Economic Clusters, Knowledge Networks and Globalisation: Fruit Growing in Dutch Limburg, 1850-1940

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TSEG 13 (4): 91–118
DOI: 10.5117/TSEG2016.4.SEGE

Abstract

This paper unravels and analyses how the fruit sector in the province of Limburg (The Netherlands) reacted to growing (inter)national competition between 1850 and 1940. Entrepreneurs, private and public organisations created shared facilities which operated on a regional scale, such as auctions and a state horticultural consultancy, to respond to this global competition and to stimulate the formation of a regional fruit cluster. This process of economic development is embedded in the emergence of knowledge networks, in which scientific and economic know how, mainly regarding product and processing quality, circulated between various actors. Initially, the fruit cluster operated mainly in a regional network, but from the First World War onwards it became increasingly integrated in a national network, steered by the government and agricultural associations.

1 Introduction

The rural economy in Western Europe and in The Netherlands underwent a structural transformation between 1850 and 1940. A first key factor was the switch from a farming system dominated by arable farming to animal husbandry and horticulture. The importance of fruit growing increased considerably during this period: the acreage expanded, production and yields increased, thanks to investments fruit cultivation took on a more commercialised and specialised character, fertilisation and disease control received more attention, etc. Of course, this was a gradual process and not all farmers participated equally. A second important development was the internationalisation and world wide integration of the agricultural and

food markets. This process of globalisation created opportunities for farmers to export their produce, but would also lead to growing competition on the internal market.[1] In The Netherlands the fruit sector expanded in some specific regions. The most prominent were South Beveland, Walcheren, the western part of North Brabant, Betuwe and South Limburg. In this contribution I analyse how the fruit cluster in Limburg, mainly concentrated on the plateau between the rivers Geul, Maas and Voer, reacted to this modernisation and globalization process. I choose this region for two reasons. Firstly, it was one of the core regions regarding fruit cultivation (acreage, production, etc.). Secondly, the specific peripheral location (caught between Belgium and Germany) makes it a good case to study the impact of globalisation.[2]

In order to unravel and understand the agricultural development of the fruit sector in South Limburg, I use ideas and concepts from economic geography.[3] To explain the success of a region, traditional theories refer to the importance of natural resources and efficient transport options in order to account for the establishment of companies and the concentration of economical activities (for instance von Thünen's regional land use model). But these insights only partially manage to analyse and clarify the cumulative processes involved. Furthermore, the classic theories only partly help to explain the socio-economic dynamics of a region, when for instance the natural advantages became less decisive, due to technological innovations. Moreover, these theories do not explain why companies establish themselves near other (similar) companies and entrepreneurs, and therefore engage in cluster-forming. The New Economic Geography of the 1990s offered new conceptual frameworks. According to Krugman firms-consumers linkages were central: workers migrate to a region where an important company is active, and once there they generate new demand impulses as consumers, which in their turn generate new economic activity.[4] Venables on the other hand advanced input-output linkages: compa-

1 Y. Segers and E. Karel, 'The Low Countries, 1750-2000', in: E. Thoen and T. Soens. (eds.), *Struggling with the environment: land use and productivity* (Turnhout 2015) 285-289.

2 Y. Segers, 'Globalisering, staatscontrole en kennisnetwerken. De fruitteelt in Limburg, 1850-1940', in: P. Timmers e.a. (eds.), *Limburg. Een geschiedenis* (Maastricht 2015) 397-416.

3 T. Martinez-Fernández, J. Capó-Vicedo and T. Vallet-Bellmunt, 'The present state of research into industrial clusters and districts. Content analysis of material published in 1997-2006', *European Planning Studies* 20 (2012) 281-304.

4 P. Krugman, 'Increasing returns and Economic Geography', *Journal of Political Economy* 99 (1991) 483-499; P. Krugman, 'What's new about the new economic geography', *Oxford Review of Economic Policy* 14 (1998) 7-17.

nies only establish themselves close to each other because of economies of scale for purchasing and sales of intermediary goods, the bundling of energy and transport costs, the advantages relating to transfer of technology, information, knowledge etc. Or in other words: proximity is put forward as core element for regional economic innovation and competitiveness.[5] More recent insights continue to build on the role of knowledge transfer and the existing social relationships between entrepreneurs, authorities and other actors to explain the innovative strength of a region. In this way Scott, Storper and Cooke put forward the manner in which entrepreneurs consciously and unconsciously exchange information as the key to success. These so-called 'information spill overs' then generate knowledge and practices which cannot be found anywhere else. Individuals and organisations with a different background learn to know each other better, and joint initiatives are set up through intensive, personal contacts. In such a sphere of mutual trust, innovative clusters can more easily be established, and knowledge and all kinds of facilities are shared. In addition to economic factors, social and cultural proximity also played a role.[6]

Broadly speaking the institutions and actors involved in cluster formation can be classified in three groups, also called the 'triple helix': 1) economic actors such as fruit growers, cooperative auctions, syrup factories; 2) knowledge institutes such as research stations, schools, and 3) governmental initiatives and organisations such as the Ministry of Agriculture. In this contribution I explore how these groups in South Limburg reacted to the globalisation and internationalisation processes. Which actors took the lead in the formation of a fruit cluster, and which characteristics did it have? Which (common) strategies were developed and which innovations took centre stage, allowing South Limburg fruit growing to maintain, or even strengthen its position? A central theme in my analysis is the role of knowledge and the (evolving) connections and interactions between the actors or groups. For this I refer to the concept of agricultural 'knowledge networks'. Herewith rural historians such as Segers and Van Molle refer to the complex mechanisms of knowledge production and diffusion in the

5 A. Venables, 'Equilibrium locations of vertically linked industries', *International Economics Review* XXXVII 4 (1996) 341-360; S. Decaigny, 'New economic geography als bedrijfshistorische invalshoek: de transformatie van de kanaalzone ten noorden van Brussel tot een industriegebied in het interbellum', *Belgisch Tijdschrift voor Nieuwste Geschiedenis* XXXIII 3-4 (2003) 535-575.

6 M.A. Porter, 'Clusters and the new economics of competition', *Harvard Business Review* (1998) 77-90; A.J. Scott, *Regions and the world economy. The coming shape of global production, competition and political order* (Oxford 1998); M. Storper, *The regional world. Territorial development in a global economy* (New York 1997).

primary sector. They underline that (scientific) knowledge is not static or just a collection of facts, but must be seen as a way of communication between scientists, experts and farmers, whereby the latter can have an active role too. Since the middle of the nineteenth century, private and public institutions in Western Europe invested more money and energy in knowledge networks as a base for innovation and economic success.[7] But surprisingly, until now scholars paid little attention to the importance of agricultural research, extension and education and to the evolution of fruit cultivation in the Netherlands.[8]

This paper demonstrates that globalization resulted in the gradual establishment of a complex network of organisations and individuals in South Limburg, which increasingly cooperated and supported innovation. However, not all farmers participated from the beginning. The focus has been on generating and especially transmitting relevant knowledge and improving product and processing quality in order to strengthen its position on the internal and foreign markets. Gradually, more producers joined the activities of the cluster. Initially, it operated mainly regionally, but from the First World War onwards the Limburg cluster became increasingly integrated in a national network, steered by the national government and agricultural associations.

7 Y. Segers and L. Van Molle, *Knowledge networks in rural Europe since 1700. Historiographies, concepts and theories* (Leuven 2014) unpublished paper.

