2002, 2012a). Even though apple farms with less than 3 ha constitute the majority of all farms in 2012, the figures show a significant shift towards larger farm sizes (Figure 3.1.2). This is illustrated particularly in the farm size class of 10 ha and more, which doubled its share from 2002 to 2012. While total apple acreage has remained constant, this implies a reduction in the number of farms. Accounting for the change in the lower boundary of farm

size included (from 0.3 to 0.5 ha) between the census, the number of apple farms has declined by 26 % in this period and average apple acreage increased from 3.8 ha to 5.2 ha.

There are significant differences in farm sizes between the production regions. In Baden-Württemberg, for example, apple acreages per farm tend to be much smaller than in the region of Niederelbe (Figure 3.1.4). In the latter region, in 2012 88 % of apple acreage was located in farms of 10 ha or more, as compared to Baden-Württemberg with only about 50 %. However, in both regions, apple acreage has increased only in the large sized farms.

In Italy, apple acreage decreased by 10 % between 2000 and 2010, while the production quantity remained stable. This indicates an increase in average yields. Average production over the past ten years was about 2.1 million tonnes per year. The variation in total production has been smaller than in Germany with a maximum of 9 % of the average. Apple production in Italy is geographically even more concentrated than in Germany. About 50 % of Italian apple acreage is located in the Alpine region of Trentino-Alto Adige with the autonomous provinces Trentino and Bolzano. Production systems there are characterised by a high intensity of cultivation and very high yields. Hence, 70 % of total Italian apple production is harvested in this region (Figure 3.1.3). Other provinces with significant shares in total apple production are Veneto (7.8 %), Piedmont and Emilia-Romagna (each 6 %).

Farm structure distribution in Italy is similar to Germany (see Figures 3.1.1 and 3.1.5), with a large number of farms cultivating less than 3 ha. Yet, apple farms in Italy tend to be smaller, with an average acreage of only 1.1 ha in 2010. The changes in apple farm structures in Italy between 2000 and 2010 were enormous, with a 58 % reduction in the number of farms between the two censuses (Istat, 2010).

The comparison of the two production regions of Trentino – Alto Adige and Emilia-Romagna shows clearly the ongoing shift towards larger

3.1.3 Acreage and production of apples in Italy by provinces, 2010

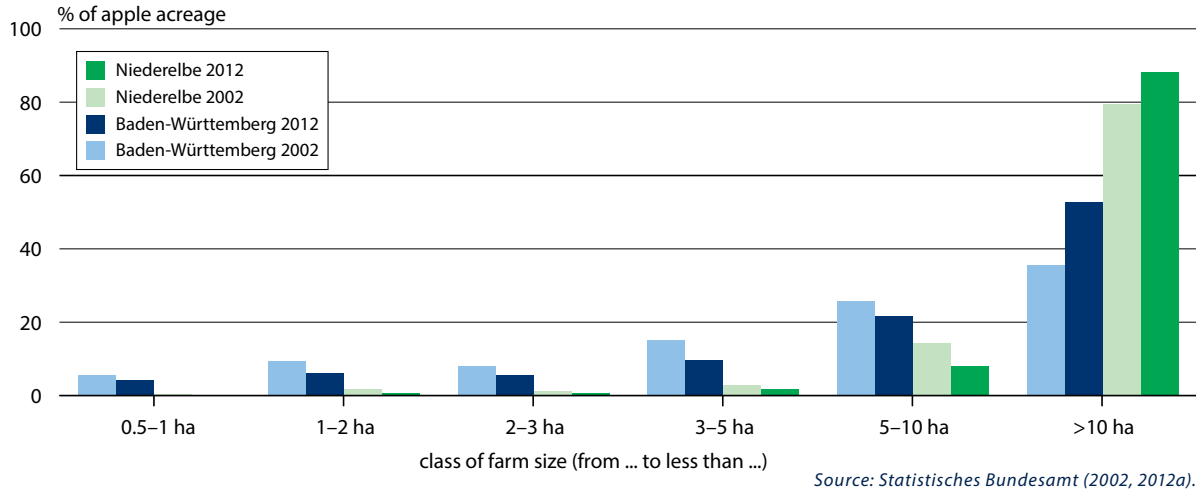
	Acreage		Production	
Province	ha	%	t	%
Italy, total	54,684	100.00 %	1,991,312	100.00 %
Piedmont	3,989	7.30 %	121,544	6.10 %
Valle d'Aosta	360	0.70 %	3,500	0.20 %
Lombardy	1,880	3.40 %	45,750	2.30 %
Trentino-Alto Adige	27,500	50.30 %	1,399,070	70.30 %
Veneto	5,979	10.90 %	155,699	7.80 %
Emilia-Romagna	4,065	7.40 %	117,868	5.90 %
Tuscany	918	1.70 %	16,942	0.90 %
Lazio	512	0.90 %	8,321	0.40 %
Abruzzo	563	1.00 %	13,885	0.70 %
Molise	430	0.80 %	6,800	0.30 %
Campania	3,398	6.20 %	65,932	3.30 %
Basilicata	357	0.70 %	7,167	0.40 %
Calabria	638	1.20 %	7,899	0.40 %
Sicily	697	1.30 %	12,377	0.60 %
Other provinces	3,398	6.20 %	8,559	0.40 %

Source: Istat (2013).

– Erratum –

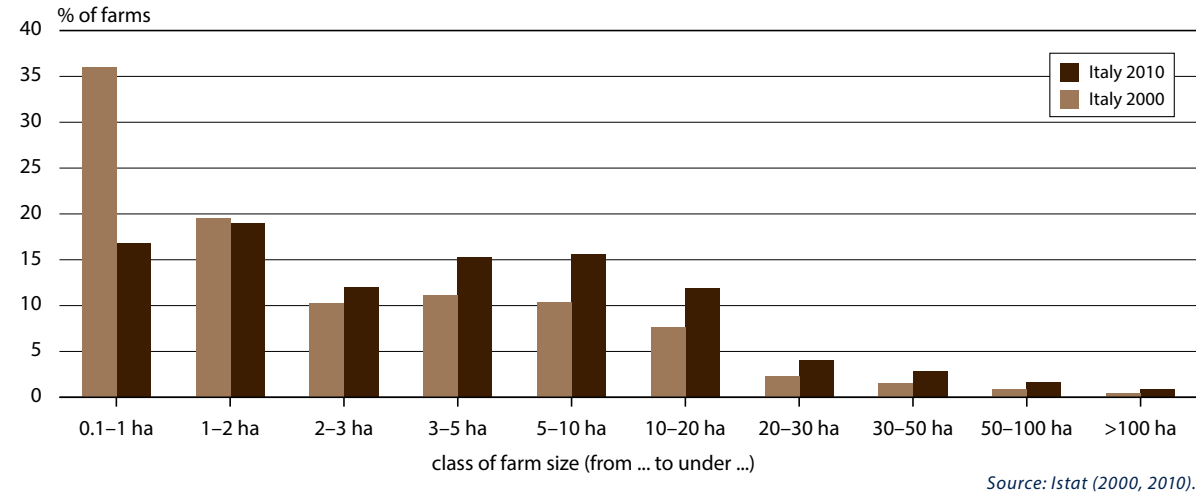
3.1.4 Size of apple farms in Baden-Württemberg and Niederelbe, 2002 and 2012

(Share of apple acreage in different size classes)



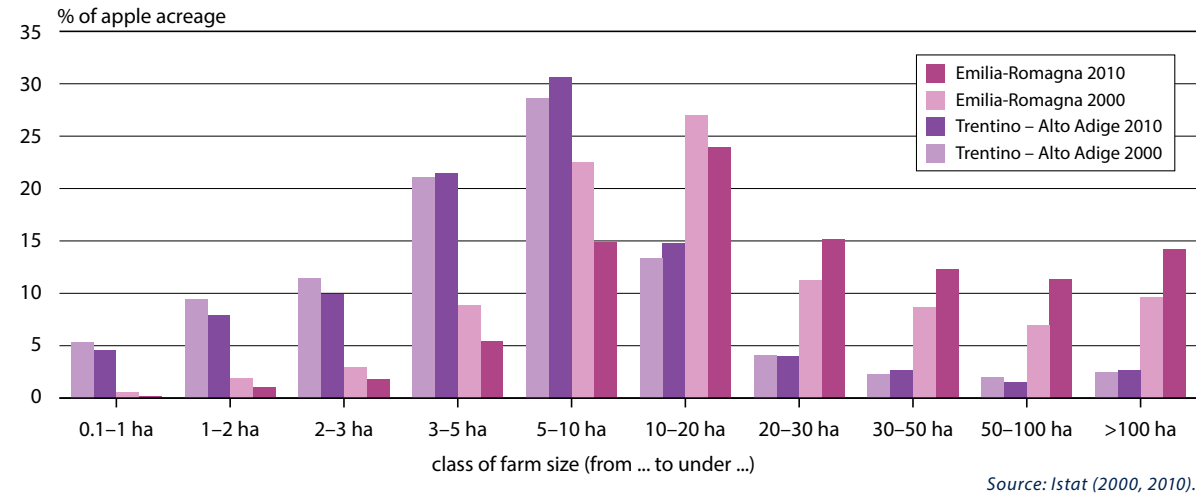
Source: Statistisches Bundesamt (2002, 2012a).

3.1.5 Farms by class of farm size in Italy, 2000 and 2010 (Share of class of farm size in %)



Source: Istat (2000, 2010).

3.1.6 Apple acreage by class of farm size in Trentino-Alto Adige and Emilia-Romagna, 2000 and 2010 (Share of acreage of class of farm size %)



Source: Istat (2000, 2010).

farm sizes (Figure 3.1.6). However, in the Alpine region, small farms continue to be important. Due to a well-organised and comprehensive system of first and second level cooperatives dealing with input supply, technical service, storage, sorting and marketing, small farms are still able to survive and be competitive on the market. In of Trentino – Alto Adige the share of apple acreage in farms below 3 ha decreased, but increased for the medium size farms of 3 to 20 ha. For the large farms with more than 20 ha apple acreage the changes were insignificant. Farm structures in Emilia-Romagna region are comparable to the German Niederelbe: From 2000 to 2010, apple acreage increased only for the large farm sizes of 10 ha and more, which represent 75 % of total acreage.

In summary, in both countries, structural change has been significant in the past and can be expected to continue. In the coming years, the number of very small apple farms is likely to decline further while apple acreage will more and more be concentrated in medium and large farms.

International trade

The analysis of trade flows to and from Germany shows a significant reduction in imports over the past ten years, from about 800,000 t in 2003 to a level of approximately 600,000 t since 2008 (UN Comtrade). The main supplier of imports is Italy, followed by the Netherlands and France. Off-season imports from the Southern hemisphere originate from New Zealand and Chile, while imports from South Africa, Argentina and Brazil have declined over the past ten years (Figure 3.1.7). Overall, there has been a decline in imports from the South, from 20 % of total imports on average during 2002 to 2008, to only 11 % in 2012. This could be explained by an increasing focus of these countries to supply apple markets in the Middle East and South East Asia. Also, the continuous improvements in storage technologies and infrastructure have led to a year-round supply of high quality fresh apples from German or European production.

Compared to imports, apple exports from Germany are at a rather low level. Main export destinations are the Russian Federation, and to some extent Italy and the Netherlands.

During the last decade, Italy has exported between 31 % and 46 % of its apple production. Imports of apples to Italy are rather negligible. Most important trade partners are Germany, followed by Spain, the Russian Federation and France. The total amounts of exports vary significantly over the years; however an increasing trend is visible since 2008 (Figure 3.1.8). In 2011, the record of 1 million tonnes of apples, 41 % of total production, was exported.

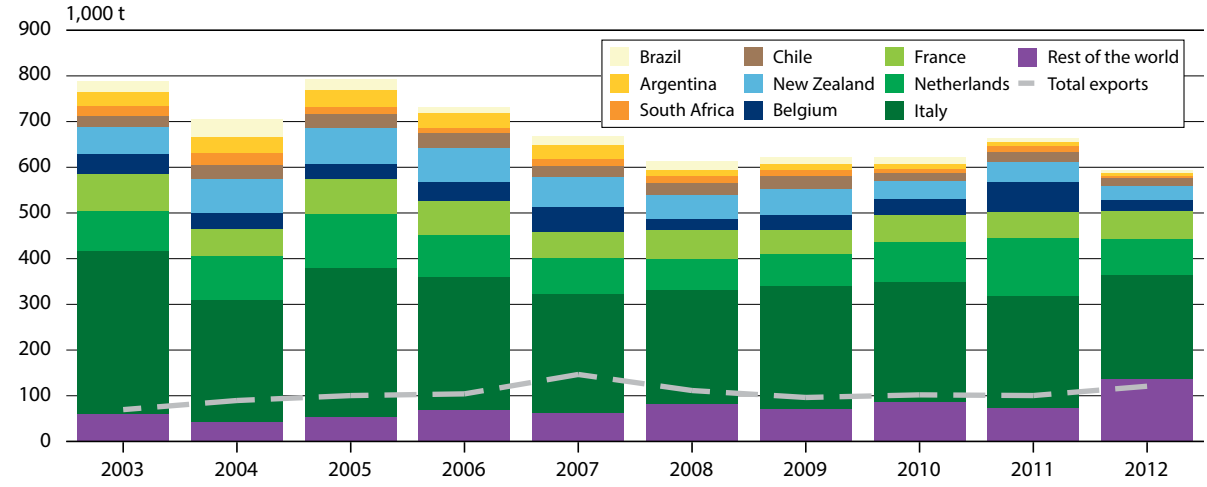
Yields and Prices

Average apple yields are about 33 % higher in Italy than in Germany, with 40 t/ha versus about 30 t/ha (Figure 3.1.9, Istat 2013, Statistisches Bundesamt several years). The main factor for this difference is probably the favourable climate. In both countries yields vary between the years, depending on the weather, and sometimes in different directions. For example in 2012, yields in Germany were higher than average, while they were relatively low in Italy. Since 2002, Italian yields have shown a positive trend from a level of 34-35 t/ha to 39-40 t/ha in 2011/2012. In Germany, variation is generally higher, therefore trends are more difficult to identify. Nevertheless, in recent years the average yields have reached 28-30 t/ha, while ten years ago the level was around 25 t/ha (FAOSTAT, 2013).

Also within the countries, there are differences in yield levels: the Italian Alpine region with its rather small, but very intensely producing farms reports significantly higher yields than Emilia-Romagna. In contrast, in Germany yields are higher in the Niederelbe region, where farms are larger (Figure 3.1.9).

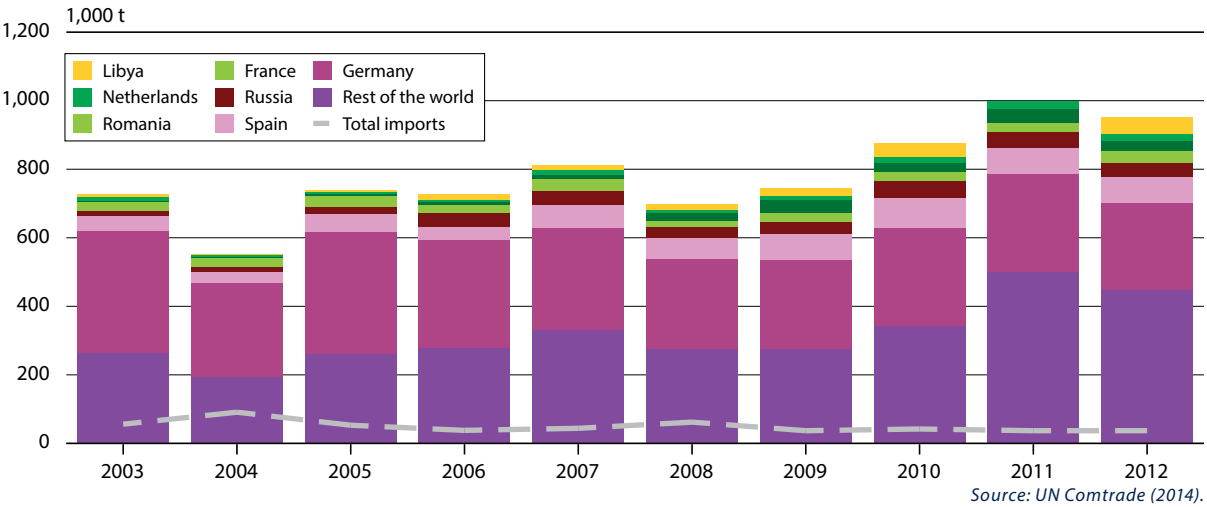
The farm gate prices for Germany and Italy are not directly comparable, since reporting and statistical methods of the data sources are different. However, in both countries, similar patterns in the pricing of different varieties can be observed (Figure 3.1.10). Lower prices are generally paid for traditional or long established varieties such as ‘Elstar‘, ‘Jonagold‘, ‘Braeburn‘ and ‘Gala‘ in Germany and ‘Gala‘,

3.1.7 German apple imports by country of origin and total exports, 2003–2012



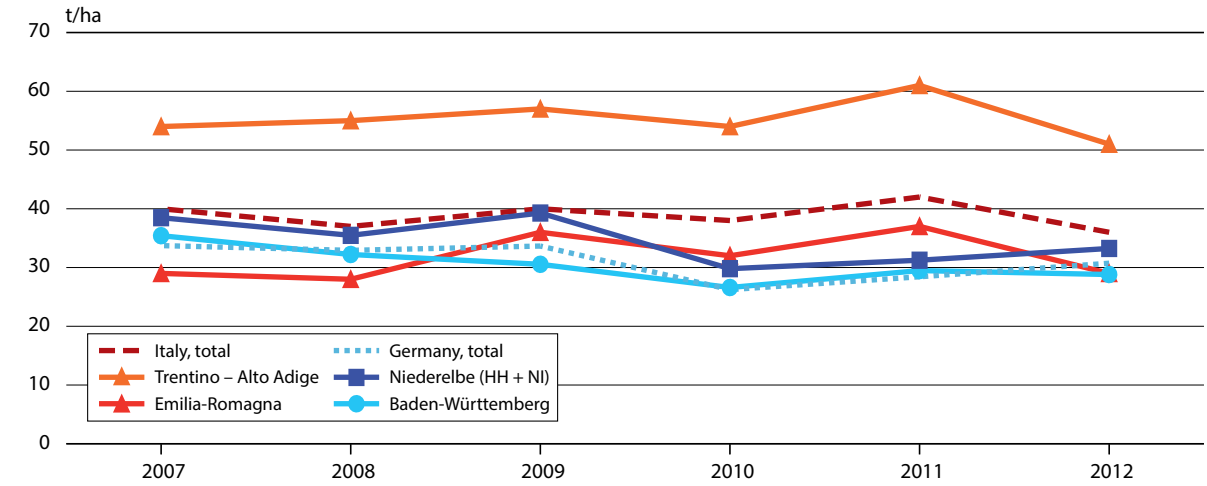
Source: UN Comtrade (2014).

