Deliverable D8.1: Report on the market potential of mi-nor cereal crops and consumers perceptions about them in different European regions

Project acronym: HealthyMinorCereals

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1. Introduction and background

Common wheat (*Triticum aestivum*) and barley (*Hordeum vulgare*) are the most important cereals[1] grown in Europe (in ha). They are suitable for large-scale crop production and replaced crop species like spelt (*T. spelta*), emmer (*T. dicoccum*) and einkorn (*T. monococcum*), or old varieties of wheat, rye (*Secale cereale*) and oats (*Avena sativa*) in the last hundred years. These crops, currently underutilised in most of the EU countries, are also named minor cereals (MC).

Many of these diverse cereal species domesticated during the Bronze Age are not relevant to food or feed crops anymore. Minor cereals including spelt, einkorn, and emmer have the status of relict crops in Europe. Rye and oats are also classified as minor cereals. Nevertheless, they are produced in significant quantities in Europe. In some regions, durum wheat (*T. durum*) belongs to the MC whereas, in southern Europe, durum wheat is a major crop.

In comparison to conventional common wheat, minor cereals typically grow well in poor soils or under low input conditions, and there are hints that the nutritional quality is high. Hence, expansion of minor cereals in the European arable sector could be a benefit (i) for the environment and crop diversity, (ii) for the economic viability particularly of small and medium enterprises (SME) and arable farmers, (iii) for the diversity and nutritional quality of cereal-based foods offered to consumers (Miedaner&Longins 2012).

However, the MC have been hardly developed as commercial crop varieties, with virtually no major investment in exploiting genetic diversity, breeding programmes, and optimising of agronomic and food industry processes. Typically, farmers have access to an insufficient number of varieties, and yields are not high enough in most cases.

In the EU funded project, HealthyMinorCereals (HMC) the potential of these crops in terms of yield, disease and drought resistance, nutritional quality, and suitability for various food products is exploited.

Farmers will only produce these crops if there is a chance to market them successfully. This report gives a comprehensive overview of available information and expert opinion relating to the MC market from several European Countries and Turkey. It includes statistical data, information on existing market initiatives and products produced from MC. In addition, consumer trends are identified based on a literature survey.

To support the market success of new or/and traditional minor cereals, it is essential to learning from successful or failed introductions of varieties into local and regional markets. These examples can provide useful information for the HMC project. These aspects will be further investigated in Task 2 and Task 3 of Work Package 8 and are not part of this report.

[1] In tonnes, maize (used as green maize and as grain maize) is the most important crop (see Annex I).

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2. Methodology

In order to assess the market potential of MC, we apply a simplified version of Porter's five competitive forces framework (2008). The methodology was selected because Porter's model uses a company's perspective, and the outcome of WP 8 should be relevant to SMEs.

Porter assumes that there are two forces from a 'vertical' competition: the power of suppliers and the power of customers (Figure 1). The 'horizontal' competition includes three forces: the direct competition between existing companies, the threat of new entrants and substitute products. A further description of the five forces is given in Annex 1.

Porter referred to these five forces as the 'microenvironment' of a company, to contrast it with the more general term 'macro environment' (e.g. policy, consumer trends, value adding). We used the five forces framework as guidance to collect information on the cereal market in selected European countries. Similar to Schelske et al. (2003), we included information the 'macro environment' of the cereal market (Chyba! Nenalezen zdroj odkazů., further below.).

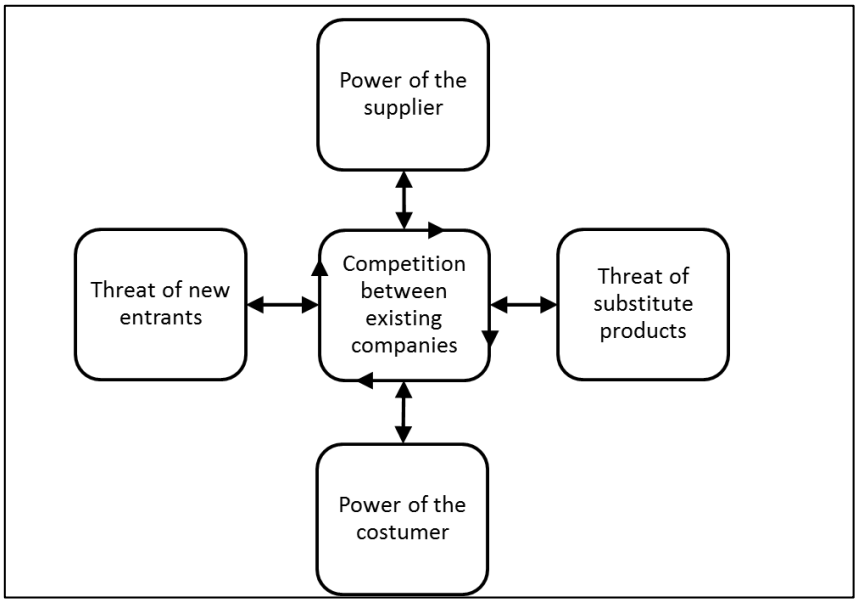

Figure 1: Porter's five forces framework to analyse the competition within the business sector. The five forces build the microenvironment of a company and include a horizontal competition: the threat of substitute products and the threat of established rivals and the threat of the new competitor entering the market. Moreover, there are two forces of vertical competition: the power of suppliers and the power of customers. Further information on Porter is provided in the annexe.

To assess *the power of suppliers*, we investigated the cereal production in selected countries. Therefore, agronomic data, e.g., area (ha), yield (t/ha) and total production (t) of spelt, rye, oats, einkorn, emmer, barley, common wheat and durum wheat was collected from 2007 – 2012. Data on barley, common wheat and triticale were included as it enabled to compare the situation of minor and major cereals on the markets. Farmers and their cooperatives are defined as suppliers.

Data on imports, exports and national self-sufficiency was included. Data was gathered from various countries, namely Austria, Czech Republic, Estonia, Germany, Hungary, Italy, the UK, Poland, Turkey and Switzerland. Besides Italy, institutions of all these countries are a partner in the HMC project. We did not include Greece because the access to data was too difficult. Instead of

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Greece, Italy was included in the investigation because the Italian market with MC seemed to be more developed compared to other European regions.

The main sources of data collection were national statistical offices, ministries of agriculture (national and sub-national level), research institutes, industry organisations (e.g. Swiss granum/Switzerland) and other institutions like AMI (Agrarmarkt Informations-Gesellschaft/Germany) or Agrarmarkt Austria. Based on the collected data, we identified large-scale markets, niche markets and no market for MC (Table 1)

Table 1: In the project, different market situations for MC were defined based on the area used for production: No market, small/niche markets and large – scale markets. The distinction was made according to the criteria listed in the table. The criteria "area" was used to assess the importance of domestic production and the "power of producers" according to Porter. The criteria "market" was used to investigate the importance of processed products made of MC and the "power of Customer".

Criteria		No market	Attributes of niche markets	Attributes of large-scale markets
Area		No data	Less than 2% of the acreage used for cereals dedicated to MC production	More than 2% of the acreage used for cereals dedicated to MC production
Market	Producer	Single farmer, Innovators, pioneers	Group of pioneers and farmers	Farmers are potential suppliers
	Trader	Mainly self-supply,	SME, mainly national	SME and large national and international traders
	Processing	The producer does processing	Manufactured, small processors, regional	Processed by large and small processors and manufacturer
	Distribution	No distribution	Products available through specialised retailers, but mainly regional.	Products are available in large retailers, few exports

To assess the *power of customer*, the market with processed products is relevant. Hence, food retailers of different sizes are the relevant actors. The compilation of products and initiatives was limited to Austria, Czech Republic, Estonia, Germany, Hungary, Italy, Poland Switzerland and UK. We looked for keywords mentioned in the context of MCs on homepages and in brochures in order to explore these trends. Additionally, we identified key actors. Here, we focused on identifying the projects' initiators. Due to a lack of language skills, information on the situation in Poland, Estonia, the Czech Republic, and Hungary were not provided by the project partners. No information from Turkey was accessible. We grouped the countries according to the presence of products made of minor cereals on the markets into a large-scale, a small-scale (niche market) segment or no market (Table 1).

In comparing the two market situations – production and traded products – potential supply deficits or oversupply could be identified. In doing so, we got an idea of the present market situation (competition, power of suppliers and consumer, new products and substitutes) and the market structures (e.g. key actors). These assumptions will be tested and further developed in Task 2 and 3 of the project.

The *competition among companies* is done by comparing companies buy products from the farmers, storing, trading, processing them for retailers. ILU focussed on products made by MC and actors (traders, processors, retailers) from the large-scale market whereas FiBL focussed on niche markets and markets initiatives. Market Initiatives were thereby defined as a lasting cooperation

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along the supply chain, where farmers, traders, processors and retailers share the interest to optimise the market performance of a minor crop. This definition is based on the definition of an *organic marketing initiative* given in the project OMIaRD (Schmid et al. 2004).

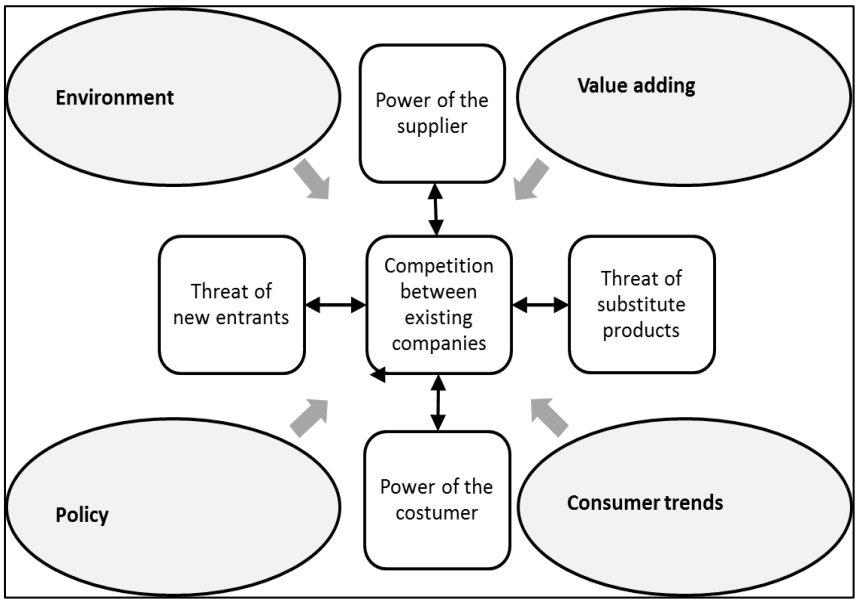

Figure 2: Potential impacts of the macro environment (consumer trends, policy, environment, value adding) on Porter's five market forces. Based on Schelske et al. (2003) we included this macro environment into our investigation of the market potential of MC, but without a closer investigation of "value adding".

A general market investigation assessed the *threat of substitute products* or *threat of new entrants.*

Similar to Schelske et al. (2003) we included the macro environment in Porter's framework (Figure 1). Hence, we identified trends in food consumption, environmental impacts, policy and other influencing factors, which support or restrain the market potential of MCs. Consumer trends were compiled with a literature research. To receive information on consumer trends from trend reports is costly. In this regard, we only collected information, which was available online for free.[2]

Additional factors are completed during a workshop with all partners of the HMC project held at the second general assembly of the HMC project in Budapest in November 2014.

The literature review underpinned and complemented the findings gathered via data collection and internet research. There was, however, only little scientific literature available on minor cereals (rye, oats, spelt, emmer, einkorn) and their market potential in the EU, including Switzerland and Turkey. We, therefore, worked with analogies. We collected and analysed literature on organic and regional products, the market potential of underutilized crops, general consumer trends and the perception of traditional foods. Additional literature was provided by FiBL employees and experts contacted during the project. We also used the bibliographies of some of the papers, which we had found during our literature research - in order to collect further literature. A total of 27 papers was analysed in detail.

To identify consumer trends, the literature was systematically collected using the search engine Google or GoogleScholar, and the scientific database Web of Science, Swissbib, Scopus and Or-

[2] www.datamonitorconsumer.com/

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ganic Eprint. The following keywords were applied: "*Lifestyle AND Cereals*", "*consumption AND bread*", "*Consumer behaviour AND cereals*", "*Consumer AND taste AND for each country*", "*Consumer AND rye*" "*Consumer AND oat*".

Table 2: Compilation of data sources collected for this report. The main source of information was internet research, official statistics and expert information. The project partner provided data from CZ, EE, HU and PL.

Country	Project-Partner	Statistical data	Market data
AT	x	x	x
CH	x	x	x
CZ	x	x	x
EE	x	x	x
DE	x	x	x
HU	x	x	x
IT		x	x
PL	x	x	x
TR		x	x
UK	x	x	x
GR			

3. Production of MCs in Europe from 2007 - 2012

Currently, Europe is self-sufficient for common wheat, barley, rye, and oats (Annex 1 and Annex 2). Nevertheless, cereals are traded among European countries, and the national self-sufficiency varies from country to country. Some grain is traded internationally. Only about 18 percent of world wheat production and 10 percent of maize production is traded globally (Murphy et al. 2012). However, most of the production never cross a national border or leaves the EU. Hence, domestic production and trade within-Europe is relevant.

Data on production of MC on a national level is compiled in order to assess the market potential. The kind and quality of statistical data on cereal production vary considerably among the countries. Where some countries just provide data on areas used by crops, others give information just by the intended use (human consumption, cereals used for bread, feed use). In some cases, there is official data from different governments and data provided by different market actors, but they are different or sometimes contradictory.

We compiled all the data gathered from different sources and transformed all in the same structure in order to make them comparable.

3.1 Area and yields of MC in Austria

Austria covers an area of 8.4 Million ha, of which almost 80% is rural. Of the total area, 32% is agricultural land while forests cover 44 %. The total population is 8.4 million – of which 66 % live in rural areas. Austrian agriculture is characterised by small-scale structures. Of a total of 173'000 farm holdings, 87% are located in mountain areas and areas facing natural or other specific constraints. Austria is an important producer of organic food. About 19.7% of the agricultural land is cultivated according to organic guidelines.

In 2012, the arable utilised area (AUA) was 811'509 ha (Figure 3). Cereals were produced on almost 69% of the area. There was a decrease in cereal production from 2007 – 2012 from 73.4% -

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68.8%. Minor cereals (durum wheat, rye, oats and spelt) covered an area of 95'939 ha (12 % of the total AUA). During the period of 2007-2012, the production area of minor cereals has decreased slightly. It represented a maximum of 13% of the total cereal production area in 2008.

With 48'525 ha (6% of AUA), rye was the most important minor cereal in 2012. Oats was cultivated on 24'815 ha (3.1% of AUA) mainly as animal feed. Emmer and einkorn were the least important minor cereals, being cultivated just on 830 ha or 0.1% of the AUA in 2012. Spelt covered an area of 9'062 ha in 2012. Compared to 2007, the production area of spelt has increased from 0.8% up to 1.1% of the AUA (6'218 ha – 9'062 ha). Regarding the production area of emmer and einkorn, it is here referred to the area mentioned in the context of the so-called Mehrfach-Anträge (MFA). Mehrfach-Anträge constitutes a form of application, which has to be filled in for receiving EU funds. Most of the farmers apply for these funds. The data presented here (Table 5) may, therefore, be seen as representative for the production of emmer and einkorn in Austria as a whole. Both, organic and non-organic production is included in these figures.

In addition to EU funds, farmers receive an extra funding through the Austrian Agri-Environmental Programme ÖPUL[3], which is based on the European Agricultural Fund for Rural Development (EAFRD). The programme supports among other topics farmers with direct payments for the production of rare agricultural crops. Some varieties of MC, common wheat and barley are part of this programme.

Table 3 illustrates the percentage of "rare agricultural crops - RAC" production areas (organic) on the total production area of emmer and einkorn in Austria. It is shown that the share of RAC production areas decreased in 2013 (64%). As our partner project mentions, non-organic production was possibly intensified. Maybe due to export reasons (personal contact BOKU, 2014-03-07). However, there was no official data on the yields of emmer and einkorn. The following data is mainly based on a survey among farmers cultivating emmer and einkorn: Einkorn reached yields of 15-30 dt/ha (including husk). Yields may go up to 35 dt/ha when the harvest was successful. As stated by our project partner, yields even reached 42 dt/ha. In this case, the farmer had a lot of experience growing einkorn and the year was, in general, a good one. According to our project partner, farmers experience, and well-adapted material plays an important role when it comes to production. Emmer reached an average of 25dt/ha in husk. Yields of 30dt/ha or 40dt/ha may be reached (Landwirtschaftskammer Niederösterreich 2009, personal contact BOKU 2014-03-07).

3 ÖPUL: Österreichisches Programm zur Förderung einer umweltgerechten, extensiven und den natürlichen Lebensraum schützenden Landwirtschaft The Agri-environmental Programme ÖPUL, Austria's programme for the promotion of an agriculture which is appropriate to the environment, extensive and protective of natural habitats, is intended to enhance the environmentally benign management of agricultural areas. Unlike some other EU countries which apply their environmental programmes only in specific, environmentally sensitive areas, Austria chose an integral, horizontal approach for ÖPUL which aims at the participation of Austrian farmers all over the country. In 2012 526 million euro were paid to 110,200 holdings for 2.2 million ha under the programme. The agri-environmental programme, is part of the programme for the development of rural areas, "Rural Development 2007 – 2013" (RD 07 – 13).

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Table 3: Share of the emmer and einkorn area planted as "rare agricultural crops- RAC" (Seltene Kulturpflanzen – SLK) in relation to the total area planted with emmer and einkorn in Austria (%). Source: Personal contact BOKU (2014-03-07) BMLFUW 2014. It is shown that the share of RAC production areas decreased in 2013 (64%). As our partner project mentions, non-organic production was possibly intensified. Maybe due to export reasons (personal contact BOKU, 2014-03-07).

Year	Share of rare agricultural crops (%)
2013	64
2012	78
2011	92
2010	92
2009	94
2008	89
2007	88

Rye was the most important minor cereal in Austria. In 2012, 204'697 tonnes of rye were produced in Austria. Rye was followed by oats with 93'491 tonnes and spelt with 23'836 tonnes. There was no official data available on the production of emmer and einkorn in tonnes (see Annex for all figures).

In average, minor cereals reached lower yields than common wheat from 2007-2012 (Annex 3): Common wheat reached an average of 51.9 dt/ha, while yields varied between 42.4 dt/ha in 2012 (lowest) and 59.9 dt/ha in 2011 (highest). Spelt reached a lower average of 27.8 dt/ha from 2010 – 2012[4].

For Austria, information on cereal imports and exports, self-sufficiency and cereal use is available (Table 4A). In 2012/13, the self-sufficiency was over 90% for wheat, rye, oats and other cereals. For barley and durum wheat, is between 54% and 84%.

According to AMA (personal contact AMA, 2014-03-05), no information is available on spelt, emmer and einkorn. These varieties are subsumed under the category common wheat. From 2009-2012, rye consumption per capita decreased but more rye was imported than exported. The consumption per capita of oats and other cereals increased slightly (see also Table 100).

Table 4: Austrian cereal supply balance in tonnes for 2012/2013 (Statistik Austria, 2014). Self-sufficiency is indicated in the last row and varies among the different cereals. In total, the self-sufficiency in cereals is 94%

Item of the balance sheet	Common Wheat	Durum Wheat	Rye	Barley	Oats	Grain Maize	Triticale	Mixtures	Other Cereals	Total
Production	**1'231'816**	**43'681**	**204'697**	**662'466**	**93'491**	**2'351'370**	**220'103**	**31'627**	**36'627**	**4'875'880**
Opening Stock	230'461	23'865	27'112	97'919	6'997	244'277	2'738		607	633'977
Final Stock	229'439	15'292	38'049	71'897	8'621	221'559	2'947		1'402	589'206
Imports	615'063	106'214	49'832	259'851	17'577	911'720	14'049		28'133	2'002'439
Exports	576'493	81'568	24'835	163'100	14'965	870'351	6'317		22'295	1'759'925
Domestic use	**1'271'408**	**76'900**	**218'758**	**785'240**	**94'479**	**2'415'457**	**227'626**	**31'627**	**41'670**	**5'163'165**
Feed	337'972	1'331	94'011	527'643	74'628	1'033'649	196'676	29'028	28'802	2'323'740
Seed	51'288	2'470	8'416	25'911	3'938	9'834	7'649	1'333	172	111'012

[4] The average yields of spelt refer to the grain and the husk. That is, about 70-80% is grain, the rest is husk, used for non food puroposes. The same applies to emmer an einkorn.

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Item of the balance sheet	Common Wheat	Durum Wheat	Rye	Barley	Oats	Grain Maize	Triticale	Mixtures	Other Cereals	Total
Processing	244'582	3'500		205'746		1'113'601	15'076			1'582'505
Losses	31'330	996	5'675	22'095	3'094	72'460	8'224	1'265	1'342	146'482
Usage (gross)	**606'236**	**28'602**	**110'655**	**3'845**	**12'820**	**185'914**	**0**	**0**	**11'354**	**959'426**
Usage (net)	494'082	49'050	86'311	2'884	9'615	116'986			8'515	767'444
Per capita (kg)	58.50	5.80	10.20	0.30	1.10	13.80	0.00	0.00	1.00	90.80
Self supply (%)	**97**	**57**	**94**	**84**	**99**	**97**	**97**	**100**	**88**	**94**

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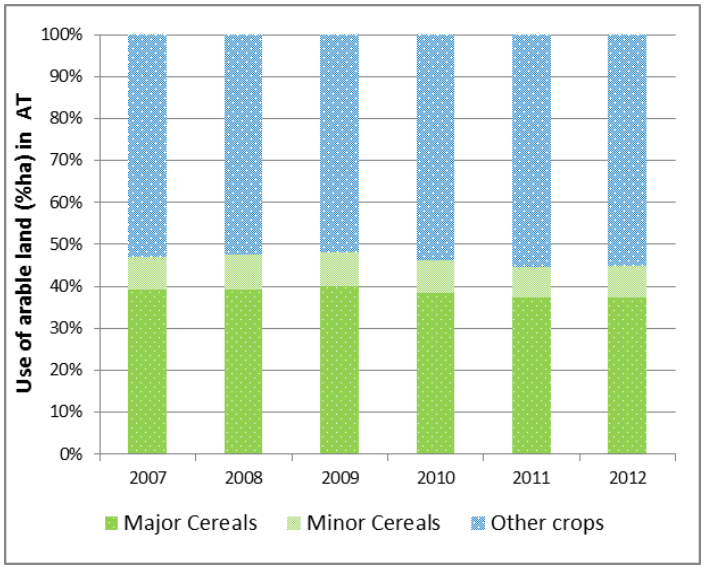
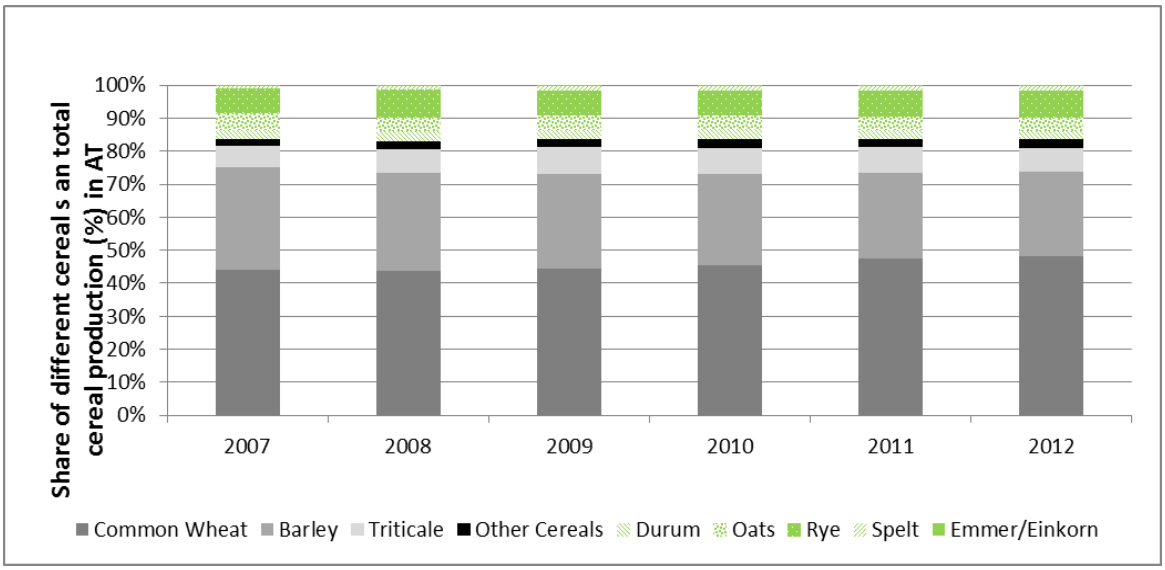
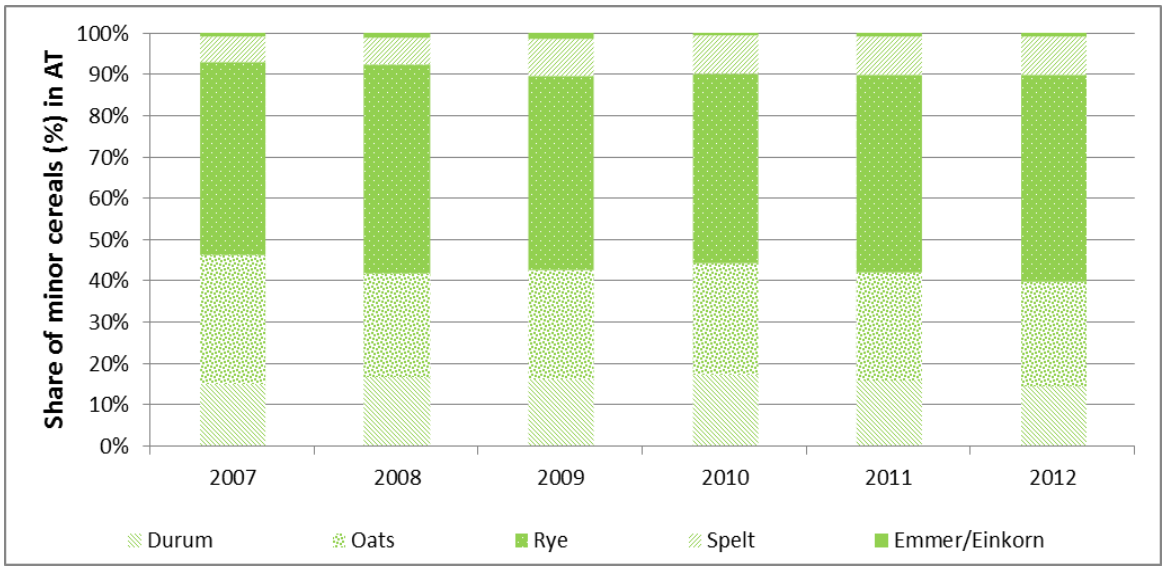


Figure 3: Left: Use of arable land in Austria from 2007 – 2012. The area planted with cereals decreased since 2007 in Austria.