8 J. Bieleman, 'Dutch agricultural history c. 1500-1950: a state of research', in: E. Thoen and L. Van Molle (eds.), *Rural history in the North Sea area. An overview of recent research* (Turnhout 2006) 283-294; J. Bieleman, *Boeren in Nederland. Geschiedenis van de landbouw, 1500-2000* (Amsterdam 2008); P. van Cruyningen, 'Dutch rural history c. 1600-2000: debates and selected themes', in: Thoen and Van Molle (eds.), *Rural history in the North Sea area*, 295-320.

Figure 1. Map of the province of Limburg and its municipalities

2 An embryonic cluster and elitist knowledge networks, 1850-1880

If we base ourselves on the productive surface, Southern Limburg was the most important fruit region in the Netherlands: in 1833 there were 6,345 hectares of fruit trees, mainly apples, pears and plums (or 35 percent of national acreage).[9] Soil and climate were natural assests. The loam soil was rich in nutrition, specifically potash and lime, which required less fertilisation in order to achieve a good yield. The water-bearing capacity of the loess was optimally suited for fruit growing in meadows. In comparison with other Dutch regions, South Limburg enjoys a better climate. The loess soils are less hot in summer and less cold in winter than for instance the sandy soils in the North. The average temperatures in South Limburg are higher, which causes the fruit to ripen earlier. Or in other words, the

9 Bieleman, *Boeren in Nederland*, 453; P. Brusse, *Provincie in de periferie. De economische geschiedenis van Zeeland* (Utrecht 2005) 185; P. Priester, *Geschiedenis van de Zeeuwse landbouw, circa 1600-1900* (Wageningen 1998) 209-213.

relatively excellent natural conditions (soil and climate) were the basis for the development of an early fruit cluster.

Although many farms, and certainly the larger enterprises, had various fruit trees on the farmyard, or even had an orchard, fruit growing remained a sideline for a long time. Farmers gave little attention to the care of the trees and the quality of the fruit. The harvest was often already sold in spring, directly or through public auctions, to traders who took the responsibility for picking and packaging. The fruit was mainly destined for own consumption and for the handcrafted production of syrup.[10] Agriculture in South Limburg was also characterised by traditional mixed activities, and differentiated itself in various areas from the agrarian system in other parts of the province. Around 1850 almost all available acreage had been brought into cultivation: 68 percent was arable land, 22 percent pastures, orchards and horticultural land, and only 10 percent consisted of wasteland and woods. In South Limburg the farms were on average larger. The region had more tenant farms, with farm labourers and maids living in, and the enterprises usually had their own livestock, with cattle and horses for draft. In comparison with the North of the province and with many other regions in the country, the agricultural sector in South Limburg was commercial and export oriented in character. The region around Luik (in Belgium) purchased an important part of its grain from South Limburg as early as the seventeenth century. However, this made the Limburg farmers and horticulturalists very vulnerable, especially after the Belgian independence in 1830 and the division of the province in Belgian Limburg and Dutch Limburg (in 1839). This left no important interior markets nearby, except for Maastricht, and the transport infrastructure also left a lot to be desired. The peripheral location in the Netherlands made the farmers in Limburg highly dependent on the economic and trade policies of neighbouring countries.[11]

10 J. Wachelder, *Geschiedenis van de tuinbouw in Limburg*, volume 2, part 1 (Maastricht 1970); E. Niesten and Y. Segers, *Smaken van het land. Groenten en fruit, vroeger en nu* (Leuven 2007) 21-22; H. Vermooten, 'De landbouw op de rivierklei en in Zuid-Limburg', in: Z.W. Sneller (ed.), *Geschiedenis van den Nederlandschen landbouw, 1795-1940* (Groningen-Batavia 1943) 302.

11 J.F.R. Philips, J.C.G.M Jansen and Th.J.A.H. Claessens, *Geschiedenis van de landbouw in Limburg, 1750-1914* (Assen 1965) 19 and 158-159; W. Rutten, 'Boeren', in: F. Hovens e.a. (ed.), *Kleine geschiedenis van Limburg*, deel 15 (Zwolle 2009) 76-85.

Illustration 1. Picking, weighing and packaging the fruit harvest in orchards was a difficult and labor-intensive job. Picture taken in the Voer region, around 1910.

Source: Collection Centrum Agrarische Geschiedenis, Leuven.

2.1 Purchasing power and foreign markets

Nevertheless, from about 1850 new chances appeared for the South Limburg fruit growers. Due to the urbanisation and the increasing purchasing power of the population, the demand for fresh fruit increased. The development of small syrup factories in South Limburg between 1850 and 1880 (for instance in Schinnen, Beek, Meersen, Eijsden and Maastricht) also caused the demand for fruit to flourish.[12] However, according to agricultural historian Jan Bieleman it was foreign demand, boosted by the free trade movement, which stimulated the fruit sector in various Dutch regions from about 1850. The price development profited from this: between 1846-1855 and 1871-1880 the price of apples rose by 58 percent. The value of all exported horticultural products rose between about 1850 and 1875 from 0.7 to 5.8 million Guilders, and mainly went to the neighbouring countries.[13] The Limburg fruit growers were focussed on London and on the booming industrial regions around Luik and in the Ruhr area. However, accurate

12 Vermooten, 'De landbouw op de rivierklei', 306; S. Langeweg, *Stroopstoken in Limburg: van ambacht tot fabriek* (Z.p. 2003).

13 D. Pilat, *Dutch agricultural export performance, 1846-1926* (Groningen 1989) table C.S.C; Bieleman, *Boeren in Nederland*, 442; D. van Marrewijk, 'Fruit in glas: opkomst en ondergang van de druiventeelt in het Westland', *Historisch Geografisch Tijdschrift* (1998) 37.

information concerning the size and destination of the export and even of the Dutch production before the start of the twentieth century is not available. The most important market places in the period 1854-1876 were Maastricht, Eijsden and Venlo; the main growing centres were the southerly cantons Meerssen, Heerlen and Gulpen, where the natural conditions were optimal.[14]

Of equally crucial importance was the improvement of transport links with the other parts of The Netherlands and the neighbouring countries. Due to low water levels, the navigability of the Maas was often problematic until 1930-1940, leaving the economic potential of the river underused.[15] Therefore the construction or extension of canals and railways from about 1850 was extremely important. The canal from Maastricht to Luik was dug in 1850, and was swiftly followed by the construction of the railways Maastricht-Aachen (1853), Maastricht-Hasselt-Brussels (1856), Maastricht-Luik (1861), and the Maastricht-Venlo line, which connected to the line between Eindhoven and the port of Vlissingen (1865). In later decades even better connections with Germany followed. Furthermore, the construction of trams and urban railways during the latter quarter of the century ensured an even better infrastructural connection to the rural areas of Limburg and a further reduction of transport costs. Exports to Great Britain also benefitted from the introduction of steam ship connections between London and the continent (Rotterdam, Vlissingen, Amsterdam, Antwerp and Ostend) from the 1850s onwards.[16]

2.2 Early knowledge networks

Notwithstanding the increased market opportunities, the (scarce) data available suggests that the size of the fruit growing area in South Limburg remained stable during the period 1840-1870/1890. According to contemporary sources the growers and traders paid scant attention to innovation. Specialisation in fruit growing was slowed down by a lack of knowledge and the fact that a majority of the farmers were tenants. Because Dutch legislation did not guarantee compensation for any improvements made by tenants, they probably hesitated to invest in the establishment of (rather expensive) orchards. A new orchard can only achieve a top yield

14 M. Knibbe, *Agriculture in the Netherlands, 1851-1950. Production and institutional change* (Amsterdam 1993) 87-93.

15 T. Bosch, "Kanaliseert de Maos. Doot et. Noe of Noets'. Acties voor de bevaarmaking van de Maas in de provincie Limburg (1839-1925)', in: *Studies over de sociaal-economische geschiedenis van Limburg* LIII (2008) 31-53.