3.1.8 Italian apple exports by destination country and total imports, 2003–2012



Source: UN Comtrade (2014).

3.1.9 Average apple yields in Italy and Germany and in selected production regions, 2007–2012



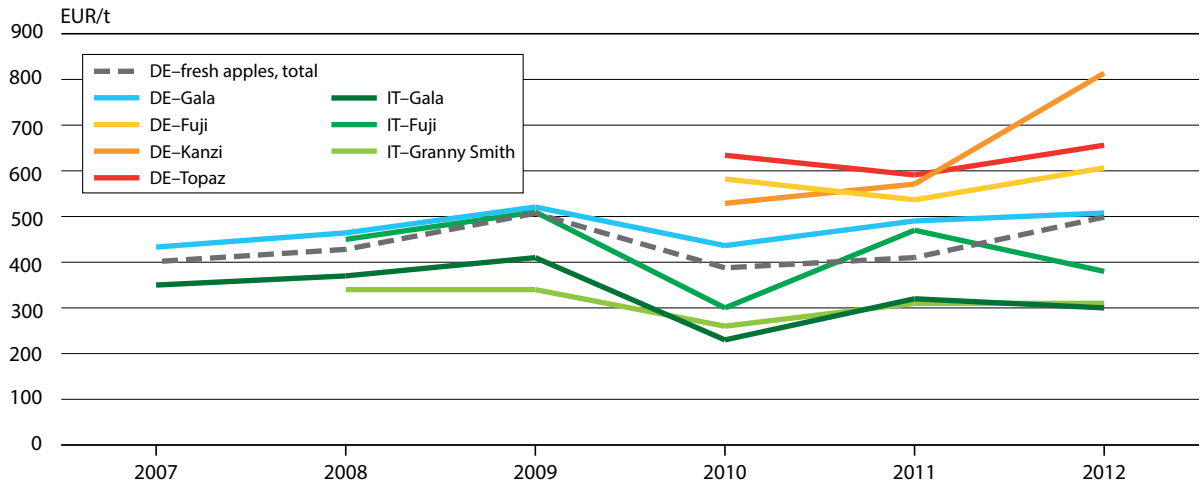
Source: Statistisches Bundesamt (several years) and Istat (2013).

3.1 Apples: Production in Germany and Italy – distribution and trends

'Golden Delicious' or 'Granny Smith' in Italy, which are produced in high quantities. Whereas for the newer varieties such as 'Fuji' in both countries, or 'Topaz' and the club variety 'Kanzi' in Germany prices are paid that can be 20 to 50 % higher than the average apple prices.

Hildegard Garming

3.1.10 Average apple prices by varieties in Germany and Italy[1], 2007–2012



[1] *For Italy, no average price across varieties is available.*
Source: AMI several years, Cam. Commercio (2013).

References

AMI (several years): Marktbilanz Obst 2009, 2010, 2011, 2012, 2013, Agrarmarktinformations-gesellschaft mbH, Bonn.

Cam. Commercio (2013): Camera die Commercio, Industria, Artigianato e Agricoltura di Bologna, Andamento prezzi annuali per campagna – Grafici, (online: http://www.bo.camcom.gov.it/regolazione-del-mercato/borsa-merci-e-rilevazione-prezzi-1/andamento-prezzi-annuali-grafici/andamento-prezzi-annuali-grafici?searchterm=mele+prezzi)

FAOSTAT (2013): Food and Agricultural Organisation of the United Nations – Statistical Devision. Production – Crops. (online: http://www.faostat.org,)

Istat (2000): Instituto nazionale di statistica, Censimiento agricole 2000, (online: http://dati-censimentoagricoltura.istat.it/?lang=en)

Istat (2010): Instituto nazionale di statistica, Censimiento agricole 2010. (online: http://dati-censimentoagricoltura.istat.it/?lang=en)

Istat (2013): Instituto nazionale di statistica, Sistema informativo su agricoltura e zootecnia. (online: http://www.istat.it/it/prodotti/banche-dati)

Statistisches Bundesamt (2002): Baumobstanbauerhebung 2002. Fachserie 3, Reihe 3.1.4, Landwirtschaftliche Bodennutzung – Baumobstflächen. Wiesbaden.

Statistisches Bundesamt (2007): Baumobstanbauerhebung 2007. Fachserie 3, Reihe 3.1.4, Landwirtschaftliche Bodennutzung – Baumobstflächen. Wiesbaden.

Statistisches Bundesamt (2012a): Baumobstanbauerhebung 2012. Fachserie 3, Reihe 3.1.4, Landwirtschaftliche Bodennutzung – Baumobstflächen. Wiesbaden.

Statistisches Bundesamt (several years): Wachstum und Ernte – Obst. Fachserie 3, Reihe 3.1.2, years: 2007, 2008, 2009, 2010, 2011, 2012, Wiesbaden.

UN Comtrade, (2014): United Nations Statistical Division: Commodity Trade Statistics Database (online: http://comtrade.un.org/)

3.2 Apples: Production in South Africa

Overview of the South African apple industry

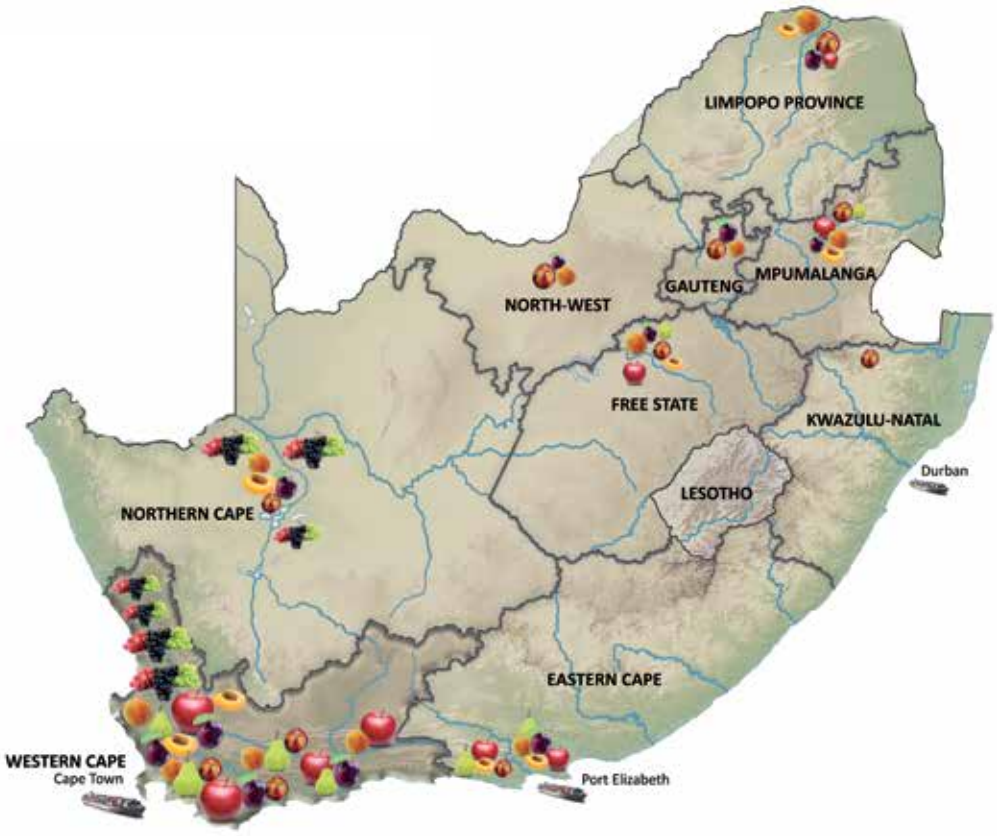
Besides China, a number of European countries and the USA, South Africa (ZA) is one of the most important apple producers globally and in particular in the southern hemisphere. During the last years, South Africa exported on average 42 % of its apple production. Therefore, it belongs to the top-10 exporters of fresh apples in the world and it is interesting to have a closer look at this important apple producer.

The various production regions of deciduous fruit in South Africa are indicated in Figure 3.2.1. The Western Cape Province, with a Mediterranean climate and winter rainfall, is the main production area of deciduous fruit. The three categories of deciduous fruit are grapes (table and dried), pome (apples and pears) and stone (peaches, nectarines, plums, prunes and apricots). Wine grapes are not included in Figure 3.2.1.

The main apple production regions in the Western Cape are EGVV (Elgin, Grabouw, Villiersdorp and Vyeboom) representing 40 % of the apple acreage and Ceres (29 %); in the Eastern Cape it is the Langkloof area (17 %). Therefore, the two typical apple farms so far established in South Africa are situated in EGVV as well as Ceres. The total area planted with apples in South Africa amounted to 22,501 ha in 2013 (Hortgro, 2014).

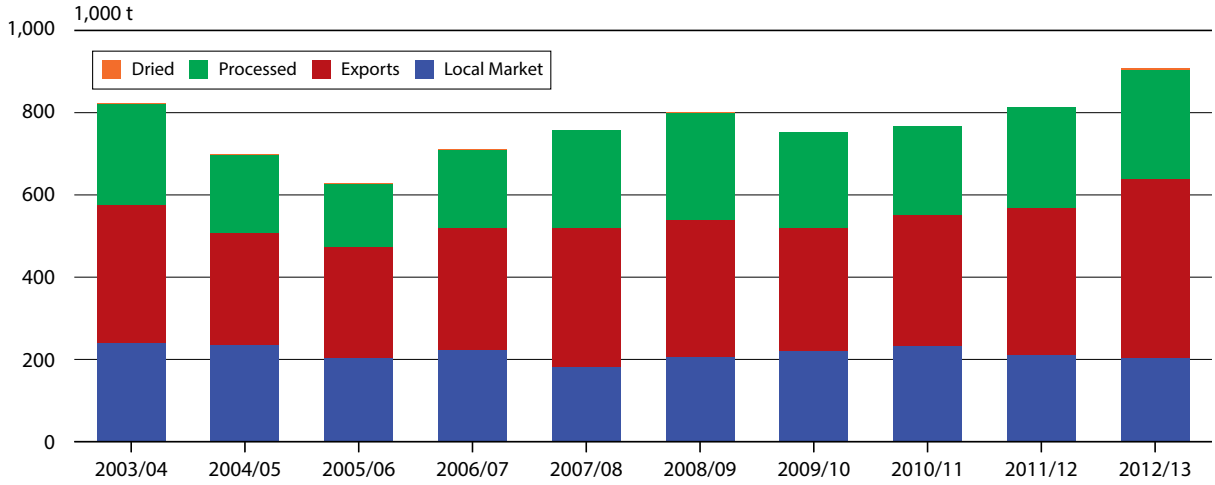
The total apple production amounted to 906 827 t for the 2012/13 harvest and the average market segment breakdown was 28.1, 42.5, 29.2 and 0.2 % respectively for the local, export, processing and dried market (Hortgro, 2014). There are slight fluctuations from year to year but as shown in Figure 3.2.2, a positive trend towards increased production can be seen. The largest share of South African apples is exported and the exchange rate for the 2013 harvest was in favour of South African exports and resulted in an increase in profitability of apple production. The United Kingdom and the rest of Europe

3.2.1 Deciduous fruit regions of South Africa



Source: Hortgro (2014), Key deciduous fruit statistics 2013. Paarl.

3.2.2 South African apple crop per market segment for production years, 2003/04–2012/13



Source: Hortgro Services (2014).

were traditionally the main export destinations for South African apple exports, but the African countries are emerging as an important export market and will probably become the main export destination of South African apples in the near future. South Africa's strong position on export markets is based on its overall good competitiveness in the sector. Based on the latest World Apple Review, South Africa ranks at position 13. With regard to infrastructure and inputs it is even at position 6, reflecting its modern and state-of the art technologies for, e.g., storage and sorting. In terms of production efficiency South Africa ranks 8, right behind Germany and Brazil.

Apple production, like other fruit production systems in South Africa, has to comply with specific national and international food safety and environmental legislation or regulations. Furthermore, as a major apple exporter, producers have to fulfil standards set by various local and international retailers (e.g., GLOBALG.A.P.). The South African fruit industry, under the umbrella of Fruit South Africa (FSA), initiated its ethical trade program that was formalised in 2012 as the Sustainability Initiative of South Africa (SIZA). SIZA is based on local legislation and uses the Global Social Compliance Program (GSCP) as the platform to benchmark its standard and audit process against international standards.

Apple farms are labour intensive and utilise permanent and casual labour. The number and timing of casual labour employed on apple farms are determined by specific actions like harvesting. Most of the activities like pruning and harvesting are done manually. The number of on-farm permanent labour equivalents amounted to 28,220 with 112,882 dependents in 2013 (Hortgro, 2014). The ratio between on-farm permanent and casual labour is 52 : 48. Labour housing and accommodation are partly supplied on-farm. There is labour legislation in place that regulates labour related issues like the minimum wage for farm workers. From 2012 to 2013, the minimum wage increased by 51 % and then rose to 11.66 Rand per hour and 2,275 Rand per month.

The main apple cultivars produced (90 % of the area under apples) are Golden Delicious, Granny Smith, Royal Gala/Gala, Topred/Starking, Cripp's Pink/Pink Lady/Rosy Glow and Fuji (Hortgro, 2014). Pome fruit needs cold winters and apples and pears are often produced in the same farming systems. Twelve percent of pome farms, which comprise 55 % of the pome fruit area, are larger than 100 ha, while 67 % of the pome farms are less than 40 ha (19 % of the area under pome fruit) (Kotze, 2013). Owners of commercial fruit farms are mainly single proprietors and private companies.

Pome fruit farms are capital intensive. High capital investment is needed for the establishment of orchards and the first full bearing of the orchards only happens after numerous

3.2 Apples: Production in South Africa

years. The replacement cycle of orchards vary, but extend over periods from 25 to 30 years and even longer. The age structure of South African apple orchards is quite mixed and therefore sustainable. Even though 28 % of the apple acreage is older than 16 and 33 % even older than 25 years, on the other hand a large proportion is young: 11 % in the first growth period and 20 % between 4 and 10 years old (Hortgro, 2014). Orchards should be irrigated regularly and specific programs are followed for weed and pest control. The Integrated Pest Management (IPM) forms part of this.

After the primary production, it is capital intensive to set up the infrastructure for storage, sorting and packaging in order to market high quality apples. The larger farms have their own packing facilities, while smaller farms utilise the services of nearby packing companies. The yield of apples varies between cultivars and, together with the quality and size of the fruit, has a direct effect on the profitability of apple production systems.

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References

Hortgro (2014). Key deciduous fruit statistics 2013. Paarl.