Middle: The dominant cereals are common wheat, barley and triticale. The most important minor cereal is rye and oats. "Other cereals" are mixed crops.

Below: Composition of minor cereals in Austria. Due to direct payment, spelt, emmer and einkorn are grown in Austria on a larger area compared to other countries.





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3.2 Area and yields of MC in Switzerland

Switzerland has about 1.1 million ha land in agricultural use (Total land area 4.1 million ha and 8.2 million residents). 71% of the farmed area in Switzerland is devoted to meadows and pastures. Cereals and vegetables are limited to the lowlands. About one-third of farms is engaged in crop production. Similar to Austria, agriculture is characterised by small-scale structures with 57'600' farm holdings, 56 % are located in mountain areas with almost no cereal production. Switzerland is an important producer of organic dairy products. About 12% of the agricultural land is cultivated according to organic guidelines. The organic farms are the most frequent in the alpine regions of Switzerland.

In 2012, the arable land (AUA) was 177'675 ha (Figure 4, Annex 4 for all figures). Cereals (without grain maize) covered an area of about 130'798 ha (or 73.6 %) of the total production area. From 2008 - 2013, this share remained stable. Wheat, rye and spelt are mainly used for bread and pastries. Swiss oats, triticale and barley, are used as animal feed.

However, since 1990, there was a decrease in cereal production, mainly in the feed sector (SGPV 2014). In other countries (AT, DE, CZ), we see an increase in maize for energy production due to direct payments. This shift also exists in Switzerland but to a lower extent. The driver for maize production (silage maize) is animal production (milk, meat), not energy production.

During the period of 2008[5]-2012, the minor cereals production area of has increased slightly. (see Figure 4 and Annex 4). In 2008, it represented 3.8% of the total cereal production area and 2012 there were 4.2%. With 3 680 ha, spelt is the most important minor cereal in terms of production area in 2012. In 2008, spelt was cultivated only on 2 822 ha. Until 2011, it increased up to 4200 ha and declined in 2012 again. Oats was cultivated on 1 642 ha in 2012, but only for animal feedstuff. The area planted with oats declined in the last ten year dramatically. Rye was cultivated on 1 771 ha. For both crops, their area declined from 2008 – 2012 approximately 10%. Emmer and einkorn were least important MC. Because there was no official data available on these species, it may be assumed that emmer and einkorn (as well as durum wheat) were only cultivated on a very small scale. However, figures on the production of emmer and einkorn (dt/ha and tonnes) were available from the private association *Swiss granum*. Based on this data, it was possible to calculate the production area of emmer and einkorn. From the total cereal production area, spelt represented 2.8 % of the production area in 2012, rye represented 1.4 % and oats 1.3 % of the total production area. Wheat, with a share of 65.3% of all cereals produces is the most important crop followed by barley.

[5] For Switzerland, no data was available for 2007.

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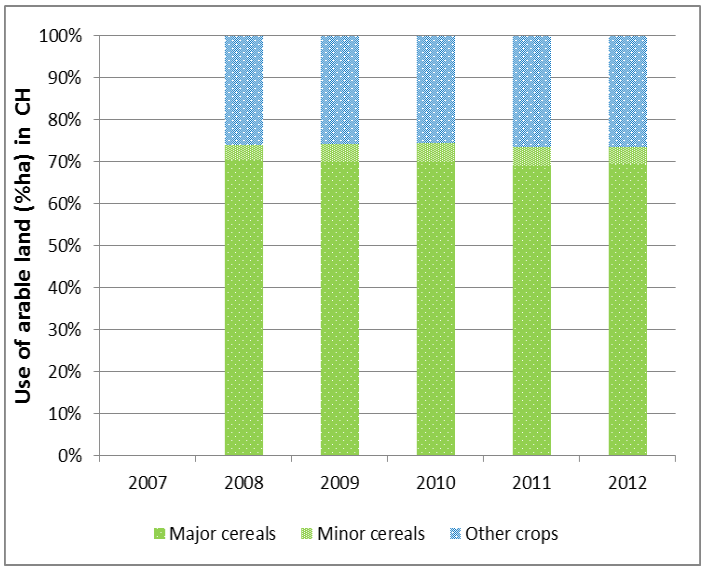
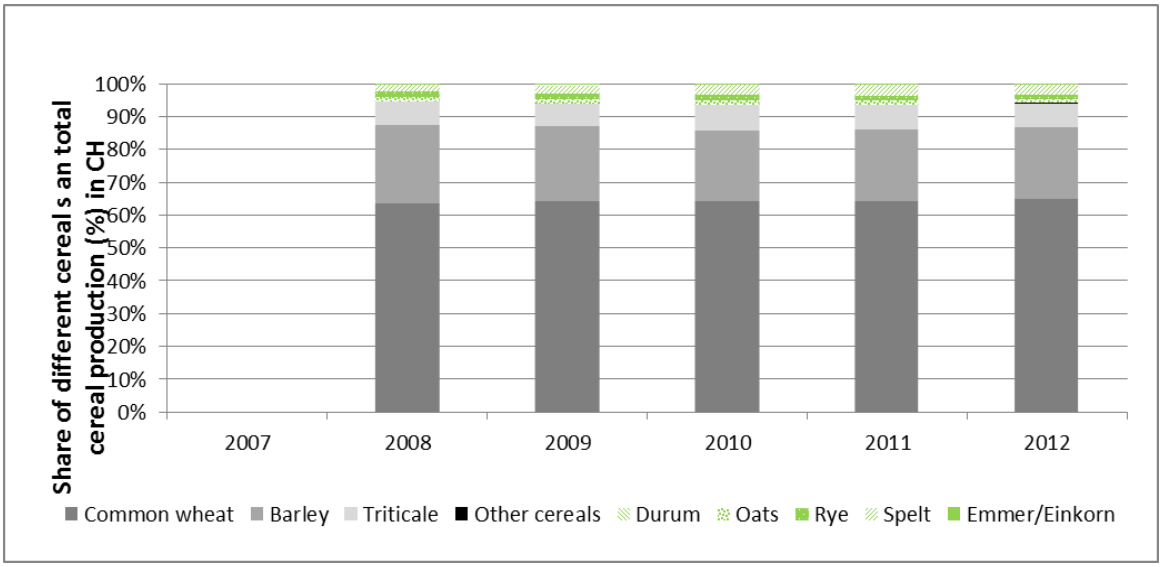


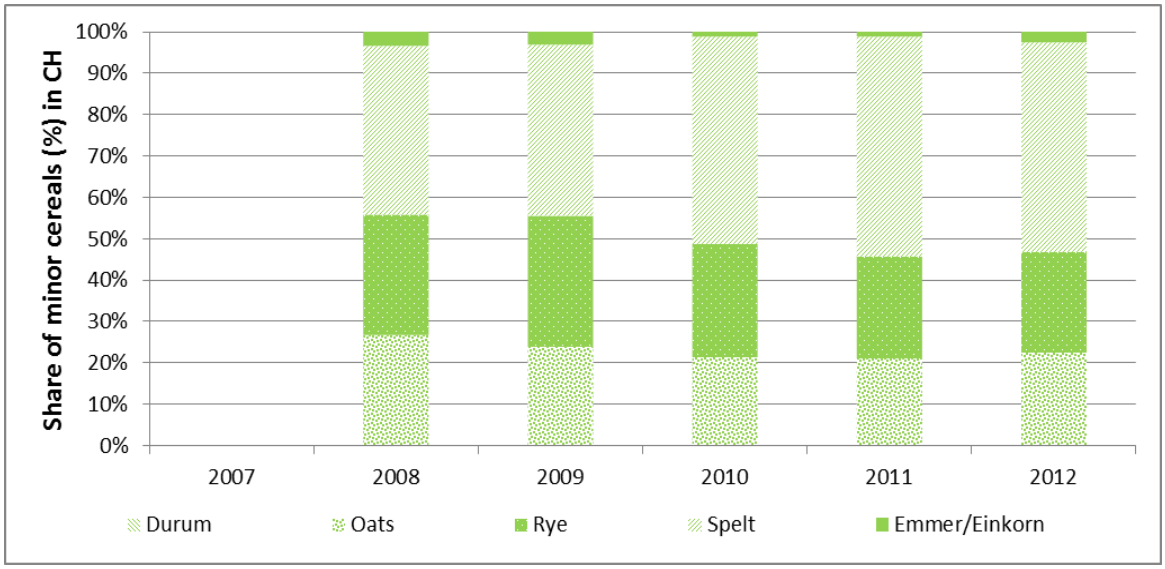
Figure 4: Left: Use of arable land in Switzerland from 2008 – 2012. The area planted with cereals remained stable since 2008.

Middle: The dominant cereal in Switzerland is common wheat. Barley and Triticale are less important than in Germany and Austria.

Below: Composition of minor cereals in Switzerland. Spelt is the most important minor cereal in Switzerland, and the area increased since 2007.

As mentioned by the sector organisation Swiss granum (personal contact Swiss granum, 2014-03-14), information on the production area of emmer and einkorn (as well as durum wheat) will be collected in the future.





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In Switzerland, farmers produce millet and mixed crops (rye and wheat - mischel). They are indicated in figure as "other".

Oats and rye reached similar yields in 2007-2012 (Figure 5, Annex 4): Oats reached an average of 59.5 dt/ha while yields varied between 58.2 dt/ha in 2007 and 63.9 dt/ha in 2011. Rye reached an average of 61.1 dt/ha. Highest yields were reached in 2011 with 66.1 dt/ha.

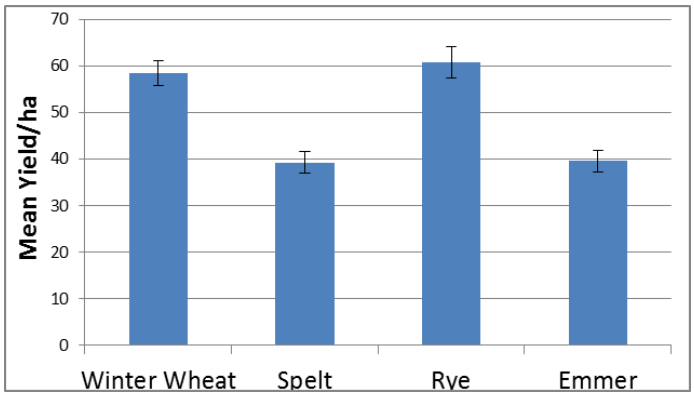

Table 5: Yield per ha differs from year to year and between the crops. In Switzerland, winter wheat and rye have similar yields. Spelt and emmer have similar yields but on a lower level.

Lowest yields were reached in 2007 with 56.7 dt/ha. The average yield of spelt is with 39.6 dt/ha considerably lower than the yield of wheat, barley, oats or rye. Highest yields were also reached in 2011 with 44.3 dt/ha, lowest in 2012 with 37.4 dt/ha. In sum, oats and rye reached higher yields than spelt. Emmer and einkorn reached yields similar to spelt.

With 12'550 t in 2012, spelt was the most important minor cereal in Switzerland. In comparison, 7'699 tonnes of rye and 7'781 tonnes of oats (animal feed) were produced in the same year. Emmer and einkorn were, with a production of 454 tonnes, were the least important.

As a result, rye, oats and spelt are identified as minor cereals located in the large-scale market in Switzerland. The production of MC covers in Switzerland less than 10%. The most important MC is Urdinkel followed by rye and oats. Hence, they are located on a large-scale market. Emmer, einkorn, other old and new varieties of wheat, as well as rye and oats, were located on a small-scale (niche) market.

Switzerland is not self-sufficient in cereal production. Whereas the self-sufficiency in cereal production for human consumption in terms of energy is about 80%, it is much lower for feed (65%).

According to the national statistics, cereal consumption per capita is decreasing since 2009. Whereas the consumption in 2009 was about 96.1 kg per capita, it was 90.9 kg in 2012. The increase in durum what was the strongest (19.2 kg/capita in 2009 to 13.9 kg/capita in 2012). A slight increase exists for oats. Spelt, emmer and einkorn consumption also decreased. This fact is explained by the fact, that a processor left the market. The market volume is taken over by wheat.

3.3 Area and yields of MC in the Czech Republic

In the Czech Republic, according to the Agricultural census 2010, of the total 7.9 million ha around 2.5 million are ha belong to the utilized agricultural area. Thereof, arable land accounted for 72.3 % of the total arable land, while permanent grassland and meadow shared 26.7% (permanent crops accounted for a marginal 1.1%).

Since 2003, the number of farms in the Czech Republic has halved. As a result, farms in the Czech Republic are almost four times bigger in economic size1 than those in the EU-15 and farmers tend to be younger than in the EU-15. In 2010, a relatively small number of farms accounted for a

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huge majority of the Czech agricultural area. About 11.5% of the agricultural land is cultivated according to organic guidelines. The Czech Republic has 10.8 million residents.

The main components of arable land were cereals, industrial crops and fodder crops. In particular, cereals represented by far the main type of production. In 2012, cereals were produced on 1'335 102 ha or 49.3% of the AUA (without grain maize) in the Czech Republic (Figure 6, see Annex 5 for all figures). Thereof, minor cereals covered an area of 81327 ha; that is 3 % of the cereal production area. These figures include the production area of oats and rye as well as the production area of organic spelt. There was no official data available on durum, conventionally cultivated spelt, emmer and einkorn. From the project partner, we received the information that in 2012, spelt production covers 2'348 ha. Statistics is available for rye and oats. There was no information available on whether oats was cultivated only for animal feedstuff (Czech Statistical Office 2014). Rye was the second most important minor cereal, grown on 30557 ha. That is 1.1 % of the total cereal production area.

According to our project partner, emmer and einkorn are only grown in organic farming. The estimated production area was less than 1000 ha (unofficial estimation) (personal contact CRI Czech Republic, 2014-02-25). Another expert estimated the production area of emmer and einkorn to be about 100 ha. Hence, figures on the estimated production area differed a lot. From the replies we get concerning emmer production, we conclude that the emmer area in the CZ is still negligible and it was therefore included with 500 ha in the figures. Based on this assumption, emmer would cover 0.6% of the area, where minor cereals had been produced in 2012.

It was also pointed out that seeds (emmer/einkorn) are distributed by PROBIO and that emmer is recommended to organic cereal producers. Some seeds were imported from Austria and, eventually, other countries. The grains were processed by PROBIO or farmers (personal contact University of South Bohemia, 2014-03-11).

For other MC, the following information was available: "Very small area of production of emmer and einkorn, only organic production (personal contact CRI Czech Republic 2014-02-25). Spelt only organic production statistically monitored" (personal contact CRI Czech Republic 2014-02-25).

During the period of 2007-2011, the production area of minor cereals remained more or less stable. With 50'770 ha, oats were the most important minor cereal in 2012. That is 1.9 % of the total production area.

According to Kotyza&Slaboch (2014), the self-sufficiency rate for cereals in the Czech Republic grew by 37% from 2000-2010. (Figure 5).With a closer look to particular crops in the Czech Republic, the most rapid growth of self-sufficiency rate has been accounted for rye (+89%) and barley (+47%). In 2000/2001, consumption of both crops exceeded production and imports were needed. At the end of the examined period, (09/10) self-sufficiency rate of both crops exceeded 120%.

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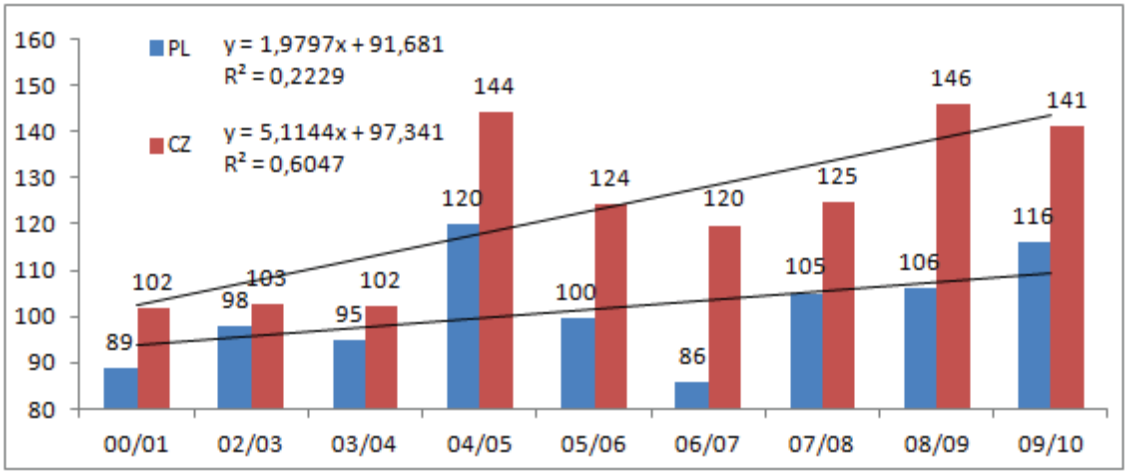

Figure 5: Self-sufficiency rate in cereals in CZ and PL (2000–2010, %) after Kotyza & Slaboch

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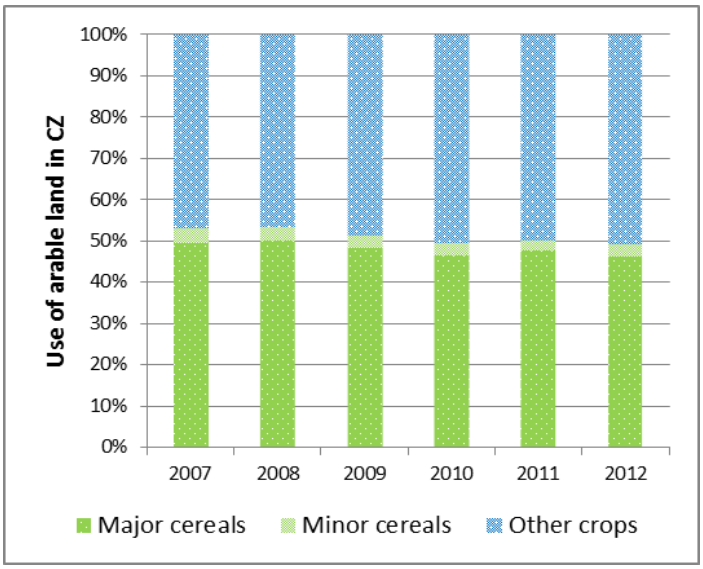
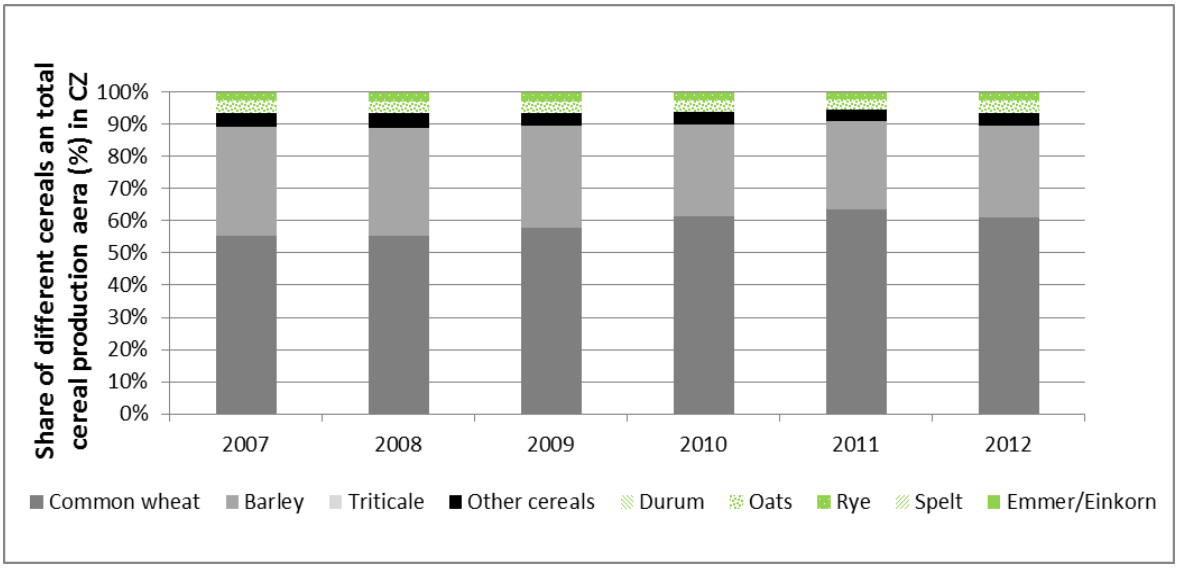
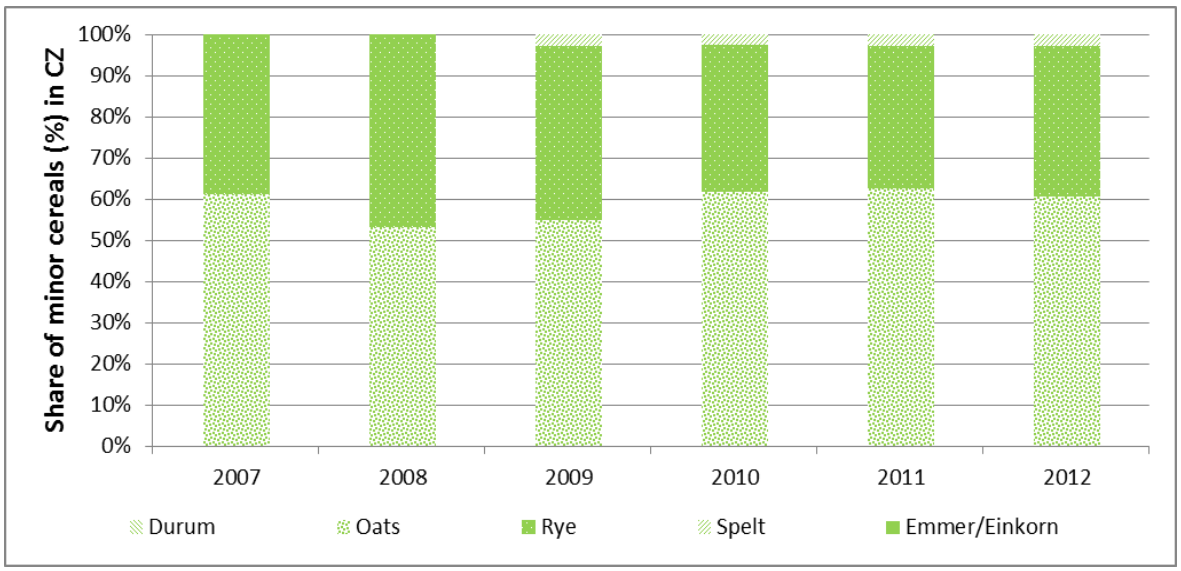


Figure 6: Left: Use of arable land in the Czech Republic from 2007 – 2012. The area planted with cereals decreased since 2007.

Middle: The dominant cereals in CZ are common wheat and barley.

Below: The minor cereals production in the CZ is dominated by oats and rye. The area planted with spelt increased from 2007 – 2011 followed by a break in 2012





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No official data was available on the production of durum wheat, emmer, einkorn and spelt in the Czech Republic. Based on expert opinions emmer and einkorn were least important, being cultivated on just a few hectares (unofficial estimation).

There was information available on spelt, but only on organic spelt. Organic spelt covered an area of 2'348 ha in 2012. That is 0.1 % of the total production area.

In the period of 2007-2012, among the minor cereals highest yields were reached by rye with an average of 45.84 dt/ha. Yields varied between 48.3 dt/ha in 2008 and 39.1 dt/ha in 2010. Oats reached an average of 32.32 dt/ha. Highest yields were reached in 2011 with 36.3 dt/ha. Lowest yields were reached in 2010 with 26.4 dt/ha. In average, spelt reached yields of 28.27 dt/ha in 2009-2011. Highest yields were reached in 2010 with 29.1 dt/ha.

There was no data available on emmer and einkorn. For comparison, wheat yield was about 50.1dt/ha from 2007 – 2012 (min. 45.3 in 2007 and 2012, max 56 dt/ha in 2011) and barley 43.7 dt/ha.

With regard to production in tonnes, oats was the most important minor cereal in the Czech Republic. In 2011, 164'248 tonnes of oats were produced. Oats was followed by rye with 118'456 tonnes and spelt with 5'638 tonnes (organic production). There was no data available on the production in tonnes of emmer and einkorn.

3.4 Area and yields of MC in Estonia

Estonia has an area of 4.5 million ha of which 50% is forest and 21% is farmland. The population is 1.3 million – of which one-third lives in rural areas. In 2013, there were 19 000 farms. The 1 000 largest farms account for three-quarters of the agricultural land. 20% of farms are traditional family farms. More than two-thirds of the farms are so small that there is no full-time work. Around 25% of farms do not produce any products – they simply maintain the land in good agricultural and environmental condition. In 2012, 144'149.50 ha or around 15 % of the agricultural land was farmed according to organic guidelines.

In Estonia, the total production area of cereals was 290'500 ha (2012) (Figure 7, see Annex 6 for all figures). The surface planted with common wheat increased since 2007 from 17.2 up to 21.9% whereas the area planted with barley decreased (from 23.5% in 2007 to 20.2% in 2012). Thereof, minor cereals covered an area of 48'900 ha; that is 7.2% of the total production area. Oats and rye were the most important minor cereals produced in Estonia.

For Estonian cereal, producers produce more cereals for export, especially exports of wheat, oats and rye is relevant. The self-sufficiency is about 114% in 2008/09 (CSO 2011). For spelt, emmer and einkorn, no information on trade is available.

In 2012, oats was cultivated on 31'800 ha. Rye was cultivated on 16'900 ha. Oats and rye made up 8.6% of the total cereal production area and 99% of the total production area of minor cereals. Spelt was produced on a very small scale. It was cultivated on about 205 ha in 2012.That is 0.1% of the total production area. The data on spelt referred to organic production. There was no data available on conventionally cultivated spelt.

A total figure (organic and non-organic production) was not available either. As stated by our project partner, spelt is mainly produced under organic conditions in Estonia. Durum, emmer and einkorn were not cultivated, only in trials (some genotypes) (personal contact ETKI, 2014-03-19,

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and 2014-02-27). Organic oat production was 16'615 t and rye production 6'420 t. It covers 21.2% of the total oat and 11.2% of rye production (personal communication).