16 H. Boersma, *Eijsden, een Maasdorp in ontwikkeling, 1851-1860* (Maastricht 2011) 70-71.

after ten to fifteen years. Moreover, during the third quarter of the nineteenth century farmers on the loess soils not only profited from good fruit prices, but also from a favourable price evolution of wheat, meat and dairy products. Their income was increasing anyway, so why would they make new, risky investments? These observations are of course also partially an explanation for the low response of active growers to the initiatives of the first agricultural organisations to modernise horticulture.[17]

These societies mainly addressed an elitist public. The 'Maatschappij van Landbouw' [The Society of Agriculture], established in 1849, united a group of prominent citizens, large landowners and gentleman farmers. They organised exhibitions, competitions with agricultural tools, lectures and courses, and published a journal for members. In this way they wanted to circulate new ideas, techniques and practices. The number of members fluctuated strongly during the 1850s: 800 in 1857 and about 300 in 1859. The main sticking point was the low participation of ordinary farmers and fruit growers (in 1859 circa 25,500 farmers were active in Limburg). For this reason the so-called 'casinos' or local branches were established, in order to lower the threshold for membership. In 1870 the appointment of G.F.R. Corten (1833-1917) as 'walking teacher' or agronomist followed, which was very early compared to other regions in the Netherlands, thanks to a subsidy from the provincial authorities. His job was to 'bring the farmers more into contact with scientific insights'. The following years Corten travelled around the entire province, and gave easily accessible lectures and courses on a variety of themes such as plant biology, artificial fertilisers, harvesting and preservation techniques. Not only Corten, but later other agronomists too, would play a key role in stimulating innovation and cooperation, and thus contributing to the formation of a fruit cluster in South Limburg.

The extra attempts of the Maatschappij to integrate and involve ordinary farmers in its activities were also prompted by the appearance of a competing organisation. In the middle of the 1860s the 'Vereeniging ter bevordering van Tuin- en Landbouw in het Hertogdom Limburg' [Association for the promotion of horticulture and agriculture in the Duchy of Limburg], also established in Maastricht, had been started. The aim was: 'Mainly the encouragement, development and improvement of everything concerning horticulture'. Both the provincial and the national authorities granted (albeit limited) subsidies, allowing the Vereeniging to develop many activities. The strong influence of Belgian experts was characteristic herein, although this should not be surprising. The growing conditions

17 Bieleman, *Boeren in Nederland*, 359.

were the same in both regions and the same fruit varieties were cultivated. The differences with other Dutch growing centres were larger. Furthermore, at that time the Belgian horticultural education was of a high level.[18] The vegetable and fruit growing courses of the Vereeniging were given by Belgian teachers who had obtained a horticulture diploma at the state horticultural schools of Vilvoorde and Gentbrugge (among others A.C. Ide, then director of the Gerard van Swietens Horticulture school in Frederiksoord, Emile Rodigas and Frédéric Burvenich). For these courses they followed the official Belgian curriculum. The organisation purposefully aimed at knowledge transfer. For instance, in 1870 and 1871 it sent three students each year to the internationally renowned horticulture school in Vilvoorde at the expense of the association.[19] It also set up the same type of activities as the Maatschappij. It published a free members' journal, distributed free seeds, plants and trees of improved or new fruit varieties to its members, and maintained an experimental garden. In 1867 the Vereeniging started organising annual vegetable and fruit exhibitions in Maastricht. In this the influence from Belgium is also striking. For instance, no less that 92 Belgians participated in the exhibition in 1868, compared to 72 Dutchmen. Until the 1880s most prizes were won by Belgians; later the Dutch/Limburg farmers took the starring roles. But despite the student scholarships and the initiatives of the rural elite, the Vereeniging mainly reached prominent citizens and pomologists. In 1872 only 11 of the 404 members were active horticulturists. Reasons for this were multiple: the high membership fees and the fact that many activities took place in or near Maastricht. And also the social and cultural differences between the ordinary farmers and the the regional elite have to be taken into account.[20]

18 In the Netherlands the first State horticultural school was founded in 1896. J.C.G.M. Jansen and W.J.M.J. Rutten, *Geschiedenis van de landbouw in Limburg in de twintigste eeuw* (Leeuwarden 1992) 136-137; E. Van Leuven, *Bijdrage tot de tuinbouwgeschiedenis. De Belgische groenteteelt, 1830-1914* (Aartrijke 1990) 75-78.

19 *Ibidem*, 177-180; V. Jacobs, *Limburgs-Haspengouw, een fruitstreek met traditie* (Borgloon 1997) 140-146.

20 J. van Lieshout, *En de boer hij gardeniert voort… De geschiedenis van de Coöperatieve Veiling-Vereeniging (1915-1946) en de Coöperatieve Venlose Veilingvereniging (1946-1990)* (Grubbenvorst 1991) 21-22; J. Korsten, *Standhouden door veranderingen. De Limburgse Land- en Tuinbouwbond als behartiger van agrarische belangen, 1896-1996* (Nijmegen 1996) 24-25; A. Schuurman, 'Agricultural policy and the Dutch agricultural institutional matrix during the transition from organized to disorganized capitalism', in: P. Moser and T. Varley (eds.), *Integration through subordination. The politics of agricultural modernisation in industrial Europe* (Turnhout 2013) 65-85.

3 Globalisation, cooperation and clustering, 1880-1916

At the end of the 1870s the economic and agrarian boom faltered. The process of increasing free trade and globalisation no longer only created chances for Dutch and Limburg farmers, but also threats. Cheap agricultural and food products were exported on a large scale to Western Europe from countries across the sea, such as the United States. The improvement of maritime transport with steamships and the extension of a dense railway network, as well as the availability of modern preservation and cooling techniques ensured that the markets for perishable products and foodstuffs (such as fruit) strongly integrated on a worldwide scale. The result was an increased international competition and, consequently, a sharp price drop of food. In Western Europe this development led to specialisation and reorientation towards livestock breeding and horticulture.[21] The Dutch agriculture and horticulture started to feel the consequences of the agricultural depression caused by this 'agricultural invasion' from 1878. Under the pressure of the farmers' organisations the authorities installed an Agriculture Commission in 1886, which had to study the situation in depth, and give advice on how to tackle the crisis. Notwithstanding the farmers' calls for protective measures, the Dutch government continued to opt for free trade during the next decades. And this while neighbouring countries Germany, France, and to a lesser extent also Belgium, opted for a protectionist policy. However, crucial in the Dutch plan was the attention given to the organisation of agricultural research and education, the establishment of an agriculture and horticulture extension service (with as key figures the state agronomists) and specialised experimental stations. The way out of the crisis had to be through innovation and cooperation, the creation and distribution of new insights and knowledge.[22]

What were the consequences of these developments for the fruit cluster and its actors in South Limburg, a region which was uniquely trapped

21 J.A. Morilla, A.L. Olmstead and P.W. Rhode, 'International competition and the development of the dried-fruit industry, 1880-1930', in: S. Pamuk and J.G. Williamson (eds.), *The Mediterranean Response to globalization before 1950* (Londen 2000) 199-232; V. Pinilla and M.I. Ayuda, 'Foreign markets, globalisation and agricultural change in Spain, 1850-1935', in: V. Pinilla (ed.), *Markets and agricultural change in Europe, from the 13th to the 20th century* (Turnhout 2009) 173-176; Y. Segers and L. Van Molle, *Leven van het land. Boeren in België 1750-2000* (Leuven 2004) 50-51; Bieleman, *Boeren in Nederland*, 277-279.