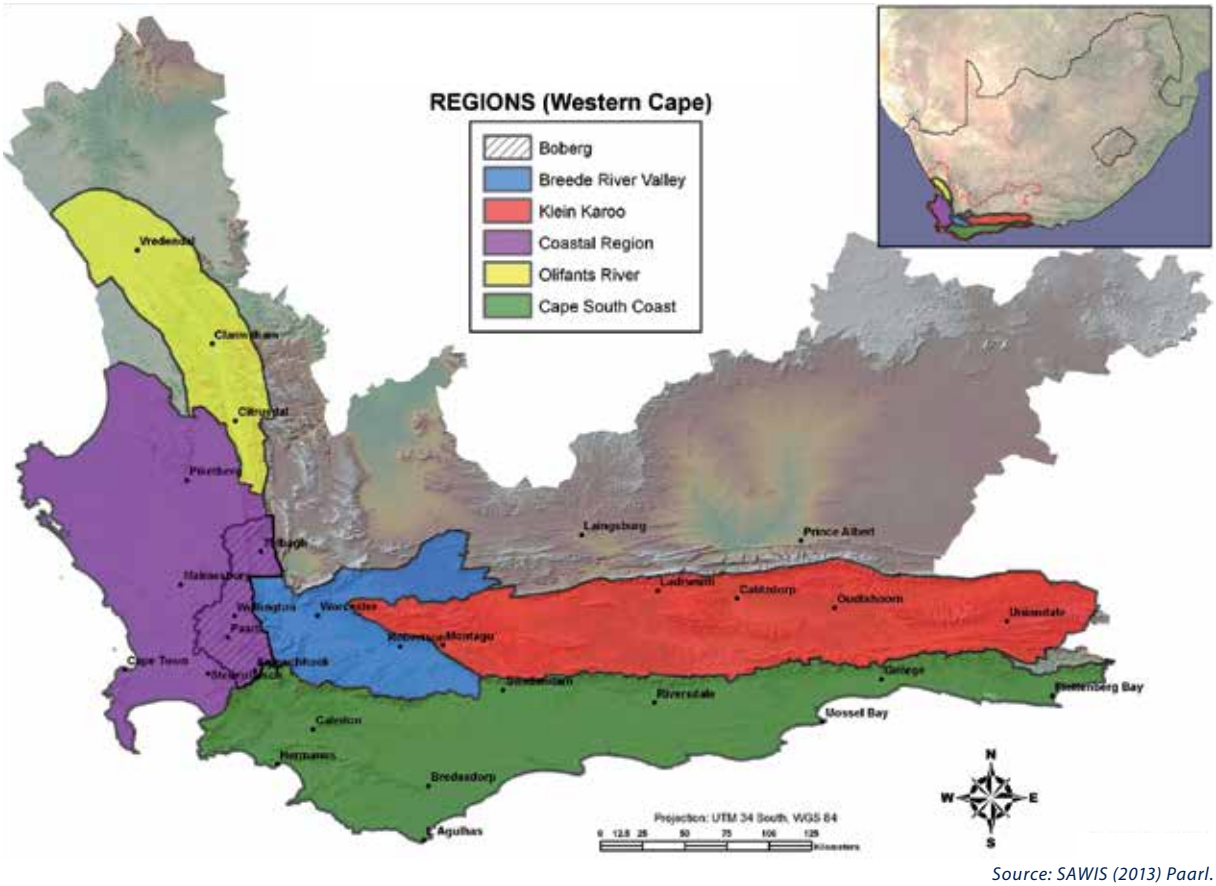
Kotze, M. (2013). Economic position of deciduous fruit producers. Paper presented at Terason.

During the last ten years, South Africa's wine production ranged between 900,000 and 1 million tonnes. Thus, it belongs to one of the 10 most important wine producing countries in the world, and accounts for about 3.6 % of global wine production, similar to the volume produced in Germany (FAOSTAT, 2014). Therefore, the following article will provide an overview of the wine grape production in South Africa.

VinPro, a service organisation for South African wine grape producers, distinguishes nine production regions for wine grapes in South Africa. Eight of these regions are located in the Western Cape Province, while the Orange River region is located in the Northern Province (Figure 3.3.1).

In 2012, the total area planted with wine grapes in South Africa amounted to 100,093 ha (refer to Figure 3.3.2). The largest production areas of wine grapes are in Stellenbosch and Paarl, each region accounting for more than 16 % of South Africa's grape acreage. One of the *agri benchmark* typical farms (ZA-50-P) is therefore located in Paarl. Figure 3.3.3 indicates that over the last years wine grape acreages in Stellenbosch, Paarl and Swartland decreased slightly while the acreage in Robertson and Breedekloof slightly increased. The industry average split in area between white and red wine grape varieties was 55 : 45 in 2012. It is clear from Figure 3.3.2 that the ratio between white and red varieties varied between the production regions, with Stellenbosch having the highest percentage of red varieties, and Orange River having the highest percentage of white varieties. According to SAWIS (2013) the four main varieties planted in South Africa were Chenin blanc (18.2 %), Cabernet Sauvignon (11.8 %), Colombar (11.7 %) and Shiraz (10.5 %). Chenin blanc and Colombar were the two main white varieties planted in the Orange River, Olifants River, Little Karoo and Breedekloof, while in Robertson and Worcester it was Colombar,

3.3.1 Wine production areas in the Western Cape of South Africa, 2013



Source: SAWIS (2013) Paarl.

3.3 Wine grapes: Production in South Africa

Chenin blanc and Chardonnay. In Swartland and Paarl the main white variety was Chenin blanc, while in Stellenbosch it was Sauvignon blanc. The three main red varieties planted in Olifants River, Swartland, Paarl and Breedekloof were Cabernet Sauvignon, Shiraz and Pinotage, while in Stellenbosch, Robertson and Worcester Cabernet Sauvignon, Shiraz, Merlot and Pinotage were the leaders. The choice of cultivar is influenced by the "terroir" and a wide range of wine styles is produced in the various regions.

The total grape production for wine making was 1,414,472 t in 2012. The average yield per hectare varied widely between the different production regions and also between the red and white varieties (Figure 3.3.2). Many of the traditional wine estates around Stellenbosch and Paarl intentionally produce lower yields in order to target a higher priced market segment. The wine grape harvest of 2012 was utilised for wine making (79 %), distilling wine (11 %), wine for brandy (6 %) and grape juice and grape juice concentrate (4 %) (SAWIS, 2013).

The structure of primary wine grape production in South Africa is indicated in Figure 3.3.4. The largest group of wine grape producers produces less than 101 t of wine grapes per year and around 75 % of producers produce less than 501 t per year. The data for four consecutive years indicates that a slight structural change is taking place. Between 2010 and 2013 in total about 270 producers, mainly the smaller ones of less than 501 t per year, quit grape production. In contrast, the number of the larger producers rose.

The average area of wine grapes per producer varies widely between the VinPro regions (Figure 3.3.5). Orange River and Little Karoo, both situated in drier areas, have the smallest average acreage with 7 to 10 ha. Five regions, among them the famous Stellenbosch and Paarl, show averages between 22 and 40 ha. The on average largest wine producers are found in Swartland and Breedekloof each with more than 50 ha. The rather young wine growing region of Breedekloof with its large structures, comparably high yields and high rate of mechanisation was chosen as second production region to establish a typical wine grape farm (ZA-50-B).

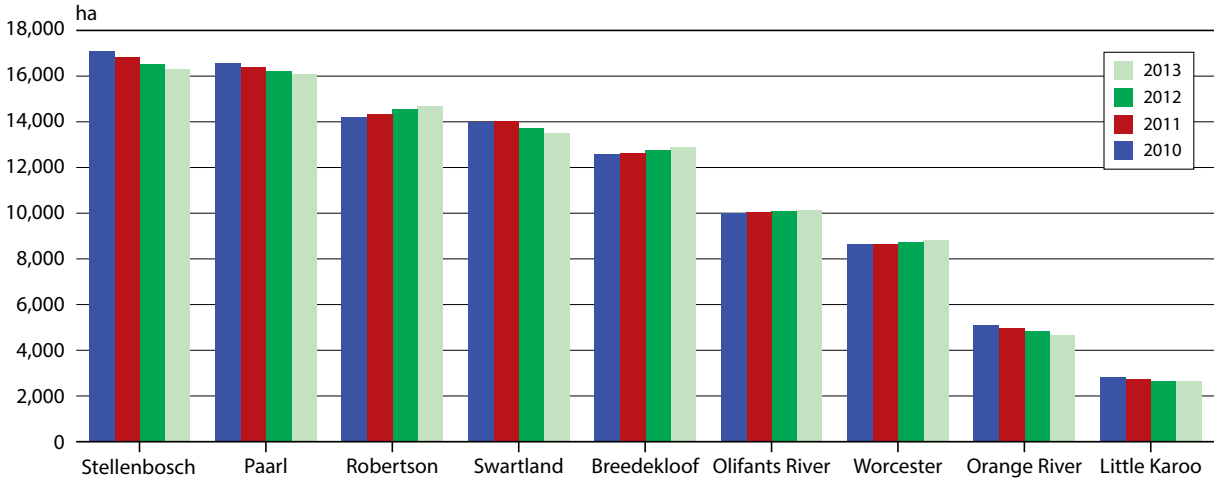
There were 582 cellars which crushed grapes in 2012. The largest number of these cellars (509) was private wine cellars, mainly in the Stellenbosch and Paarl area, which in total processed 17.4 % of the grapes. The largest share of the wine grape crop (75.6 %) however was crushed by 50 producer cellars. These are wineries

3.3.2 Area, production and yield of wine grapes per VinPro region in South Africa, 2012

					Grape production for wine making		
	Total area		Percentage of area		Total	Yield, t/ha	
VinPro wine region	ha	%	% White	% Red	t	White	Red
Stellenbosch	16,526	16.5	37	63	116,948	6.75	7.27
Paarl	16,202	16.2	42	58	144,272	9.34	8.60
Robertson	14,550	14.6	62	38	239,941	18.80	12.70
Swartland	13,730	13.7	42	58	103,811	9.35	6.28
Breedekloof	12,766	12.8	64	36	250,229	21.50	16.21
Olifants River	10,110	10.1	70	30	223,488	25.77	13.38
Worcester	8,737	8.7	67	33	172,884	20.56	18.23
Orange River	4,829	4.8	91	9	118,284	26.01	8.27
Little Karoo	2,643	2.6	73	27	44,615	18.93	11.26
Total	**100,093**	**100**	**Ø 55**	**Ø 45**	**1,414,472**		

Source: SAWIS (2013) SA wine industry statistics no 37. Paarl.

3.3.3 Acreage of wine grape production in South Africa, 2010-2013



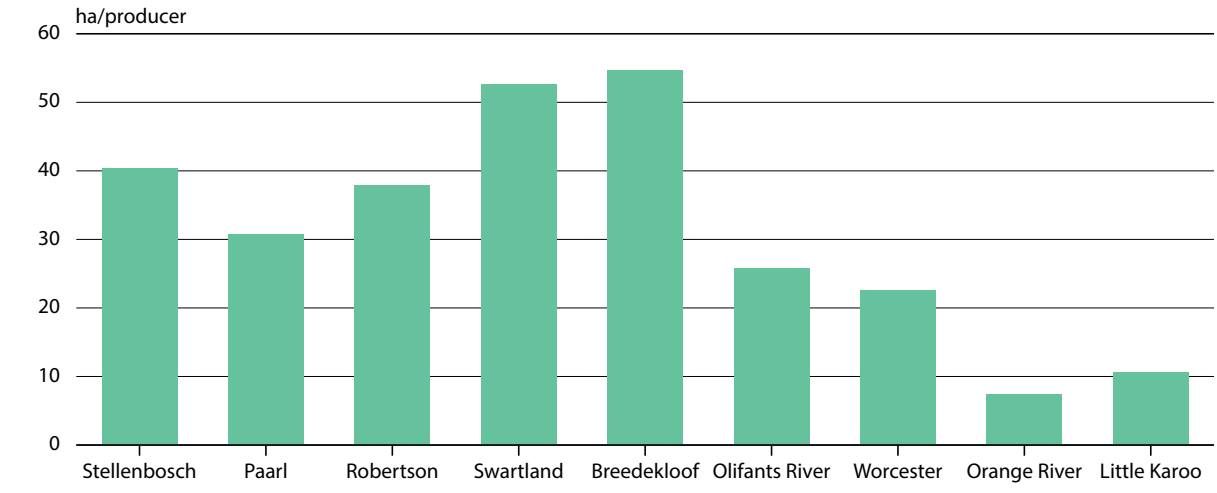
Source: SAWIS (2011-2014) SA wine industry statistics no. 35, 36, 37, 38, Paarl.

3.3.4 Number and size of primary grape producers in South Africa, 2010–2013

Production category	Number of producers				
	2010	2011	2012	2013	Change 2013 vs. 2010
1 - 100 t/year	1,542	1,461	1,370	1,249	-293
101 - 500 t/year	1,304	1,273	1,250	1,216	-88
501 - 1,000 t/year	415	457	448	429	14
1,001 - 5,000 t/year	329	329	362	416	87
5,001 - 10,000 t/year	6	7	10	13	7
Total t/year	**3,596**	**3,527**	**3,440**	**3,323**	**-273**

Source: SAWIS (2011-2014) SA wine industry statistics no 35, 36, 37, 38. Paarl.

3.3.5 Average area of wine grapes per producer, 2011



Source: Calculations from SAWIS (2012) SA wine industry statistics no. 36, Paarl.

3.3 Wine grapes: Production in South Africa

that receive and process grapes on behalf of a group of wine grape producers, its members, into wine and other products and market them packaged or in bulk. The remaining 7 % of the grapes were crushed by the 23 producing wholesalers (SAWIS, 2013).

Nearly half of the volume of wine produced was exported. Sixty percent of the exported wine is in bulk due to the market tendency to bottle wine at the destination. In this way the carbon footprint of the importing retailers is also lowered.

Wine grape production systems are labour intensive and investments in vineyards are high. The establishment cost, trellises and irrigation systems require a high initial investment and full bearing of vines usually starts from the fifth year. The average age composition of vineyards differs between farming systems, between white and red grape vineyards and also for different production regions. A relatively high proportion of white grape vineyards are older than 25 years (SAWIS, 2013). Drip irrigation is the main irrigation practice, but other irrigation systems like micro, sprinkler and flood are also used to a smaller extent.

Labour is the largest single cost component of wine grapes in South Africa, although some of the production processes, like harvesting and topping, are mechanised on some wine grape farms and modernisation is increasing. According to Van Wyk and Van Niekerk (2013) over the last few years the average primary wine grape producer was caught in a typical cost-price squeeze, referring to increasing costs and simultaneous decreasing or stable prices. However, there were producers who succeeded in performing very well by implementing the correct practices regarding, e.g., pruning, canopy management, fertilisation and irrigation, efficient labour management and the correct timing of actions.

Wine grape farmers are encouraged to participate in the voluntary environmental sustainability scheme, the Integrated Production of Wine (IPW). Because a large part of South Africa's wine-growing takes place in the Cape Floral Kingdom, wine grape farmers are also encouraged to participate in the Biodiversity and Wine Initiative (BWI) and thus conserve the natural environment.

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References

FAOSTAT (2014), database on wine production (selected countries and years). (online: http://faostat.fao.org/site/636/DesktopDefault.aspx#ancor))

SAWIS (2011). SA wine industry statistics no 35. Paarl.

SAWIS (2012). SA wine industry statistics no 36. Paarl.

SAWIS (2013). SA wine industry statistics no 37. Paarl.

SAWIS (2014). SA wine industry statistics no 38. Paarl.

Van Wyk, G. & Van Niekerk, P. (2013). The cost of wine grape cultivation and top achievers in difficult times. WineLand: May 2013.


4


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3.4 Tomatoes: Overview of production in our network countries

Global perspective

On a global scale, tomatoes are the most important vegetable crop with more than 160 million tonnes produced in 2012, or about 15 % of total vegetable production. Global tomato production has increased by nearly 40 % since 2002. FAO statistics show that the increase has been distributed evenly across producing countries: no major shifts have occurred in the top-10 producing countries, and their share of total tomato production has remained stable with about 75 %.

Besides China, India and the USA, the countries around the Mediterranean Sea are major tomato producers, with Turkey, Egypt, Spain and Italy among the top-10 (Figure 3.4.1), and Portugal, Greece, Tunisia and Morocco in the top-20.

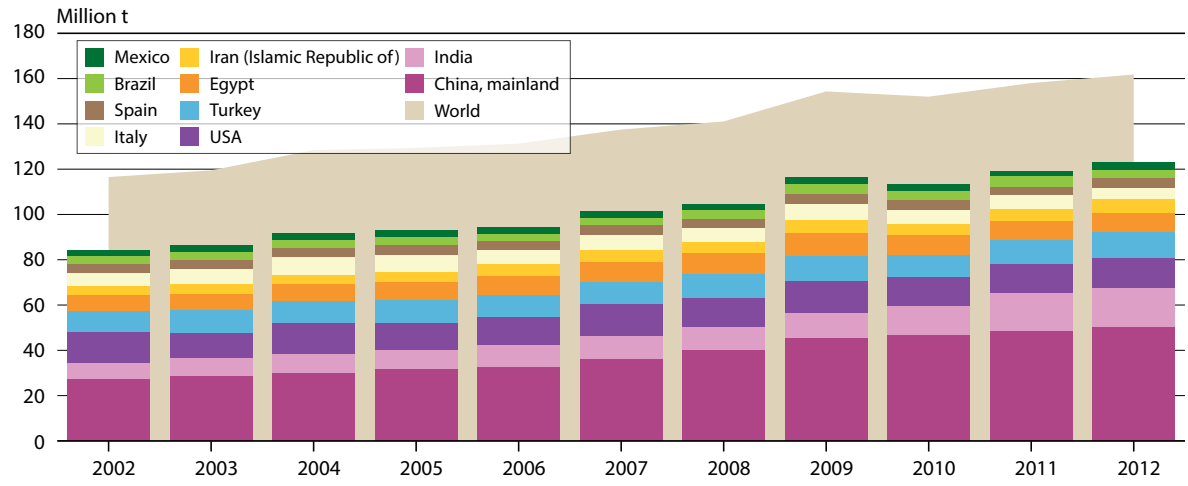
Besides the top-10 countries, tomatoes are produced and consumed in nearly all countries of the world (Figure 3.4.2). Tomato production systems can be grouped in two main categories: tomatoes for processing or industrial tomatoes, and tomatoes for fresh markets. While tomatoes for processing are usually grown in open fields, the tomato for fresh markets are mostly cultivated in greenhouses or protected cultivation, although in favourable climates production on open fields is possible. Global trade statistics differentiate between fresh tomatoes, preserved tomatoes which include paste and any preserved tomatoes in preparation without vinegar, and tomato sauce, i.e., ketchup or other spicy tomato sauces with vinegar.