During the period of 2007-2012, the production area of minor cereals has fluctuated between 14.1% up to 18% of the area planted with cereals. From the data collected, we conclude, that oats and rye reach lower yields in Estonia than in, for instance, Austria, Switzerland and the Czech Republic (Annex 6). There was no data available on production (yields, tonnes) for spelt/organic spelt, emmer and einkorn. Oats was the most important minor cereal in terms of tonnes. In 2012, 78'400 tonnes of oats were produced. Oats is followed by rye with 57'100 tonnes.

In Estonia, data on imports and exports was available for oats and rye (see Annex 6 for all figures). In the period of 2009-2012, more oats was exported than imported. Exports were highest in 2012 with 28'038 tonnes; imports were also highest in 2012 with 7'372 tonnes. Concerning rye, imports were higher than exports except the year 2009. Highest imports were registered in 2010 with 16'178 tonnes. Highest exports were registered in 2009 with 17'606 tonnes. As stated, the year 2009 constituted an exception in the overall trend. Considering the period 2010-2012, 6'471 tonnes of rye were exported in average. Based on information received from the Estonian Chamber of Agriculture and Commerce, 28 tonnes of spelt (for seeds) were imported in 2012. In 2013, it was 0.07 tonnes (for seeds) (personal contact ETKI 2014-03-21). Durum wheat is not cultivated in Estonia.

According to the experiences of our project partner, emmer and einkorn might be sold in specialised shops, such as organic shops. As stated, emmer and einkorn are almost unknown to Estonians. Little is known about spelt. That is, there is a lack of awareness regarding emmer, einkorn and spelt as well as products thereof in Estonia (personal contact ETKI 2014-03-19). The fact that there was no statistical data available on spelt, emmer and einkorn underpins the statements of our project partner.

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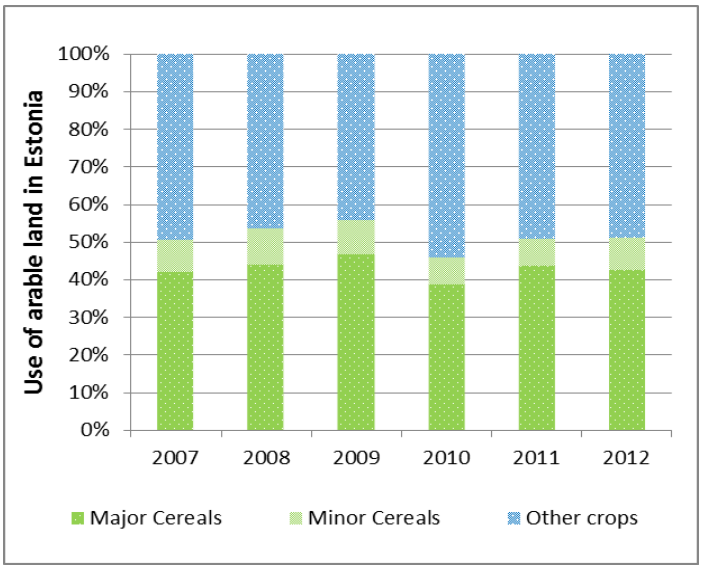
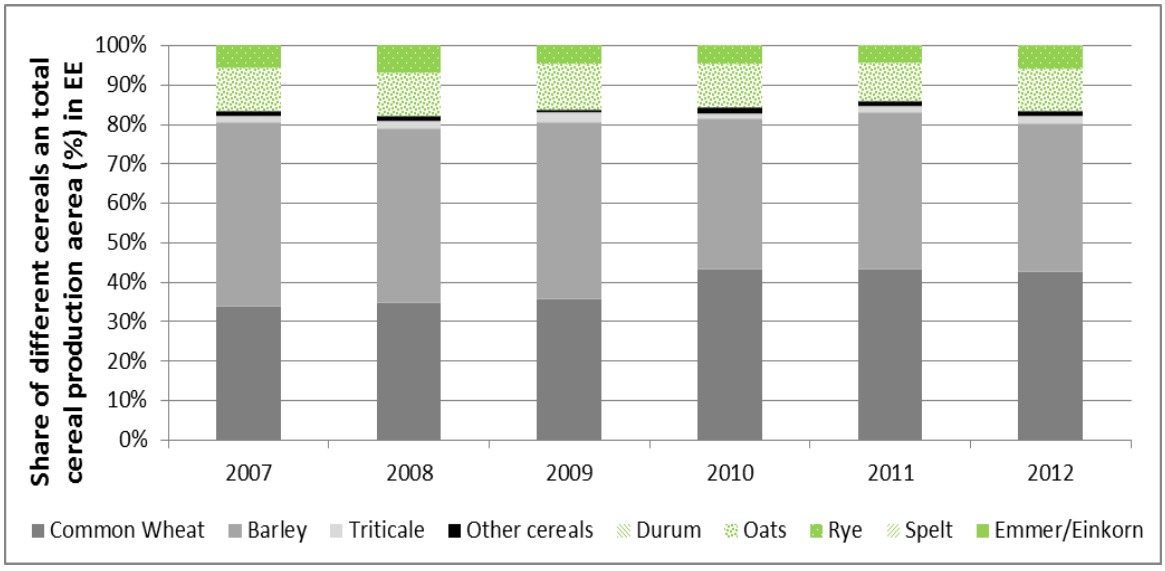
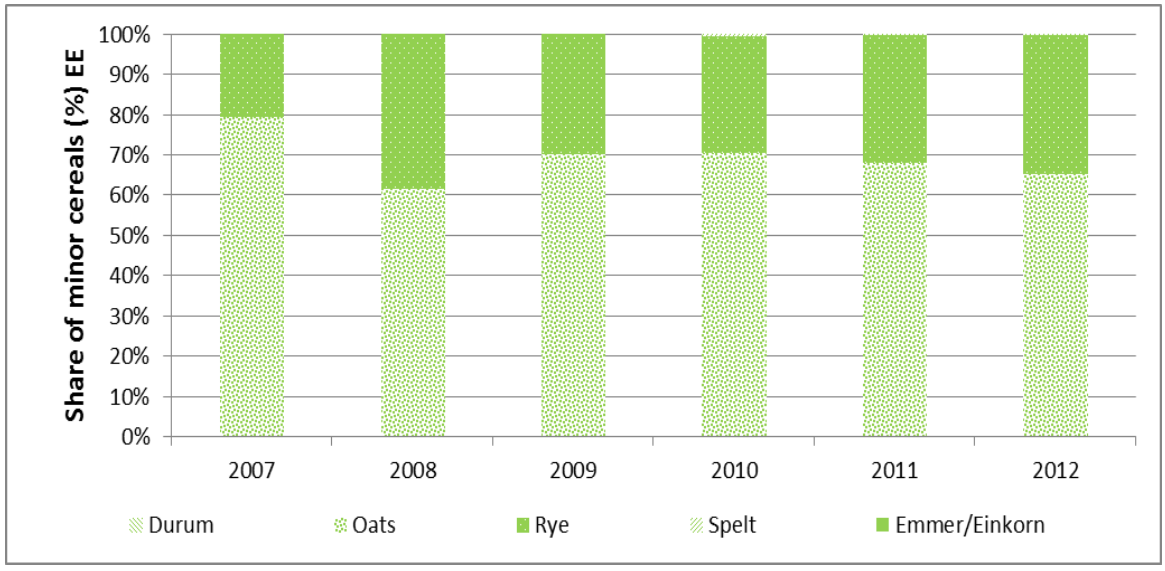


Figure 7: Use of arable land in Estonia from 2007 – 2012. The area planted with cereals fluctuated since 2007.

Middle: The dominant cereals in Estonia are common barley and common wheat.

Below: The minor cereals production in Estonia is dominated by oats and rye.





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3.5 Area and yields of MC in Germany

Germany covers an area of 35.7 million ha of which 89% is rural. Of the rural area, nearly 53% is agricultural land while forests cover nearly 35%. The total population is 80.5 million – of which 59% live in rural areas. At the end of 2012, there was around 1.03 million ha of land organically in accordance with the EU legislation on organic farming. This accounts for around 6.2 % of the total utilised agricultural area

In Germany, data on the production area of oats and rye was available for the period of 2007-2012. However, information had to be collected from various sources to cover the years in question. In Germany, the categories used to register the cereal production differed a lot from the categories used in other countries. Therefore, data was only compiled for the years 2011 and 2012 (Figure 8, see Annex 7 for figures). In 2012, the total production area of cereals was 6'518'000 ha. Minor cereals constituted 7.3% of the total production area. Minor cereals were cultivated on 872'000 ha. These figures include oats, rye and organic spelt. Figures on the production of spelt in total or conventionally cultivated spelt were not available.

With 709'000 ha in 2012, rye was the most important minor cereal in terms of production area in Germany. Rye was followed by oats with 145'000 ha. Looking at the period of 2009-2012, the production area of organic spelt decreased. In 2009, spelt was cultivated on 21'000 ha. In 2012, it was cultivated on 18'000 ha.

Emmer and einkorn were least important. Nevertheless, there was no official data available, as in the case of conventionally produced spelt. In official statistics, spelt, emmer and einkorn are included in the category common wheat.

Rye and oats reached similar yields in 2011 or 2012 (see Annex 7 for figures): In 2012, oats reached an average of 52.0 dt/ha while rye reached an average of 54.7 dt/ha. In 2011, yields were lower. Oats reached an average of 43.7 dt/ha. Rye reached an average of 41.1 dt/ha.

Data on yields/ha of organic spelt were not available but it was possible to calculate yields as data on production in tonnes and production area was available. As a result, organic spelt reached an average of 38.3 dt/ha.

As trials showed, emmer may reach an average of 42 dt/ha (grain in husk). Yields varied a lot between the different varieties of emmer in these trials. In order to get the actual yields (grain without husk), yields have to be reduced by 30%. Same applies to spelt (Habeck&Login 2014).

Concerning production in tonnes, rye was the most important minor cereal in Germany. 3' 878'000 tonnes of rye were produced in Germany in 2012. 757'000 tonnes of oats were produced in 2012. Oats and rye were followed by spelt. The production of organic spelt constituted 69'000 tonnes in 2012. There was no data available on emmer and einkorn. Therefore, it may be assumed that these species were least important.

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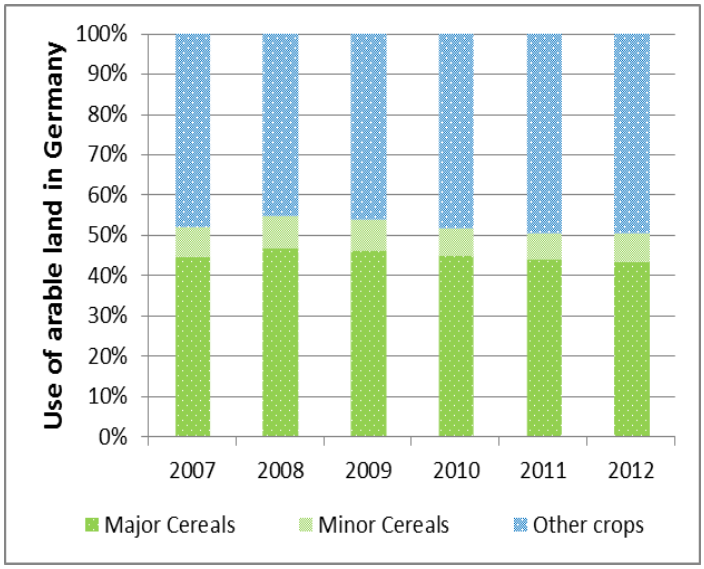
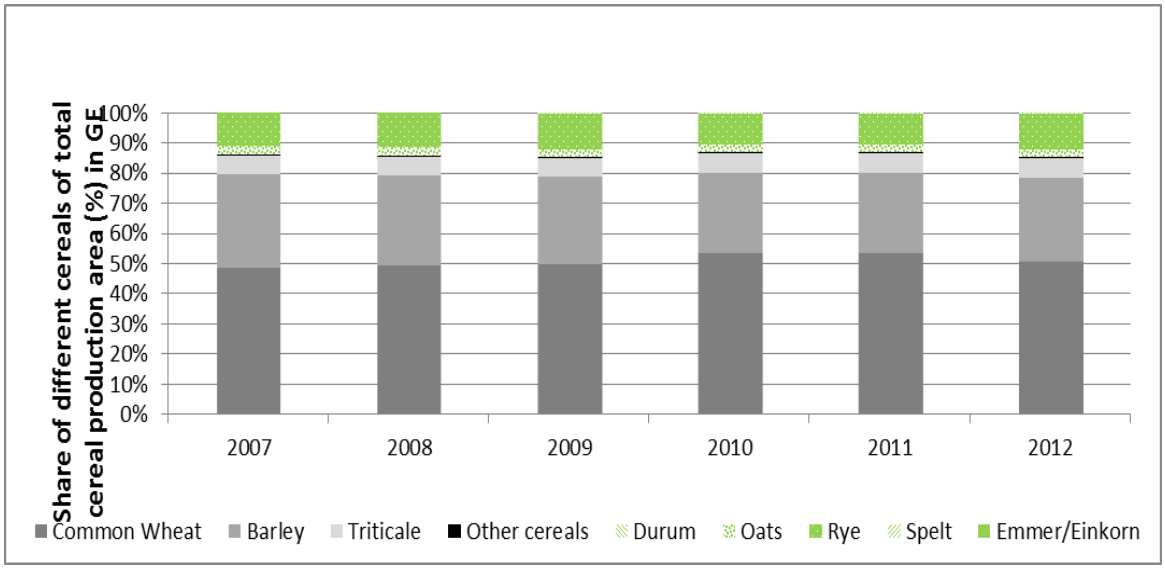
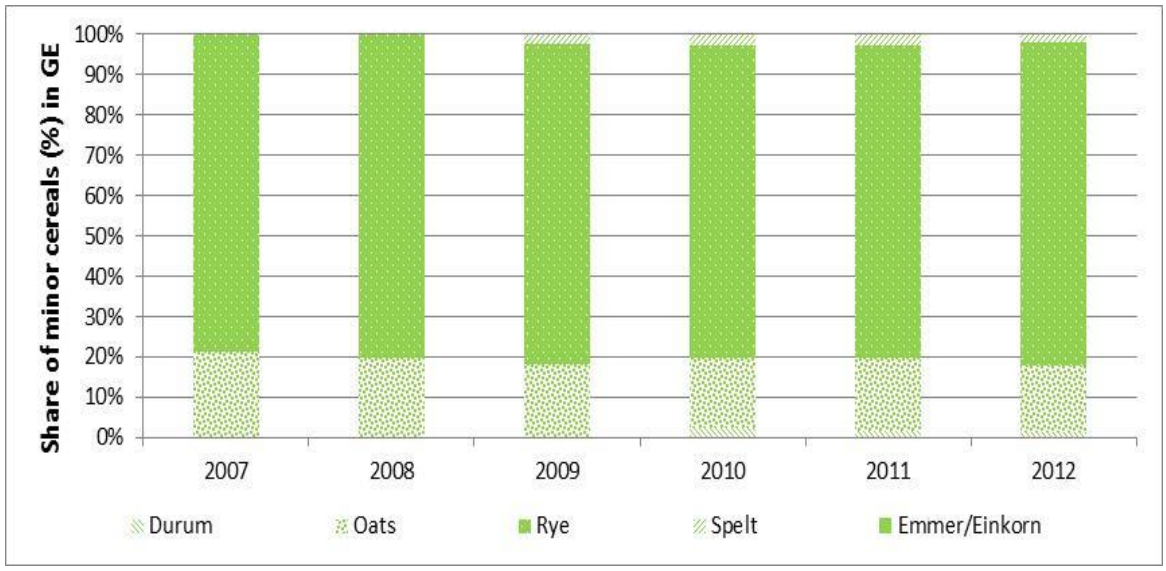


Figure 8: Use of arable land in Germany from 2007 – 2012. The area planted with cereals decreased since 2007.

Middle: The dominant cereals in Germany are common wheat, barley and triticale

Below: The dominant minor cereal in Germany is rye. Oats is much less relevant. The area of spelt increased slightly since 2007.





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Germany is self-sufficient for wheat and rye for food use (Figure 9). Besides human consumption, energy and feed use are relevant. In terms of imports and exports, data was available on oats, rye, durum wheat and common wheat. More oats was imported than exported. In average, 274'191 tonnes were imported in the period of 2009-2012. In the same period, an average of 34'866 tonnes was exported. Regarding rye, a similar quantity was imported into and exported from Germany. In average, 334'699 tonnes were imported and 328'623 tonnes were exported in the period of 2009-2012. According to BLE (2012), there is a trend to replace domestic common wheat with durum wheat. From 2006 – 2010, common wheat was replaced by durum wheat imports. We assume that durum wheat is mainly used for pasta production because the pasta consumption in Germany is increasing (Verband Deutscher Nudelmacher 2015). Durum wheat is produced in Germany, but to a lower extent (Figure 8).

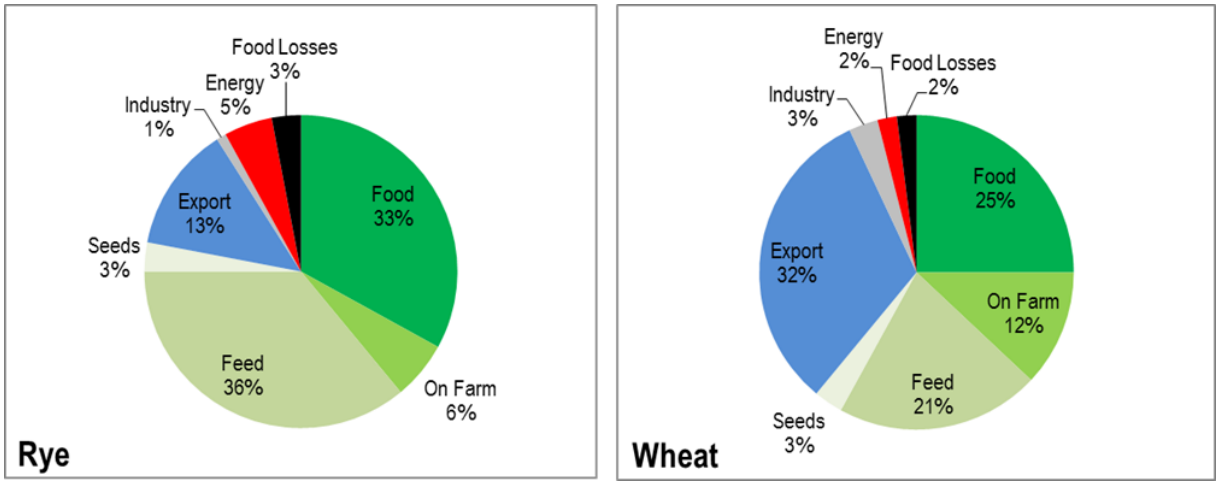

Figure 9: Germany is self-sufficient for wheat and rye for food use. For both cereals, feed (grain, silage) use, the energy production, industrial processing (starch, spirits) and exports are relevant too (Regionale Versorgungsbilanz 2010)

Interestingly, the price for triticale, barley or other feed crops is in some regions (North-west) more attractive for producers than the price for rye for food use (triticale-info 2015).The data on imports and exports of cereals indicates an intense trade within Germany and the EU. Common wheat, barley, rye and oats were almost exclusively imported from EU-27 member states and exports were directed to EU-27 states too. Different experts were contacted regarding data on imports and exports for emmer and einkorn (personal contact BLE (2014-03-06, 2014-06-14), personal contact Kaiserstühler Garten (2014-03-06), personal contact Spielberger Mühle (2014-03-03). No information was available on emmer and einkorn.

3.6 Area and yields of MC in Hungary

Hungary has an area of 9.3 million ha, of which 83%, or. 7'6 million ha, is used for agriculture. The agricultural area was mostly taken up by arable land (82.3%). In 2010, permanent grassland and meadows covered only 14% of the agricultural land, and permanent crops 3.3%. The area cropped according to the EU regulation on organic farming covers 130'609 ha.

In 2012, the total production area of main cereals (wheat, barley, triticale, rye and oats) in Hungary was 1.56 million ha (Figure 10 see Annex 8). From 2009–2013, the cereal area remained sta-

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ble at 1.54 million ha for main cereals. For 2013 and 2014, we see an increase compared to 2012 of 2% (2013: 1.55 million ha and 2014: 1.6 million ha).

Minor cereals constituted 3.8% of the total production area, being cultivated on 104'643 ha. In Hungary, data on the production area of oats and rye was available for the period 2007-2012 (see Annex 8). We received data on spelt and einkorn for the period 2010-2012 by personally contacting the Hungarian statistical office. Official data on emmer did not exist. With 53'000 ha, oats constituted the most important minor cereal in terms of production area, followed by rye with 35'000 ha and durum wheat (12'214 ha in 2012).

Received data on spelt and einkorn derived from the Hungarian Central Statistical Office for the period 2010-2012 is contradictory with the data provided by the two organic certification bodies. According to the latter in 2012 organic spelt itself was produced on 5'198 ha (2012: 6'700 ha), organic einkorn on 200 ha (2013: 304 ha) and organic emmer is on 50 ha (2013: 67 ha).These figure on organic areas are slightly higher compared with the official statistics on all spelt and einkorn for 2012. Official data from Central Statistical Office on emmer did not exist. Emmer and einkorn were the least important crop being cultivated in Hungary.

The majority of spelt, emmer and einkorn are produced according to organic guidelines, the area compared with oat and rye is relatively small for spelt and marginal for the other two. Looking at the whole period 2007-2012 for minor cereals the production area of oats and rye is slightly decreasing, whereas based on the incomplete dataset of spelt, einkorn and emmer these speciality cereals are increasing.

Yields of rye and oats were low, for instance, compared to the yields reached in Switzerland (see Annex 8for figures): average oat yields for the period 2009-2012 was 24 dt/ha, average rye yield for the same period was 22.9 dt/ha. The highest yield was reached in 2014 because the favourable weather conditions: rye 29.1 dt/ha, oat 27.1 dt/ha. Yields of spelt varied between 20.5 dt/ha in 2010 and 2011, and 30.0 dt/ha in 2012 (period of 2010-2012).

In 2010 and 2011, einkorn reached yields of 5.7 dt/ha. In 2012, yields were 21.4 dt/ha. This huge fluctuation probably can be explained by the very small production area and ambiguous data collection as a result

Concerning production in tonnes, oats was the most important minor cereal in Hungary (see Annex 8 for figures). 137'000 tonnes of oats were produced in 2012, 132'000 t in 2013 and 137'000 in 2014. Rye was second important. 79'000 tonnes of rye were produced in 2012, 2013 (108.000t) and in 2014 (95.000t). This is half of the harvest of 1990 (229'000t).

The third most important minor cereal was spelt with a production of 12'996 tonnes. 206 tonnes of einkorn were produced. Einkorn was least important. Data on emmer did not exist.

Hungary is a cereal exporter with a self-sufficiency of 123% for cereals (CSO 2011). Looking at the data on imports, more oats was exported than imported. In the period of 2010-2012, an average of 283 tonnes was imported and an average of 5'453 tonnes was exported. Also more rye was exported from Hungary than imported.

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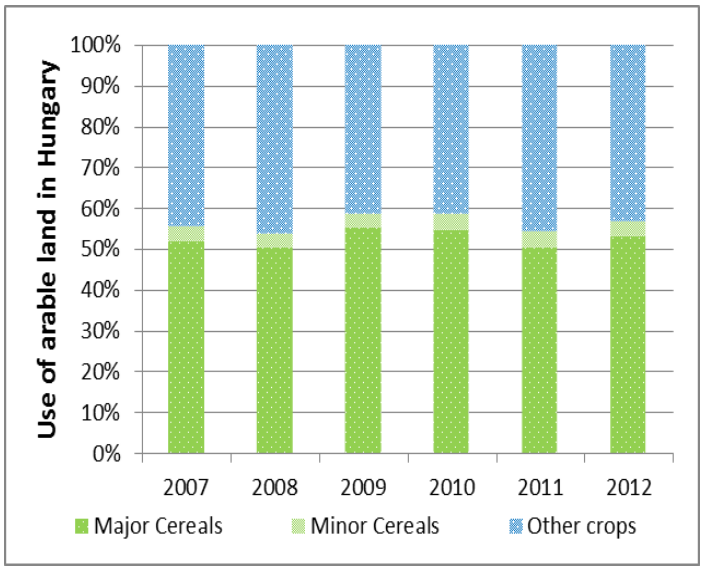
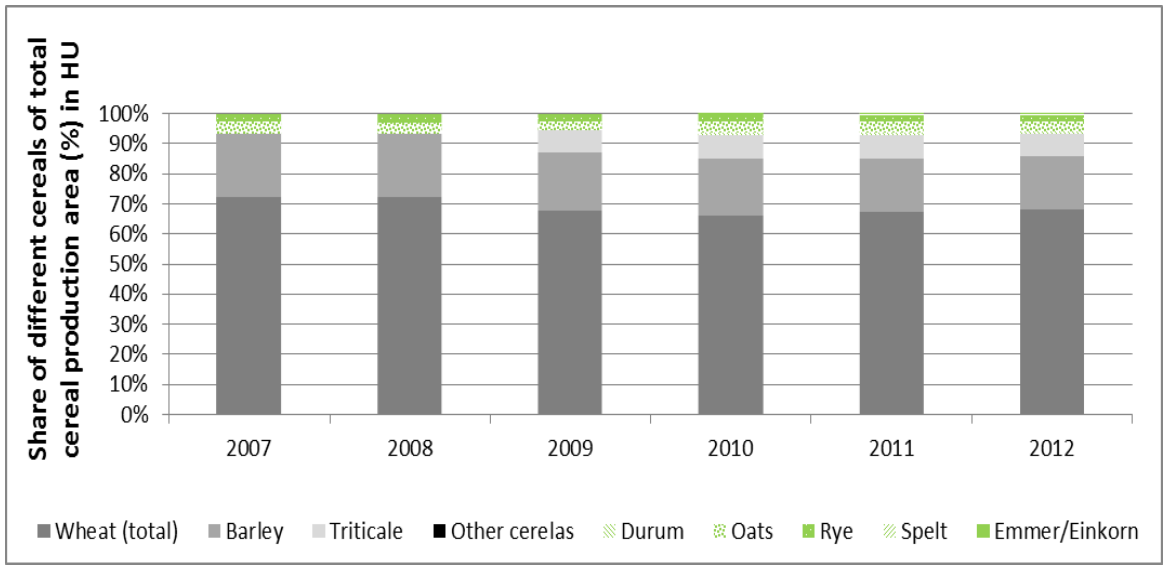
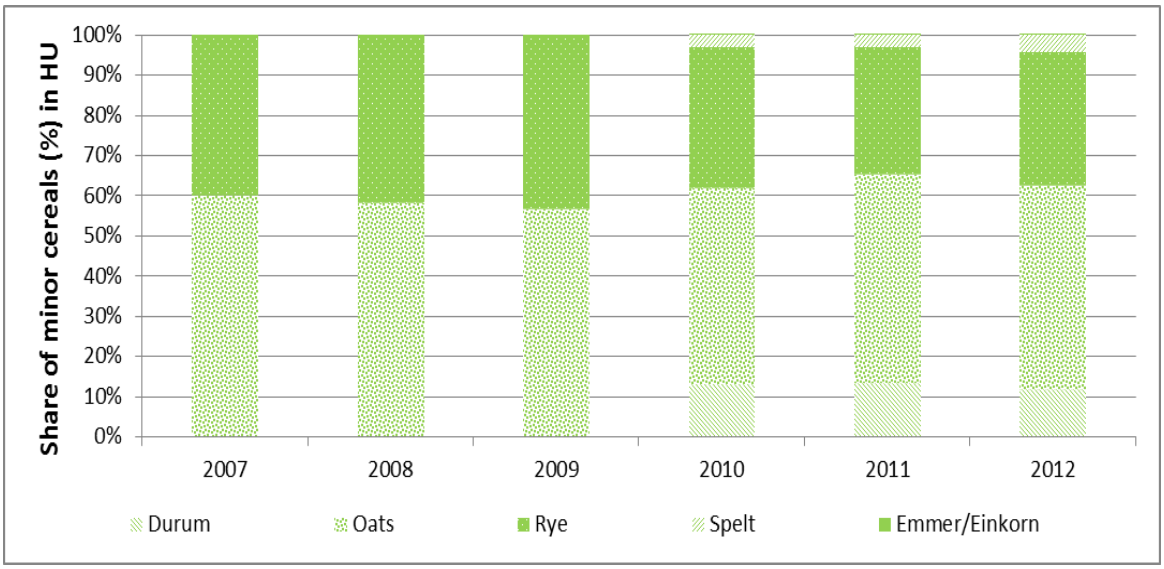


Figure 10: Use of arable land in Hungary from 2007 – 2012. The area planted with cereals remained stable since 2007 and were, compared to other EU countries, high.