22 K.H. O'Rourke, 'The European grain invasion, 1870-1913', *Journal of Economic History* 57 (1997) 775-801; Knibbe, *Agriculture in the Netherlands*, 161-167; P. Brusse, A. Schuurman, L. Van Molle and E. Vanhaute, 'The Low Countries, 1750-2000', in: B. van Bavel and R. Hoyle (eds.), *Social relations. Property and power* (Turnhout 2010) 216-217.

between neighbouring countries who were operating in an increasingly protectionist manner? It is apparent from many contemporary sources that the South Limburg farmers initially performed relatively well. They continued to combine arable farming (mainly bread wheat) with livestock farming and fruit growing, and during the first decade they could continue to rely on the relatively high prices for (breeding) cattle, dairy products and fruit. When however from the middle of the 1890s more and more livestock products streamed into the country, the income of the Limburg farmers came under increasing pressure. From that time on fruit growing proved, more than ever before, to be an interesting option. Or, as expressed in the report of the state commission from 1886: 'It is generally known that since there is a notorious slump in agriculture, those farms which had a substantial fruit harvest at their disposal, could maintain the balance in the otherwise so much reduced agricultural proceeds of the land'.[23] Table 1 clearly illustrates that between 1851 and 1904 the price of fruit, both hard and soft fruit, in the Amsterdam market remained firmer than the price of rye and butter. It was therefore not surprising that in South Limburg more and more arable land outside the village centres was converted into 'fruit meadows', which were more suitable for a combination of commercial fruit growing and livestock farming.[24]

The orientation towards fruit growing and extensive livestock farming was also an answer to the increasing shortage in manpower. The upcoming industrial regions in Germany and Belgium, with their high wages attracted many rural workers from South Limburg.[25] This labour shortage also explains why fruit growers in Limburg held on to the extensive system of 'fruit meadows' much longer than elsewhere in The Netherlands.[26]

23 Quoted in Wachelder, *Geschiedenis van de tuinbouw in Limburg*, volume 2, part 1, 57.

24 Between 1875 and 1921-1925 the wheat acreage in the province Limburg fell from 14,200 to 5,900 hectares. Bieleman, *Boeren in Nederland*, 362.

25 Bieleman, *Boeren in Nederland*, 362.

26 In 1912 as little as 0.8 percent of the orchards in Limburg would have had underplanting; in Zeeland at that time it was already 33 percent and in Gelderland approximately 5 percent. Brusse, *Provincie in de periferie*, 187.

Table 1. Average prices of fruit in the Amsterdam market, 1851-1904 (1860-1869 = 100)

	Apples	Pears	Cherries	Strawberries	Rye	Butter
1851-1859	98	99		79	98	83
1860-1869	100	100	100	100	100	100
1870-1879	136	119		149	97	112
1880-1889	109	103		83	84	105
1890-1899	112	103		134	65	89
1900-1904	198	138	183	192	65	95

Source: J.L. van Zanden, *De economische ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800-1914* (Wageningen 1985) 309.

How fast the fruit acreage expanded is not really clear. Reliable figures about the evolution of the fruit acreage at the provincial level only become available from 1900 (see table 2). This information suggests that before 1900/1906 little to no expansion took place; only between 1906 and 1912 would the acreage in The Netherlands and in the province Limburg have increased. Unfortunately these figures say nothing about the importance of the various types of fruit which were grown, or about the yield. It is in any case certain that the fruit acreage consisted mainly of apples, pears and cherries. Plums were not commercially grown. Until the First World War, the system of mixed planting in the orchards remained prevalent in Limburg. In the same orchard one row of cherry trees was alternated with a row of apple or pear trees. The advantage of this method was in the faster return: the cherry trees were indeed much faster productive.[27]

Table 2. The evolution of fruit growing in The Netherlands and Limburg, 1900-1940 (in hectares)

	Netherlands	Limburg	Share Limburg
1900	18,379	5,820	31.7%
1906	19,014	5,870	29.5%
1912	24,430	7,323	30.0%
1919	25,698	7,600	29.6%
1927	33,937	10,225	29.8%
1940	54,565	13,304	24.4%

Source: Wachelder, *Geschiedenis van de tuinbouw in Limburg*, volume 2, part 1, 85.

27 Bieleman, *Boeren in Nederland*, 366-368.

An important dynamic behind the expansion of the fruit acreage was the increasing demand, at home and abroad, for fresh table fruit and especially factory fruit.[28] Shortly before the turn of the century the manufacture of syrup went through a process of mechanisation, upscaling and concentration. It was one of the most important rural industries in South Limburg and a dynamic actor in the regional fruit cluster (although very little is known about its activities). In 1889 there were about 300 small, artisanal syrup factories in the province, 6 industrial syrup factories remained in 1920 (of which 5 in the fruit region around Maastricht). The preserves industry, witch developed from the 1890s onwards in the Betuwe and in the region of Breda (on the British model), was less important in Limburg.[29]

3.1 New sales systems

Table 3 presents some of the scarce data concerning the export of fruit in 1896 from some municipalities in South Limburg (specifically from Eijsden, Beek and Bunde). It is noticeable that pears and apples went mainly to Germany. Cherries were destined for the Dutch market in limited amounts, and were exported to Great Britain. During top seasons more than 350,000 kilos of cherries were sent from Eijsden each week. The fruit trade was in the hands of Limburg and Belgian traders, whereby Antwerp traders played a key role in the export to Great Britain. An important part of the trade was organised through consignation. In this system the grower remained owner of a fruit lot until it was sold. But he had to trust the merchant: the farmer was not sure about the exact quantities sold and the market price; he had to partly pay for the transport and also paid a commission to the trader.

28 A. van Otterloo, *Eten en eetlust in Nederland, 1840-1990. Een historisch-sociologische studie* (Amsterdam 1990); J. Jobse-van Putten, *Eenvoudig maar voedzaam. Cultuurgeschiedenis van de dagelijkse maaltijd in Nederland* (Nijmegen 1995).

29 Van Marrewijk, 'Fruit in glas', 38-41; H.A. Muntjewerff, 'Het ontstaan van de Bredase jamindustrie, 1900-1921', *Industriële Archeologie* (1991) 20-21; Jansen and Rutten, *Geschiedenis van de landbouw in Limburg*, 149; Langeweg, *Stroopstoken in Limburg*.

Table 3. The export of fruit in 1896 from some municipalities per month, in tons and per destination

Eijsden and surroundings	June	July	August	Septem-ber	October	Novem-ber	Destination
Cherries	17.8	274.3					GB
Plums		19.0	13.9				GB
Nuts				71.9			GB
Pears			72.6	55.7			Germany
Apples				765.8	940.3		Germany
Beek and Bunde							
Plums		11.2	20.05				GB+ Germany
Apples			215.3	461.1	746.2	101.8	Germany
Pears			163.0	181.9	143.9		Germany

Source: Wachelder, *Geschiedenis van de tuinbouw in Limburg*, volume 2, part 1, 103.