The three largest exporters of fresh tomatoes are Mexico, the Netherlands and Spain. Intensive greenhouse production systems in the Netherlands and export oriented horticultural value chains are among the driving factors. The USA, though ranking third in global tomato production, is at the same time the largest importer of fresh tomatoes, before the Russian Federation and Germany. A large proportion of US tomato production goes into processing, where the country ranks third in exports, or into sauces and ketchup, where USA is the world largest exporter. Italy is the largest exporter of processed tomatoes with 1.8 million tonnes, equivalent to about 35 % of Italian tomato production in 2012 (Figure 3.4.3).

Tomato production in Germany

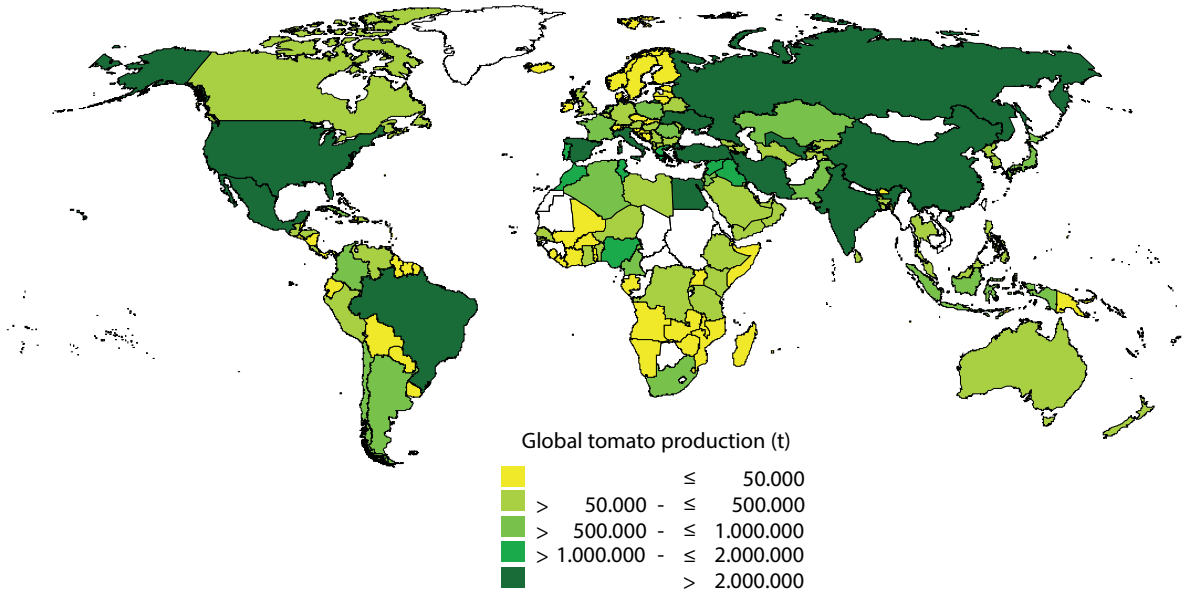
Imports of fresh tomatoes to Germany exceed national production by a factor of nearly ten. In Germany, tomatoes are only produced in greenhouses and are a small share of total vegetable production in Germany. Nevertheless, the crop has gained importance in Germany and production has increased by more than 50 % over the past 10 to 15 years, reaching 80,000 t in 2011. The most recent figure indicates that in 2013 about 70,000 t of tomatoes were harvested in Germany (Figure 3.4.4). Trends in

3.4.1 World tomato production and top-10 producing countries, 2002-2012



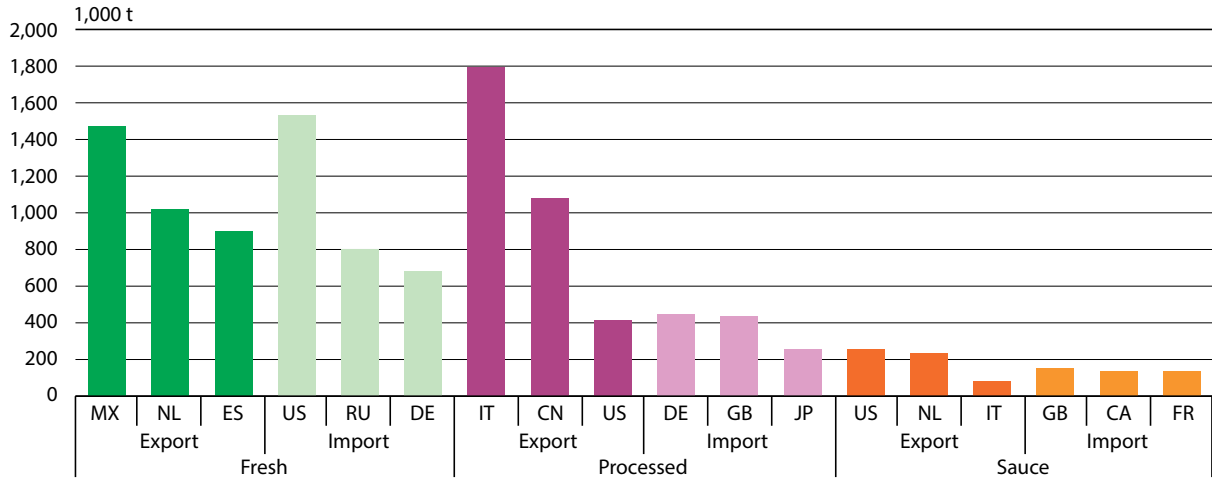
Source: FAOSTAT (2014).

3.4.2 Global tomato production, 2011



Source: FAOSTAT (2012).

3.4.3 Top-3 exporting and importing countries for fresh, processed tomatoes and tomato sauce, 2012



Source: UN Comtrade (2014).

3.4 Tomatoes: Overview of production in our network countries

consumer preferences towards regional production have led to high preferences for tomatoes from domestic production. Support from EU programs to producer organisations for fruit and vegetable production has also stimulated investment in tomato production.

There are clear clusters of vegetable production in Germany. The three major tomato producing regions are Baden-Württemberg, the Northern Rhine region in North Rhine-Westphalia and Bavaria with about 50 ha each. Lower Saxony, Thuringia and Brandenburg report around 25 to 30 ha of tomato production each (Figure 3.4.4).

The structure and intensity of tomato production differ between the regions, resulting in differences in average yields (Figure 3.4.5). Though only second in terms of area, North Rhine-Westphalia (NW) ranks first in terms of production. Thuringia (TH) with more than double the output per ha than Baden-Württemberg (BW) ranks second in terms of total production.

Tomato production in Italy

In Italy, the most important production system for tomatoes is industrial tomatoes in open field cultivation on 75,000 ha, which represent 84 % of total tomato output in 2012.

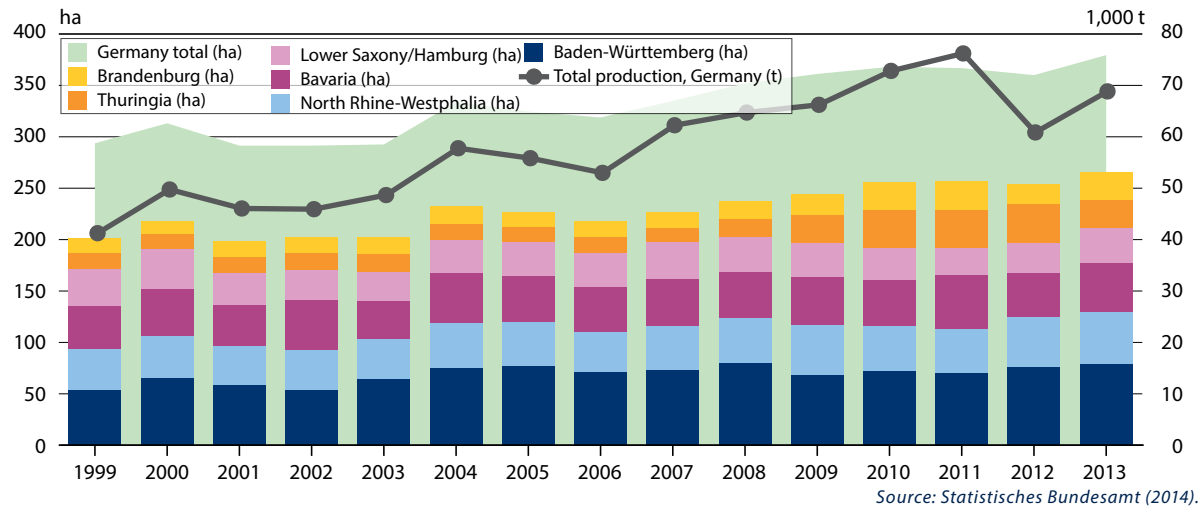
Additionally, tomatoes for the fresh markets are grown in greenhouses (approximately 6,360 ha) and in open field production systems on 16,300 ha.

Fresh tomatoes are mainly produced in the South of Italy, with Sicily as the most important province for greenhouse production (2,774 ha equivalent to 42 % of total greenhouse acreage) and about 45 % of total acreage (7,000 ha) of tomatoes in open fields (Figure 3.4.6). More than 1,000 ha of tomatoes in greenhouses are grown in Campania, followed by Lazio, Sardinia and Veneto, each exceeding 500 ha.

The largest areas of industrial tomato production are found in Emilia-Romagna and Puglia with more than 20,000 ha each, corresponding to 30 % of total acreage each (Figure 3.4.6). Output of industrial tomato production is variable over the years. Figure 3.4.7 shows that the regional distribution has remained constant in the period of 2006 to 2012, indicating that varying climate conditions may have caused the yield variation.

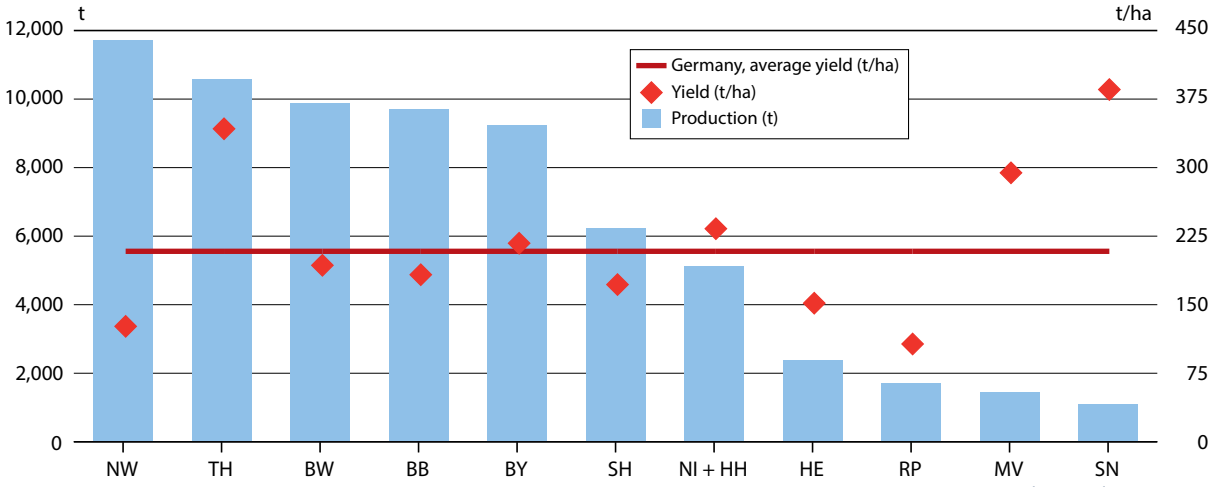
With respect to the numbers and size of tomato farms, the latest data available are from 2007. Although the total area of tomatoes in open fields is much smaller, the number of farms was very high, 24,500 holdings, implying on average small production areas of less than 1 ha per farm. In contrast, the large production area for industrial tomatoes was distributed over only 14,382 farms, i.e., 4.4 ha per farm on average.

3.4.4 Tomato area in Germany by federal state and total production, 1999–2013



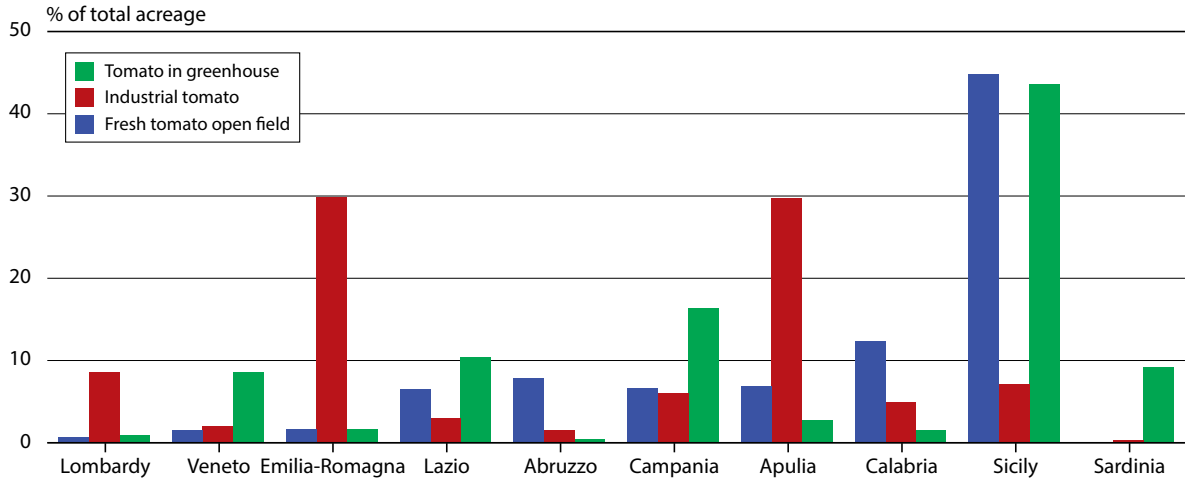
Source: Statistisches Bundesamt (2014).

3.4.5 Tomato production and yields in Germany by federal state, 2013



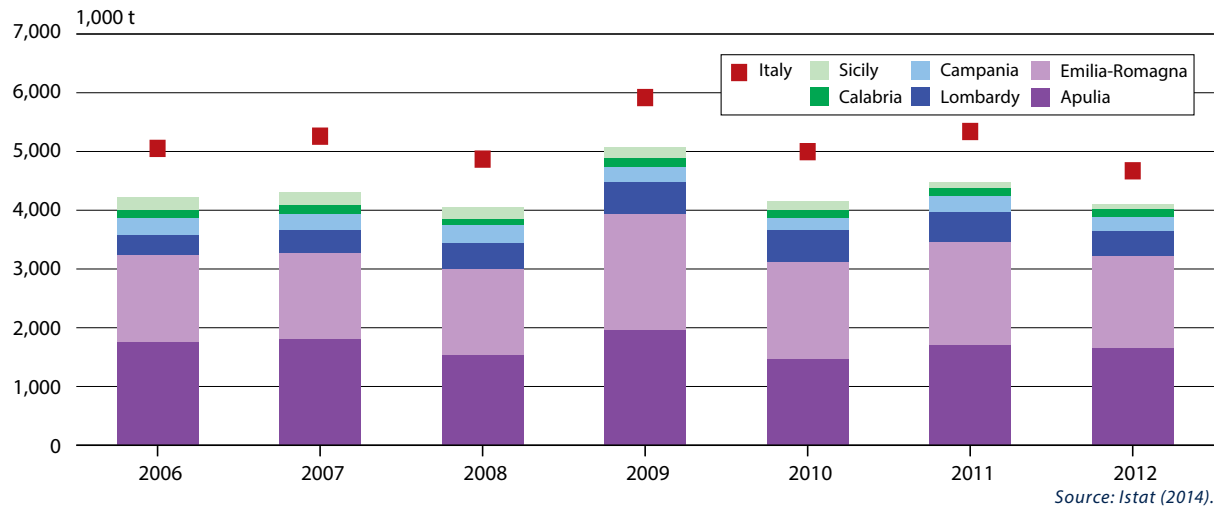
Source: Statistisches Bundesamt (2014).

3.4.6 Tomato production systems in Italy by region, 2012



Source: Istat (2014).

3.4.7 Production of industrial tomatoes by province in Italy, 2006–2012



Source: Istat (2014).

3.4 Tomatoes: Overview of production in our network countries

Tomato production in Tunisia

In Tunisia, the tomato production covers an average area of 30,000 ha, with an average total production of about 1.2 million t/year. Over the past decade, production has been variable, however, an increasing trend can be observed from below 25,000 ha to over 30,000 ha tomato acreage (Figure 3.4.8). Average yields vary between different years, but have remained rather stable over the past 12 years, with a level of 35 to 40 t/ha.

Within Tunisia, tomatoes are distributed in regional clusters, the most important being Nabeul, in the northeast of the country, rather close to Tunis, with more than one third of national production. Other important production regions are in the centre of the country: Kairouan and Sidi Bouzid.