Middle: The dominant cereal in Hungary is, similar to Switzerland, common wheat. Barley and triticale are much less important. The area planted with MC is, compared to other countries, low.

Below: The dominant minor cereals in Hungary are rye and oats. Spelt is of increasing importance.





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3.7 Area and yields of MC in Italy

Italy has 60 million residents and a national territory of 30 million ha. With the alpine mountains in the north and an extreme climate in the south, less than 30% of the land is arable. Of this 30%, 9% is used for permanent agricultural crops.Within the arable land, cereals and fodder crops were the two main categories of production. The production area of cereals was 2.3 million ha in 2012 (Figure 11, see Annex 9). From 2000-2010, the production of cereals decreased its share over the total hectares of arable land. On the other hand, fodder crops gained importance over the years.

Thereof, minor cereals were cultivated on 1.4 million ha; that is almost 40% of the total production area. Minor cereals refers to durum, oats, rye, spelt, emmer and einkorn. Durum is the most important cereal in Italy and covers more than 55% of the area dedicated to cereal production and, therefore, more important than common wheat, which covered just 25% in 2012. Also barley (11% in 2012), oats (5.26% in 2012) and rye (0.22 in 2012) are much less important than durum wheat.

Official statistics on production area and production (yields, tonnes) were not available for spelt, emmer and einkorn. That is, because, in the farmers' cultivation statement for community contributions (Common Agricultural Policy) - the most reliable source -, this species are not listed separately from common wheat, barley, oats and rye, but is lumped together with the rest, as 'other cereals' (Buerli 2006). This is surprising, because spelt, emmer and einkorn, known as *Farro* in Italy, are among the most ancient cereal crops of the Mediterranean region and are now becoming popular again (Buerli 2006).

However, the usage of the term *farro* is vague. Sometimes, it is only used for emmer, sometimes it is used as a collective term for spelt, emmer and einkorn. In order to distinguish between the three varieties, it is better to use the terms "*farro grande*", "*farro medio*" and "*farro piccolo*". "Farro grande" is used for spelt, "farro medio" is used for emmer and "farro piccolo" is used for einkorn (expert interview Giuliani, 2014-05-20; Buerli 2007). Among these three varieties of farro, farro medio (emmer) is the most important in Italy. In 2003, the Italian Ministry of Agriculture estimated the surface of emmer cultivation to be about 2000 ha. The area dedicated to spelt was estimated to be about 500 ha (Buerli 2006).

In terms of yields, figures had to be calculated (Annex 9). Data was only available on area (ha) and production (tonnes) in Italy. For the year 2012, it was calculated that oats reached average yields of 24.4 dt/ha and rye reached average yields of 32.2 dt/ha. Oats was produced on a larger area. As a result, more oats than rye was produced. In 2012, 292'900 tonnes of oats and 16'100 tonnes of rye were produced.

For cereals in general, Italy has a self-sufficiency of 71% (CSO 2011). According to the USDA Italian Grain and Feed Report 2012, Italian soft wheat consumption fluctuates around 7.5 million metric tonnes (MMT), mainly destined for the milling industry (approximately 70 percent is milled to produce flour for food purposes) and to the feed industry (25 percent). Of the Italian durum wheat production, almost all is utilized by the pasta industry.

Italy has a long history of leading the EU in its production of organic foods. 9.1% (1.17 million ha) of the agricultural land is managed according to the EU regulation on organic farming. And Italy is the forerunner of the "slow food" movement and in the protection of the wide variety of their local cuisines.

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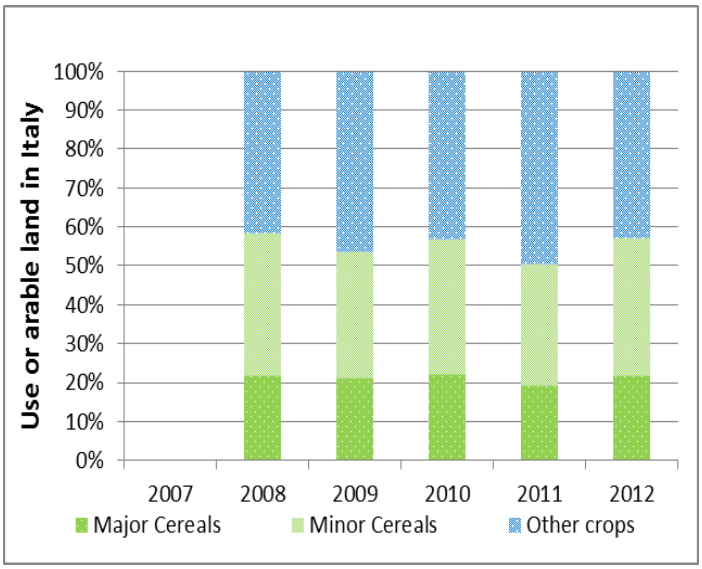
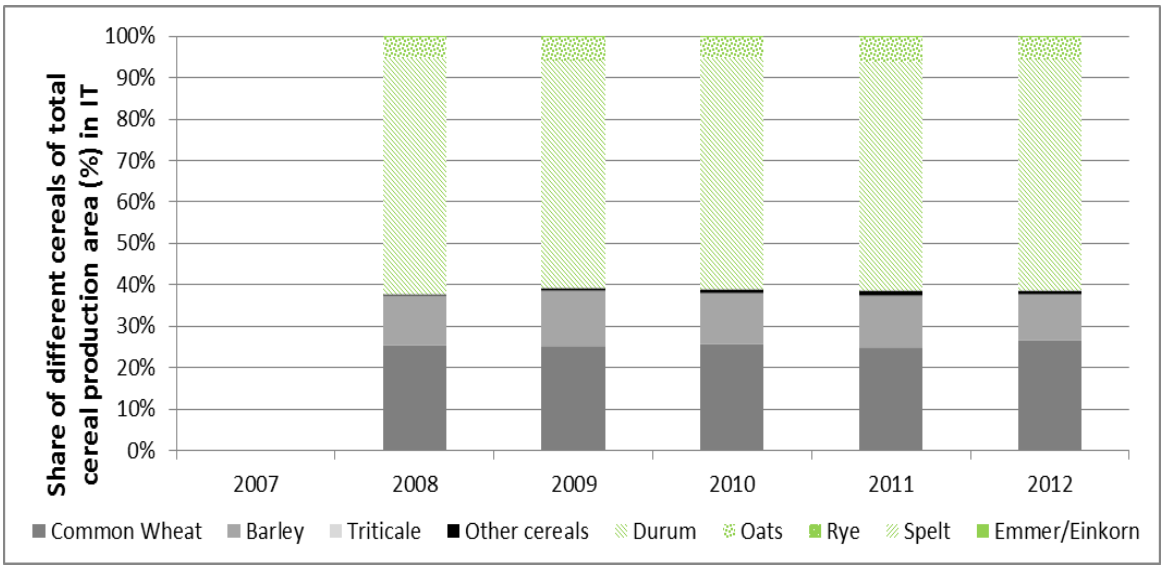
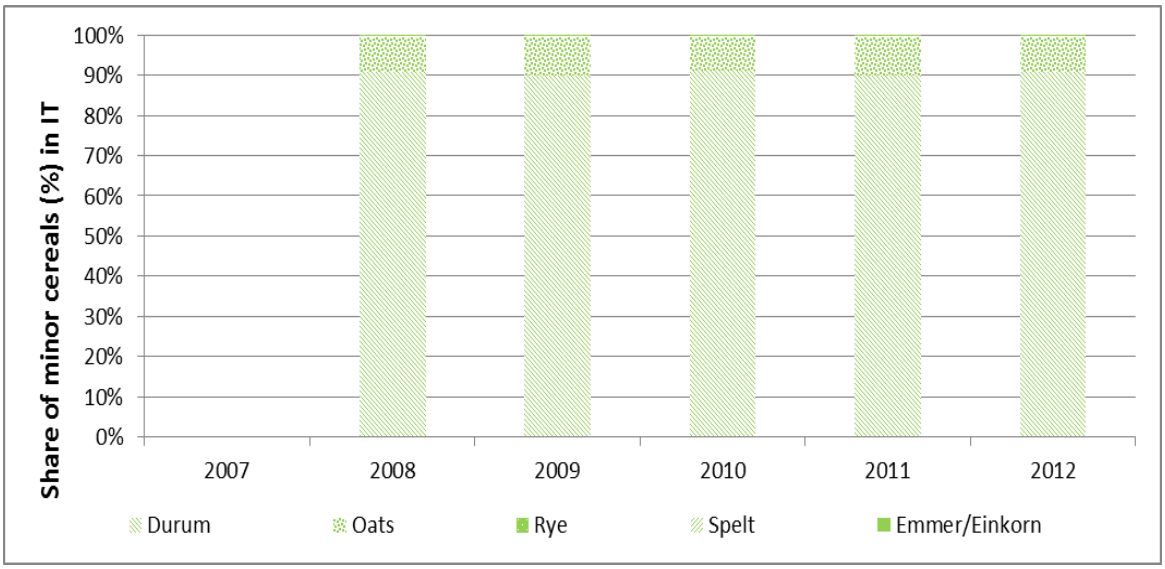


Figure 11: Use of arable land in Italy from 2007 – 2012. The area planted with cereals remained stable since 2007 and is, compared to other EU countries, high. Data on spelt, emmer and einkorn (Farro) is not available. We estimate the share of about 1%.

Middle: The dominant cereal in Italy is a minor cereal: durum wheat. Barley, common wheat and triticale are less important. The area planted with MC is, compared to other countries, the highest.

Below: The dominant minor cereal in Italy is durum wheat.





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3.8 Area and yields of MC in Poland

Poland covers an area of 31. million ha of which 51.2% is rural. Of the 14.5 million ha of utilised agricultural area, 74.7% is arable land and 22.4% is permanent grassland and meadows. The total population is 38.5 million – of which 39% live in rural areas.

The Polish agriculture is dominated by small farms. Out of 1.5 million farms, some 55% are below 5 ha and run as a family farm. Organic farming covers 0.6 million ha are managed by 25'000 farmers (Total of 1.8 million farmers) according to EU regulation on organic farming.

In Poland, field crops cover approximately 90% of agricultural land of which five main cereal crops, potato, industrial and oil bearing plants are produced. Fodder industry consumes ca. 3.5 million tonnes of cereals. Despite low soil quality and frequent rainfall shortages Poland ranks third in the European Union for the harvest of cereals (t) after France and Germany (For information on self-supply see chapter Czech Republic). Rye became less important and while wheat and triticale production increased. This is surprising because rye is adapted to low nutrient water demand. The change is driven by increasing poultry production, where rye is not suitable.

But not just for feed use, also for human consumption, the demand for rye decreases due to the fall in consumption of cereal products. The fall results mainly from the rise of incomes, but also from the changes in lifestyle and the possibilities of substituting these products for other products. Regarding production in tonnes, rye is still the most important minor cereal in Poland.

Rye and oats reached similar yields in the period 2010-2012 (see Annex 10 for all figures): In 2012, rye reached an average of 27.7 dt/ha while oats reached an average of 28.6 dt/ha. During the whole period, rye reached average yields of 26.2 dt/ha. In comparison, oats reached an average of 26.7 dt/ha. While yields were similar to the yields of oats, the production area of rye was approximately double the size of the production area of oats (e.g. in 2012). Consequently, the production of rye in tonnes was twice as big as the production of oats. In 2012, 2'888'100 tonnes of rye were produced, and 1'467'900 tonnes of oats. There was no information available on the production (yields, tonnes) of spelt, emmer and einkorn in Poland.

Cereals were cultivated almost on 73% of the total sown area in 2012, and their acreage displays a growing tendency (Figure 11, see Annex 10). Wheat is the most extensively grown cereal in Poland. In 2012, it covered 20% of the total crop area and 25% of the total cereal cultivation area. Barley, rye, triticale and cereal mixtures occupied 12%, 11%, 11%, and 13% of cultivation area, respectively. Poland is an important producer of cereals and supplies local and international markets. In Poland, the total production area of cereals was 10'147'000 ha (sown area) in 2012 (see Annex 10 for all figures). Thereof, minor cereals covered an area of 1.56 million ha; that is 21.7% of the total production area. These figures account for oats and rye. Data on spelt, emmer and einkorn were requested from two different sources, but no data was received.

With 1.04 million ha, rye was the most important minor cereal in terms of production area in 2012. Oats was cultivated on a smaller scale. It was produced on 514'000 ha in 2012. As there was no information available on spelt, emmer and einkorn, it may be assumed that these crops were not produced or only on a very small scale.

Poland is the biggest triticale producer in the world with a growing area of 1.4 million ha and a crop of 5.2 million tonnes in 2009. The biggest portion by far is being fed on farm, a smaller part sold in the free market, and in good years, Poland is an important exporter of triticale as well as of rye.

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According to triticale-info (2015), the average of the years 2009 - 2011 prices for triticale in Poland were between 9 and 20 % higher than those of rye, though clearly below those of wheat which in Poland mainly is used for baking purposes. Probably the reason for these high differences is a considerable overproduction of rye for bread, whereas the production of wheat is lower compared to the market demand (triticale-info 2015).

Poland has, like other countries, a long history in rye breeding. An example is given in Annex 6.

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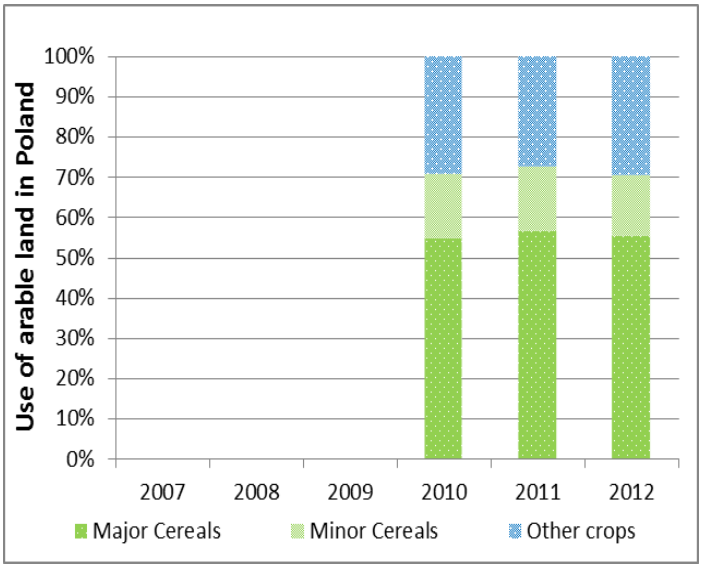
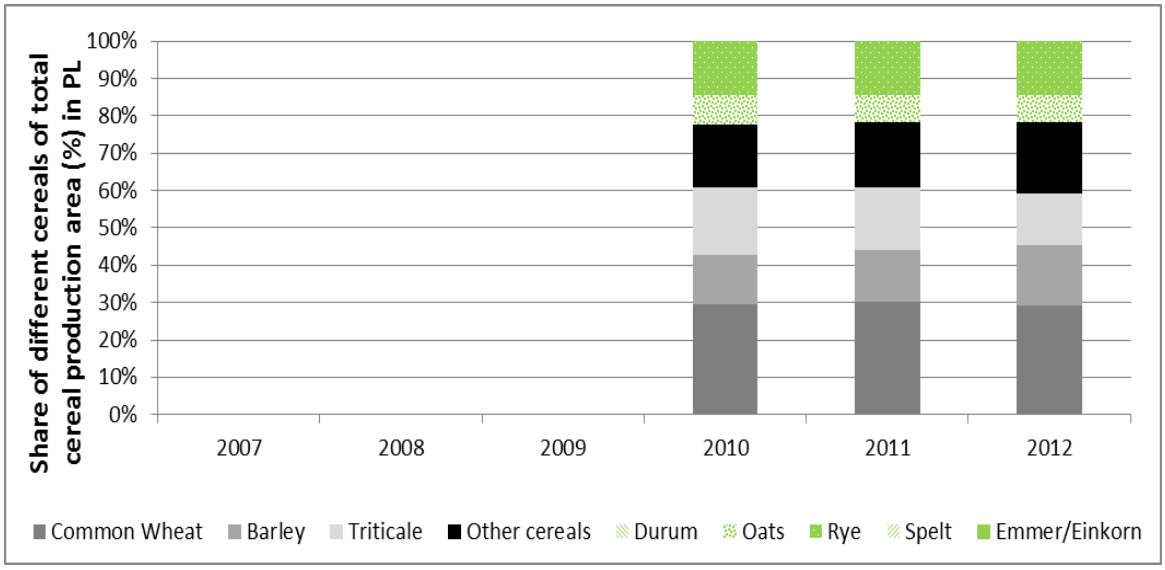
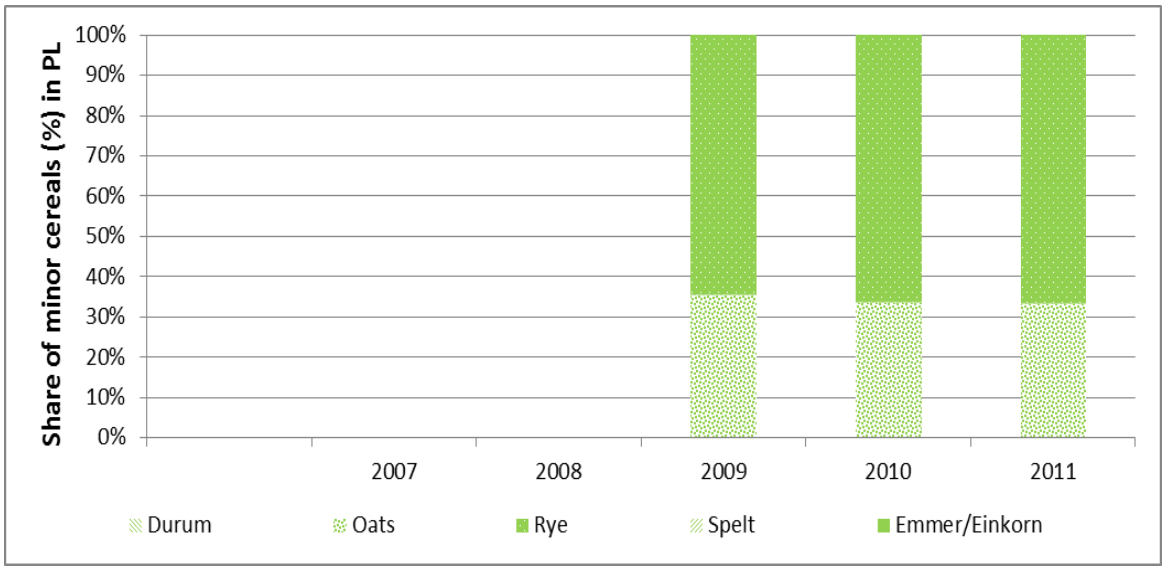


Figure 12: Use of arable land in Poland from 2010 – 2012. The share of cereals on the total arable used land is the very high.

Middle: The cereal production in Poland is different from other countries because there is no dominant major or minor cereal. Mixed cereals included in the national statistics mixed cereals but also buckwheat and millet. Poland is the biggest triticale producer worldwide.

Below: The dominant minor cereals in Poland are rye and oats.





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3.9 Area and yields of MC in Turkey

With a size of 78.4 million ha and a population of about 76.7 million people, Turkey is the second largest country on the European continent. About 35.5% of the country is arable lands and 15% consists of forests. The cultivated land is around 26.5 million ha. Around 18.4% of the cultivated land is irrigated. Fruits and field crops are the most important products.

Of the total agricultural area 523'627 hectares are cropped by guidelines of organic farming (2.16%). 76.4% consists of arable crops, mainly cereals, and 16.5% permanent crops while another 4.7% is given over to permanent grassland and grazing areas.

Cereal production dominates the arable used land (Figure 13, see Annex 11). The total production area (sown area) of cereals was 10.55 million ha in 2012, which corresponds 86% of the arable land (see Annex for all figures). Thereof, minor cereals covered an area of 1.44 million ha; that is 11.6% of the cereal production area. These figures include data on durum, oats, rye and spelt. Data on emmer and einkorn was not monitored in official statistics. It was included in the category 'spelt-wheat' (Personal Contact Aksaray University 2014-03-18).

Estimations of the production area and the production in tonnes of emmer and einkorn existed. The area was estimated to be about 5,000 ha. The estimated production in tonnes was about 2,500-5,000 tonnes. It was stressed out that both figures were rough estimations (Personal Contact Abant İzzet Baysal Üniversitesi 2014-03-18).

We compared the data on spelt-wheat respectively emmer and einkorn published by the official statistical office. It became clear that the figures for spelt-wheat and emmer/einkorn were the same. That is, spelt is not cultivated in Turkey or, there was no statistical data available. Emmer and einkorn are cultivated and registered in Turkey and subsumed in the official statistics under the term 'spelt-wheat'. The official figures corresponded to those figures on emmer and einkorn mentioned by the experts.

During the period 2007-2012, the total production area of minor cereals (durum, oats, rye, spelt) represented 13.5% of the total cereal production area in 2007. It remained more or less stable until 2012. With 1190'036 ha, durum wheat was the most important minor cereal in 2012, followed by rye with 143'222 and oats with 89 327 ha. Spelt (including emmer and einkorn) was least important. It was cultivated on 3988 ha.

The actual size of the production area of spelt, emmer and einkorn is not known and/or is difficult to monitor. However, estimations exist. Furthermore, it is known that data on emmer and einkorn is included in official statistics. That is, both species are cultivated in Turkey.

When looking at data on yields, rye and oats reached similar yields in the period of 2007-2012. Rye reached highest yields in 2011 with 28.7 dt/ha and lowest yields in 2007 with 18.1 dt/ha. Oats reached highest yields in 2011, too, with 25.4 dt/ha. Lowest yields were monitored in 2007 with 20.0 dt/ha. In average, rye reached yields of 23.8 dt/ha. Oats reached yields of 22.8 dt/ha. (Annex 11).