Around the turn of the century growers and the local casinos increasingly developed initiatives to strengthen their influence on the (export) trade. The most important advantage of this direct trade was of course that the profit margins of all intermediaries were omitted and farmers received a better price in this way. But this, of course, required consultation and the willingness to cooperate. It was not by accident that these initiatives were developed in a period during which the prices came under pressure, partly because of increased competition on the worldwide fruit market. Especially the United States increased their export of apples to Europe very strongly during these years. The developments caused more and more countries, such as Germany, to opt for tighter protectionism. In 1903 this led to the following remark from dr. Poels: 'Belgium and Germany close their borders or impose charges, but our Limburg is open on all sides for Belgians and Germans and all strangers; we cannot move without somehow, to the left or to the right, colliding with a custom house'.[30] Furthermore other countries started to set higher quality requirements. For instance, the British authorities invoked the *Public Health Act* to have fruit of lesser quality destroyed. When, in 1899, large batches of Dutch soft fruit (strawberries, berries and raspberries) were rejected this led to a lot of protest. Many newspaper commentators condemned this in the press as a veiled form of protectionism, but the Dutch Chamber of Commerce in London surprisingly saw things differently. The fruit growing sector re-

30 Quote from Philips, Jansen and Claesen, *Geschiedenis van de landbouw in Limburg*, 281. See also H.A. Poels, *Een zestal redevoeringen; uitgave van de Limb. R.K. Werkliedenbond* (Heerlen z.j.) 29-34.

ceived the advice to give more attention to 'cleanliness and correct weight of all it is sending abroad'.[31] In sending this message the organisation touched on a crucial sticking point: the fruit for export was not always of a good quality, the transport often caused considerable damage, and some growers hid low quality fruit at the bottom of the baskets, bags or barrels. In contrast to, for instance butter, Dutch authorities did not yet require a quality label. This could be a partial explanation for the decreasing importance of the British market for the Dutch fruit growers around the turn of the century.[32]

Dutch fruit growers developed two types of initiatives to upgrade the export trade. First of all there were the shipping associations such as for instance the 'Bond Westland' (1898) and 'Gelria' in the Betuwe (1897), but these could only deploy a modest activity. Auctions, organised on a cooperative basis or not, were more successful, among others because they required less investment and market knowledge than shipping associations, which were responsible for the transport to and sales in the foreign countries. The first Dutch cooperative horticultural associations were established during the 1880s.[33] The oldest auction in the province Limburg was the small cherry auction in Gronsveld, established in 1906 and housed in a warehouse near the station. From 1910 a 'Verzendvereeniging Eijsden' [Shipping association Eijsden] was also active, established with the encouragement of state horticultural consultant A.M. Sprenger and some prominent citizens, but it stopped its activities at the outbreak of the First World War.[34] Sprenger formulated the goals and points of attention as follows: 'Therefore finally, nothing else can be done than becoming organised and through organisation strengthening oneself against the trade: firstly by introducing uniform packaging; secondly by sorting and inspecting the fruit offered, and thirdly by trading at good prices with the highest bidder'. Cooperation between growers and agricultural institutions was necessary and possible, especially on a local level. Thanks to the activitities of the casinos (e.g. the organisation of lectures, courses and fruit expositions) and the intermediate role of the state or provincial agronomists, the fruit growers in Limburg got to know each other better and

31 *Het vernietigen van Nederlandsche fruit bij aankomst in Engeland gedurende den zomer van 1899* (*Nederlandsche Kamer van Koophandel*) (Amsterdam 1900) 11-17.

32 J. Bos, *Vijftig jaar Nederlandse fruitteelt* (Amsterdam 1948) 169-171; Bieleman, 'Dutch agriculture, 1850-1925', 19-20.

33 J.H. van Stuijvenberg, *Economisch-historische aspecten van de ontwikkelingen van het veilingwezen in de afzet van Nederlandse agrarische producten* (Haarlem 1954) 16-17.

34 Wachelder, *Geschiedenis van de tuinbouw*, volume 2, part 1, 163-164.

became more and more convinced that cooperation was the best answer to the growing challenges in the fruit markets. Mutual trust was of great importance. Especially a better fruit quality was required to maintain market share abroad as well as to enter into competition with American and exotic fruit in the domestic market.

Illustration 2. Young apple trees 'Schone van Boskoop', in Meerssen, Limburg. Photo taken about 1920.

Source: Collection Centrum Agrarische Geschiedenis, Leuven

3.2 A basis for knowledge networks

From the 1880s onwards, research, education and information were deployed as an answer to the globalisation and increasing competition in the fruit markets abroad and at home. Agricultural associations, increasingly supported by the government, undertook new initiatives to distribute new scientific insights and agronomic practices to the ordinary growers. The creation of a modern, and especially an accessible agrarian knowledge network manifested itself before the First World War not only in The Netherlands, but was also a crucial element of the agricultural policy in other Western European countries.[35]

In Limburg a remarkable role was reserved for agronomist Corten. He gave countless lectures and presentations about more rational fertilisation, pruning and maintenance, customised fruit varieties which took into ac-

35 N. Vivier (eds.), *The state and rural societies. Policy and education in Europe, 1750-2000* (Turnhout 2009); L. Van Molle, 'Kulturkampf in the countryside. Agricultural education, 1800-1940: a multifaceted offensive', in: C. Sarasua, P. Scholliers and L. Van Molle (eds.), *Land, shops and kitchens. Technology in the food chain in twentiethcentury Europe* (Turnhout 2005) 139-169.

count the taste of the consumer, transport and tenability and a better disease control. From the 1880s Corten changed his approach. He left the general introductory courses to the local village teachers, who, according to him were closer to the rural dwellers, had a lot of authority and so held a key position in the transmission of agricultural knowledge and the stimulation of cooperation in the Limburg fruit cluster. He started to organise two specialised courses per year, which included twenty lessons each, and which provided more in-depth insights. In cooperation with the local agricultural societies he started empirical education, among others through the establishment of demonstration and experimental fields. These courses proved to be of great importance (as were the winter schools) for the modernisation of fruit growing. They had a relatively low accessibility threshold, were cheap, offered theoretically underpinned vocational education at a high level and were as much as possible adapted to regional needs. 233 persons participated in the fruit courses between 1872 and 1900. Gradually the Limburg knowledge network for fruit could start to operate without the input from Belgian experts. Under Corten's impetus the number of local agricultural associations in the province of Limburg also rose strongly: in 1896 there were 45 casinos which together had some 1,450 members. Most of them functioned as cooperative purchasing and sales associations: they purchased all sorts of products such as chemical fertilisers, fodder, seeds, seedlings, agricultural tools and machinery and even breeding animals. At the same time the provincial and national authorities broadened their support of agriculture and fruit growing. They gave financial support to the agricultural societies, and from 1895 Corten was employed as state horticultural consultant. But despite these efforts the Maatschappij still did not succeed in reaching a large public.[36] It was to be surpassed by the 'Limburgsche Christelijke Boerenbond' [Limburg Christian Farmers' Union], established in 1896. Thanks to the help and support of among others the local clergy, this new association quickly became successful, and was able to establish a branch in most municipalities and villages. In 1901 the Maatschappij and the Limburgsche Christelijke Boerenbond decided to merge into the 'Limburgse Landbouwbond' [Agricultural Union of Limburg].[37] This farmers' union, as was happening elsewhere in The Netherlands and in Belgium too, would act as political representative for, and defender of the interests of, the farmers and horticulturists of their region[38].