In Tunisia, tomatoes are produced at different times of the year in order to continuously supply the market. There are two main categories:

1. "Season tomatoes" are grown in open fields and harvested between June and August and supplied either to the processing industry or the fresh domestic market. Main production areas for season tomatoes are Cap Bon, Sidi Bouzid, Basse vallée de la Mejerda and the Sahel.
2. "Off-season tomatoes" are divided into three categories and production systems:
   a. "Late tomatoes" from open field production. The harvest is between September and November in the region of Kasserine, Sidi Bouzid, Le Kef and Bizerte. Late tomatoes are mainly produced for the fresh domestic market.
   b. "Cold greenhouse tomatoes" are grown in greenhouses and harvested over several months between the end of December and the beginning of May in the regions of Monastir, Sfax, Mahdia and Sidi Bouzid. These tomatoes are produced for both, domestic and export fresh markets.
   c. "Warm greenhouse tomatoes" are produced between November and May in the regions of Gabes, Tozeur and Kebili. Most of the warm greenhouse tomatoes are exported. The production system is specific to these regions and relies on geothermal energy for heating. Geothermal tomatoes are characterised by a specific taste quality mainly due to the mineral composition of the water and microclimate of Southern Tunisia. This quality has contributed to the development of exports over the years: they increased from 1,850 t in the 2002–2003 campaign to 23,957 t during the 2011–2012 campaign.

With respect to total tomato acreage, about 75 % of total area is planted with open field seasonal tomatoes, and about 25 % are off-season tomato production systems, including the open field late tomatoes and both greenhouse production systems (GICA).

Tunisia exports processed tomatoes as tomato paste or dried tomatoes, as well as fresh tomatoes, the latter mainly from geothermal greenhouse production. In total, exports are still on a very low level, but have increased over time.

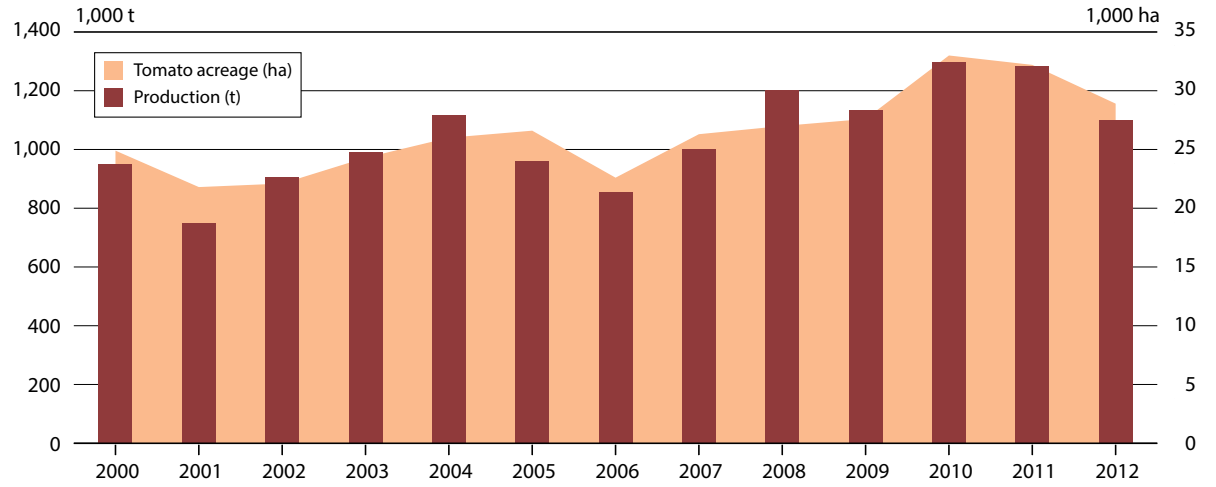
Fresh tomato exports have increased greatly since 2008, while the export volumes of processed tomatoes have remained stable over the past 12 years (Figure 3.4.9). Major export destination countries are France and Libya (Figure 3.4.10).

Tomato production in Morocco

In Morocco tomato production has varied between 1.2 to 1.4 million tonnes per year over the ten years. Total tomato acreage has declined from an average of 20,000 to 25,000 ha to about 15,000 ha in 2012 (Figure 3.4.11).

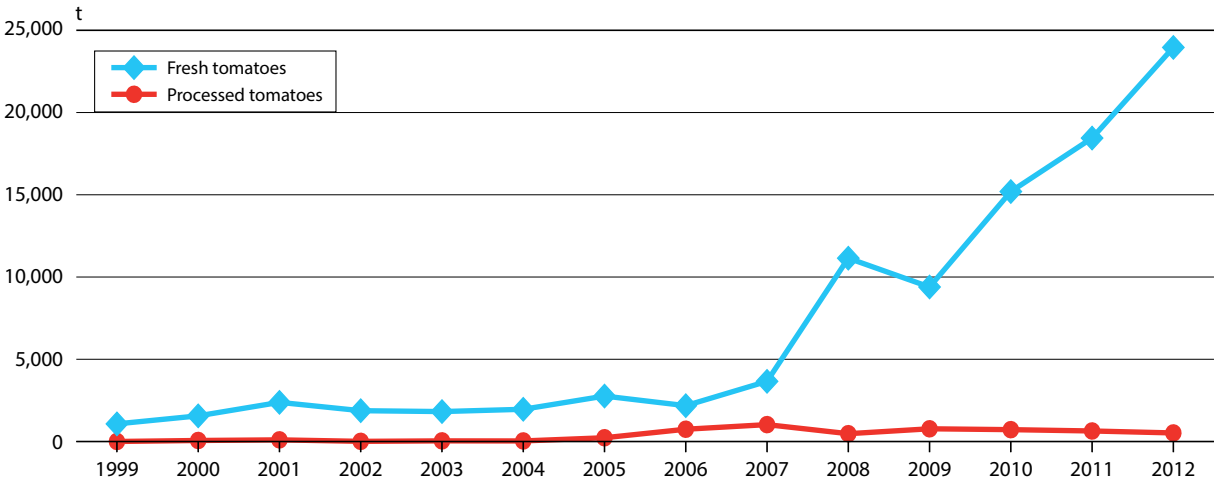
The main production systems for tomatoes in Morocco are greenhouse production systems, either "early" or "late." The main production regions for greenhouse tomatoes are the Souss Massa, El Oualidia, El Jadida and Casablanca. Most greenhouses are located on the coast. Picking can be over six months (November to May). Yields range from 120 to 150 t/ha depending on the quality of care of the crop, but can exceed 200 t/ha in highly intensive,

3.4.8 Tomato acreage and total production in Tunisia, 2000–2012



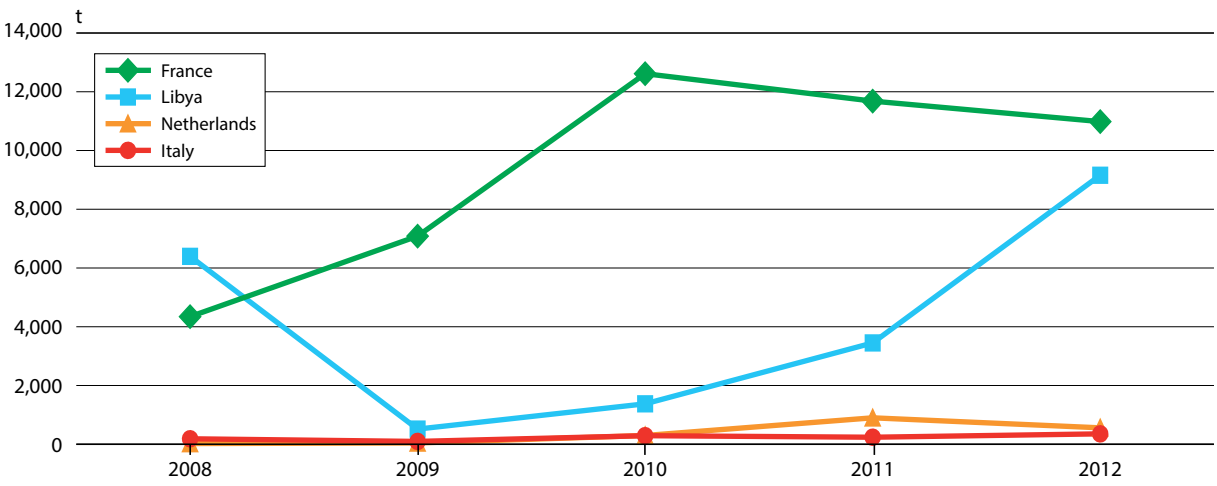
Source: FAOSTAT (2014).

3.4.9 Export of fresh and processed tomatoes from Tunisia, 1999–2012



Source: GICA (2013).

3.4.10 Tunisian tomato exports to main destinations, 2008–2012



Source: INS (2013).

3.4 Tomatoes: Overview of production in our network countries

export oriented production systems. In the case of late greenhouse tomatoes, harvesting stops in December in order to plant the subsequent crop, e.g., beans or melons. In this case, tomato yield rarely exceeds 50 to 60 t/ha. Greenhouse tomatoes are dedicated to the fresh market (domestic and export).

In Morocco, industrial tomatoes are produced primarily in the Loukkos region (Northwest), and in different parts of Sais and Haouz. Since 2008, the acreage of industrial tomatoes has decreased sharply from more than 4,000 ha to only about 700 ha in 2011/12 (Figure 3.4.12).

Due to the differences in yield levels, the share of "early" tomatoes of total production is much larger than the acreage share. Figure 3.4.13 also show the shift towards this production system over the past 5 years. The production share of industrial tomatoes has decreased sharply.

Hildegard Garming and Aïcha Mechri

References

FAOSTAT (2014): FAO Statistics: (online: http://faostat.fao.org/site/339/default.aspx)

GICA (2014): Groupement des Industries de Conserves Alimentaires, Tunisia. (online: http://www.gica.ind.tn)

INRA Maroc (2014): Institut National de la Recherche Agronomique Maroc, Morocco. (online: http://www.inra.org.ma)

INS (2014): Institut National des Statistiques, Tunesia. (online: http://www.ins.nat.tn)

Istat (2013): Instituto nazionale di statistica, Sistema informativo su agricoltura e zootecnia, Italy. (online: http://www.istat.it/it/prodotti/banche-dati)

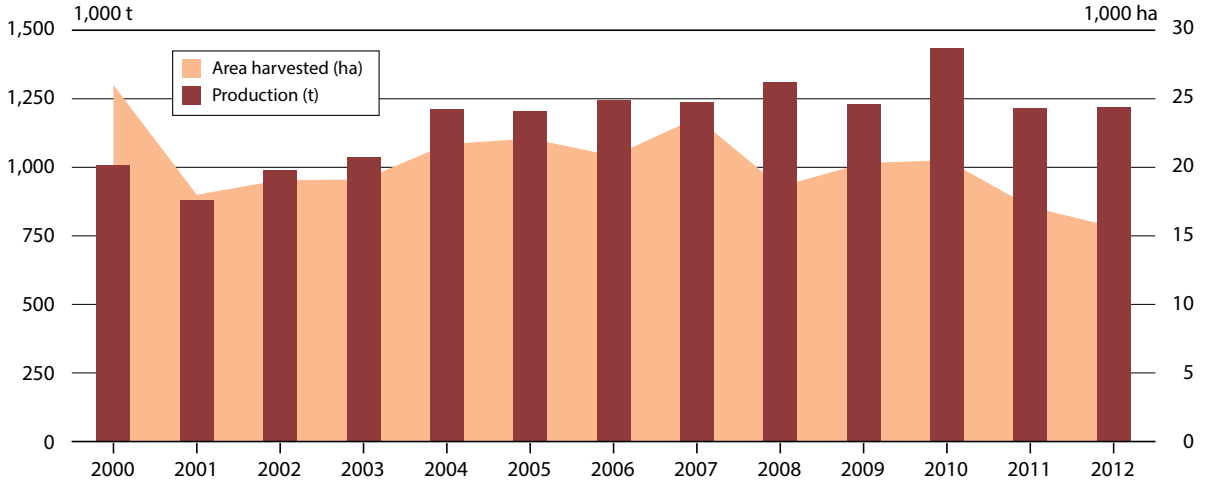
Ministère de l'Agriculture et de la Pêche Maritime, Morocco. (online: http://www.agriculture.gov.ma/pages/statistiques-agricoles)

ONAGRI, (2014): Observatoire National de l'Agriculture, Tunisia. (online: http://www.onagri.tn)

Statistisches Bundesamt (2014): Betriebe, Anbauflächen und Erntemengen von Gemüse, Germany. (online: https://www.destatis.de/DE/ZahlenFakten/Wirtschaftsbereiche/LandForstwirtschaft Fischerei/ObstGemueseGartenbau/ObstGemueseGartenbau.html)

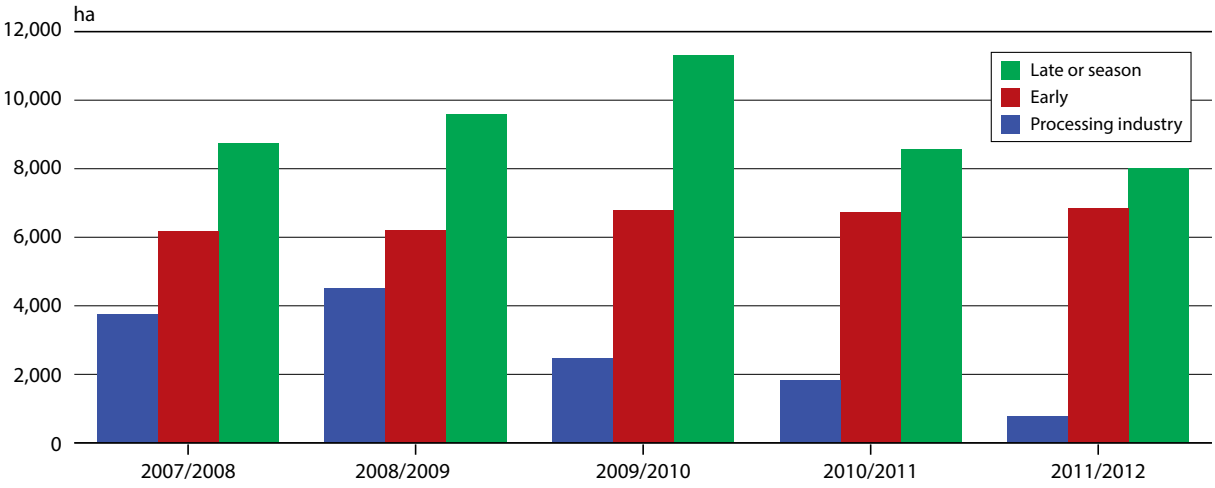
Système d'information sur les prix agricoles (ASAAR), Morocco. (online: http://www.prixagriculture.org) UN Comtrade, (2014): United Nations Statistical Division: Commodity Trade Statistics Database. (online: http://comtrade.un.org/)

3.4.11 Tomato production and acreage in Morocco, 2000-2012



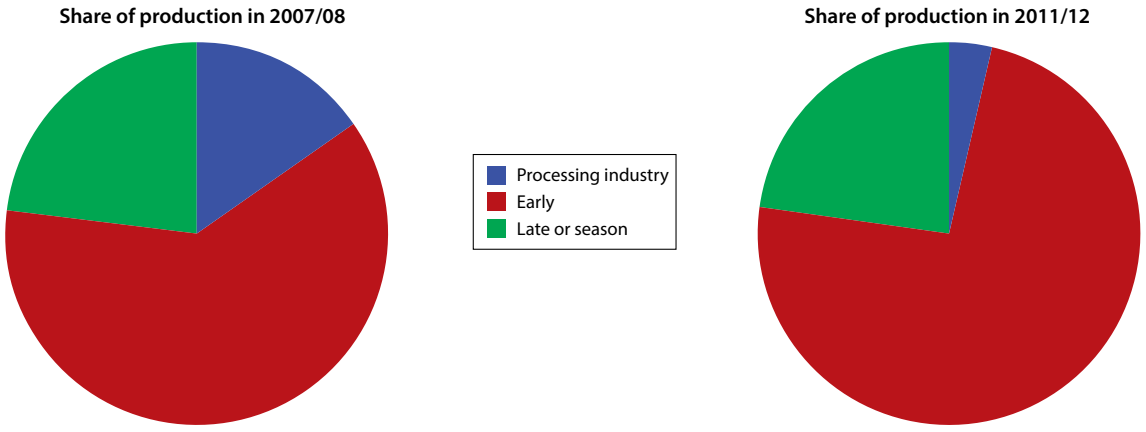
Source: FAOSTAT (2014).

3.4.12 Acreage of different tomato production systems in Morocco, 2007/08–2011/12



Source: INRA Maroc (2014).

3.4.13 Share of different production systems of total tomato production in Morocco, 2007/08 and 2011/12



Source: INRA Maroc (2014).