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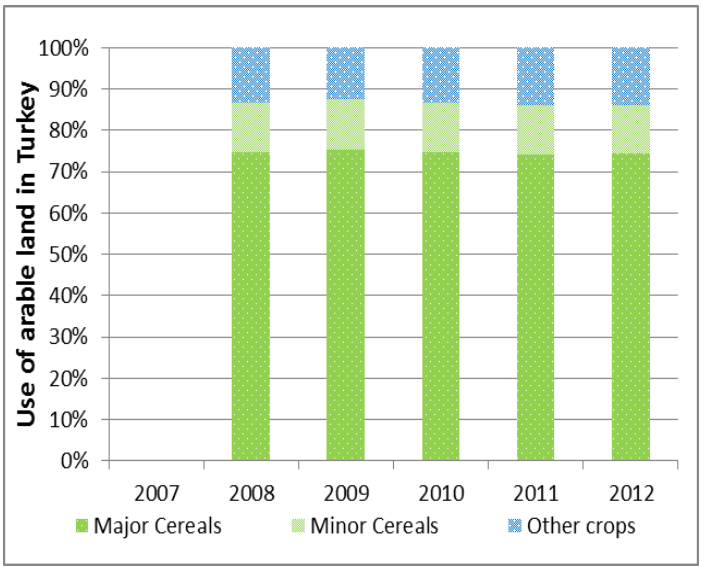
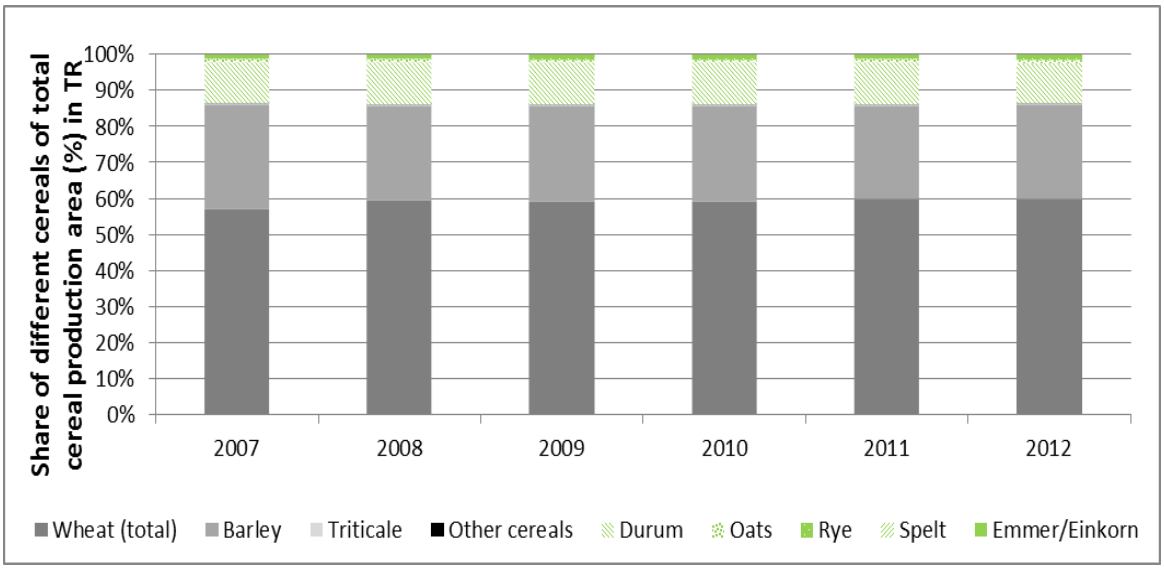
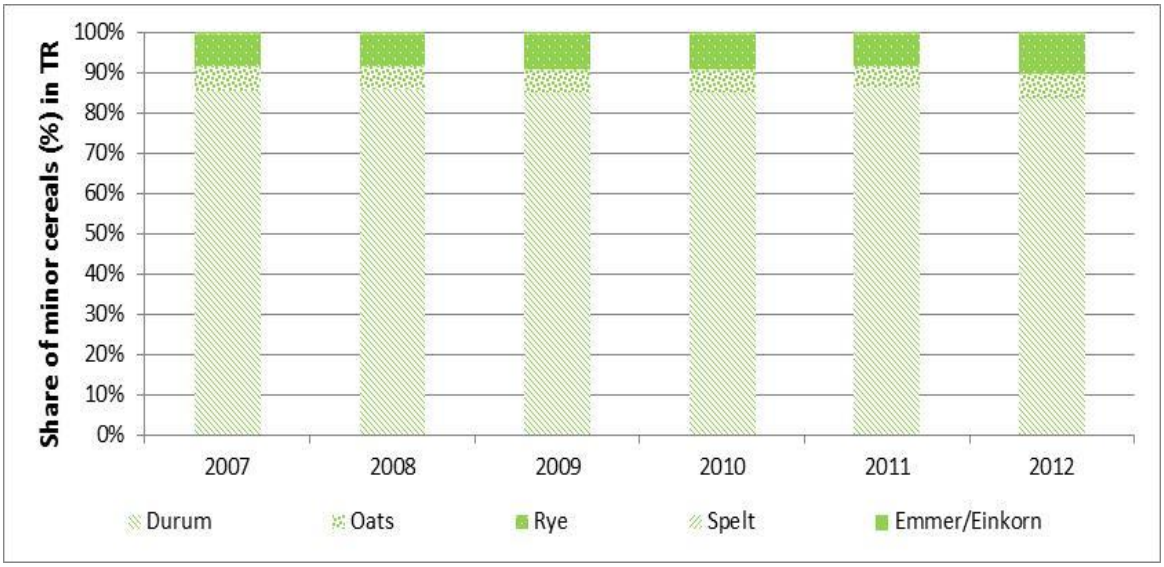


Figure 13: Use of arable land in Turkey from 2008 – 2012. The share of cereals on the total arable used land is the highest of all in this report.

Middle: The cereal production in Turkey dominated by durum wheat and barley. No spelt is produced in Turkey. Emmer and einkorn cover 0.03% of the area dedicated to cereal production.

Below: In Turkey durum wheat is the most important minor cereal followed by rye and oats. According to the official statistics, no spelt is grown, but emmer and einkorn. The cover 0.3% of the area planted with MC.





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Concerning production in tonnes, durum wheat and rye are the most important minor cereal in Turkey (see Annex 11 for all figures). In 2012, 370 000 tonnes of rye were produced. Rye is followed by oats with 89 327 tonnes. 6 565 tonnes of spelt (including emmer and einkorn) were produced.

Data on imports and exports was available on oats and rye. Looking at the statistics on oats, a much larger quantity of oats was imported into Turkey than exported in the periods 2009-2010, 2010-2011 and 2011-2012. In the latter period, imports constituted 8'690 tonnes while exports constituted 26 tonnes. In the case of rye, data on imports and exports was not complete.

Data on exports was available for the periods 2009-2010, 2010-2011 and 2011-2012. Data on imports was only available for the period 2011-2012. During this period, 98 tonnes of rye were imported, and 1'613 tonnes of rye were exported. Data on spelt, emmer or einkorn was not available. As stated by the experts, emmer and einkorn, or farro, was not traded. In other words, there was no import or export of these varieties (Personal Contact Abant İzzet Baysal Üniversitesi, 2014-03-18, Personal Contact Aksaray University, 2014-03-18).

3.10 Area and yields of MC in the UK (England)

In the UK covers an area of 13 million ha of which 85% is rural. The total population is 53 million – of which 18% live in rural areas. Of the land area, 70% (17.3 million ha) is farmland while forests cover 10 %. 48% of the croppable area is planted as cereal crops with wheat and barley as the predominant cereal crops.

The share of organic farming in the UK is 3.4 %. Of the total organic area of 590'009 ha, 68.7 % consists of permanent grassland and grazing areas (405'569 hectares), 30.4 % arable land (179'227 hectares), and 0.84 % permanent crops (4'952 hectares).

In the UK, the total production area of cereals was 3.14 million ha in 2012 (Annex 12 for all figures). Thereof, minor cereals covered an area of 148 000 ha; that is 4.7% of the total cereal production area. These figures include data on oats and rye (including mixed corn and triticale). Data on spelt, emmer and einkorn was not available. Defra - the department for environment, food and rural affairs – states, that data of these species (spelt, emmer, einkorn, durum wheat) is not collected in the UK (Personal Contact Defra, 2014-03-06).

HGCA - home grown cereals authority – constitutes that they do not collect data on these crops as "these are minor crops in the UK". Approximations existed for rye only. Following data from Defra, HGCA estimates the production area of rye to be 6000 ha and the production in tonnes to be 30'000-40'000 tonnes (Personal Contact HGCA 2014-03-12). In official statistics, the production area of rye including mixed corn and triticale was estimated to be 26'000 ha (2012). Therewith, rye (incl. mixed corn and triticale) was the second most important minor cereal.

With a production area of 122'000 ha, oats was the most important minor cereal in 2012. Spelt, emmer and einkorn may be considered as being least important. No data was available for these species.

During the period of 2007-2012, the production area of minor cereals decreased slightly (see figure). In 2007, it represented 5.4% of the total cereal production area. In 2012, it constituted 4.7% of the production area.

When looking at data on yields, rye reached higher yields than oats in the period of 2007-2012. Highest yields were reached in 2009 with 66.0 dt/ha. Lowest yields were reached in 2012 with

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52.0 dt/ha. Oats reached highest yields in 2008 and 2009 with 58.0 dt/ha and lowest yields in 2012 with 51.0 dt/ha. In average, rye reached yields of 58.8 dt/ha. Oats reached yields of 55.5 dt/ha. In terms of production in tonnes, oats was the most important minor cereal (see Annex for all figures). In 2012, 627 000 tonnes of oats were produced in the UK. Oats was followed by rye with 105 000 (including mixed corn and triticale). In these statistics, rye, mixed corn and triticale were mentioned as "minor cereals" (source: Defra). There was no official data on the production (tonnes, yields) of spelt, emmer and einkorn.

For all cereals, UK has a self-supply of 92% (SCP 2012). From the demand side, the livestock sector is relevant.

Data on imports and exports was available for oats and rye (Annex 12). In the case of oats, more oats was exported than imported in the periods July 2009-June 2010 and July 2010- June 2011. In the latter period, 53 030 tonnes of oats were exported. 18 670 tonnes were imported. In the periods July 2011- June 2012 and July 2012- June 2013, more oats was imported than exported. In July 2012-June 2013, 71 605 tonnes were imported, 12 956 tonnes were exported. These shifts in exports and imports might be based on the poor harvest in the UK during these years (Personal Contact HGCA, 2014-03-18). Considering the imports and exports of rye, more rye was imported than exported, except the period July 2010-June 2011. In this period, 30 tonnes of rye were imported, and 75 tonnes were exported. Both imports and exports were quite low during this period. In comparison, 5 928 tonnes of rye were imported, and 276 tonnes of rye were exported in the period July 2012- June 2013. As HGCA mentions in the context of imports and exports of durum wheat, figures on imports and exports have to be treated with caution as people might put wrong codes by accident. Hence, varieties are not registered correctly. Furthermore, figures vary due to the quality of the harvest in the UK (Personal Contact HGCA 2014-03-18). In general, the quantities of imports and exports of oats were a lot higher than the quantities of rye traded during the same period.

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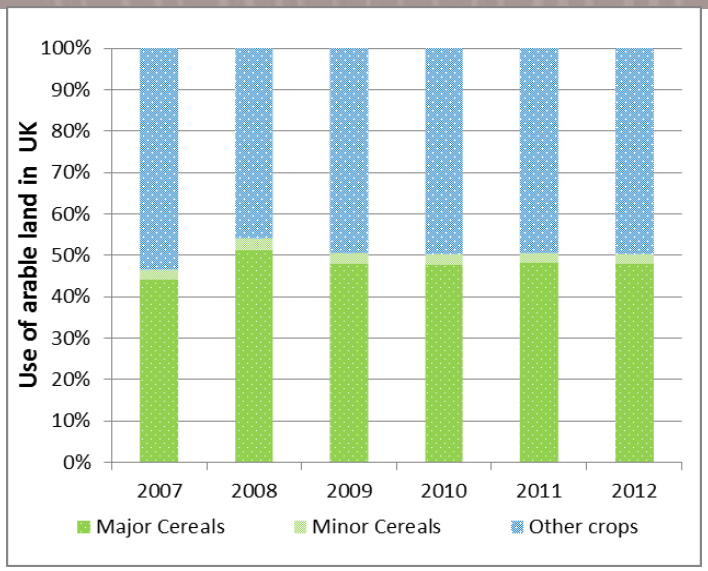
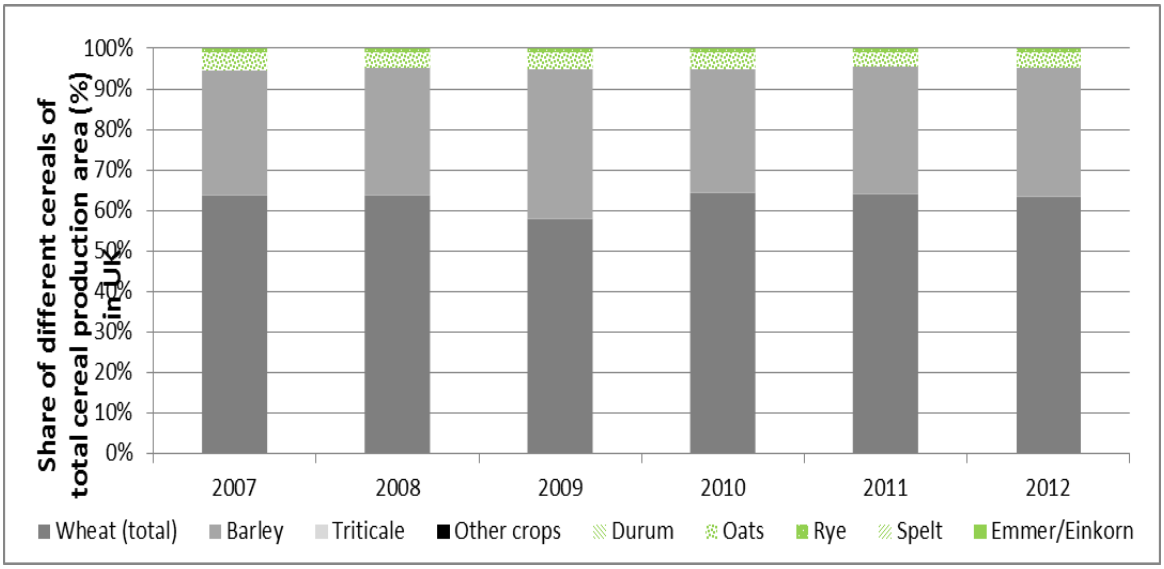
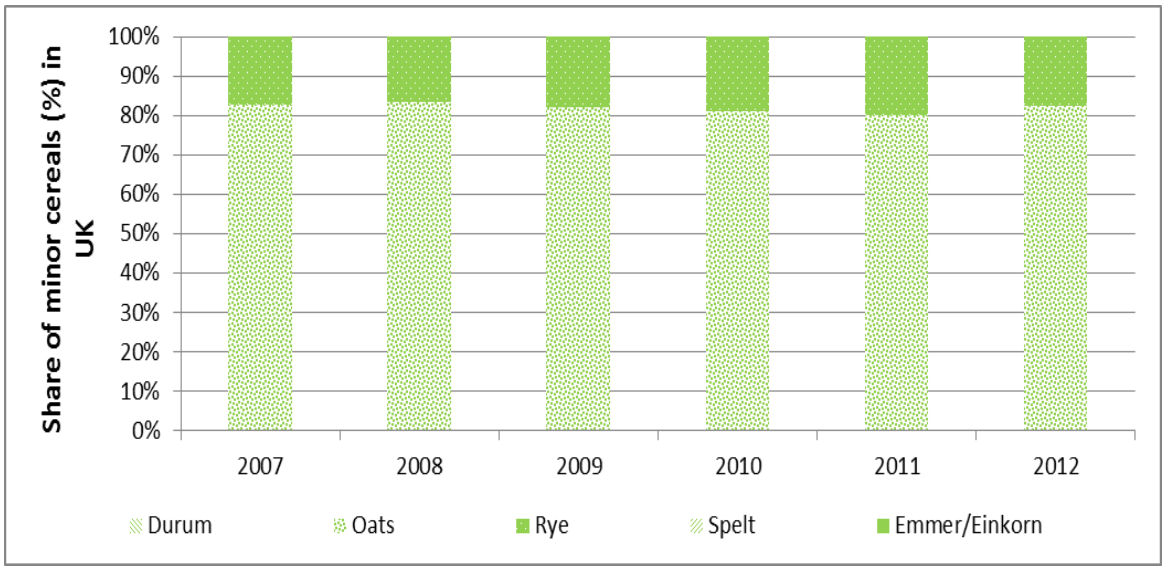


Figure 14: Use of arable land in the UK from 2008 – 2012. The share of cereals on the total arable used land is lower compared to other countries.

Middle: The cereal production in the UK is dominated by wheat and barley. Oats is the most important minor cereal.

Below: In UK, oats is the most important minor cereal. According to the official statistics, neither spelt nor emmer and einkorn is produced in





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3.11 Conclusions

For oats and rye, data collection from national statistics was easy. The data covered the area planted with MC in ha, the yield in tonnes, and tonnes/ha. Less data was available about the intended use.

Overall, it is difficult to draw conclusions about the market relevance of a crop just from the comparison of national statistics because the data collection is not harmonised and especially records on spelt, emmer and einkorn are often not available. However, some estimates about the importance of a crop for the national food industry could be done (Table 6).

In the different countries investigated, the eating traditions have an impact on the corps produced. This explains the higher share of rye and oats in Germany, Poland, Estonia or Austria or Durum in Turkey and Italy and Spelt for some regions in Switzerland. These eating traditions have developed because the food production was more affected by environmental factors like soil conditions and temperature. E.g. the so-called rye-belt stretches across regions from Germany, Poland, the Russian Federation, the Ukraine, Belarus and other countries in Central Europe. In these countries, rye is well adapted to the light to medium soils. Concerning rye, the current production could be increased mainly in the Czech Republic or Hungary.

Table 6: Comparison of MC crop production (area dedicated to MC crop like oats, rye, spelt, durum wheat and emmer/einkorn production) in different European countries. The data is based on the production area of MC from 2007- 2012.

◗: Niche production < 2 % of the arable used land covered with MC crop; ●> 2% of the arable used land covered with MC crop; O production only for self-consumption, farm-shops < 0.1% of the arable used land covered with the MC crop. No data: spelt, emmer and einkorn are produced but no national statistics available.

Country	Oats	Rye	Spelt	Durum	Emmer/Einkorn
	Area	Area	Area	Area	Area
Austria	●	●	◗	◗	○
Czech Republic	◗	◗	○/◗	○	○
Estonia	●	●	○	○	○
Germany	◗	●	◗	◗	○
Hungary	●	◗	◗	◗	○
Italy	●	○	*no data*	●	*no data*
Poland	●	●	*no data*	*no data*	*no data*
Switzerland	◗	◗	●	○	○
Turkey	●	●	◗	◗	○
UK	◗	◗	○/◗	○	○

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4. Market with products made of MC

4.1 MC on the large scale markets (ILU)

In 2010 of the worldwide cereal production 33.9% was used in animal feed 46.9% for human consumption, 12.8 for different purposes and 6.4% as bioethanol. Different from that, nearly two-thirds of the EU's cereals are used for animal feed, with around one-third for human consumption. Only 3% is used for biofuels.

The Cereals Price Index is increasing which indicates that the demand for cereals is increasing again around the world. In May 2014, the index was 204.4. (Compared to 2010: 179.2 or 2013: 219.2). The average 204.4 points in May, down 2.4 points (or 1.2 percent) from April and 30 points (or 13 percent) below last year. The decline in May was mostly triggered by maize prices, which fell in response to favourable growing conditions and good supply prospects in 2014/15.

MC like rye, oats, durum wheat or spelt are not of interest on these global large-scale commodity markets. However, they could be of interest, when there is a shortage in wheat.

In terms of quantity and area, wheat is by far the most popular cereal grown in the EU, making up nearly half the total arable utilised land. Of the remaining 50%, about one-third is maize and one-third barley. Other cereals grown in smaller quantities include triticale, rye, oats and spelt (Annex 1, EC Agricultural and Rural Development).

Table 7: In the project, additional market situations for MC were defined: Besides the niche markets and large – scale markets, there is an XXL market. The distinction between large-scale and XXL markets was made according to the criteria listed in the table. On the XXL markets, commodities like wheat, barley, soybeans, corn and palm oil are traded.

Criteria	Attributes of large-scale markets	Attributes of an XXL markets
Area	More than 2% of the acreage used for cereal production	More than 20% of the acreage used for cereal production
Suppliers	Farmers are potential suppliers Different suppliers for processors and traders	Most of the farmers
Market	Regional and national market, product traded internationally.	Commodity market Traded international on spot markets
Processing	Processed by large and small processors and manufacturer	Processed by large processors
Distribution	Products available in some large retailers all over a country, or in several countries	Products available in all retailers, discounters

The four big commodity traders –Archer Daniels Midland (ADM), Bunge, Cargill and Louis Dreyfus, collectively referred to as 'the ABCD companies'–are dominant traders of grain globally and central to the modern agri-food system. They supply Kraft, Nestlé, Unilever, and General Mills and belong to the XXL market (Table 6). There are also smaller traders and processors. In Table 9, actors from the Swiss, Austrian, Hungarian, and German large-scale cereal market are compiled.

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With a closer look to Europe, the following markets are identified (Table 8):

Wheat: The main producers are the EU (mainly France, Germany and the UK - 21% of global output), China (17%), India (12%) and the US (9%). Globally, exports of wheat and flour amount to around 29 m tonnes each year. The major exporters are the US (21% of world exports), followed by the EU (15%), Australia (13%), Canada (13%) and Russia (10%). The main trading centre for EU milling wheat is LIFFE in Paris. Feed wheat is typically traded on LIFFE in London (MINTEC).Wheat imports and exports are decreasing after their peak in 2010 (Exports 51million tonnes, imports 33million tonnes) in Europe. In Europe, ca. 30Million tonnes of wheat were imported and 42 Million tonnes of wheat were exported in 2011.

Rye: The main producing and consuming countries for rye in the EU27 are *Germany* and *Poland*, which account for about three-quarters of the total EU27 market (Knight 2013). Imports and exports are decreasing in Europe. The peak was 2009/10 with 1.6 thousand tonnes imported rye and 1.6 million tonnes exported rye. In 2011, Europe imported about 0.6 thousand tonnes whereas 0.6 million tonnes were exported.

Rye is predominantly planted to less fertile sandy regions. Rye is used in animal feeds (grain, silage), food (bread), and, by the growing share, in bio-ethanol production. Declining demand for rye bread in Poland, which is driven by high prices and an overall decline in bread consumption, tempered the further development of rye in the large-scale market.

Oats: The three main producers of oats in the EU27 are Poland, Finland, and Spain. They have traditionally accounting for between 40 and 50 percent of the production. EU27 production of oats has been in long-term decline but good yields for the crop harvested in 2012 saw production rise. Trade in oats is almost exclusively intra-EU with the minor export volume to non-EU27 countries originating from Finland and Sweden. The destinations are mainly Switzerland and the U.S (Knight 2013). Exports in Europe are rising again after their deep in 2007/08 (0.6 million tonnes). In 2011 0.9 million tonnes of oat are exported from Europe and 0.7 million tonnes were imported to Europe. Most of the exports go to Canada. This indicates an increasing demand for oat.

Table 8 The European cereals supply and demand market based on the EC Agricultural and Rural Development (2014): Balance sheets for cereals Source: FAO http://www.fao.org/economic/est/statistical-data/en/)

LAST UPDATED:29/09/2014 '000 metric tonnes

	2012/13									
	Common wheat	Barley	Durum wheat	Maize	Rye	Sorghum	Oats	Triticale	Others	TOTAL CEREALS
Beginning stocks	10 063	7 200	716	16 913	583	213	932	734	241	37 595
Usable production	123 945	54 305	8 249	58 009	8 542	397	7 730	9 847	4 975	276 000
Area ('000 ha)	23 063	12 442	2 596	9 524	2 360	118	2 640	2 412	1 769	56 925
Agronomic yield (t/ha)	*5.4*	*4.4*	*3.2*	*6.1*	*3.6*	*3.4*	*2.9*	*4.1*	*2.8*	*4.8*
Imports (from third countries)	3 786	80	1 464	10 978	98	316	7	-	135	16 864
TOTAL SUPPLY	*137 794*	*61 586*	*10 429*	*85 901*	*9 223*	*926*	*8 669*	*10 581*	*5 351*	*330 459*
Domestic uses										
Human consumption	*47 947*	*359*	*8 068*	*4 820*	*3 030*	*154*	*1 137*	*51*	*23*	*65 589*
Seed	*4 727*	*2 262*	*444*	*482*	*491*	*24*	*455*	*476*	*325*	*9 685*
Industrial uses	*10 300*	*9 400*	*100*	*8 300*	*1 500*	-	*100*	*600*	*100*	*30 400*
of which alcohol										*11 100*
of which bioethanol/biofuel	*4 300*	*900*	-	*3 000*	*800*	-	-	*500*	-	*9 500*
Animal feed	*45 000*	*37 200*	*200*	*57 000*	*3 500*	*700*	*6 200*	*8 800*	*4 600*	*163 200*
Losses	*900*	*400*	*50*	*600*	*70*	-	*70*	*90*	*40*	*2 220*
Total domestic uses	108 874	49 621	8 862	71 201	8 592	878	7 962	10 017	5 088	271 095
Exports (to third countries)	20 289	7 807	1 399	1 825	124	5	103	2	13	31 567
TOTAL USE	*129 163*	*57 428*	*10 261*	*73 026*	*8 716*	*883*	*8 065*	*10 019*	*5 101*	*302 662*
Final stocks**	8 630	4 158	168	12 874	507	43	604	562	250	27 797
Change in stocks**	-1 432	-3 043	-548	-4 039	-76	-170	-328	-172	10	-9 798

* Marketing year: from July to June
** At the end of the marketing year

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Barley: The EU27 is, by far, the largest producer with a 41% (like UK, France, Germany, Poland, Denmark) market share. Russia and Ukraine produce 12% and 8%, respectively. Following corn, barley is the second largest feed grain traded internationally. (Taylor et. al. 2005). In terms of consumption, the European Union is the clear leader, with Russia trailing at a distant second. Exports and Imports to / from Europe with barley are rising. In 2011, 13 million tonnes were exported, and 9 million tonnes were imported to Europe. A lot of barley is asked in France and Australia.

Spelt: The spelt market has grown hugely over the last 10 years amid recognition of its nutritional benefits and taste. Globally, it was worth £10m in 2004 but rose to £150m last year. Demand for the grain, which is grown mainly in the UK, Germany, Switzerland and Austria, has pushed the price of spelt from £500 to £1.600 a tonne. Supplies of organic white spelt flour are hardest to come by because 40 % of the grain is lost during the milling process. Many farms have had to stop selling its spelt grain for other people to mills. Spelt grain prices doubled late last year and with the first crops of 2014 in the summer likely to be even higher.

Emmer/Einkorn: Very little statistical data is available for emmer and einkorn production in the EU27 since they are treated as part of wheat production. Production and consumption of hulled wheat relatives, such as spelt (*Triticum spelta*), emmer (*Triticum dicoccum*) and einkorn (*Triticum monococcum*) is rising. Most wheat in North America is currently grown in the great plains of the United States and the prairies of Canada.

Information of European-wide trade with durum, spelt, emmer and einkorn are seldom or not available.

The main actor in the European cereal market is the Dailycer Group. Dailycer Group is one of the biggest manufacturers in Europe of supermarket own brand breakfast cereals and cereal bars (http://www.dailycer-fr.com/en/our-products/premium).

The growth potential of the market also depends on the research and development, and opportunities to introduce new types of cereal ingredients. The market is characterized by the growing demand for ready-to-eat breakfast cereals. Due to increasing health issues of highly processed food products, the need for the consumption of cereals is important. Hence, the changing lifestyle and the booming food and beverage industry have driven the demand for cereal ingredients.

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Table 9: Examples of existing large-scale markets for products made of MC in Switzerland, Austria, Germany and Hungary. The companies often deal with different kind of cereals.