36 Van Lieshout, *En de boer, hij gardeniert voort…*, 28-30.

37 Korsten, *Standhouden door veranderingen*, 45.

38 Brusse, Schuurman, Van Molle and Vanhaute, 'The Low Countries', 211-212.

The influence of the knowledge offensive described above is difficult to estimate, although most scholars consider it as rather limited. According to Jansen and Rutten there was less progress after 1880 in South Limburg than in other regions, among others because of the scant attention for applied research and the establishment of experimental fields. Van Zanden stated that the transition to modern fruit growing only progressed in small steps and that it remained a typically secondary activity.[39] According to state horticulture consultant A.M. Sprenger (active in Limburg from 1907 to 1917, and from 1918 professor in Wageningen), in 1910, there was still a long road to go and the management in many farms was below par: 'Very few fruit growers know whether their orchards are profitable or not. How fast would the interest in fruit growing not disappear if one could compare the expenses with the income? (…) The combination of livestock farming and fruit growing has not been a happy affair in Limburg and certainly has led to disadvantages for fruit growing'. One of the results of this failing management was the relatively low fruit quality. Only after the First World War were structural measures taken to remedy this, through a more intense cooperation between all actors, whereby the Dutch authorities would take on a more dirigiste and directing role.[40]

4 National policies and strategies, 1916-1940

It is difficult to overestimate the influence and the importance of the First World War on the agriculture and horticulture sector in the Netherlands and Western Europe. The war disrupted profoundly existing trade circuits. However initially, very little changed for the South Limburg fruit growers. The export to Great Britain continued as normal and Germany even opened a trading bureau in the Netherlands in order to purchase more foodstuffs. The scarcity of agricultural products however caused substantial price rises on the Dutch market. In 1916 the government intervened, in order to ensure the national food supply and to protect the Dutch consumer from overly high prices. The export of food was limited (through the so-called consent policy), maximum prices were introduced and the pro-

39 Jansen and Rutten, *Geschiedenis van de landbouw in Limburg*, 162-163; J.L. van Zanden, *De economische ontwikkeling van de Nederlandse landbouw in de negentiende eeuw, 1800-1914* (Wageningen 1985) 243-245.

40 R. Lijsten, 'De Nederlandse fruitteelt, 1888-1948', *Tijdschrift der Nederlandsche Heidemaatschappij* 59 (1948) 198-201; Vermooten, 'De landbouw op de rivierklei', 311; Wachelder, *Geschiedenis van de tuinbouw in Nederland*, volume 2, part 1, 236.

duction was also directed. For instance, the growing of soft fruit such as berries and plums for conservation was significantly expanded. The distribution also increasingly became controlled by the state, and the government introduced an auction requirement for horticultural products. In South Limburg this led to the establishment of several new vegetable and fruit auctions, among others in Beek, Bunde, Sittard, Gronsveld and Wijlre, which together formed the auction association 'Zuid-Limburgse Coöperatie' [South Limburg Cooperative].[41]

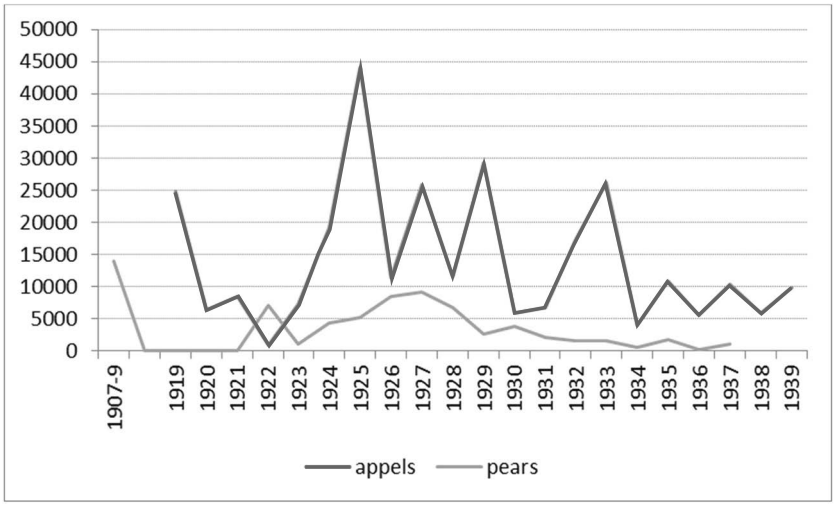
The Dutch government's new strongly regulating policy was subject to a lot of criticism. Fruit growers wanted to profit from advantageous prices in all liberty. They cursed the government control and the limitation of their freedom as entrepreneurs. They therefore hoped, in 1918, to be able to return to the pre-war situation as soon as possible. The auction requirement was indeed rescinded, but the fruit export recovered slowly. Graph 1 perfectly illustrates this.[42] A first reason for this was the strong position of the Dutch Guilder. The value of the Belgian Frank and German Mark had been substantially reduced, and this hindered the export to these countries. A second cause was the reduced demand for Dutch fruit. In Germany purchasing power had dropped significantly, and the Dutch market was only a limited alternative, also because some varieties did not appeal to the domestic consumers. Out of necessity the Dutch and Limburg fruit growers went in search of new markets such as Scandinavia, but that only resulted in a limited and temporary upturn.

A third cause was the strong competition from Mediterranean fruit (specifically oranges) and especially from the United States. American apples were extremely beloved in Western Europe due to their low price, good quality and the care taken in sorting and packaging.[43] The Dutch fruit sector tried to enter the competition battle, preferably through the auctions, but initially this was not simple. After the war many growers had turned their backs on the auctions, and some auctions had to close down. Especially in Limburg the popularity of the auctions decreased. A clear explanation for this is not available; maybe because fruit growing was no more than an extra for most farmers at that time? Or were the conditions

41 Lijsten, *De Nederlandse fruitteelt*, 201 and 210; J.P. Planje, *Vijftig jaar Limburgse land- en tuinbouw 1901-1951* (Roermond 1951) 136; Korsten, *Standhouden door veranderingen*, 46; Bieleman, *Boeren in Nederland*, 288-290.

42 Wachelder, *Geschiedenis van de tuinbouw*, volume 2, part 3, 349-360.

43 Pinilla and Ayuda, 'Foreign markets, globalisation and agricultural change'; C. Dimitri, 'Contract evolution and institutional innovation. Marketing Pacific-grown apples from 1890 to 1930', *Journal of Economic History* 62 (2001) 189-212.