3.5 Carrots: Global overview and production structures in Germany

Global perspective

Between 2003 and 2012, global carrot production rose by 47 % from 25 to nearly 37 million tonnes (Figure 3.5.1). China increased its production from 8 to about 17 million tonnes (+110 %) and thus accounted for 75 % of the overall production increase. Thanks to a drastic production expansion in Uzbekistan (+193 %) and Ukraine (+73 %), which together with Russia are among the top-5 producers, this Eastern region gained in importance. In the Mediterranean countries a dynamic development of carrot production can be observed. Algeria increased its production by 120 %, Morocco by 113 % and Turkey by 76 %. Production in Europe remained rather stable and amounts to around 5.5 million tonnes. During the last decade the United States as one major producer reduced its carrot production by 20 % whereas in Canada it increased by the same amount.

Carrots are not a high value crop and therefore transport over long distances is not profitable in most cases. Thus, only 6.3 % of global production in 2012 was exported. China being the largest carrot producer tripled its carrot exports during last decade and meanwhile accounts for 25 % of global exports (Figure 3.5.2). The Netherlands are an important transfer country for vegetables and so they are the second country with regard to carrot exports. Besides these two top exporters, there are about 10 countries that export relevant quantities, ranging from 10,000 to 160,000 tonnes per year. Within this group, Israel accomplished the largest increase and multiplied its carrot exports 13 times. Carrots harvested in Russia, Uzbekistan and Ukraine are mainly sold on domestic markets and are therefore not shown in Figure 3.5.2.

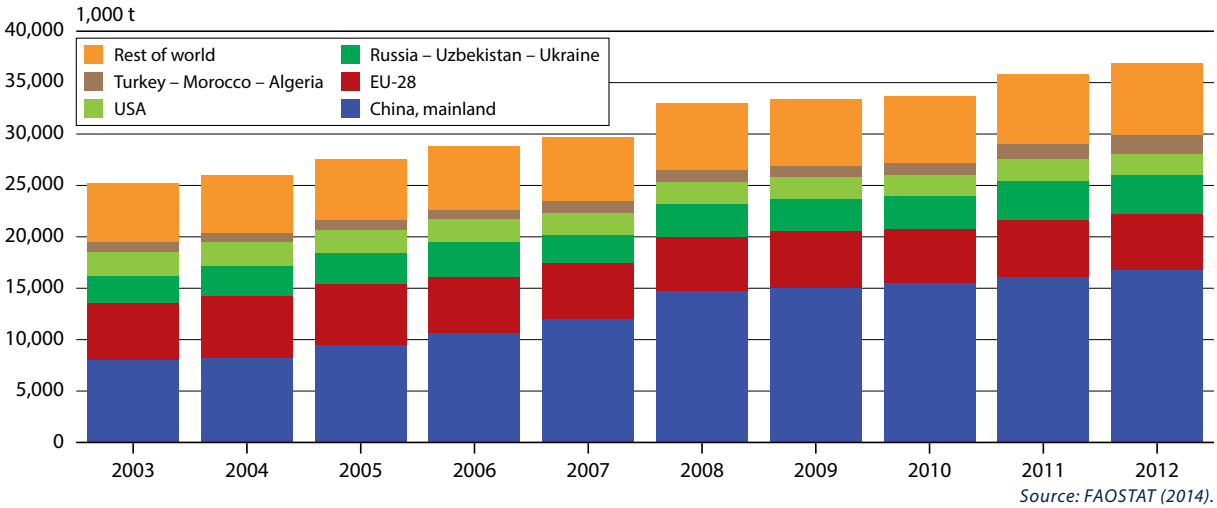
Carrots in Germany

In 2012, Germany was at position 11 with regard to global carrot production and within Germany carrots are one of the most important vegetables being produced on open fields. In terms of acreage, they are at position 2, following asparagus (10.150 ha in 2012, see Figure 3.5.3). When it comes to tonnage, they are even at position 1 with nearly 600,000 t in 2012 (Figure 3.5.4). During the past five years this scale has remained relatively stable with a slight tendency of increasing yield levels (Figure 3.5.5).

Looking at the regional distribution, carrots are mainly grown in the important vegetable producing regions of the Western federal states. In particular North Rhine-Westphalia (NW) with more than 2,300 ha, Lower Saxony (NI) and Rhineland-Palatinate (RP) with each comprising more than 1,700 ha need to be mentioned (Figure 3.5.6). These three states together present 58 % of the German carrot production, both in terms of acreage and tonnage.

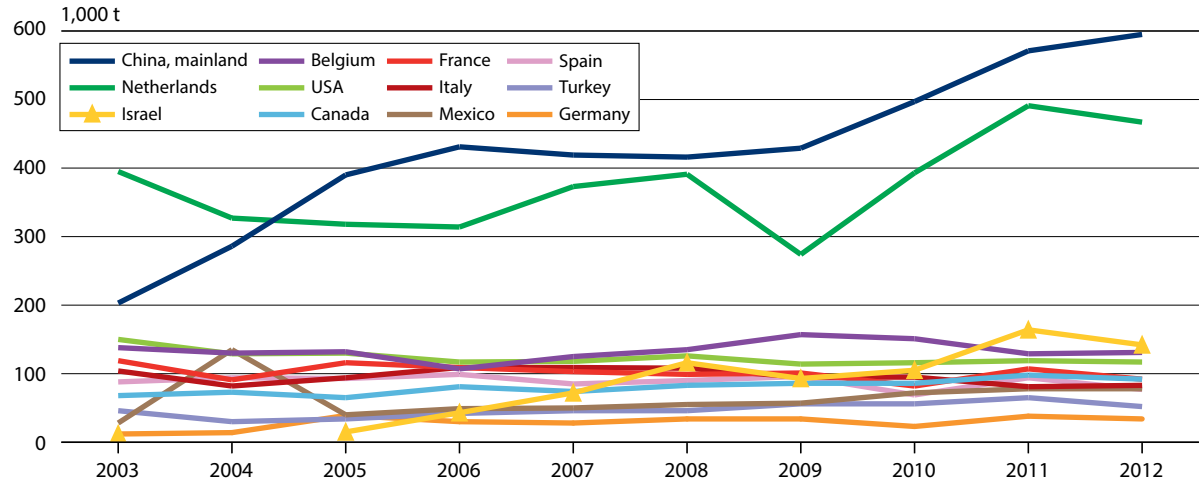
Between 2004 and 2012 the carrot acreages at the level of the federal states changed a bit.

3.5.1 Global production of carrots and turnips, 2003–2012



Source: FAOSTAT (2014).

3.5.2 Export carrots and turnips of selected important countries, 2003–2012



Source: UNComtrade (2014), carrots and turnips (fresh/chilled), exports to world.

3.5.3 Acreage of the top-10 vegetables, 2012

Germany	Acreage, ha
Asparagus (harvested)	19,329
Carrots	**10,150**
Onions	9,512
White cabbage	6,212
Asparagus (in establishment)	4,478
Cauliflower	4,369
Fresh peas for threshing	4,174
Iceberg lettuce	4,169
Bush beans	4,063
Radishes	3,551
All vegetables together	**114,630**

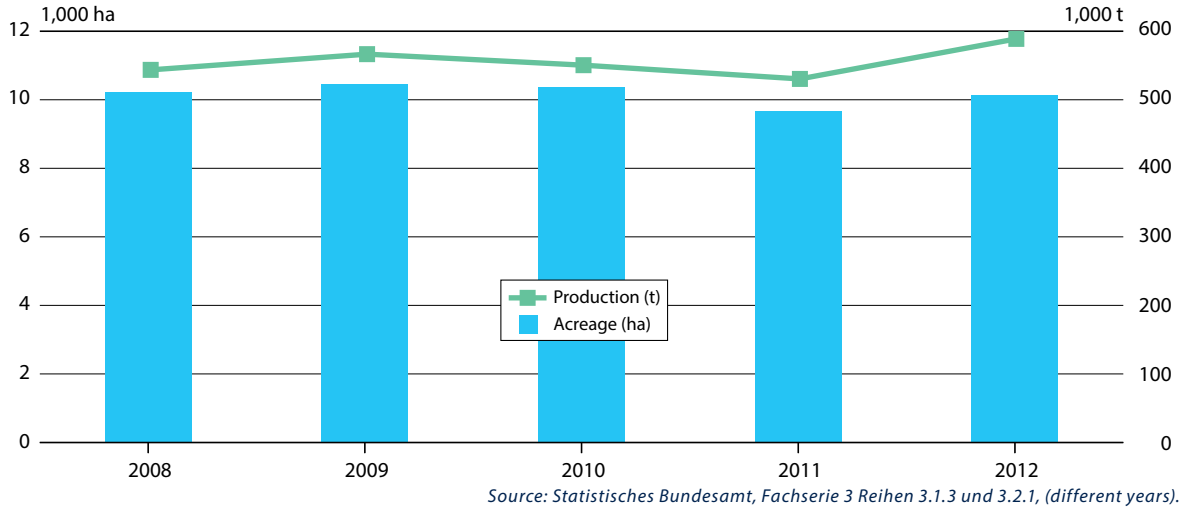
Source: Statistisches Bundesamt Fachserie 3 Reihe 3.1.3, (2013).

3.5.4 Harvest of the top-10 vegetables, 2012

Germany	Harvest, t
Carrots	**592,761**
Onions (dried)	484,632
White cabbage	473,118
Gherkins	186,678
Iceberg lettuce	183,494
Cauliflower	143,035
Red cabbage	123,617
Leek	116,309
Green onions	103,648
Asparagus (harvested)	102,395

Source: Statistisches Bundesamt Fachserie 3 Reihe 3.1.3, (2013).

3.5.5 Carrot production in Germany, 2008–2012



Source: Statistisches Bundesamt, Fachserie 3 Reihen 3.1.3 und 3.2.1, (different years).

3.5 Carrots: Global overview and production structures in Germany

In Baden-Württemberg (BW) for instance it almost doubled from 450 to 860 ha, whereas in Brandenburg (BB) it reduced considerably from 945 in 2004 to only 260 ha in 2012.

However, it has to be noted that in the course of time there was a statistical break. In 2004 and 2008 farms with at least 0.30 ha vegetables were captured through this statistic. In 2012, a farm had to be larger and cultivate at least 0.50 ha. Thus, smaller farms are no longer represented in this survey.

Between 2004 and 2012 the number of farms in Germany producing carrots reduced by 40 %. The largest reductions occurred in Bavaria (BY) and Baden-Württemberg. However, this is most likely due to the statistical changes mentioned above. The reductions in the other federal states are probably due to structural changes in the way vegetables and in particular carrots are produced (Figure 3.5.7).

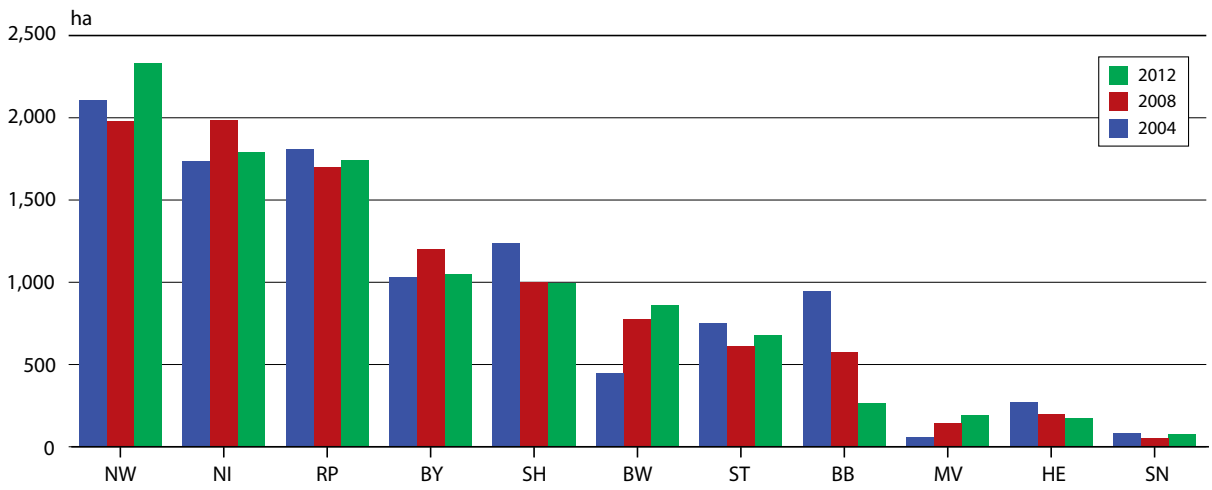
The map is based on 2012 data and shows carrot production at the level of administrative regions or, where not available, federal states (Figure 3.5.8). It indicates that even within the federal states carrot production is highly concentrated in geographical clusters. In Rhineland-Palatinate, for instance, carrots are produced only in one small district in the East, close to the Rhine. In some cases, the concentrations can be explained by specific market infrastructure such as the canning or freezing industry (North Rhine-Westphalia), or specialized buyers for fresh carrots.

Going down even one level further, one can identify 14 hot-spot districts with a large carrot production of between 200 and nearly 1,300 ha each (Figure 3.5.9). These 14 important districts together represent almost 60 % of Germany's total carrot production. In three districts (Lüneburg, Rhein-Neckar-Kreis and Recklinghausen) carrot is a very dominant vegetable as it comprises more than 34 % of the overall vegetable acreage in these particular districts. On average, farms producing carrots cultivate 15.9 ha of this crop. However, there are four districts where carrot producers farm even between 20 and 50 ha on average (Borken, Viersen, Rhein-Pfalz-Kreis and Recklinghausen). Three districts (Viersen, Rhein-Neckar-Kreis and Recklinghausen) give a clear indication that carrot producing farms tend to be larger than farms that produce vegetables in general.

In 2012, yields were between 509 and 716 dt carrots per hectare while three districts obtain a yield of more than 670 dt/ha. However, this detailed data is not available for all districts; in some districts the yield in the larger administrative unit or the federal state had to be used as proxy. Overall, in Germany the average yield is 584 dt/ha.

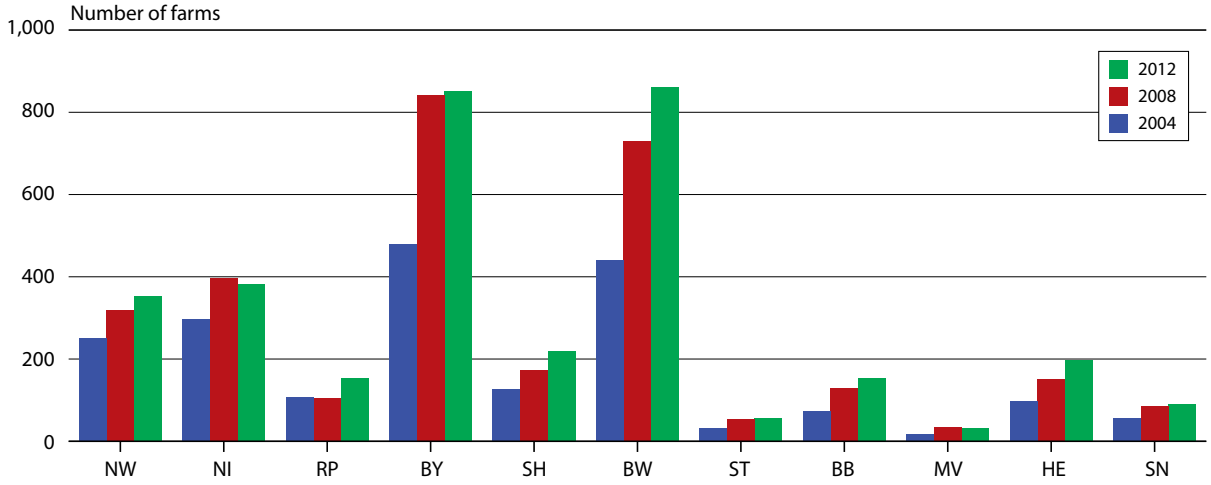
Kathrin Strohm

3.5.6 Carrot acreage in the most important German federal states 2004, 2008 and 2012



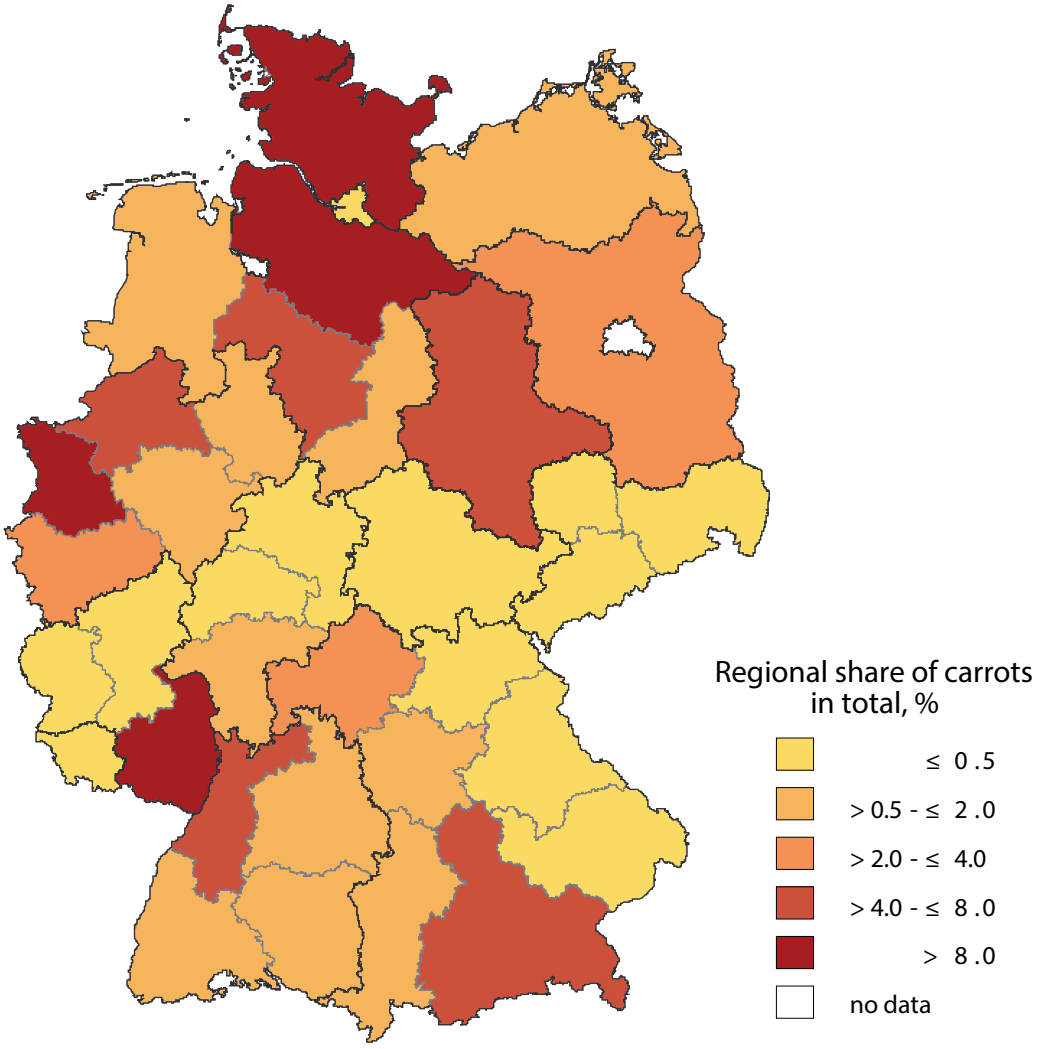
Source: Statistisches Bundesamt Fachserie 3 Reihe 3.1.3, (2013, 2009 and 2005).