Country	Collection	Trader/Importer of raw material	Mills	Processor
CH	IG Urdinkel (spelt) Biofarm (organic cereals) Fenaco (organic/conv. cereals) Mills (organic/conv. cereals)	Fenaco SwissMill Granosa	Meyerhans Mühlen Groupe Minoteries Zwicky Kentauer GmbH	Bread: Jowa Groba, Bern/Bachmann Hiestand, Schlieren Coop Bäckereien Pasta: Jowa Buchs AG (18,000 t/y) Pasta Gala in Morges (17,000 t/y), Hero Pasta Nova (14,000 Tonnen t/y) Walter Leuenberger AG in Huttwil Flakes Familia Sarnen Kentauer GmbH
DE	Association of German Cereal Processors and Starch Producers (VDGS) OrigiNatur GmbH	1000Koerner Markt Achalda Ackerlei Royal Sales Germany GmbH	Pflanzenzucht Oberlimpurg, PZO Saat GmbH, Hammermühle GmbH	Bread. Harry Brot, Lieken Brot- und Backwaren GmbH, Mestemacher GmbH, ema Vollkorn-Spezialitäten Heinrich Leupoldt KG Flakes: Rüggen GmbH, Nordgetreide GmbH, Elkershausen, Rosengarten, Biotropic, Bauck Pasta:

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Coun-try	Collection	Trader/Importer of raw material	Mills	Processor
				Byodo, Naturata, D'Angelo Pasta GmbH All: Peter Kölln KGaA
AT	Saatzucht Donau, Federal Agricultural Wholesalers Association	Bio Austria Austria Trading	Naturmühle Strobl Mantler Mühle Rosenburg Kom. Ges. Ebentaler Mühle Steininger GmbH Rosselmühle Ludwig Polsterer Graz	Bread: Dietmar Kugerl GmbH, Hans Mathes Pasta: Weisenhorn Food Specialties GmbH, Wolf Nudeln GmbH, Kärtner-Nudel-Produktions GmbH Werner Fetz,
HU	Agrifoods Intl. Ltd. Farmiz Kft. Fortunate Product Kft.	C&C Tradex Kereskedelmi Kft. Terra Global Solu-tions Kft.	ABO Mill Kft. Sikér Zrt. Mária Malom Kft. Oros Malom Kft. Eger Malom Kft.	Bread: Elsö Pesti Malom- és Sütöipari Kft., Lipóti Pékség, Szolnoki Sütöipari Zrt., Lövér Sütö, Vita-Sütö Kft. Pasta: Nyirbátori Tésztaipari Kft., Pronto Bt., Stein Tésztaüzem Kft., Gyermelyi Élelmiszeripari Zrt.

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Bakery markets

According to the Canadian International Market Office recommendations (2011), in 2009, artisanal producers held 58.6% of the bakery products market in Western Europe, while private label producers held almost 12%.

The same source refers to Datamonitor (2010), which says, that Kuchenmeister held almost 20% of the cakes and pastries market in Western Europe in 2009. Kraft held 24.5% of the cookies market and 32.6% of the crackers market. Barilla held 20.3% of the morning goods market and 23.7% of the bread and rolls market. Finally, Kellogg's held 58.2% of the breakfast cereals market in 2009.

In 2013, rice and wheat breakfast ingredients accounted for a major share in terms of the value of the total breakfast ingredient market. The steady increase in demand for quick, yet healthy products is projected to increase the market share in terms of the value of breakfast cereal ingredients by 2019.

4.2 Examples of existing niche markets for MC in Austria

A large variety of minor cereal products was available on the Austrian market (Table 10). Not all varieties were present to the same extent. The market is divided into a large-scale and a small-scale market. Oats is mainly cultivated as animal feedstuff. For rye, import and export data was available. This fact underpins the importance of rye for Austria (Annex 3).

Regarding durum wheat rye, oats and spelt, we identified a large-scale market even if just rye and oats were produced in Austria on a larger scale. Hence, even if there is no data on spelt import available, import happens. For rye, oats and spelt, both organic and non-organic products were available. They are sold via big retailers such as supermarket chains, via direct marketing or e-commerce (online shops). Hence, no problems occur for the consumers in accessing these products. We defined seven product categories for rye, oats and spelt: baked goods, cereals/cereal bars, pasta, flour, grains, spirits/beer and convenience food. In Austria, products are available in all categories. The product variety is large, both in terms of single categories as well as within one category.

Table 10: Austrian cereal consumption (kg/capita) from 2007 – 2013

Year Cereal consuption per	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**
Common Wheat	57.9	58.3	58.0	58.2	58.6	58.5
Durum Wheat	5.3	6.1	6.0	5.8	5.8	5.8
Rye	10.7	10.6	10.7	10.4	10.3	10.2
Oats	1.0	1.0	1.0	1.0	1.1	1.1
other	0.8	0.8	0.8	0.9	1.0	1.0

For emmer and einkorn, a niche market is identified: Products from emmer or einkorn are available in the following categories: baked goods, cereals/cereal bars, pasta, flour, grains, spirits/beer and convenience food. That is, in the same categories as rye, oats and spelt.

Concerning convenience food, products are rather rare. Direct marketing (e.g. via farm shops) or online-shops are the dominating sales channels. Besides emmer and einkorn, old varieties of wheat such as Purpurwheat (purple wheat) are sold. Products based on old varieties of rye (e.g. Waldstaudenroggen (*Secale multicaule*)) and rare varieties of oats (e.g. Schwarzer Hafer

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(black oats)) are available too. Like emmer and einkorn, these products are sold via farm shops or online-shops. The variety of products is similar to the product variety of emmer and einkorn.

Products based on emmer, einkorn and other old varieties are almost exclusively organic. Since spring 2014 a craft beer from Stiegl containing spelt, emmer and oat malt is on the Austrian market. The cereal ingredients were all produced organically by the farm of the brewery. Consequently, emmer, einkorn and other old varieties of wheat, rye and oats were identified as minor cereals located on the niche market in Austria.

Products made from spelt, rye and oats were located on the large-scale market. As spelt production is limited in Austria, there is a need to import spelt and rye from abroad.

Emmer, einkorn and old varieties of wheat, rye and oats were, in contrast, located on a small-scale (niche) market. We identified trends which indicated that products thereof may reach the large-scale market in the future (see the example of Bio-Hofbäckerei Mauracher or Schlägler Bier/Schlägler Roggen).

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Table 11: Some examples of companies producing, processing and selling minor cereals products (list not complete) in Austria.

Companies	Products	Links	Sales Channels
Recheis Teigwaren GmbH	spelt pasta (non-organic)	.recheis.at	-
Firma Wolf GmbH	spelt pasta (organic, origin: AT)	.wolfnudeln.at	-
Martinshof Vertriebs GmbH	spelt pasta (organic, origin: AT)	.martins-hof.at	-
Urkornhof, Kammerleithner GmbH	spelt pasta, einkorn risotto, Grünkernburger, Urdinkel („ancient wheat)"-Flakes…	.urkornhof.at	farm shop and online-shop
Bierbrauerei Schrems GmbH	rye beer (organic)	.schremser.at	-
Schläger Bier	Rye beer from organic "Schlägler Roggen".	.stift-schlaegl.at	Retailer (SPAR) Catering/gastronomy Online-Shops
Meierhof	abo for ancient grains products (UrGetreideAbo); pasta: emmer, einkorn, Waldstaudenroggen, spelt; grains: einkorn, summer- and winteremmer, spelt, Nackthafer (naked oats), Waldstaudenroggen (waldstaudenrye), Schwarzer Hafer (black oats); semolina: einkorn, emmer, spelt, Bergweizen, Nackthafer (naked oats), Waldstaudenroggen (Waldstauden-rye), Schwarzer Hafer (black oats); flakes: einkorn, rye, Schwarzer Hafer (black oats); fruit bars: with ancient cereals; organic	.meierhof.at	farm shop and online-shop, other shops selling their products
Bio-Hofbäckerei Mauracher (organic farm bakery)	Baked goods, e.g. bread, pastries made of spelt, einkorn, oats, pharaonenkorn/kamut, purpurwheat, rye, wheat (organic)	.mauracherhof.com/	specialist retailers (organic), delis, gastronomy, canteen kitchen
minor cereals products sold via: myProduct Online Shop (e.g. products from Biohof Brenner)	Biohof Brenner (organic farm, Waldviertel/Vienna): Flour: waldstaudekorn; spelt bread; spelt toast; spelt pastries; grains: spelt, einkorn, emmer, waldstaudekorn, waldstaudekornrice	.myproduct.at	online-shop

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Companies	Products	Links	Sales Channels
more farms or companies selling minor cereals may, for instance, be found in the region called Wald-viertel (close to Vienna)		.lebendigevielfalt.at	shops, farm shops, online-shops
Salzburger Stiegl	Since spring 2014 a craft beer from Stiegl containing spelt, emmer and oat malt is on the Austrian market.	.stiegl.at/de/node/900	Online-shop Own restaurants

4.3 Examples of existing niche markets for MC in Switzerland

In Switzerland, a large variety of minor cereals products is available on the market. Regarding rye, oats and spelt, organic and non-organic products are available (Table 13). The two dominant Swiss supermarket chains (Migros, Coop) sell most of them. Additional marketing channels are other retailers, e-commerce, farm shops and specialised or organic shops. Products are available in the product categories: baked goods, cereals/cereal bars, pasta, flour, grains, spirits/beer, and convenience food.

Table 12: Number of dehulling mills in Switzerland. From these figures, the respective importance of the various regions for spelt cultivation can be deduced. The column "Active" shows how many rolling collection points today actively accept and process original spelt (Urdinkel) (Source .Urdinkel.ch).

Canton	BE	LU	AG	SO	TG	BL	JU	SH	ZH	SG	FR	SZ	ZG	GR	TI	VD	VS	NE	GE
Existing rolling mills	47	21	15	5	4	2	1	1	1	1		0	0	0	0	0	0	0	0
Rolling mills cooperating with the interest group	12	6	8	3	2	2	1		1		1	0	0	0	0	0	0	0	0
Spelt producer (2012)	974	424	404		72	100	40	56	172	13	43	1	18	6	2	7	2	7	4

Products from emmer or einkorn are available, but on a much smaller scale than rye, oats and spelt. Baked goods, as well as cereals/cereal bars, pasta, flour, grains and spirits/beer made of emmer and einkorn, are sold. Convenience food from emmer and einkorn are not available.

Products are mainly sold via direct marketing (farm shops), online-shops but also by the big supermarket chains (e.g. emmer pasta and einkorn bread from Coop, emmer bread from Migros). The IG Emmer-Einkorn (Interest group emmer – einkorn) organises since 2006 the production and marketing of emmer and einkorn looking for cooperation with partners from large-scale and niche markets. The so-called "White Emmer" is marketed as an old variety enhancing biodiversity.

Besides emmer and einkorn, products from *Urdinkel* are available. *Urdinkel* ("ancient spelt" or "original spelt") is since 1996 a protected trademark and refers to two varieties of spelt which were traditionally cultivated in Switzerland. The IG Dinkel (Original Spelt Interest Group) organ-

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ises the producers, buyers, and processors. Due to their activities, spelt is the most important minor cereal in Switzerland. During the last century wheat became established in Switzerland, producers in areas with a harsher climate preferred the original spelt. Today the traditional area of cultivation of the Swiss original spelt extends primarily across nine Swiss cantons (Berne, Lucerne and Aargau, followed by Basel Country, Thurgau, Solothurn, Jura and Zurich). Only farms that fulfil the requirements of the Swiss production labels IP-SUISSE (1000 farms produced spelt in 2012) or BIO SUISSE (508 farms produced spelt in 2012) will be considered for growing original spelt (Urdinkel) under contract. Conventional producers can also grow spelt, but this spelt will be traded without a trademark. In addition, contractual growers must be situated within the immediate vicinity of one of the traditional rolling mills. Thus long transport routes can be avoided and the commercial, mostly family-run, rolling mills obtain regional protection. The interest group could build on the fact, that there are still some rolling mills in Switzerland able to process spelt, but also emmer and einkorn (Table 12). The IG Dinkel concentrates on the cultivation of old Swiss spelt varieties that are not crossbred with wheat. Some breeders see this as an obstacle to the further development of spelt. Old varieties of oats (Ultner Hafer, Nackthafer, Weisse Hafer), rye (Cadi (Bergroggen) and barley are produced and sold too (see initiative Gran Alpin). Seeds are provided by Pro Specie Rara[6].

Table 13: Some examples of companies producing, processing and selling minor cereal products in Switzerland (list not complete)

Companies	Products	Links	Sales Channels
Hiestand AG	Walliser ryebread, Urdinkel bread (ancient spelt) (IP Suisse)	.hiestand.ch	Supplier of frozen, baked, pre-baked artisan bakery goods to the food sector.
Biofarm Genossenschaft	Flour and grains: spelt, rye, emmer, Grünkern, oats, Emmerkörner (partially origin CH); pasta: spelt	.biofarm.ch, shop.biofarm.ch	Online-shop, organic shops
Genossenschaft GranAlpin	Grains: rye, naked oats, spelt; flour: rye, spelt; cereals: rye, spelt, oats: pasta: spelt	.granalpin.ch/	e.g. farm shops, Coop,
Mühle Bachmann AG	Flour: emmer, rye, spelt	.muehle-bachmann.ch/	e.g. direct marketing
Bakothek, Unterstammheim	Emmer bread Organic bread		Supplies Organic shops with emmer bread
Andrea Bach, Mühlilade Balchenstahl GmbH	Organic: Rye: flour and grains; spelt: flour and grains; oats: grains Non-organic: Urdinkel (ancient spelt): pizza flour, flour, pasta; Spelt: grains, cereals; rye: flour; oats: bran, cereals	.muehlilade.ch	Shop specialised on flour
Brauerei Erusbacher & Paul AG	rye beer	.erusbacher.ch/	
Brauerei Falken	emmer dark beer	.falken.ch/	

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Companies	Products	Links	Sales Channels
Anna & Christian Bühler-Risch Hof Coms	Selling Gran Alpin Genossenschaft products (flour, pasta), producing e.g. rye for Gran Alpin	.coms.ch/cms/	Direct marketing
Coop	Emmer Pasta, Urdinkel (ancient spelt) 50 organic and non-organic products (e.g. bread, flour, cereals, pasta, cookies, crispbread) Einkorn bread (Saisonal)	.coop.ch	Retail
Migros	Urdinkel (ancient spelt) more than 50 organic and non-organic products (e.g. bread, flour, cereals, pasta, cookies, crispbread) bread Emmer bread	.migros.ch	Retail

It seemed as if these old varieties of wheat, emmer, einkorn, spelt, oats or rye (and barley) were produced and sold on a smaller scale than, for instance, in Austria. No information is available on newly bread minor cereal varieties.

As in Switzerland, wheat is the dominant cereal breeders in Switzerland have focused on a high wheat quality during the last decades. One breeder works with Triticale for food use (bread) because the crop achieves high yields under organic conditions. For these breeders, the attractiveness of minor cereals is seen as a competition to their new breds. A clear differentiation had to be made between the scale of production and the scale of product trading.

Hence, we identified a large-scale product market for minor cereals in Switzerland because products of all MC are traded by the largest retailer in Switzerland. As the domestic production does not cover the market demand, spelt, rye, emmer and einkorn are imported. From 2012, the following data on import is available: 4'900 t spelt, 1'400 t rye and 1'200 t emmer, einkorn (SGPV_FSPC 2012).

4.4 Examples of existing niche markets for MC in the CZ

For spelt, emmer and einkorn in the Czech Republic, the organic market is relevant, and their production is recommended to organic farmers in marginal areas (Konvalina 2010). PROBIO is the relevant actor in the organic market. PROBIO is the first Czech producer and an important supplier of a wide range of high-quality organic food. The company aims at returning forgotten traditional crops and food to consumers. Actually, PROBIO sells products of spelt and emmer in all of the following product categories: baked goods, cereals/cereal bars, pasta, flour, grains. Experts said: "*emmer and einkorn: Some grain is processed via PROBIO company, some is used by farmers, some... I don´t have official statistics related to growing of emmer and einkorn in the Czech Republic. There some hectares of growing area - some seed is distributed through PROBIO company, some seed is from Austria and maybe from other countries*" (personal contact University of South Bohemia 2014-03-11).

The Czech menu is typical for dumplings, all sort of sauces, soups, roux for soups, noodles for soups, yeast cakes and buns, Christmas biscuits. The common wheat flour, used during cooking of these meals, can be exchanged for spelt flour. Spelt, rye and oat (from non-organic and

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organic production) are common in Czech dishes and products. Mainly they are sold in super-market chains because most of the people buy food in these big supermarkets. In addition, spelt biscuits, spelt crackers, spelt chopsticks, spelt pasta, spelt spaghetti are available.

There are some traditional dishes in the Czech Republic based on minor cereals like

- rye bread, rye – wheat bread, baked, rye gingerbreads,
- rye pasta, rye flakes.
- oat is used for porridge, oat flakes, muesli, snack bars, oat biscuits.
- a cereal „coffee" (made from barley, rye and chicory roots), could be made from spelt also.
- a traditional dish is spelt shulmajstr (spelt kernotto - hulled spelt, red beans, big onion, olive oil, smoked pork or tofu, pepper, salt),
- regional dish: Giant Mountain Kuba (hulled barley, mushrooms, smoked pork, onion, garlic, pork fat, salt, pepper, marjoram). The hulled barley can be replaced with spelt kernotto (hulled spelt).

Table 14 Some examples of companies producing, selling or processing minor cereals in the Czech Republic (list not complete)

Companies	Products	Links	Sales Channels
PROBIO	Spelt, Rye, Oat, Emmer and Einkorn (flours, pasta, spaghetti, breakfast cereals, muesli, cereal "coffee", biscuits, crackers, chopsticks)	.probio.cz/en	Organic products of spelt, rye, oat, emmer, einkorn in large-scale markets, small-scale markets, special shops for healthy and organic food, e-shop
Semix	Rye, Oat and Spelt (offer of 100% whole grain cereals, organic products sold under name "Healthy Living" - bread maker mixes, starch products, sweet mixes, salted mixes...)	.semix.cz/en	Products in large-scale markets, small-scale markets, special shops with healthy and organic food, e-shops
Emco	Oat (muesli, porridge, oat flakes, oat biscuits, breakfast cereals, cereal drinks)	.emco.cz/en	Products in large-scale markets, small-scale markets, special shops with healthy and organic food
Úsovsko	Oat (muesli, muesli snack, breakfast cereals)	.usovsko.cz/, .fit.eu/	Products in large-scale markets, small-scale markets, special shops with healthy and organic food
Bonavita	Oat and Rye (cereal bread, porridge, muesli, cereal drinks, crispbread)	bonavita.cz/en	Products in large-scale markets, small-scale markets, special shops with healthy and organic food

Other minor cereals (emmer, einkorn – just from organic production) consumers are not familiar with, and they do not know how to use them. They can be bought just in stores specialised in organic or healthy food. Just people interested in this type of products visit these shops.

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Based on the information gathered in regard to the market situation of minor cereals in the CZ, emmer and einkorn were identified as minor cereals located on the small-scale, niche market (Table 14). Oats and rye are identified as minor cereals, which have already reached the large-scale market. Spelt is not grown to a large extent by Czech farmers and still a niche product.

As a processed product, several products could be available in supermarkets (Table 14). Different from other countries, the international supermarkets (e.g. ALDI, Eurospar) just LiDL is established in the Czech Republic.

From the collected data, we identified a large-scale product market for rye, oats and spelt in the Czech Republic because the large retailers trade products made of the cereals. Products made of emmer and einkorn are located on the organic niche markets. Due to the lack of data on imports, it was difficult to assess the importance of domestic production. It is assumed, that the domestic production covers the market demand for rye and oats as well as emmer and einkorn.

4.5 Examples of existing niche markets for MC in Estonia

For Estonian, cereal producers grow more cereals for export. Especially exports of wheat, oats and rye are relevant. The self-sufficiency is about 114% in 2008/09 (CSO 2011). For spelt, emmer and einkorn, no information on trade is available.

In Estonia, an expert said: "We do not cultivate durum, emmer and einkorn. Maybe there is some emmer or einkorn in very specific shop. I have never seen in our shops emmer or einkorn. Estonians know something about spelt but not very much." The experts also mentioned spelt seed imports in 2012 and 2013 (*spelt-wheat import in 2013: 0.07 tonnes (for seed")*, "*spelt-wheat import in 2012: 28 tonnes (for seed)*"

Rye black bread is a traditional and conventional food in Estonia, but there is a tendency of decreasing the consumption. Flummery made from oat was a traditional food in Estonia but is little eaten nowadays.

Table 15: Some examples of companies producing, processing and selling minor cereal products in Estonia (list not complete)

Companies	Products	Links	Sales Channels
Tartu mill	Rye flour, flour mixtures, oat flakes	tartumill.ee/	Supermarkets and other shops
Veski Mati	Rye, oat flour, flour mixtures Oat flakes, brans, porridge Organic oat flakes Cereal mixture flakes	.veskimati.ee/	Supermarkets and other shops
Eesti Pagar	Rye bread	.eestipagar.ee	Supermarkets and other shops
Sangaste linnas AS	Oat flakes	.helen.ee/	Conventional and e-shops
Organic farm: Zerna Ökotalu OÜ	Organic oat flakes		Organic shops, including e-shops (.sahver.ee/)
Organic farm:Loona talu	Rye and spelt flour, flakes, brans	loonatalu.ee	Shops, direct market-

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Companies	Products	Links	Sales Channels
veski	Spelt semolina Oat flakes Cereal mixture flakes		ing
Organic farm: Koplimäe talu	Rye and spelt grains, flakes, flour, semolina, brans Spelt cookies	koplimae.eu/	e-shop, organic shops
Vändra Leib	Rye and spelt flour, Rye bread	https://sites.google.com/site/vonderloib/	Organis and conventional shops
Farm: Kaarli Talu	Rye, oat and spelt flour, flakes,	.v-maarja.ee/kaarli talu	Shops, direct marketing
Raismikuoja OÜ	Spelt flour, flakes Rye flour, flakes and grains Oad flakes and flour		Organic shops

Rye bread and oat porridge are the most typical foods in Estonia made from minor cereals. Durum wheat pasta is a conventional food in Estonia as well. There is also pasta production in Estonia, but flour is imported. Oats is used mainly for making porridge and baked goods like biscuits, also in the composition of the muesli. Rye and oat and flour, rye bread, oat flakes and brans are conventional in supermarkets. There can also be found spelt flour. Other products like oat biscuits, rye wafers, crispbread, rye spirits, oat brans, muesli (containing oat), porridge mixtures, rye soup, etc. are also available in supermarkets. The mentioned products are mostly available for consumers. Products that are more specific can be found only in small organic shops. This also includes emmer and einkorn products.

Types of products available in Estonia (Table 15):

– milling products (flours, semolina, brans),
– bakery goods (rye bread, oat biscuits, rye wafers, bars, etc.),
– breakfasts (porridge, muesli),
– rye spirit

Most of the flour and bakery productions comes from large companies like “Tartu Mill”, “Eesti Pagar”, “Leibur”. Besides these, there are over 100 small bakeries in the market.

Some, mostly organic farms are growing oat, rye, spelt and producing (also selling) flour, flakes, semolina, brans and other products.

From the data available, we conclude, that in Estonia, there is no existing market for emmer and einkorn. Oats and rye products are taking part in the large-scale markets. Local spelt production is very small, but spelt products are available to some extent.

4.6 Examples of existing niche markets for MC in Germany

A large variety of minor cereal products is available on the German market (Table 16). For rye, oats and spelt or products thereof, a large-scale market was identified. From the data, we assume, that spelt is imported for processing. For durum wheat, emmer and einkorn as well as other old or new varieties of wheat, rye and oats a niche market was identified.

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Regarding rye, oats and spelt, both organic and non-organic products were available. They were sold in supermarkets/large supermarket chains, via direct marketing or e-commerce and specialised shops such as organic shops. That is, no problems occurred for the consumers in accessing these products. Products were available as baked goods, cereals/cereal bars, pasta, flour, grains, spirits/beer and convenience food. The product variety was large, both in terms of product categories and with regard to the product variety within one category (e.g. pasta or bread). Rye, oats and spelt were produced in Germany and for all of these crops, statistical data was available. For spelt, data was only available on organic spelt. Rye and oats were both imported into and exported from Germany. The fact that statistical data was available underpins the importance of these crops for Germany. As a result, rye, oats and spelt were identified as minor cereals located in the large-scale market in Germany.

Table 16 Some examples of companies producing, selling or processing minor cereals in Germany (list not complete):

Companies	Products	Links	Sales Channels
Brauerei Enzensteiner, Martin Kreß (organic farmer)	Beer: naked oats (stout); emmer beer (stout)	web288.sv12.pixelx.de/enzensteiner/	direct marketing (beer garden and other events)
Riedenburger Brauhaus Michael Krieger KG	Beer: Emmer beer, Einkorn beer, 5-Korn-Urbier (5-cereals-ancient beer); barley, wheat, einkorn, emmer, spelt)	.riedenburger.de	Products available in organic shops, own shop at the brewery and own online-shop
Eselsmühle (woodstove bakery, shop, coffee shop)	Baked goods: bread based on emmer, dinkel, rye; pastries based on spelt, emmer	.eselsmuehle.com	Direct marketing via own shop, own coffee shop, weekly market; organic shops
Mühlenbäckerei Jürgen Zippel	Bread: rye, emmer, spelt; pastries: spelt	.muehlenbaeckerei-zippel.de	Farm/mill shop, local market or via organic shops
MeisterMarken - Ulmer Spatz (CSM Germany GmbH)	Baking mixtures for bakeries and pastry shops, e.g. for Ur-Röggelchen (rolls based on Waldstauden-roggen or spelt), for bread based on einkorn, emmer, Waldstauden-roggen and spelt (called “das Urige” which means “the Ancient”)	.meistermarken-ulmerspatz.de	Baking mixtures for bakeries and pastry shops
Legena Naturkost	Various products based on emmer, einkorn, Purpurwheat, spelt, oats, naked oats, rye, Waldstaudenroggen	.legena-naturkost.de	Online shop for organic products
Bohlsener Mühle	Cereals containing spelt, emmer, einkorn (e.g. ancient grains); baked goods: spelt cookies and bread/ toast, oats cookies, rye and Lichtkornroggen bread, oats bread, einkorn bread, rye rolls,	.bohlsener-muehle.de	their products are sold in organic shops

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Companies	Products	Links	Sales Channels
	speltgrünkern-burger		
Rossmann	Bio Urgetreide-Müsli (müsli including Einkorn-/Emmer- / Spelt-flakes)	.rossmann.de	1824 branches in Germany
Alnatura	Urkorn-Müsli (containing emmer and einkorn, spelt, Purpurwheat	.alnatura.de	Organic supermarket chain
Bauck Hof	Besides other minor cereals products, Lichtkornroggen (newly bred-rye variety) flour	.bauckhof.de	farm shops, organic shops, online shops and own online shops

Products from emmer and einkorn were available in all of the following product categories: baked goods, cereals/cereal bars, pasta, flour, grains, and spirits/beer.