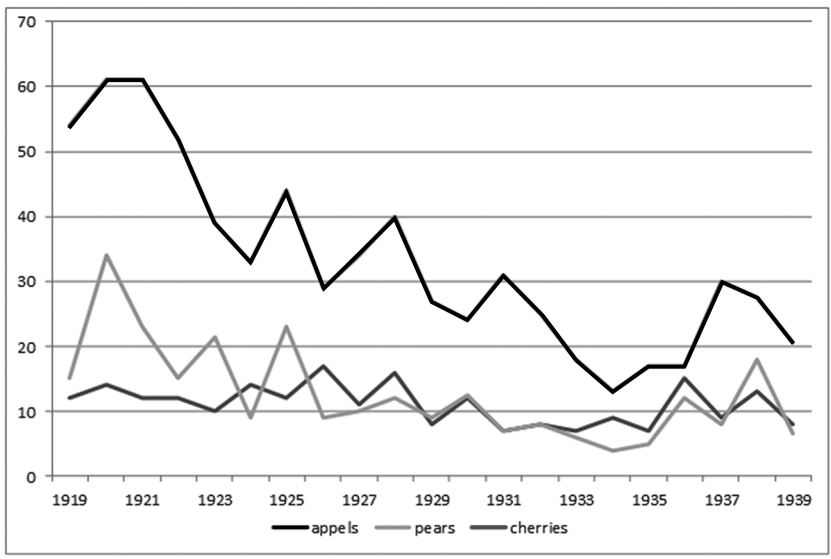


Graph 1. The export of apples and pears to Germany, 1907-1939 (*in tons*)
Source: Wachelder, *Geschiedenis van de tuinbouw in Limburg*, volume 2, part 3, 350 and 352.

and the willingness to cooperate less in South Limburg? Nevertheless, the auctions which were still operating continued to work together in a 'Bond van Zuid-Limburgse fruitveilingen' [Union of South Limburg fruit auctions], and at the start of the 1920s some new initiatives emerged in Oostrum (1921) and Oefelt (1922). In the meantime the fruit acreage in The Netherlands and in the province of Limburg was substantially increased. Between 1919 and 1927 it grew from about 26,000 to 34,000 hectares on a national level, and in Limburg from 7,600 to slightly more than 10,000 hectares (see table 2). Not only did the existing growers in Limburg extend their acreage; many wheat farmers also started growing fruit as a response to the substantially decreasing grain prices. The Limburg auctions started various initiatives, in cooperation with state horticulture consultant Van der Kroft, in order to improve the fruit quality. Again it was an agronomist or consultant from the state who acted as intermediary, as an advocate of cooperation. During the early 1920s the union ordered 7,000 fruit crates aimed at improving and standardising packaging. The material was made available to transporters and traders. At the national level there was also awareness that the export position could only be improved by better quality. For this reason, in 1924, the Uitvoer Controle Bureau [Export Control Bureau] (UCB), an initiative of the Centraal Bureau van de Tuinbouwveilingen [Central Bureau of the Horticultural Auctions] in The Netherlands and the exporters unions, had introduced a quality label. The aim was to 'bring unity in and supply guarantees for the quality, sorting, packaging,

sizes and weight of agricultural and horticultural products destined for export'. Those who met the requirements were eligible for the voluntary quality label. The auction boards also surveyed quality increasingly sternly. In 1927 Thei Derkx, director of the Venlo auction, quoted as the cause of the sometimes lower quality of the fruit delivered mainly the many new fruit growers.[44] The Venlo auction acted firmly against this. The sorting of apples became mandatory, and those who hid too low a quality in the crates had to start sorting again under surveillance of the auction staff. At the initiative of the same auction the first American sorting machines were bought in 1929.[45]

However, the fruit sector continued to struggle during the end of the 1920's. The prices of fruit were under increasing pressure around the world as well as in The Netherlands (see graph 2) and in 1928 the harvest failed. The closure of the auction in Oeffelt is characteristic for the atmosphere of crisis at the time. The economic and financial crisis which gripped the world from 1929-1930 reinforced the difficulties to sell the fruit in the foreign markets even more.



Graph 2. The average auction price of apples, pears and cherries per kilogram (in Guilder-cents), 1919-1939

44 Van Lieshout, *En de boer, hij gardeniert voort…*, 52-53.

45 Jansen and Rutten, *Geschiedenis van de landbouw in Limburg*, 172; Van Lieshout, *En de boer, hij gardeniert voort…*, 59 and 79-80.

Source: Wachelder, *Geschiedenis van de tuinbouw in Limburg*, volume 2, part 3, 362.

In the period 1930-1931 the export of Dutch apples to Germany considerably decreased (see graph 1), also because import duties were raised. The exceptional importance of the German market was aptly expressed by chairman Wiel Driessen during the annual meeting of the Venlo branch of the LLTB in March 1932: 'The Venlo horticulture cannot live without Germany as a market. All enterprises are organised for it and are united with it. We must be able to sell to Germany, even if we had to smuggle it across the borders'. The sales problems also increased in other markets such as Great Britain (which devalued the British Pound and left the Gold Standard in September 1931), in Belgium and in France, which strongly limited the imports of fruit by means of a quota system.[46] In this period the total value of the export of vegetables, fruit and potatoes markedly shrank from 96 million Guilders in 1928 to 75 million in 1930 and barely 49 million Guilders in 1932. Three years later the export was worth only 27 million Guilders. Table 4 shows a similar trend for the turnover of the most important South Limburg cooperative auctions. Only at the end of the 1930s did the turnover recover somewhat.

Table 4. The turnover of some cooperative auctions in South Limburg (x 1000 Guilders), 1931-1939

	1931	1932	1933	1934	1935	1936	1937	1938	1939
Bunde	231	285	124	141	114	89	107	137	150
Grons-veld	145	124	64	105	96	45	106	29	148
Wijlre	183	230	97	130	102	70	82	120	205
Sittard	69	89	47	112	81	51	62	63	116
Beek	262	296	139	144	119	63	104	148	152

Source: Planje, *Vijftig jaar Limburgse land- en tuinbouw*, 188.

Initially the Dutch government remained aloof, and assumed that the problems would only be temporary. However, pressed by the agricultural organisations and parliament, it launched a series of measures. In 1931 it introduced the Wheat law, which guaranteed the arable farmer a fixed sale price which was double the world market price. In autumn 1932 the Horticulture support law followed. Through a premium on the auction prices the government paid no less than five million Guilders in support in order

46 Quoted in van Lieshout, *En de boer, hij gardeniert voort…*, 64. Bieleman, *Boeren in Nederland*, 457; G. G. Minderhoud, *De Nederlandse landbouw* (Haarlem 1952) 33-34.

to compensate the continuously dropping prices. Finally, in May 1933, the Agriculture crisis law followed, which grouped existing and a number of new measures, and which gave the government far reaching powers concerning price formation, production limitation, distribution and international trade. The impact of this law was substantial: between 1933 and 1936 the Agriculture crisis fund annually spent about 200 million Guilders, or no less than a quarter of the total state budget.[47] What effect did the crisis law have on the fruit growing sector?

On 23 Augustus 1933 the Dutch 'Groenten- en Fruitcentrale' [Vegetable and Fruit Exchange] was established. This exchange regulated the import. Traders could only import vegetables or fruit if they had obtained a permission to do so from the Centrale and had paid the so-called monopoly charge. The main aim of this measure was to restrict the influx of high quality cheap horticultural products such as American fruit. After all, between 1930 and 1933 the supply of apples on the Dutch market had risen by almost a factor of 5. An observer noted: 'As the Dutch public is not only sensitive to foreign labels, but also appears to find products which come from further away better tasting than what is grown domestically, foreign fruit is serious competition for the Dutch grower'. Pushing back the import could give the Dutch fruit growers some breathing space. In a certain sense the sales in the Dutch market compensated for the shrinking of its own export markets. In 1934 the government also placed the Dutch export under control, in order to keep the price setting even firmer in hand. Only those who had a permit could export. At the same time the auction requirement was re-imposed for vegetables and fruit, except for apples, pears and cherries which were directly supplied to industry and consumers. The quality could be more strictly surveyed through the auctions. Finally, in 1936-1937 the government, within the framework of the Agriculture Export law, would impose minimum quality requirements for the export of among others apples and pears. Inspectors of the auctions ensured the necessary verifications. Indeed, foreign markets could only be conquered with products of high quality.