3.5.7 Carrot farms in the most important German federal states 2004, 2008 and 2012



Source: Statistisches Bundesamt Fachserie 3 Reihe 3.1.3, (2013, 2009 and 2005).

3.5.8 Regional share of carrots in total German carrot acreage, 2012



Source: own elaboration based on statistics of various federal states regarding the 'Gemüseerhebung (2012)', Statistisches Bundesamt Fachserie 3 Reihe 3.1.3 (2013).

3.5 Carrots: Global overview and production structures in Germany

3.5.9 Statistics on 14 most important German carrot producing districts, 2012

District	ha carrots	% of total German carrot acreage	Share of carrots in vegetables, %	No. farms producing carrots	Ø ha carrots per 'carrot farm'	Ø ha vegetables per 'vegetable farm'	Ø dt carrots per ha
1) Rhein-Pfalz-Kreis	1,283	12.6 %	11.2 %	35	36.7	80.8	566
2) Dithmarschen	904	8.9 %	19.4 %	64	14.1	19.2	671
3) Lüneburg	498	4.9 %	34.2 %	34	14.7	19.7	560
4) Viersen	491	4.8 %	15.6 %	18	27.3	23.9	597 [2]
5) Rhein-Neckar-Kreis	446	4.4 %	40.5 %	34	13.1	10.3	531
6) Borken	360	3.5 %	18.7 %	17	21.1	25.9	597 [2]
7) Germersheim	296	2.9 %	8.2 %	27	10.9	44.6	509
8) Kleve	280	2.8 %	12.3 %	30	9.3	15.1	597 [2]
9) Rhein-Kreis Neuss	250	2.5 %	12.8 %	18	13.9	20.3	597 [2]
10) Recklinghausen	249	2.5 %	35.3 %	5	49.8	16.8	597 [2]
11) Rhein-Erft-Kreis	234	2.3 %	13.6 %	12	19.5	29.2	597 [2]
12) Würzburg	233	2.3 %	19.7 %	43 [1]	6.9 [1]	14.4 [1]	716 [1]
13) Diepholz	220	2.2 %	13.0 %	25	8.8	24.5	628
14) Uelzen	202	2.0 %	16.6 %	13	15.6	15.9	715
Total or average	**5,946**	**58.6 %**	**15.6 %**	**375**	**15.9**		

[1] Data for Würzburg is not available but for the larger administrative region, called 'Unterfranken'.

[2] Data for the individual districts is not available but for the federal state North Rhine-Westphalia.

Source: Own elaboration based on statistics of various federal states regarding the 'Gemüseerhebung (2012)', Statistisches Bundesamt Fachserie 3 Reihe 3.1.3 (2013).

References

FAOSTAT (2014): FAO Statistics. (online: http://faostat.fao.org/site/339/default.aspx)

Statistisches Bundesamt (2013): Fachserie 3 Reihe 3.1.3, Gemüseerhebung (Anbau und Ernte von Gemüse und Erdbeeren) 2012 and previous years

Statistisches Bundesamt (2013): Fachserie 3 Reihe 3.2.3, Wachstum und Ernte (Gemüse), several years

Statistische Landesämter (2013): Gemüseerhebung 2012

UN Comtrade, (2014): United Nations Statistical Division: Commodity Trade Statistics Database. (online: http://comtrade.un.org/)

4 Factsheets

4.1 Typical apple farms 58

4.2 Typical wine grape farms 64

4.3 Typical tomato farm 71

4.1 Typical apple farms

Chile

Region	El Maule: CL-25-EM	O'Higgins: CL-80-OH
Total farm size, ha	25	80.8
– full production, ha	25	64
– non full bearing, ha	0	11.2
– in establishment and maintenance, ha	0	5.6
– other farm branch, ha	0	0
Lifetime orchard, years	25	25
Average time to first full yield after planting	5	5
Yield on farm 2011, t/ha	58-80	45-80
Total production 2011, t/farm	1,570	4,173
Average use of plant protection products, EUR/ha	932	489
Average use of fertiliser, EUR/ha	228	286
Average rainfall, mm/year	715	580
Share of irrigated orchards, %	100	100
Irrigation system	Drip irrigation and flooding systems	Drip irrigation and flooding systems
Top-3 varieties grown		
– Name 1	Royal Gala	Granny Smith
– ha	16.5	40.4
– Name 2	Fuji	Royal Gala
– ha	4.5	24.3
– Name 3	Granny Smith	Pink Lady
– ha	4	16.1
Trees per ha	990	990–1,667
Distance between the rows, m	4	4
Canopy management / production system	Spindel	Spindel
Legal form	Family farm with hired administrator	Administrator – led farm
Decoupled payment, EU subsidies, ha	No	No
Subsidies (per farm) (e.g., for irrigation system, hail nets etc.)	No	No
Vertical market integration / marketing channels	Contract with exporter or export cooperative	Contract with exporter or export cooperative
Participation in private quality certification scheme	Global Gap	Global Gap, Tesco Nurture,
Family labour, hours per year	1,000	0
Hired labour, hours per year	6,000	27,240
Seasonal workers, hours per year	20,000	88,803
Use of own machinery	Yes	Yes
Use of hired machinery / contractors / co-operative machine pool	No	No
Harvest	Manual	Manual

Germany

Region	Altes Land: DE-21-AL	Altes Land: DE-41-AL
Total farm size, ha	21	41
– full production, ha	14.93	30.36
– non full bearing, ha	3.78	7.28
– in establishment and fallow, ha	2.27	3.43
– other farm branch, ha	0	0
Lifetime orchard, years	18	18
Average time to first full yield after planting	4	4
Yield on farm 2011, t/ha	35-42	35-42
Total production 2011, t/farm	642	1,298
Average use of plant protection products, EUR/ha	881	906
Average use of fertiliser, EUR/ha	238	244
Average rainfall, mm/year	800	800
Share of irrigated orchards, %	75	70
Irrigation system	Late frost protection	Late frost protection
Top-3 varieties grown		
– Name 1	Jonagold	Jonagold
– ha	7	14
– Name 2	Elstar	Elstar
– ha	6	12
– Name 3	Braeburn	Braeburn
– ha	2	5
Trees per ha	2,500	2,500
Distance between the rows, m	2.50	2.50
Canopy management / production system	Spindel	Spindel
Legal form	Family farm	Family farm
Decoupled payment, EU subsidies, ha	350	350
Subsidies (per farm) (e.g., for irrigation system, hail nets etc.)	No	No
Vertical market integration / marketing channels	Marketing cooperative	Marketing cooperative
Participation in private quality certification scheme	Global Gap Integrated production	Global Gap Integrated production
Family labour, hours per year	2,000	4,000
Hired labour, hours per year	1,900	900
Seasonal workers, hours per year	3,474	8,800
Use of own machinery	Yes	Yes
Use of hired machinery / contractors / co-operative machine pool	Yes	Yes
Harvest	Manual	Manual

4.1 Typical apple farms

Germany

Region	Lake Constance: DE-15-B	Saxony: DE-183-S
Total farm size, ha	15	183 (325)
– full production, ha	12	152
– non full bearing, ha	2.25	22
– in establishment and fallow, ha	0.75	8
– other farm branch, ha	0	144
Lifetime orchard, years	20	20
Average time to first full yield after planting	4	4
Yield on farm 2011, t/ha	33-45	20-74
Total production 2011, t/farm	507	8,807
Average use of plant protection products, EUR/ha	1,355	801
Average use of fertiliser, EUR/ha	250	31
Average rainfall, mm/year	700-900	650
Share of irrigated orchards, %	0	(10)
Irrigation system	/	Late frost protection, fertigation
Top-3 varieties grown		
– Name 1	Jonagold	Idared
– ha	5	27
– Name 2	Elstar	Pinova
– ha	3	20
– Name 3	Royal Gala	Elstar
– ha	2.5	27
Trees per ha	2,500	2,600
Distance between the rows, m	2.50	3.50
Canopy management / production system	Spindel	Spindle, fruit wall
Legal form	Family farm	Corporation, limited company
Decoupled payment, EU subsidies, ha	0	330
Subsidies (per farm) (e.g., for irrigation system, hail nets etc.)	Up to 50 % of investment cost for hail nets	Yes
Vertical market integration / marketing channels	Marketing cooperative	Marketing cooperative
Participation in private quality certification scheme	Global Gap	Global Gap Tesco nurture Integrated production
Family labour, hours per year	5,400	0
Hired labour, hours per year	0	183,800
Seasonal workers, hours per year	5,800	107,217
Use of own machinery	Yes	Yes
Use of hired machinery / contractors / co-operative machine pool	Yes	Yes
Harvest	Manual	Manual, machine-aided

Italy

Region	Emilia-Romagna: IT-5-ER	Trentino: IT-2.5-T
Total farm size, ha	5	2.5
– full production, ha	4.4	2
– non full bearing, ha	0.4	0.38
– in establishment, ha	0.2	0.12
– other farm branch, ha	5	0
Lifetime orchard, years	25	18
Average time to first full yield after planting	3	4
Yield on farm 2011, t/ha	40-60	57-68
Total production 2011, t/farm	250	151.4
Average use of plant protection products, EUR/ha	1,180	1,003
Average use of fertiliser, EUR/ha	200	199
Average rainfall, mm/year	650	920
Share of irrigated orchards, %	100	100
Irrigation system	Drip irrigation	Micro aspersion
Top-3 varieties grown		
– Name 1	Fuji	Golden Delicious
– ha	2	1.4
– Name 2	Pink Lady	Red Delicious
– ha	1	0.3
– Name 3	Royal Gala and Modi	Royal Gala and Renetta
– ha	1 each	0.3
Trees per ha	2,500	3,000
Distance between the rows, m	4	3.50
Canopy management / production system	Spindel	Spindel
Legal form	Family farm	Family farm
Decoupled payment, EU subsidies, ha	0	0
Subsidies (per farm) (e.g., for irrigation system, hail nets etc.)	400	900 environ-mental scheme
Vertical market integration / marketing channels	Marketing cooperative	Marketing cooperative
Participation in private quality certification scheme	Tesco Nurture	Global Gap
Family labour, hours per year	2,700	873
Hired labour, hours per year	510	0
Seasonal workers, hours per year	1,400	400
Use of own machinery	Yes	Yes
Use of hired machinery / contractors / co-operative machine pool	Yes	Yes
Harvest	Manual with platform wagon	Manual

4.1 Typical apple farms

South Africa

Region	Elgin, Grabouw, Villiersdorp, Vyeboom: ZA-80-EGVV	Ceres: ZA-120-C
Total farm size, ha	90	144
– full production, ha	70.3	96
– non full bearing, ha	5.09	14.4
– in establishment, ha	5.09	9.6
– other farm branch or fallow, ha	10	24
Lifetime orchard, years	25	20-30
Average time to first full yield after planting	6	6
Yield on farm 2011, t/ha	45-60	50-80
Total production 2011, t/farm	3,980	6,866
Average use of plant protection products, EUR/ha	1,298	1,046
Average use of fertiliser, EUR/ha	192	388
Average rainfall, mm/year	990	614
Share of irrigated orchards, %	100	100
Irrigation system	Drip irrigation, micro aspersion	Drip irrigation, micro aspersion
Top-3 varieties grown		
– Name 1	Golden Delicious	Red Delicious
– ha	20	22.8
– Name 2	Granny Smith	Golden Delicious
– ha	16.8	21.1
– Name 3	Royal Gala	Pink Lady and Royal Gala
– ha	11.2	14.4 each
Trees per ha	1,667	1,767
Distance between the rows, m	4	4
Canopy management / production system	Spindel	Spindel
Legal form	Family farm	Family farm
Decoupled payment, EU subsidies, ha	No	No
Subsidies (per farm) (e.g., for irrigation system, hail nets etc.)	No	No
Vertical market integration / marketing channels	Contract with exporter or export cooperative	Contract with exporter or export cooperative
Participation in private quality certification scheme	Global Gap SEDEX	Global Gap, Tesco Nurture
Family labour, hours per year	2,052	2,160
Hired labour, hours per year	55,404	101,520
Seasonal workers, hours per year	59,450	136,080
Use of own machinery	Yes	Yes
Use of hired machinery / contractors / co-operative machine pool	No	No
Harvest	Manual	Manual

Switzerland

Region	Thurgau: CH-6-TH
Total farm size, ha	6
– full production, ha	5.2
– non full bearing, ha	0.4
– in establishment and fallow, ha	0.4
– other farm branch, ha	0
Lifetime orchard, years	18
Average time to first full yield after planting	4
Yield on farm 2012, t/ha	35-47
Total production 2012, t/farm	229
Average use of plant protection products, EUR/ha	2,765
Average use of fertiliser, EUR/ha	341
Average rainfall, mm/year	1,100
Share of irrigated orchards, %	0
Irrigation system	None
Top-3 varieties grown	
– Name 1	Royal Gala
– ha	1.5
– Name 2	Golden Delicious
– ha	1.3
– Name 3	Jonagold
– ha	1
Trees per ha	2,500
Distance between the rows, m	3.5
Canopy management / production system	Spindel
Legal form	Family farm
Coupled and decoupled payments, Swiss government, EUR/ha	1,394
Subsidies (per farm) (e.g., for irrigation system, hail nets etc.)	0
Vertical market integration / marketing channels	Marketing cooperative
Participation in private quality certification scheme	Swiss Gap
Family labour, hours per year	2,200
Hired labour, hours per year	0
Seasonal workers, hours per year	2,000
Use of own machinery	Yes
Use of hired machinery / contractors / co-operative machine pool	Yes
Harvest	Manual

4.2 Typical wine grape farms

Australia

Region	Riverland: AU-22-R	Barossa: AU-20-B
Total farm size, ha	22	20
– full production, ha	19.8	18
– non full bearing, ha	0	0
– in establishment and fallow, ha	2.2	2
Lifetime of vineyard, years	40	40
Average time to first full yield after planting new vines	4	4
Grape yield on farm 2011, t/ha	19-23	4-5 (high quality)
Total grape yield 2011, t/farm	415	103.5
Average use of plant protection products, EUR/ha	405	54.5
Average use of fertiliser, EUR/ha	168	8
Average rainfall, mm/year	261	480
Share of irrigated vineyards, %	100	100
Irrigation system	Drip (+ fertigation)	Drip and trickle
Total surface of these 6 international wine varieties, ha: Merlot, Pinot Noir, Syrah/Shiraz, Cabernet Sauvignon, Chardonnay, Sauvignon Blanc	21.4	19.5
Top-3 varieties grown		
– Name 1, ha	Chardonnay 8.2	Chardonnay 6.8
– Name 2, ha	Shiraz 8.2	Shiraz 6.8
– Name 3, ha	Cabernet S. 5	Cabernet S. 5.9
Vines per ha	2,000	2,000
Distance between the rows, m	2.7	2.7
Legal form	Family farm	Family farm
Subsidies (per farm), EUR/ha	0	0
Canopy management / production system	Vertical trellis system	Vertical trellis system
Vertical market integration / marketing channels		
– selling grapes (with or without formal contracts) or delivering them to cooperative	80 % to purchasers with contract; 20 % without	100 % sold to purchasers without formal contract; agreement to buy at current prices with quality premium
Participation in private quality certification scheme	Vitis program and EntWine	EntWine and "The Barossa Viticulture Technical Group"
Family labour, hours per year	2,000	2,000
Hired labour, hours per year	726	676
Use of own machinery	Yes	Yes
Use of hired machinery / contractors / co-operative machine pool	Harvester; contractors for new establishment	Contractors for new establishment
Harvest	100 % machine	100 % hand harvest