Direct marketing (e.g. via farm shops, mill shops, on the weekly market), e-commerce/online-shops and specialised shops such as organic shops were the dominating sales channels. Besides products containing emmer and einkorn, products based on other old varieties of wheat such as Purpurwheat and old varieties of rye (e.g. Waldstaudenroggen (Waldstauden-rye)) and oats (e.g. Schwarzer Hafer (black oats)) were available. As in the case of emmer and einkorn, these products were mainly sold via farm shops, organic shops/organic bakeries or online-shops. Also new breed varieties, e.g. "Lichtkornroggen" are on the market

Products based on emmer, einkorn and other old varieties were almost exclusively organic. There was only little statistical data available on emmer and einkorn. Based on the information gathered in terms of emmer, einkorn and other old varieties of wheat, rye and oats, these crops were identified as minor cereals located on the small-scale, niche market.

In sum, a large-scale and a small-scale market was identified for minor cereal products in Germany. Differentiation has to be made concerning the different varieties. Some of them were located in the large-scale market while others were still located in the niche market. More precisely, products made from spelt, rye and oats were identified as minor cereals which have already reached the large-scale market as processed products in Germany.

Emmer, einkorn and old varieties of wheat, rye and oats as well as new breeds thereof (e.g. Lichtkorn-rye flour by Bauck Hof) were identified as crops which were still located on the small-scale (niche) market. Trends, which indicate that products from emmer, einkorn and other old varieties may reach a larger market in the future, were identified (see examples of Rossmann, MeisterMarken - Ulmer Spatz and Alnatura in the list above).

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4.7 Examples of existing niche markets for MC in Hungary

No real national traditions of minor cereals exist in Hungary. Local specialties might be still available, but rather using millet as a traditional cereal crop and not spelt, emmer or einkorn. Before World War II, rye bread was used by the poor as a staple crop, especially in years with unfavourable weather.

Oats was and still is mainly cultivated as animal feedstuff. In contradiction with rye and other cheaper, low prestige carbohydrate sources "white" common wheat was the higher standard. Minor cereals use to have low prestige in traditional Hungarian societies. They are coming to the forefront since the 1990's through health-conscious diets, the influence of Western food consumption patterns and new value trends.

Nowadays minor cereals are mostly used as ingredients of speciality bakery goods and the producers strongly utilise the positive health connotation consumers conceive about them (Table 17, Annex 14). Rye is mainly used for flour and bakery products, commonly oats is used as flake and muesli ingredient, spelt is mainly used for flour, bakery goods and snacks. Generally, oats and rye have already reached the large-scale market mainly as conventional products.

Spelt, emmer and einkorn are on the small-scale, niche market and mainly produced and processed according to the guidelines of organic production.

During the last 10-15 years, products mainly or solely made from minor cereals became symbols of healthy eating habits. Even so, these products are not yet part of the mainstream food consumption. However the available processed products are mostly imported, and there is a lack of domestic processing capacity, and there are low market development activities popularising food products made from minor cereals grown in Hungary. The existing companies in the sector are rather small. A wide variety of processed product containing minor cereal is mainly available in foreign-owned supermarket chains (SPAR, DM, Aachen, Grossmann) and in small, speciality food shops and via online shops. At these retailers, products were available in all categories: baked goods, cereals/cereal bars, pasta, flour, grains and convenience food. In terms of alcoholic beverages, only one variety of domestically produced beer is available nationwide. In domestic retailers, smaller groceries and discount supermarket chains product variety is smaller both in terms of single categories as well as within one category. The Hungarian Academy of Sciences (MTA) for Agricultural Research Centre and the Corvine Brewing and Distilling created the first national organic beer made from einkorn.

To sum up, there is a small-scale market for minor cereals like rye, oats and spelt. A very small market exists for emmer and einkorn. The main driver in the market for spelt, emmer and einkorn seem to be the organic movement and SME like the pasta producer Attila Ruedi. However, healthy cereals are a trend in Hungary and processed products made of MC are available through international retailers.

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Table 17: Examples of companies producing, selling or processing minor cereals in Hungary (list not complete):

Companies	Products	Links	Sales Channels
Piszkei Öko Ltd.	einkorn, emmer and spelt bakery products, flour, convenience food, sun-flower oil (organic)	.piszkeioko.hu/	organic and specialty food stores
Kőrös-Maros Biofarm Ltd.	Einkorn beer (organic)	.alakorsor.com/index.php/alakorsor	organic and specialty food stores, super-market chains, bev-erage wholesalers
Dolche Vita Web-shop	Imported einkorn prod-ucts: flour, grains (organic)	.dolcevitakonyha.hu/index.php/elelmiszer/liszt/monococcum-1-kg.html	e-commerce
Naturgold Ltd.	spelt and einkorn grains, flour, pasta, convenience food: biscuits, snacks, etc. (organic)	gomortorna.hu/gt-webaruhaz/category/22-gabonak-a-k	e-commerce, organic and specialty food stores, supermarket chains
Mogyi Ltd.	spelt cracker (conventional)	.mogyi.hu/hu/ onyhaba	supermarket chains, organic and specialty food stores,
Biopont Ltd.	oat and spelt muesli, con-venience food, rye, oat, durum wheat and spelt flour (organic)	.biopont.com/hu	e-commerce, su-permarket chains,
Rédey 97' Bt.	whole wheat spelt pasta (organic)	bioteszta.hu/hu/bio-termekeink/bio-tonkoly-teljes-kiorlesu-tesztak	organic and specialty food stores, super-market chains,
Green Living Hun-gary Ltd..	spelt husks pillow (conven-tional)	.zoldpolc.hu/1071-haloszoba/3202-tonkoly-parna-alvo-30x40cm	e-commerce

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4.8 Examples of existing niche markets for MC in Italy

According to the International Pasta Organization (IPO), Italy is the largest pasta producer and consumer in the world. Italy imports good quality soft wheat for milling mainly from France and central-eastern European countries (Austria, Hungary, and Germany) and the United States, with smaller amounts from Canada.

Pasta is mainly consumed in the domestic market, but significant quantities are increasingly exported to EU (Germany, France, and UK) and non-EU countries (United States, Japan, and Russia). MY 2011/12 durum wheat imports declined due to Italian millers and pasta producers increasingly demanding for domestic production and stocks rather than importing from third countries (USDA 2012).

A large variety of minor cereal products is available (Table 18). In the case of Italy, research focused on spelt, emmer and einkorn. Often, he term *farro* is used for all these varieties. Based on the data collected, a large-scale market was identified for spelt and emmer. A small-scale market was identified for einkorn.

Spelt and emmer were mainly available in the product categories pasta, flour, grains and baked goods. In the latter case, the focus was not on bread but on cookies such as *cantuccini* or puffed rice. Convenience food, for instance, the ready-made soup was available but only to a small extent.

Emmer beer and spelt beers were available, too. Spelt beer was also imported. The category spirits/ beer was not that present on the market. The range of products within this category was not diverse.

The same applied to the category cereals. Cereals containing spelt and emmer were processed and sold, but not to such a large extent. The main sales channels were supermarkets/ supermarket chains/organic shops/farm shops and e-commerce.

There are companies specialised on emmer or spelt products (see the examples of *Poggio del Farro – farro per passione (emmer)* and *Azienda Agricola Dolci Giuseppina (spelt)* in (Table 18).

Additionally, dishes/traditional food based on spelt and emmer was available in restaurants. Sometimes, these gastronomical activities were combined with tourism. Spelt and emmer are also used in the daily cuisine. In sum, no problems occurred for the consumers in accessing products from spelt and emmer.

In the UK, farro products (mainly emmer) from Italy were available. Hence, they were exported. Organic and non-organic products from spelt and emmer were sold.

In contrast to other countries, emmer has never really disappeared from the Italian market. Experts were saying, the " *crop has reached the large-scale market in Italy*".

Products from einkorn were not as common. Only a few companies were selling products thereof. Einkorn products were available in the categories: baked goods (cookies), flour, pasta and grains. The dominating marketing channels were e-commerce/online-shops. Therefore, a niche market was identified for einkorn in Italy.

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Table 18: Some examples of companies producing, selling or processing minor cereals in Italy (list not complete)

Companies	Products	Links	Sales Channels
Azienda Agricola Dolci Giuseppina	Spelt: flour, grains, puffed rice, sweets	farrodimonteleone.it/	Direct marketing, online shop
Bartolini Emilio & C. s.n.c.	Farro: grains, flour, pasta (emmer pasta)	.frantoiobartolini.com	-
Borghini	Farro : grains (farro della Garfagnana) and soup (minestra di farro, zuppa di farro) (non-organic); Farro : soup (zuppa ai cinque cereali, among others with farro; minestra di farro ed orzo; zuppa antica, among others with farro) (organic)	.borghini.it	-
La terra e il cielo Societa agricola co-operativa	Emmer : grains, puffed, emmer taralli with onions or rosemary, emmer with chickpeas	.laterraeilcielo.de	Online shop, -
Poggio del Farro (farro per passione)	Organic and no-organic farro products (emmer, spelt): pasta integrale, couscous, puffed rice (gallette), thin slices of bread, grains, sweets and cookies, gnocchi, cereals, spelt drink, flour, beer	.poggiodelfarro.com	Online shop, --
Marino Felice Srl	Flour: farro (integrale e bianco), L'Enkir (einkorn from the Piemont region); all products organic	.mulinomarino.it	-
Tibiona	spelt beer, cookies and other sweets, couscous, cracker, flour...(mainly organic)	.tibiona.it/	online shop selling farro products, not only produced in Italy
Farroteca Monterosso	Products: different kinds of pasta and grains	.farrotecamonterosso.it/	Restaurant specialised on emmer, also apartments (tourism) and own products
Prometeo Urbino (una passione natural per il farro)	Mainly emmer products, but also einkorn and spelt; in the case of einkorn, the company is only using MonLis, a registered variety of einkorn; all products are organic; soups: emmer; cookies: einkorn, farro; flour: spelt, einkorn; cereals: emmer; soup for children: einkorn and emmer; couscous: einkorn	.prometeourbino.it	Online shop, -
Mulino Sobrino	Flour made of farro (spelt, emmer, einkorn), but also kamut, chestnut or millet.	.ilmulinosobrino.it/ita/index.asp	Online Shop Products available in Hungary

The Italian origin of farro is usually made visible by using a label. Designations of origin are used for spelt, emmer and einkorn. Some examples are: *Farro di Monteleone di Spoleto* (spelt

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from Umbria), *Farro della Garfagnana* (emmer from Tuscany), *Enkir*® (einkorn from Piemont), *Shebar*® (einkorn from Brescia).

Designations of origin are used because of an increased competition on the market: Farro is traditionally cultivated in mountainous regions. Today, it is also cultivated on large farms in non-traditional regions. In traditional areas, landraces have been maintained. In new cultivation areas, varieties are imported from traditional areas or they origin from recent plant breeding programmes. This situation creates market competition, traditional areas lose their competitiveness and there is no guarantee of product traceability.

Labels are a tool to ensure product quality and benefits for the producers while local varieties are protected (Giuliani 2007, Buerli 2006).

For Italy, data on imports and exports are missing. Therefore, it is difficult to assess, if the products compiled in Table 18 are made of Italian farro.

To sum up, the market for MC in Italy is very different from the market in other countries. Both a large-scale and a small-scale market were identified for *farro* (emmer, einkorn and spelt) in Italy. Spelt and emmer were identified as being located on the large-scale market. Einkorn was identified as being located on the niche market.

4.9 Examples of existing niche markets for MC in Poland

Bread in Polish cuisine and tradition is important. It has been an essential part of them both for centuries. Now the variety of different bread types available at the nearest grocer's is taken for granted. However, in the past ages, time of hardship often struck, and bread was treated with great respect. When bread fell to the ground, it was immediately picked up and kissed. A new loaf was marked with the sign of the cross before cutting. Important guests to the house were greeted with bread and salt. Similar traditions exist also in other European countries.

Today bread remains one of the most important foods. The main ingredient for Polish bread is wheat, rye or both. Such bread is made on sourdough, which lends it a distinctive taste. It can be stored for a week or so without getting too hard and is not crumbly when cut. Unfortunately these days more and more breads are made in a more "modern" industrial way for a cheaper price and - compared to rye bread, with less taste.

But it is still quite easy to find great bread in Poland. Each good craft bakery makes its bread slightly differently. Breads are made of various cereals (not just wheat or rye), whole grain breads abound and sometimes some traditional extra ingredients are used (e.g. onion, sunflower seed or lard).

In last 10-15 years spelt flour is used commonly. Taking a broader view, the variety of bakery products in Poland is truly magnificent! From bread rolls and rogaliks (a kind of croissant) to cheese cakes and *makowiec* (poppy seed strudel).

Close to 25% of rye grain is used for human consumption. Despite an opinion that rye flour contains many nutritional components its use for bread making drops down all the time. In the last 50 years, the percentage share of rye bread in the total bread consumption got reduced from 50% to 2%. It is also due to about 50% reduction of bread consumption during the years.

The significance of rye is steadily increasing for industrial purposes. More than 70% of alcohol in the country is produced out of rye grain. Its importance may still be increased because of

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use of ethanol as an environment-friendly biofuel (Czarnecki, Michniewicz 2000). Nevertheless, it should be stressed, that a steady crop improvement by breeding, application of modern plant cultivation and grain production, human and animal feeding technologies, other cereal species have become more and more competitive for rye.

Most common oat product for human consumption on Polish market is oat flakes – cereal. Currently, there are three classes produced flakes:

– Common - subject to minimum hydrothermal treatment to prepare a meal, it is necessary to cook them;
– So-called "mountain" - with a greater degree of processing, in order to prepare them to eat enough to boil;
– Instant - ready to eat cold, characterized by lower humidity (below 10%).

There is also oatmeal produced from malted oats. As a result, of this treatment is prepared up to 40 mg of vitamin C per 100 g of cereal. However, their production is low due to the possibility of mould growth during the malting process, and hence the need to maintain a very high purity of line (Gąsiorowski 1995).

Most popular dish from oats is "owsianka" – porridge, a dish prepared with oat flakes and milk. Depending on the type of flakes, it could be cooked in boiling water or flooded. Traditional Polish porridge is prepared with no other additives, a pinch of salt or sweet. There are also versions of foods: vegetables, garlic and chilli or even tuna. Sweet porridge added apple, banana, nuts, cocoa or dried fruit and nuts.

Oat flakes are used as a basic ingredients in a variety of muesli, muesli bars and other breakfast cereals products. Average consumption of cereals in Poland over the last decade has increased almost 10-fold. Breakfast cereals and muesli products are very well known and liked by Polish consumers. The market is very diverse in terms of size, type of packaging and pricing, and the Poles willing to reach for these products.

Polish market of cereals *ready-to-eat* rose in 2007 by 5.4% in volume and 7.3% in value (according to. Research AC Nielsen). Sales alone of flakes for adults rose in 2007 of 1/5. Other segments also recorded increases: cereals for children 11% increase, muesli almost 7%. The decline while - about 5% - was recorded in the sub-category flakes for the whole family (hurtidetal.pl).

Experts agree that innovation in the category of cereal products are determined primarily by the changing expectations of consumers. Polish consumers are relatively less conservative, not afraid of novelty, like both brand new products, and new variations of known products. Some even believe that Poland is a good place to test new products. Thanks to this attitude of consumers, the industry is experiencing its heyday with new products in support of health & wellness. The reason for this situation is also a growing nutritional awareness of the Poles, who are increasingly turning attention to the presence of valuable products in their daily diet. The trend is weight loss/controll and healthy eating. Driven by consumer expectations, manufacturers have launched many innovative articles, among which are the proposals of breakfast (http://m.biznes.pl; http://magazynhandel.pl)

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Table 19: Examples of companies producing, selling or processing spelt in Poland (list not complete):

Companies	Products	Links	Sales Channels
ANIA Produkty rol-nictwa ekologic-znego	Fan cookies from spelt 120g	.tobio.pl/fun-cookies-orkiszowe-120g.html	.tobio.pl .biovert.pl http//.alma24.pl
BIO Babalscy	Spelt grits 500g Fine spelt grits 500g Medium spelt grits 500g Oats grits 500g Spelt coffee minced 500g Spelt flour type 1850 BIO Oats flour type 500 BIO Spelt pasta various types other	biobabalscy.pl/nowa/ .tobio.pl/manufacturer/bio-babalscy	.tobio.pl
BIOHURT Sp. z o.o. Pokrzydowo	Flours, Grits	biohurt.pl/nowa/	.tobio.pl
Bio Planet S.A. Leszno	Spelt wholemeal bread sticks salted 150g BIO	.bioplanet.pl/	.tobio.pl
PPUH NIRO Boronów	Spelt pasta,	.nowa.niro-bio.pl/	.tobio.pl

Products made of HMC are sold in supermarkets/large supermarket chains (Table 19):

– A range of breakfast cereals, cereal bars and muesli are available on the Polish market. The main player is Nestle, then Sante, Bakalland, Maspex (Mlekołaki), Otmuchów. A lot of Private labels are available as well.

– Oat flakes are very common and easy to produce, local producers are everywhere available, in supermarket chains also

– Local bakeries and supermarket bakeries offer rye bread, spelt based bread or breads made of mix of flours with spelt/rye

– On the shelf with "healthy" products spelt flour, pasta, grits and coffee could be found as well as cookies, sticks and other snacks

– Most common is rye bread and spelt bread (available in "bakeries on the corner" and markets bakeries), oat flakes (everywhere),

– Rye alcohols and spelt beer.

– Other products are only in specialized shops with "healthy" or "bio" foods. They are only in big cities located and quite rare. Other ways of buying are Internet shops.

– In Poland, there is also cooked buckwheat grits and cooked barley grits popular as ingredients of main dishes instead of pasta or potato.

In sum, there exists both a large-scale for cereals in Poland. Products from rye and oats are traded on the large-scale market. Spelt products are available (Table 19). However, no information is available on products made from spelt, emmer, and einkorn. We assume, that they were still located on the niche market (spelt), or no market is developed (emmer, einkorn).

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4.10 Examples of existing niche markets for MC in Turkey

During the project, no details information about consumer habits and traditional foods were available. From the Canadian international market bureau, it is said that individuals in Turkey consume the most bakery products per capita in volume terms (including frozen bakery items and desserts) compared to states within Europe.

To sum up, there exists both a large-scale and a small-scale market for minor cereals. Durum is traded on the large-scale market, whereas rye, oats, and spelt are a niche market. No market exists for emmer and einkorn, even if these products are part of the traditional cereals in Turkey. An expert stated that there is a niche market for emmer for migrants in Turkish cities like Istanbul. They are still produced by farmers for self-consumption but not traded.

4.11 Examples of existing niche markets for MC in the UK

A large variety of products from oats, rye, and spelt are available in the UK (Table 20). The main product categories were baked goods (e.g. biscuits, cakes and bread), cereals (not cereal bars), flour and grains. To a smaller extent, pasta and convenience food was available. No information was found on beer/spirits. Products from oats were most common. These products were both processed from oats cultivated in the UK, e.g. Scotland, and from oats imported from abroad. The figures on imports and exports available for oats underpin these findings. The statistical data shows that oats was traded more than other minor cereals (imports and exports). Products from oats were often marketed as gluten-free. There existed companies specialised on processing and selling oats products. Products from rye were, like oats, available in the categories baked goods (e.g. bread), cereals (e.g. rye flakes), flour and grains. Rye bread was, among others, marketed as German rye bread. Hence, it was referred to German baking traditions. The statistical data available on rye supports the finding that rye is common in the UK. In other words, that is has reached the large-scale market. Rye was both cultivated in the UK as well as traded.

Spelt was cultivated on a very small area in the UK, which is not included in the national statistics. Spelt was traded and imported but not exported. According to experts, products from spelt became popular during the last years. They seemed to be common in the UK. Products from green spelt were also available.

The main product categories for spelt were baked goods (biscuits and bread), flour, grains, cereals and pasta. The product category *convenience food* was less common. No information was found on products within the category spirits, beer, or other drinks. Some companies were specialised in producing and/or processing spelt and selling spelt products.

Products based on oats, rye and spelt, were available in organic and in conventional quality. They were sold via online-shops, small and big retailers, warehouses and via farm shops. Products were easily accessible for the consumers. Within the main product categories, the variety of products was large. As a result, oats and rye, as well as spelt were identified as minor cereals located on the large scale-market. Spelt was not as prominent on the market as oats and rye. Spelt might be considered as a marginal case, being located between the large-scale and the small-scale market. Here, it was included in the category large-scale market.

In Cornwall, locally grown durum wheat is being used to produce genuine Cornish pasta. The producer process the crop to “Padstow Pasta from Cornwall”.

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Table 20: Examples of companies producing, processing and selling minor cereals in the UK

Companies	Products	Links	Sales Channels
Gilchester Organics	Production, milling, sales of mainly spelt/spelt products: baked goods like biscuits and flour; also rye, emmer, einkorn (all organic)	.gilchesters.com	Own online shop (direct marketing),small retailers, big retailers/chains (Booth's supermarkets)
Alara Wholefoods Ltd.	Products based on Scottish oats, milled by a local mill, all organic, gluten-free; mainly cereals such as Müsli, porridge, oatmeal; some products contain rye flakes, spelt flakes,	.alara.co.uk	Own online shop, -
The Oatmeal of Alford, Montgarrie Mill,	Milling, processing and sales of oats: oatmeal, porridge, oat flakes; products also for pets like dog food based on oats (manufacturer: Wilson's of Dundee); organic and non-organic	.oatmealofalford.com	Own online shop, some Tesco stores in Scotland, local wholesalers, farm shops, delis and independent stores
The Village Bakery Melmerby	Baked goods: rye and spelt bread, oatcakes, bars	.village-bakery.com	Bakery with own online shop, shop and café; small and big retailers (Waitrose, Booth's)
Big Oz Industries Limited	Production (also for the wholesale and retail sector) and sales of gluten-free products: cereals	.bigoz.co.uk/	Own online-shop, smaller retailers
Melbury & Appleton	Sales of farro products from Italy; Grains: Premium Quality Farro Perlato (Pearled Farro) from Umbria, produced by Bartolini; Italian Borghini; Pasta: Fettuccine di Farro (Italian Spelt Fettuccine Pasta), produced by Bartolini; Flour: Farina di Farro (Italian Spelt Flour), produced by Bartolini	.melburyandappleton.co.uk	Warehouse and online shop for hard-to-find ingredients and speciality food
Windmill Organics. Ethical Organic brands. Brands are: Amisa, BioFAIR, Biona, Profusion, Raw Health	Amisa: products containing spelt, rye, oats, not emmer and einkorn; Biona: products containing spelt, rye, oats, not emmer and einkorn or farro; pizza and pasta: organic pizza bases (spelt), organic tortellini (spelt, green spelt), lasagne (spelt), spaghetti (wholegrain spelt); drinks: organic biomalt - grain coffee instant (rye);	.windmillorganics.com/	Products available in small and big retailers, at wholesalers, various online shops

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Companies	Products	Links	Sales Channels
	baked goods: organic bread (rye), organic cookies; Convenience Food: organic energy Mini Burgers (oats); all products organic		
Sous Chef	Grains: farro perlato (emmer), by Dalla Corte, produced by SUBA Alimentare s.r.l. (non-organic); organic spelt grain, produced by Infinity Foods (origin: UK); Flour: organic wholegrain spelt flour, produced by Infinity Foods, (origin: UK)	.souschef.co.uk	Warehouse/online shop
Infinity Foods	spelt: pasta, cereals (flakes), baked goods (such as cakes, bread), flour, couscous; rye: grains, cereals (flakes), flour, baked goods (bread); oats: cakes (gluten-free), crackers, biscuits; no products from farro or emmer; einkorn flour available, produced by Doves farm; all products organic	.infinityfoodswholesale.co.uk	one of UK's leading wholesale distributors of organic and natural foods
	handmade, organic bread: sourdough rye bread, spelt bread, seeded spelt, cumin rye	.infinityfoodsretail.co.uk/bakery/	bakery
Doves Farm Foods	Production, milling and processing of English wheat, spelt, rye, oats; also emmer and einkorn (smaller projects), specialised on organic flour and cereals	.dovesfarm.co.uk/	Own online shop, other online shops (see Infinity Foods), caterers
Sharpham Park	Organic farm and own mill; specialised on spelt; products: flour, baked goods (cookies), grains, cereals (Müsli, porridge); farm owned by Roger Saul, the founder of the fashion label Mulberry	.sharphampark.com/	Own shop/online-shop, café, retailers such as Selfridges, Harvey Nichols, Fortnum & Mason and Waitrose
Padstow farm	Padstow pasta and flour is made with home grown durum wheat. The grain is milled at The Cornish Mill & Bakehouse & the flour is then used in our Italian pasta machine. T	.padstowfarmshop.co.uk	Online shop Supplies Jamie Oliver's restaurants

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Emmer, einkorn, and products thereof were rare in the UK. Both crops were cultivated on organic farms, during projects. These projects were run in cooperation with research institutes (see Dove Farm Foods in Table 24). Products from emmer and einkorn were not common. The company "Dove Farm Foods" produced flour from einkorn. Other products from emmer and einkorn, cultivated in the UK, were not sold.

However, various products from Italian *farro* were available. They were sold via online-shops or warehouses specialised on speciality foods or hard-to-find ingredients. In this context, the term *farro* was mainly used for products based on emmer and spelt. Farro products from Italy were available as grains, pasta and flour. In sum, emmer and einkorn were only produced on a very small scale in the UK and on organic farms only. Products thereof were rare and product categories limited. Consequently, a small-scale market was identified for these crops. No information was found on other old varieties of wheat (e.g. Purpurwheat), oats (e.g. Schwarzer Hafer (black oats)) or rye (e.g. Waldstaudenroggen (-rye)).

In sum, there is a large market for minor cereals like oats, rye, and spelt in the UK. From the production site, spelt has no relevance. Spelt is imported, but also for imports, no data is available. As a result, both a large-scale and a small-scale market were identified for minor cereals in the UK. Differentiation had to be made between the different varieties: Oats, rye and spelt were located on the large-scale market. Emmer and einkorn were identified as still being located on the niche market.

4.12 Conclusions

In most of the investigated countries, oats and rye are traded on the large-scale markets. They diversity of cereal products produces from MC is large: bread, flour, pasta, beer, pastries and breakfast cereals.

Rye bread and pasta are important products made of MC. Although durum wheat production is also part of the niche markets in most of the European Countries, pasta consumption is a mass market. In some regions, we see an increase in pasta production (Germany), where common wheat is replaced by durum wheat. For rye, especially silage, there is also an increasing demand from the feed and energy sector. Oats products are common too, but the product diversity is lower, and the feed markets are relevant.

For these MC, the market is saturated, most of the countries have a high self-supply, but trade happens.

Spelt, emmer, and einkorn are just available on the food market. Products made of spelt are on the large-scale market. We estimate that the European production does not meet the demand. Even if there is no information available on imports and exports from the EU, we assume a supply deficit.