In contrast to other agricultural sectors the national government did not impose a limitation on the production or the fruit acreage (except for some types of small fruit). The relatively favourable fruit prices caused the fruit acreage to increase even more between 1927 and the breaking out of the Second World War than in the preceding decade. In The Netherlands the fruit acreage grew from almost 34,000 to approximately 55,000 hec-

47 Van Zanden, *De economische betekenis van de Nederlandse landbouw*, 128.

tares. The increase was mainly situated in the Betuwe and in Gelderland. The province of Limburg's performance was less strong, although the acreage here also increased by more than a third, from just over 10,000 to almost 13,500 hectares.[48]

During the 1930s measures to boost demand were also taken, mainly on a national level. Especially private associations, such as the Nederlandsche Heidemaatschappij [Dutch Heather society], took the lead in this.[49] In 1934 it organised a fruit exhibition on the occasion of the opening of the Central Market halls in Amsterdam. In the bar, the consumption of 'sweet most' or fruit juice was promoted. A year later it distributed fruit calendars and a set of coulour post cards to housewives and schools. In the same year the 'Better Dutch fruit' campaign also started. The Commission of Fruit experts of the 'Centraal Bureau van de Tuinbouwveilingen' [Central Bureau of Horticultural auctions] wanted to promote well sorted and packaged fruit by means of this campaign, among others during the national fruit exhibition in the Apollo-hall in Amsterdam in 1937.[50] Auction boards organised so-called 'elite and first quality auctions', during which only first class fruit was offered. These were all initiatives aimed at improving the quality of the fruit, and at finding a destination for the continuously increasing production. The efforts to support the fruit processing and to optimise the preservation of fruit also fitted within this framework. In 1936 A.M. Sprenger, who had in the meantime become professor Cultivation of Horticultural Plants in Wageningen, started an institute for research in the field of processing and preservation of vegetables and fruit. He intensively worked together with the fruit processing industry, which had expanded during the interwar years and which proved to be a crucial player. Fruit processing companies at that time were buying about one fifth of the Dutch harvest in order to produce among others syrup, jam and fruit juices. [51]

4.1 Knowledge and product quality

Sprenger's work illustrates the increasing efforts to deal with the economic and technical problems of the fruit sector. Agricultural associations, the national government and the auctions joined forces and developed initiatives around marketing, research, information and education. First and foremost more attention was paid to the maintenance of the orchards:

48 Knibbe, *Agriculture in the Netherlands*, 90-91; Brusse, *De economische geschiedenis van Zeeland*, 193; Bieleman, *Boeren in Nederland*, 192-193.

49 Bos, *Vijftig jaar Nederlandse fruitteelt*, 5-7.

50 Lijsten, 'De Nederlandse fruitteelt', 210-213.

51 Bieleman, 'Dutch agriculture, 1850-1925', 38-39.

judicious pruning and fertilising (with calcium, nitrogen and potassium) were required. State horticultural consultant Van der Kroft, supported by the auction in Venlo, set up experiments concerning fertilisation and spraying against diseases and insects, in a private orchard. In 1932 the same Van der Kroft was the driving force behind the establishment in Maastricht of the first fruit growing vocational college in The Netherlands, where older students with practical experience could study further and specialise in 'modern fruit growing'. The end of the 1920s also saw the arrival of new disease fighting techniques. The application of glue bands around the trunks was promoted and especially the (communal) usage of motor sprayers and other spraying equipment, imported from the United States. In this way the Jonge Boeren en Tuinders Bond (JBTB) [Young Farmers and Horticulturists Union], among others, stimulated the mechanisation and specialisation of fruit growing. For this the mixed planting had to disappear. Old orchards were pulled up and replaced by more modern varieties, adapted to the preferences of consumers at home and abroad. From the middle of the 1930s growers in South Limburg increasingly replaced standard tree orchards by low growing trees. This implied that the combination with livestock farming became more difficult, but this trend (which anyway would only become stronger after the Second World War) did result in increased production and productivity.[52]

5 Conclusion

This article unravels and analyses the response of the fruit growing sector in Southern Limburg to the extensive process of globalisation and increasing international competition. This long-term analysis enables us to evaluate the strategies and (knowledge) initiatives being developed by various actors at the regional and national level, and their interrelationships. In a first phase the main dynamism could be found with private agricultural organisations: through information, education and demonstration they stimulated innovation. However, the results were rather limited. These elitist associations, which received support from provincial and national authorities, had little contact and empathy with ordinary farmers. The foundation of the knowledge network was at an early stage and to a large extent based on Belgian expertise. Overall, cooperation (and its impact) between the actors in the fruit cluster (or 'triple helix') remained limited.

52 Bieleman, *Boeren in Nederland*, 372.

The agricultural depression at the end of the nineteenth century caused a number of innovations to gain momentum. The various actors within the economic cluster increasingly started to collaborate in this second phase. Farmers became organised (encouraged by local and regional elites, with a prominent role of the state agronomists or consultants), and established organisations with a low threshold and auctions. A shared awareness emerged that a competitive fruit sector required science-based practices. From the 1890s both the provincial and national authorities and farmers' organisations addressed the growing competition in the agricultural markets through the formation of an agrarian knowledge network, and not through protectionism. Education and information initiatives (set up by state agronomists, but also village priests and teachers) were to familiarise farmers with modern cultivation practices and commercial insights, whereby attention to process and product quality was central. These efforts ensured that Dutch farmers and fruit cultivators could compete rather successfully on the domestic and foreign markets.[53] Knowledge related initiatives, in which actors from the various domains participated, ensured a strong foundation on which innovation in the cluster could flourish.

Remarkable was the changing role of the national government. Initially, it limited itself to (financial) support and active participation in the emerging knowledge network. The exceptional circumstances during the First World War and the 1930s did cause policy makers to change their course. In a third phase, a protectionist agricultural policy, designed on a national level, was drawn up after consultation with the sector. Increasingly other forms of cooperation between actors and institutions on the regional and especially the national level were set up, such as cooperative auctions, quality labels, initiatives to develop market directed research, etc.[54] The auctions in Limburg had only limited success. Not all farmers participated; the imposition of mandatory quality standards did not go smoothly. Why this was the case, is not easy to explain, inter alia, in the absence of source material that allows the analysis of the decisions of individual farmers. However, the present study is not necessarily an end, in that it has the ambition of providing inspiration for new research. For instance, the Limburg case can be compared with the development of other regional fruit clusters in the Netherlands and abroad. Or the participiation of the processing industry in the cluster can be analysed more in detail.

This article shows how the Limburg fruit sector or cluster became in-

53 Knibbe, *Agiculture in the Netherlands*, 230-231.

54 Bieleman, *Boeren in Nederland*, 313-314 and 571-572.

creasingly integrated in a more national oriented and organised cluster and knowledge network, within which the government was responsible for clear regulations, offering financial incentives or setting up forums in which private and public institutions and actors from the various domains could meet each other. Therefore it illustrates that not only regional clustering of economic activity or 'proximity' plays a role in stimulating innovation and knowledge diffusion. Essential knowledge sharing takes place in social networks and these do not have to be spatially concentrated.[55]

About the author

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55 P. Cooke, 'Introduction. Regional assymetries, knowledge categories and innovation intermediation', in: P. Cooke and A. Piccaluga (eds.), *Regional development in the knowledge economy* (New York 2006) 8.