France

Region	Languedoc Roussillon: FR-20-L		Bordeaux: FR-17-B	
Total farm size, ha	20		26	
– full production, ha	18.5		15	
– non full bearing, ha	0		1	
– in establishment and fallow, ha	1.5		1	
– other farm branch, ha	0		9	
Lifetime of vineyard, years	25-40		25-40	
Average time to first full yield after planting new vines	3		3	
Grape yield on farm 2011, t/ha	7.2–14.4		7.2–12.8	
Total grape yield 2011, t/farm	184		123	
Average use of plant protection products, EUR/ha	831		654	
Average use of fertiliser, EUR/ha	134		145	
Average rainfall, mm/year	650		920	
Share of irrigated vineyards, %	/		/	
Irrigation system	/		/	
Total surface of these 6 international wine varieties, ha: Merlot, Pinot Noir, Syrah/Shiraz, Cabernet Sauvignon, Chardonnay, Sauvignon Blanc	14		14.8	
Top-3 varieties grown				
– Name 1, ha	Shiraz	5	Merlot	8.6
– Name 2, ha	Merlot	3.3	Cabernet S.	4.8
– Name 3, ha	Carignan	2.2	Cabernet F.	1.8
Vines per ha	3,600–4,000		2,000–4,000 (new plantings > 3,300)	
Distance between the rows, m	2.5		4 – 3.5 – 2 – 2.2 (today: 2.5 or 3 max.)	
Less favoured area	2.5		4–3.5 – 2 – 2.2 (today: 2.5 or 3 max.)	
Legal form	Family farm		Family farm	
Decoupled payment, EU subsidies, EUR/ha	0		0	
Subsidies (per farm) (e.g., for irrigation system, conversion of old vineyards, grubbing-up etc.), EUR/ha	Grubbing up old and planting quality vines: 300 EUR/ha establish new and trellising system: 8,900 EUR/ha		Grubbing up old and planting quality vines: 300 EUR/ha establish new and trellising system: 8,900 EUR/ha	
Canopy management / production system	Trellising system – Cordon de Royat		Trellising system – Double Guyot	
Vertical market integration / marketing channels				
– selling grapes (with or without formal contracts) or delivering them to cooperative			100 %	
– producing and marketing bulk wine	100 %			
Participation in private quality certification scheme	Terra Vitis: sustainable viticulture		AgriConfiance, ISO 22000	
Family labour, hours per year	1,850		1,680	
Hired labour, hours per year	560		420	
Use of own machinery	Yes		Yes	
Use of hired machinery / contractors / co-operative machine pool	Harvest and establishment		Harvest and establishment	
Harvest	100 % machine		100 % machine	

4.2 Typical wine grape farms

Hochschule Geisenheim University

Germany

Region		Rheinhessen: DE-30-R
Total farm size, ha		30
– full production, ha		27.6
– non full bearing and maintenance, ha		1.2
– in establishment and fallow, ha		1.2
– other farm branch, ha		0
Lifetime of vineyard, years		25
Average time to first full yield after planting new vines		3
Grape yield on farm 2011, t/ha		10–18
Total grape yield 2011, t/farm		349
Average use of plant protection products, EUR/ha		915
Average use of fertiliser, EUR/ha		120 for barley and rye seeds as cover crops
Average rainfall, mm/year		500
Share of irrigated vineyards, %		0
Irrigation system		/
Total surface of these 6 international wine varieties, ha: Merlot, Pinot Noir, Syrah/Shiraz, Cabernet Sauvignon, Chardonnay, Sauvignon Blanc		1.2
Top-3 varieties grown		
– Name 1, ha	Müller-Thurgau	5.0
– Name 2, ha	Riesling	4.0
– Name 3, ha	Dornfelder	3.3
Vines per ha		4,000
Distance between the rows, m		2
Less favoured area		/
Legal form		Family farm
Decoupled payment, EU subsidies, EUR/ha		0
Subsidies (per farm) (e.g., for irrigation system, conversion of old vineyards, grubbing-up etc.), EUR/ha		0
Canopy management / production system		Vertical training system
Vertical market integration / marketing channels		
– selling grapes (with or without formal contracts) or delivering them to cooperative		100 % delivery to cooperative
Participation in private quality certification scheme		Yes
Family labour, hours per year		3,376
Hired labour, hours per year		1,669
Use of own machinery		Yes
Use of hired machinery / contractors / co-operative machine pool		Harvest; establishment of new vineyard
Harvest		100 % machine

Italy

Region	Emilia-Romagna: IT-5-E	Veneto: IT-10-V
Total farm size, ha	5	10
– full production, ha	4.4	9
– non full bearing, ha	0.4	0
– in establishment and fallow, ha	0.2	1
– other farm branch, ha	10	0
Lifetime of vineyard, years	25 years or more	25 years or more
Average time to first full yield after planting new vines	3	3
Grape yield on farm 2011, t/ha	8.5	15-20
Total grape yield 2011, t/farm	38.2	151.5
Average use of plant protection products, EUR/ha	1,057	613
Average use of fertiliser, EUR/ha	207.8	160
Average rainfall, mm/year	600	1,100
Share of irrigated vineyards, %	0	100
Irrigation system	/	Drip, trickle or micro irrigation
Total surface of these 6 international wine varieties, ha: Merlot, Pinot Noir, Syrah/Shiraz, Cabernet Sauvignon, Chardonnay, Sauvignon Blanc	0	3
Top-3 varieties grown		
– Name 1, ha	Sangiovese 5	Prosecco 3
– Name 2, ha		Pinot Grigio 3
– Name 3, ha		Cabernet S. 1.5
Vines per ha	3,333	2,500–3,500
Distance between the rows, m	3 x 1	1.7–3
Legal form	Family farm	Family farm
Decoupled payment, EU subsidies, EUR/ha	0	0
Subsidies (per farm) (e.g., for irrigation system, conversion of old vineyards, grubbing-up etc.), EUR/ha	Yes: 400 EUR/ha	Yes: 200 EUR/ha regional / national subsidies
Canopy management / production system	Cordon spur	Sylvoz
Vertical market integration / marketing channels		
– selling grapes (with or without formal contracts) or delivering them to cooperative	100 % delivery to cooperative	
– producing and marketing bulk wine		
– producing and marketing packaged wine		100 %
Participation in private quality certification scheme	Integrated production	Integrated production
Family labour, hours per year	649	1,500
Hired labour, hours per year	0	0
Use of own machinery	Yes	Yes
Use of hired machinery / contractors / co-operative machine pool	Harvest and transport; establishment phase	Harvest
Harvest	100 % machine	100 % machine

4.2 Typical wine grape farms

Spain

Region	Castilla la Mancha: ES-25-M	Castilla la Mancha: ES-130-M
Total farm size, ha	37	130
– full production, ha	25	130
– other farm branch, ha	12	0
Lifetime of vineyard, years	30	35
Average time to first full yield after planting new vines	3	4
Grape yield on farm 2011, t/ha	4.5–8.5	8.5–13.6
Total grape yield 2011, t/farm	173	1,316
Average use of plant protection products, EUR/ha	43	123
Average use of fertiliser, EUR/ha	74	90
Average rainfall, mm/year	400	460
Share of irrigated vineyards, %	60	100
Irrigation system	Drip irrigation	Drip irrigation
Total surface of these 6 international wine varieties, ha: Merlot, Pinot Noir, Syrah/Shiraz, Cabernet Sauvignon, Chardonnay, Sauvignon Blanc	0	78
Top-3 varieties grown		
– Name 1, ha	Tempranillo 15	Tempranillo 37
– Name 2, ha	Airen 10	Shiraz 33
– Name 3, ha		Merlot 26
Vines per ha	2,000–2,100	1,200–1,600
Distance between the rows, m	3.2	2.5–3
Less favoured area	Yes	Yes
Legal form	Family farm	Family farm (joined ownership)
Decoupled payment, EU subsidies, EUR/ha	215	280
Subsidies (per farm) (e.g., for irrigation system, conversion of old vineyards, grubbing-up etc.), EUR/ha	Conversion of old vineyards, irrigation systems	Irrigation systems, trellis, conversion of old vineyards, agrarian Insurance
Canopy management / production system	Old vines: goblet; Young vines: trellising system	Trellising system
Vertical market integration / marketing channels		
– selling grapes (with or without formal contracts) or delivering them to cooperative	100 % delivery to cooperative	100 % selling to a few selected wineries
Participation in private quality certification scheme	/	/
Family labour, hours per year	1,403	240
Hired labour, hours per year	641	15,495
Use of own machinery	yes	yes
Use of hired machinery / contractors / co-operative machine pool	Partly pruning, harvest and transport of grapes	Partly grape transport
Harvest	40 % manual; 60 % machine	100 % machine

Spain

Region		La Rioja: ES-15-R
Total farm size, ha		15
– full production, ha		15
– other farm branch, ha		0
Lifetime of vineyard, years		40
Average time to first full yield after planting new vines		4
Grape yield on farm 2011, t/ha		6.5
Total grape yield 2011, t/farm		98
Average use of plant protection products, EUR/ha		158
Average use of fertiliser, EUR/ha		74
Average rainfall, mm/year		550
Share of irrigated vineyards, %		/
Irrigation system		/
Total surface of these 6 international wine varieties, ha: Merlot, Pinot Noir, Syrah/Shiraz, Cabernet Sauvignon, Chardonnay, Sauvignon Blanc		0
Top-3 varieties grown		
– Name 1, ha	Tempranillo	15
Vines per ha		1,200–1,600
Distance between the rows, m		3–3.5
Less favoured area		No
Legal form		Family farm
Decoupled payment, EU subsidies, EUR/ha		0
Subsidies (per farm) (e.g., for irrigation system, conversion of old vineyards, grubbing-up etc.), EUR/ha		Conversion of old vineyards
Canopy management / production system		Trellising system
Vertical market integration / marketing channels		
– selling grapes (with or without formal contracts) or delivering them to cooperative		100 % delivery to cooperative
– producing and marketing bulk wine		/
– producing and marketing packaged wine		/
Participation in private quality certification scheme		PDO
Family labour, hours per year		1,336
Hired labour, hours per year		0
Seasonal workers, hours per year		450
Use of own machinery		Yes
Use of hired machinery / contractors / co-operative machine pool		For pruning and harvesting
Harvest		100 % machine

4.2 Typical wine grape farms

South Africa

Region	Breedekloof: ZA-50-B		Paarl: ZA-50-P	
Total farm size, ha	50		50	
– full production, ha	42		40	
– non full bearing, ha	4		6	
– in establishment and fallow, ha	4		4	
– other farm branch, ha	0		0	
Lifetime of vineyard, years	25		25	
Average time to first full yield after planting new vines	5		6	
Grape yield on farm 2011, t/ha	15–27.5		10–20 (high quality)	
Total grape yield 2011, t/farm	923.1		558	
Average use of plant protection products, EUR/ha	261		212	
Average use of fertiliser, EUR/ha	187		107	
Average rainfall, mm/year	500		650	
Share of irrigated vineyards, %	100		100	
Irrigation system	Drip		Drip	
Total surface of these 6 international wine varieties, ha: Merlot, Pinot Noir, Syrah/Shiraz, Cabernet Sauvignon, Chardonnay, Sauvignon Blanc	19.7		32.33	
Top-3 varieties grown				
– Name 1, ha	Chenin Blanc	13.4	Chenin Blanc	11
– Name 2, ha	Colombar	9.3	Cabernet S.	10.78
– Name 3, ha	Shiraz	5.3	Shiraz	8.73
Vines per ha	3,333		3,333	
Distance between the rows, m	2.5		2.5	
Legal form	Family farm		Family farm	
Subsidies (per farm), EUR/ha	/		/	
Canopy management / production system	Five-strand extended Perold			
Vertical market integration / marketing channels				
– selling grapes (with or without formal contracts) or delivering them to cooperative	100 % delivery to cooperative		100 % sell to private cellars and wholesalers	
Participation in private quality certification scheme	Integrated Production of Wine (IPW); Wine Industry Ethical Trade Association (WIETA)			
Family labour, hours per year	2,160		2,160	
Hired labour, hours per year	28,080		19,440	
Seasonal workers, hours per year	6,480		10,800	
Use of own machinery	Yes		Yes	
Use of hired machinery / contractors / co-operative machine pool	Land preparation at establishment of new vineyards			
Harvest	40 % manual and 60 % machine		62 % manual and 38 % machine	

Italy

Region	Emilia-Romagna
Total farm size, ha	92
– tomato production, ha	30
– other crops (wheat, corn, sugarbeets), ha	62
Yield on farm 2013, t/ha	70
Total production 2013, t/farm	2,100
Average use of plant protection products, EUR/ha	766
Average use of fertiliser, EUR/ha	300
Average rainfall, mm/year	900
Irrigated tomato fields, %	100
Irrigation system	Sprinkler
Legal form	Family farm
Decoupled payment, EU subsidies, EUR/ha	1,200
Subsidies (per farm) (e.g., for irrigation system, hailnets etc.), EUR/ha	/
Vertical market integration/marketing channels	Direct marketing to processing industry
Participation in private quality certification scheme	/
Family labour, hours per year	1,153
Hired labour, hours per year	/
Seasonal workers, hours per year	630
Use of own machinery	Yes
Use of hired machinery / contractors / co-operative machine pool	No
Harvest	Mechanically with own harvester

A Annex

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A.1 Explanation of terms

Terms		
Accounting profit	=	Gross margin – overhead costs – depreciation **OR** = Gross revenue – direct costs – hired labour – overhead costs – depreciation (others may call it "Net cash farm income")
Contractor	=	Costs for contractor services such as labour and/or machinery; in some countries this comprises the renting of bee hives for pollination or consulting experts for accounting services
Depreciation	=	Depreciation of machinery + depreciation of buildings
Direct costs	=	Seed/seedling cost + total fertiliser cost + total pesticides cost + storage energy cost + irrigation cost (var.) + crop insurance net cost + other direct cost (e.g. binding material)
Economic profit	=	Accounting profit – opportunity costs **OR** = Gross revenue – direct costs – hired labour – overhead costs – depreciation - opportunity costs (others may call it "Return to management or Entrepreneurial profit")
Family labour	=	Valued with opportunity costs either for off-farm salary or farm manager salary
Gross margin	=	Gross revenue – direct costs – hired labour
Gross revenue	=	Total market revenue + other returns + coupled payments
Hired labour	=	Salaries paid (including social fees, taxes) to hired permanent or seasonal workers
Labour productivity	=	Gross revenue for the whole farm divided by total hours worked on farm (family and hired labour)
Machinery	=	Machinery depreciation + machinery finance + machinery repair
Opportunity costs	=	Opportunity cost for family labour + opportunity cost own land + opportunity cost equity (own capital)
Other pesticides	=	Sum of fungicides, insecticides, herbicides (if not specified otherwise)
Overhead costs	=	Total cost – (direct costs, hired labour, depreciation, opportunity cost) **OR** = Water/electricity + insurance + tax + advisory services + accounting + office + land rents + maintenance (buildings and machinery) + diesel/fuel and lubricants + contractor services + interest paid on loans (machinery, buildings, field inventory)

A.2 Exchange rates

The following average exchange rates have been used (national currency = … EUR) www.oanda.com

Country and Currency		2010	2011	2012
European Union	EUR	1	1	1
Australia	AUD	0.6921	0.7417	0.8054
Chile	CLP	0.0015	0.0015	0.0016
Switzerland	CHF		0.8123	0.8296
South Africa	ZAR	0.1032	0.0993	0.0948

Countries	
AU	Australia
CA	Canada
CH	Switzerland
CL	Chile
CN	China
DE	Germany
ES	Spain
FR	France
GB	United Kingdom
IT	Italy
JP	Japan
MX	Mexico
NL	Netherlands
RU	Russia
US	United States of America
ZA	South Africa
EU	European Union

German federal states	
BB	Brandenburg
BW	Baden-Württemberg
BY	Bavaria
HE	Hesse
HH	Hamburg
MV	Mecklenburg-West Pomerania
NI	Lower Saxony
NW	North Rhine-Westphalia
RP	Rhineland-Palatinate
SH	Schleswig-Holstein
SN	Saxony
ST	Saxony-Anhalt
TH	Thuringia

Others	
GICA	Groupement Interprofessionnel des Conserves Alimentaires, Tunisia
INRA	Institut national de la recherche agronomique
INS	Institut National de la Statistique, Tunisia
Istat	Italian National Institute of Statistics
SAWIS	South African Wine Industry Information & Systems

Measures and Units	
dt	Decitonne
h	Hour
ha	Hectare
kg	Kilogramme
t	Metric tonne

the *agri benchmark* project

Management: Walter Dirksmeyer

Johann Heinrich von Thünen Institute
Federal Research Institute for Rural Areas, Forestry and Fisheries
Institute of Farm Economics
Bundesallee 50
38116 Braunschweig
Germany

Management: Svea Sievers

German Agricultural Society (DLG)
Eschborner Landstraße 122
60489 Frankfurt am Main
Germany

Website: www.agribenchmark.org
E-mail: info@agribenchmark.org

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