The market for emmer and einkorn is small in most of the countries. In Italy, emmer is on the large-scale market whereas einkorn is still a niche market. Unfortunately, no data on the production of emmer in Italy is available.

Old varieties or new bred varieties of minor cereals are found in the organic market, or on niche markets mainly in Germany, Switzerland, Austria and UK. In Austria, regional official authorities support not only the production but also the marketing of MC.

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Overall, it is difficult to draw conclusions about the market relevance of the cereals by collection just information about traders and retailers. However, it was interesting to see, that spelt, rye and oats are present in most of the countries as the large retailers are selling them in across the EU.

However, some estimates about the importance of a crop for the national food industry could be done (Table 21).

Table 21: ◗: Estimated market for products made of MC in the investigated countries in Europe. The definition of markets is given in detail in Table 7. ◗: Minor cereal products are traded on niche markets. ●: Minor cereals are traded on large scale markets. ○ no market.

Country	Oats	Rye	Spelt	Durum	Emmer/Einkorn
	Market size	Market size	Market size	Market size	Market size
Austria	●	●	●	●	◗
Czech Republic	●	●	●	?	◗
Estonia	●	●	◗	?	○
Germany	●	●	●	●	◗
Hungary	●	●	◗	?	◗
Italy	◗	◗	●	●	●
Poland	●	●	◗	?	○
Switzerland	●	●	●	●	◗
Turkey	◗	◗	?	●	?
UK	●	●	●	○	◗

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5. Identification of consumer trends

Only little scientific literature was available on consumer trends concerning oats, rye, spelt, emmer and einkorn, other old varieties and new breeds thereof in the EU, including Switzerland and Turkey. Due to this, we worked with analogies. We collected literature on, for instance, rye bread consumption and its linkage to healthy lifestyles in Finland, consumers' perceptions of traditional foods and consumer trends about whole grain products. We focused on Europe regions, including Switzerland and Turkey.

The literature analysis included papers and books gathered via different scientific database. Additionally, we worked with those papers; the scientific papers referred to. German- and English-speaking literature was included. Literature collection was not focused on consumer trends (for key words see chapter 2). All papers, which had been collected, were checked and, if needed, excluded from the analysis. In total, 27 publications were analysed. As our analysis showed, a majority of authors does not explicitly refer to consumer trends: Topics such as consumers' perceptions and attitudes toward traditional food, rye bread or whole grain consumption are rather examined against the background of trends such as regional or healthy food. Some authors do not address trends at all. Nevertheless, their studies' results are of interest: they reveal important insights into consumers' attitudes and food choices, which have to be considered in the context of MCs. In some cases, the authors explicitly address consumers' attitudes towards minor cereals.

The results of the literature analysis are shown in Table 22. The authors' names and the country that their study addresses are mentioned. The papers' topics and the context within which these topics are discussed are listed, too. Moreover, statements and/or results that are especially important for the MCs project are outlined. The papers by O'Neill (2010), Weisz (2010) and Cameron (2010) were analysed although the authors work for the food industry. As their articles were published in "Cereal Foods World" and give important insights into consumer trends, they were included in the analysis after all. In the course of the literature review, we identified a research gap: The topic of minor cereals – oats, rye, spelt, emmer, and einkorn – was discussed in scientific papers but mainly from a natural science perspective, not from a market or consumers' perspective. It was also difficult to find appropriate information on the situation in Europe as a whole. Most papers focused on just one or few countries.

Based on the literature review, the following trends were identified:

- Ancient grains, tradition, heritage
- Colour, taste, texture
- Gluten-free
- Health and nutrition
- Wellness/indulge me, luxury
- Quality,
- small portion sizes, reduced calories
- Naturalness
- Organic
- Pleasure
- Variety, speciality

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Table 22: Compilation of the literature analysed in order to identify consumer trends

Author	Country	Topic; Context	Statements/Results
Almli et al. (2011)	Belgium, France, Italy, Spain, Norway, Poland	Traditional food; general image and attribute perceptions	Traditional food products (TFP) have a positive image in all countries, especially in Spain and Portugal. European consumers accept the expensiveness and time-consuming preparation of traditional food for the specific taste, quality, appearance, nutritional value, healthiness and safety. The general image of TFP is linked to festive consumption rather than daily consumption.
Annunziata & Vecchio (2013)	EU	Health and nutrition; functional foods (FFs)	FFs is seen critical by Europeans although the Functional Foods market has been growing and there is a general interest of consumers towards healthy and nutritious foods. Their critical view has partly been ascribed to a more critical attitude towards the truthfulness of products' health claims. European consumers link healthiness to naturalness and a low degree of processing. They believe that the use of certain technologies, like genetic modification and irradiation, makes food products less healthy. The demand for FFs within the EU varies considerably from country to country mainly due to food traditions and cultural heritage.
Cameron (2010)	USA	Food trends	Consumers make healthier choices, not necessarily healthy choices: They want tasty food, quality and flavour and rather cut back on e.g. portion size. Small portion sizes are often linked to quality and luxury. Consumers turn away from low-fat or reduced calories products. They want to be indulged. Moreover, consumers who cook are increasingly interested in varietal ingredients such as ancient grains. Speciality grains are popular, from bread to beer. The relaxation trend - related to the wish of a good night's sleeping - creates a market opportunity for oats or whole grain products. Due to their contents, these products - in combination with other ingredients – are considered to generate a relaxation.
Crofton et al. (2013)	Ireland	Health; healthy snacks	Consumers' expectations on a healthy snack: low levels of calories, fat, salt, and sugar; high levels of whole-grain, oats, bran, nuts, seeds, pulses, fruit. Healthy snacks should be free from any artificial colours, sweeteners, and flavours. Healthy snack consumption was encouraged by a reduced risk of weight gain, diabetes, heart burn and bloating. Healthy consumption was prevented by e.g. taste, portion size, accessibility, and confusion over the credibility of the 'healthy product' tag.

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Author	Country	Topic; Context	Statements/Results
Flammer & Müller (2013)	Regions in the Alps	Heritage, tradition, local, variety; cuisine	The increasing importance of local traditions and variety leads to an enhanced use of old crop varieties such as emmer, einkorn and spelt in bakeries and confectioneries but also within gastronomy. In the case of coeliac disease, spelt is gaining importance as an alternative. Beside these old wheat varieties, rye is seeing a revival. Rye bread is part of the local traditions of some regions in the Alps.
Folloni & Ranieri (2013)	Finland, Germany, UK, Italy	Health and nutrition; whole grains	"When addressing whole grain food products, trends, and consumers, Europe cannot be regarded as a whole. This is mainly due to the absence of a common and agreed official definition of whole grain in the different EU countries." A comprehensive picture of whole grain consumption in Europe does not exist. It is most probably similar to the American one. "Usual whole grain intakes are around 15% of the recommended value while refined grains are 100% above the limit." Looking at the market for bread, white bread is dominating in Europe. In the UK and in Southern Europe, whole grain bread has a low market share (< 3%). In Germany and other countries with traditions in whole grain products, the share is stable (10%). In Nordic countries, whole grain bread have a larger share of the market. Nevertheless, white bread is dominating. The association of whole grains with healthiness does not necessarily lead to a higher purchase of whole grain products as shown in a study on consumers' behaviour in Finland, Germany, the UK and Italy. In Italy, the whole grain labelling even decreased the likelihood of buying. Another study on consumers' attitudes towards whole grains - conducted in the UK, Italy, and Finland - shows that, in general, whole grain products are rated as "more nutritionally balanced, healthier, more natural, more filling, slower to release energy, slightly more digestible than the refined product category." In terms of sensory features, Finns and British rated whole grain products slightly better than refined products. Italians rated refined products better than whole grain products. As a result of the study: "Providing information about the benefit of whole grains may not be a successful strategy for promoting the consumption of whole grains. Instead, it seems essential to provide new whole grain options with attractive sensory features relying on the overall positive health image of cereal-based prod-

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Author	Country	Topic; Context	Statements/Results
			ucts." (Proceedings, Whole Grains Summit 2012)
Giuliani et al. (2009)	Turkey, Italy	Production and market potential of emmer	Interest in emmer is growing in Italy. Reasons for the rediscovery of emmer are among others an increasing attention to local traditions and ancient foods from consumers. Pioneer farmers recognized the potential of emmer linked to history, folklore, and marketed emmer to tourists visiting the regions. They sold emmer in its traditional form. In Turkey, healthy food is particularly popular among urban residents.
Giuliani et al.. (2009.)	Turkey	Underutilized crops (emmer) ; marketing	In some regions in Turkey, emmer is still considered the "food for the poor". Introduced wheat varieties are regarded as more modern and more cosmopolitan. In other places, emmer is appreciated among consumers due to its tastier flavour and nuttier texture (compared to modern wheat varieties), also by those consumers living in cities. Some consumers started to buy emmer bulgur due to its suitability for people with diabetes. This reflects the growing importance of healthy and organic food in Turkey. The trend is not limited to cities. It has spread to the villages, too. (see also Giuliani 2007, Giuliani et al. 2009, Hoeschle-Zeledon 2009)
Guerrero et al. (2010)	Belgium, France, Italy, Norway, Poland, Spain	Traditional; associations	Similarities and differences exist between different EU countries and regions in regard to associations of consumers with the word traditional in the food context. Words such as family, good, grandmother, healthy, natural, regional, restaurant or simple were elicited in all regions. In southern European regions, consumers associated traditional with heritage, culture, history. Central and Northern Europeans tended to focus on more practical issues like convenience, health and appropriateness. The food culture in Europe is heterogeneous.
Horská et al. (2011)	Poland, Czech Republic, Slovak Republic	Quality; trade-off between quality and price	In Central Europe, food choices are no longer only based on the price of products. In terms of food quality, hygiene was most important in all three countries. The trade-off between price and quality is important in consumers' choices. There are many reasons why consumers are not willing to pay the given price for a specific product quality.
Kühne et al. (2010)	Belgium, Italy, Poland	Traditional food sector;	Quality innovations are accepted by consumers in the traditional food sec-

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Author	Country	Topic; Context	Statements/Results
		innovation	tor. The highest acceptance was in regard to a lower fat level. In the category convenience foods, innovations were only accepted to a certain extent (e.g. individual portions). Consumers were critical towards pre-cooked food, ready-to-eat dishes or frozen food. Expectations on the quality rise when labels which indicate the origin of products are used. The acceptance of distribution channels is dependent on their image. They must be in line with the image of traditional foods (e.g. manufacturer as sales point accepted, acceptance of vending machines or home delivery low).
Kyrø et al. (2011)	Denmark, Norway, Sweden	Health and nutrition; whole grains	Consumers who follow a healthy lifestyle and seek nutritional benefits are interested in whole grain products.
Longin & Miedaner (2012)	Germany	Ancient grains	Baked goods from emmer, einkorn, and spelt are in line with the trend. An increasing number of consumers appreciate their good taste and wholesomeness. Moreover, they have a high nutritional value. Considering climate change, it is important to have varieties, which are resistant to drought, heat, salt and ozone. In this regard, black emmer (Schwarzer Emmer) might e.g. become more important in the future. Consumers can contribute to preserve biodiversity through their product choice, that is, through buying seasonal, region-specific products or products, which have become rare. "Undervalued cereals" provide variety and pleasure and it looks as if old varieties are especially suitable for processing and marketing products in organic quality (low yields but unique properties). Consumers tend to choose tasty and natural products. Advantages of old varieties are e.g.: biodiversity, nutritional value (to be used as functional food), regional specialities, cultural diversity, taste and pleasure. Einkorn is furthermore interesting due to the yellow colour it provides.
Lyly et al. (2007)	Finland, France, Sweden	Health; functional food	The food industry is increasingly interested in the functional food market. The interest of the industry and the consumers in dietary fibre is expected to be growing. The willingness of consumers to use products containing oat beta-glucan is strongly influenced by taste. The willingness to pay the given price for these products decreased after tasting, regardless of the health claims.

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Author	Country	Topic; Context	Statements/Results
Nótári (2013)	Hungary	Traditional, region-specific; market potential of traditional, local, high quality horticultural products	Natural and social values of traditional and regional-specific horticultural products have a big market potential. The price is dropping significance in consumers' food choices. Non–price factors such as product features, place of origin and communication have become more important.
Nótári & Ferencz (2013)	Hungary	Traditional, region-specific; horticultural products	Consumers select traditional, region-specific horticultural products rather based on their particular taste and their quality than on price and appear-ance. The Hungarian provenance, the place of origin and traditional features are important aspect. These factors play a significant role in the consumers' judgement on value.
O'Neill (2010)	USA, Europe	Gluten-free	The trend for gluten-free products is expanding. It is driven by consumer demand, which is based on increased awareness and better diagnosis of coeliac disease. Not only celiac-sufferers and their families are interested in the products. "Consumers in general seem to see gluten free as an element of prevention, or simply as having a healthy halo that they wish to adopt."
Paasovaara & Luomala (2011)	Finland	Health-related product information; spelt por-ridge	Attitude towards and intention to purchase spelt porridge were more positive when health-related product information was provided. "Health information stressing fiber intake still seems to be effective in persuading consumers to try novel whole-grain products, such as spelt porridge, al-though health claims have been massively used in food product promotion in recent years." Individuals high in need for cognition seem to experience natural and healthy foods, such as products made of spelt, more positively. They might be purchasers of these kinds of novel niche-market foods, rather than individuals low in need for cognition.
Petrovici et al. (2012)	UK	Diet and health; labelling	"[T]he use of nutritional information and health claims increases with the stated importance of 'nutrition' and 'family preferences'". Shoppers for whom "taste" is an important driver of food purchasing behaviour are less likely to use these information or claims. There is mistrust in health claims.
Pieniak et al. (2009)	Belgium, France, Italy, Norway, Poland, Spain	Tradition, region; tradi-tional food (consumption)	"General attitude towards traditional foods, familiarity, and importance of food naturalness emerged as drivers for traditional food consumption. Importance attached to convenience and health acted as direct barriers to

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Author	Country	Topic; Context	Statements/Results
			traditional food consumption." The importance of weight control was an indirect barrier as it lowered the general attitude towards traditional food. The price had no influence on the general attitude and traditional food consumption.
Pohjanheimo et al. (2010)	Finland	whole grain and rye bread consumption	In Finland, wholegrain products are widely used. Finnish adolescents consider wholegrain breads healthier and more acceptable than refined breads. Motives for wholegrain bread consumption mentioned: taste, feeling of filling-ness and weight control. Females were more interested in bread healthfulness than males. Those participants who were more interested in health issues mentioned using more rye and wholegrain breads than participants with negative attitudes towards general health interest.
Prättälä et al. (2001)	Finland	Health and nutrition; (rye) bread consumption.	In Finland, the consumption of (whole grain) rye bread is not associated with a healthy lifestyle. Finns who are concerned about their health avoid white bread but also rye. White bread is associated with an unhealthy lifestyle and rye with tradition but not with health. The consumption of rye bread decreased during the years 1978-1997. The consumption of rye bread is associated with a low educational level and a rural place of residence. It is not associated with smoking, exercise or alcohol consumption, in contrast to white bread. "In Finland, rye bread has a different image to the image of whole-grain or dark brown bread in many other western European countries." Rye bread is traditionally sold as large loafs, which are not currently practical for small households preferring fresh bread. The study was conducted in the period from 1978 - 1998.
Puumalainen et al. (2002)	Finland	New products; Grünkern	"The form in which a new product is served has a major impact on responses to an unfamiliar food." Information increases the acceptance of unfamiliar food.
Stefani et al. (2006)	Italy	Region; place of origin (PDO, PGI, TSG labels)	Consumers' quality expectations rise the narrower and more precise a region is defined. The authors distinguished between the region of Garfagnana (valley in the Apennines), Tuscany and Italy. The willingness to pay is related to place of origin label. Hence, region is linked to quality expectations and the willingness to pay higher prices.

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Author	Country	Topic; Context	Statements/Results
Verbeke et al. (2012)	Italy, Spain, France, Belgium, Norway and Poland	Region, tradition; PDO, PGI, TSG labels	Consumers' awareness of geographical indications and traditional specialities differs between countries. The use of PDO, PGI or TSG labels is linked to the belief that the labels signal better product quality. Interest in the origin of foods is a stronger driver of label use than interest in support for the local economy. In case of the TSG-label use, both motivations are not directly related to its use.
Weisz (2010)	USA, global	Health, nutrition, taste	"Formerly limited to specific health-conscious consumers, the market for healthy, good-for-you food is expanding rapidly, and is increasingly targeted at the mainstream public." Besides the trend towards healthier and more nutritionally sensible products, consumers demand good taste: "Today's consumers demand old-fashioned taste and cutting-edge nutrition." Moreover, good-for-you formulations often involve the use of new ingredients such as stevia.
Zagata (2012)	Czech Republic	Organic; consumers' beliefs and behavioural intentions	The intention to purchase organic food is mainly based on positive attitudes towards organic food. Major behavioural beliefs of consumers are linked to health aspects and taste. The purchase of organic products is influenced by social norms (family expectations). The availability of organic products and the price constitute minor barriers for the purchase, at least when consumers already buy organic products. The qualities of organic food recognised by consumers are those associated with health. Consumers expect higher volumes of vitamins and nutrients. Consumers pay attention to process-based qualities of organic food, which are part of the method of production, such as the absence of GMOs or artificial additives. Less importance is given to attributes that are related to environmental aspects and issues of sustainable rural development and localisation of food production.

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Concerning processing and marketing products from minor cereals, it may be concluded:

– Whole grain products are especially demanded by consumers who seek a healthy lifestyle and nutritional benefits. Hence, MC products might be successful on the market when processed in whole grain quality and marketed as healthy and nutritional. The target group of these products may be consumers interested in issues such as health and nutrition.

– The association of whole grains with healthiness does, not necessarily lead to a higher purchase of MC products. In Finland, the consumption of (whole grain) rye bread is not necessarily associated with a healthy lifestyle. Finns who are concerned about their health avoid white bread, as white bread is associated with an unhealthy lifestyle. However, the traditional rye bread is not associated with health benefits whereas whole grain products are. Consumer trends concerning whole grain products as well as rye bread, and the understanding of healthy lifestyles differ between the various European regions.

– Functional food is seen critical by Europeans. The truthfulness of products' health claims is interrogated. European consumers link healthiness to naturalness and a low degree of processing. The demand for FFs within the EU varies considerably from country to country mainly due to food traditions and cultural heritages. Consequently, the linkage of healthiness to naturalness and a low degree of processing has to be considered when processing and marketing MC products. Food traditions and cultural heritages may influence the purchase of MCs products when processed/sold as functional foods.

– Taste and price are important factors which influence consumers' willingness to buy functional food. Health claims alone do not convince consumers. When functional food contains MCs, attention has to be paid on the taste and the price of these products.

– The demand for gluten-free products is increasing as the awareness of coeliac disease is rising. Marketing oat products as gluten-free might be advantageous. However, some information portals for people with Coeliac disease recommend the avoidance of oats. Hence, the situation is confusion for consumers. Rye, spelt, emmer and einkorn do contain gluten.

– Consumers who prefer "tasty" products to "healthy" products might be less interested in products labeled healthy. Consequently, the labeling of MCs products may not only be focused on health and nutrition. It might hinder consumers preferring tasty food from purchasing these products.

– Healthy snacks are associated with the following ingredients: oats, whole-grains, nuts, seeds, pulses or fruit. In terms of developing and marketing, MCs products in the product categories cereals/cereal bars and baked goods has to consider these findings.

– When MCs products are marketed by using designations of origin - linked to the region-trend - it is important to refer to a small, precisely defined regions.

– Designations of origin are linked to a high quality standard. That is, it is important that these products keep a high standard. Second, consumers are likely to pay higher prices when the product quality is high. Labels, which indicate the place of origin, are often used in Italy concerning farro products. In terms of labeling, Italy might be an interesting case to look at. It might serve as a role model.

– Emmer products may be successfully introduced on the market when linked to history, folklore and region, as the case of Italy shows. Here, the marketing focused on tourists. The case

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of Italy might constitute a role model for other countries. The rediscovery of emmer in Italy is among others related to consumers' growing interest in local traditions and ancient food, a consumer trend, which might also apply to other Western European countries. In Turkey, mainly urban residents are particularly interested in healthy food. Due to its nutritional values, emmer may be marketed as healthy food. The marketing may focus on consumers living in urban agglomeration.

– The purchase of spelt products might be increased when health-related product information is provided. Spelt products high in fiber such as whole-grain spelt porridge should be advertised using health information stressing fiber intake.

– Information increases the acceptance of unfamiliar food. Hence, in the context of new products or dishes containing MCs it is important to inform consumers sufficiently. Second, it might be easier to introduce new products or dishes on the market if they are similar to products/dishes consumers are familiar with.

– When MCs products are marketed as regional and traditional – traditional rather in the sense of traditionally produced in the region -, it is important to consider that consumers associate these products with naturalness but also familiarity. Moreover, consumers do not purchase traditional food(s) for convenience, health or weight control reasons. The price does not seem to play a major role in traditional food consumption. It may therefore be assumed that consumers are willing to pay higher prices for products or dishes containing MCs when these are associated with traditional food(s) - given that other factors such as taste and quality meet consumers' expectations.

– Regarding product innovations in the category convenience foods in the traditional food sector, consumers accept innovations only to a certain extent. This has to be considered when developing MCs products in the product category convenience, given that these products are linked to traditional food(s). Furthermore, consumers might not accept all forms of distribution channels for traditional, minor cereals products. Consumers link traditional products, and therewith-traditional products containing MCs, to the possibility of purchasing these products from the manufacturer. Selling these products via vending machines or home delivery might fail.

– Foods markets in Central and Western European countries differ. Consumers do not have the same prerequisites. Price, well as food quality play an important role in Central Europe.

– In terms of traditional and regional-specific horticultural products, a big market potential is predicted in the Hungarian niche market as prices drop significance in consumers' food choices. Consumers tend to favour quality to price. Traditional, local foodstuff may be linked to quality and price. Consequently, Hungarian consumers might purchase MCs products, which are traditional and region-specific, tasty and meet their quality expectations even if these products are expensive.

– Traditional food products (TFP) have a positive image among consumers in Europe. Consumers appreciate taste, quality, appearance, nutritional value, healthiness and safety of traditional food and accept the relative expensiveness and time-consuming preparation. These facts have to be considered when TFP contain MCs.

– Consumers demand healthy, nutritional products with old-fashioned taste. That is, MCs products, which combine both demands – health/nutrition and good taste –, might be successful on the market.

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– Consumers make healthier choices, not necessarily healthy choices: they rather cut back on portion size than on taste, quality and flavour. Consumers turn away from low-fat and reduced calories products. As a result, developing tasty MCs products with a high quality and good flavour, which are available in smaller portions, might be successful on the market. They serve the consumer trends of healthier food, taste, quality and flavour and meet the consumers' wish of feeling indulged.

– As consumers are increasingly interested in variety and specialty, ancient grains become more popular, too. This trend is directly linked to MCs products and it constitutes a big market potential.

– Baked goods from emmer, einkorn and spelt are in line with consumer trends. This is, in itself, a reason for processing baked goods from ancient grains. Furthermore, it may be advantageous to market MCs products by using the ancient grains' names on the packaging.

– MC products may be marketed by focusing on climate and biodiversity. Consumers might not immediately link minor cereals such as emmer and einkorn or new breeds of spelt with climate issues and biodiversity. Consequently, good communication is necessary. Consumers are especially aware of climate change. Marketing new breeds by informing the consumers about their benefits in the context of a changing climate might be beneficial.

In addition to the literature collection via scientific search engines, literature was gathered via experts, FiBL employees and the search engines Google and GoogleScholar. We worked with bibliographies of relevant papers, too. In so doing, scientific and grey literature was collected. German- and English-speaking literature was included.

Literature collection was not focused on consumer trends. Consequently, some of the collected publications do not refer to consumer trends or related topics and had to be excluded from the literature analysis. Our analysis furthermore showed that literature rarely focuses on consumer trends. It is rather touched upon consumer trends while addressing other topics in the context of MCs more profoundly.

The results of this analysis are shown in Table 23. The authors' names and the country to which the study addressed to are mentioned. The papers' topics are outlined, as well as statements and/or results that are especially important for the HMCs project. In total, 13 publications were analysed.

Based on the analysis of grey and scientific literature that was mainly gathered via experts, FiBL employees and the search engines Google and GoogleScholar, the following consumer trends were identified:

– Agro-biodiversity
– Ancient grains
– Convenience
– Gluten-free
– Health and nutrition
– Heritage
– History
– Naturalness
– Organic
– Quality

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- Region, local
- Specialty
- Sustainability
- Taste
- Tradition
- Variety

Forty publications on the topic of consumer trends concerning MCs - oats, rye, spelt, emmer and einkorn, other old varieties and new breeds thereof - and related topics were analysed in total. The number of publications found via scientific search engines – using key words – was scarce. Therefore, we also used other sources such as GoogleScholar in order to collect literature. As the number of papers on HMCs in social sciences seemed to be small, we furthermore approached the topic from a broader scale. That is, we did not focus on consumer trends but looked for all kinds of literature linked to the topic of minor cereals. This also included, for instance, literature on value chains and key actors. In doing so, we tried to get an idea of the literature available. Additionally, we sought to collect literature for the project's future research activities.

To sum up, it is important to distinguish between marketing activities concentrated on old varieties and new breeds. The consumer trends identified do not always fit both old varieties and new breeds. Different aspects have to be emphasized in order to attract consumers' interest.

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Table 23: Compilation of analysed papers on food trends.

Author	Country	Topic	Statements/Results
Beckmann (2013)	Germany	Renaissance of old varieties (emmer, einkorn, spelt)	Consumers demand more choice in baked goods for taste and curiosity reasons. Using less known varieties is a possibility to meet this need. One reason for the revival of spelt is the growing interest in high quality and organic food products. Emmer, einkorn and spelt are better tolerated by people who react allergic to wheat.
BLW 2013	Switzerland	Market report bread	Every other bread offered carries the declaration of Swiss origin (Switzerland or Swiss region). Seven retail companies were analysed in the study.
Buerli (2006)	Italy	Farro	The market for emmer in Italy has developed in the 1980s. It was mainly health-conscious people living in cities who started to consume emmer. By now, the trend has spread to other consumer groups. Emmer contains high levels of fibre, protein content and certain vitamin B complexes and is cultivated traditionally, without the use of synthetic pesticides or fertilizer. It is considered to be a healthy food. It is quite easy to be cultivated organically. The production of certified, organically-produced farro became an important niche. Its "characteristics enable farro to fit almost perfectly into a recent food trend focussing on healthy food with a good taste and a history."
Buerli (2006)	Italy	Emmer	"In recent years, farro has been enjoying a resurgence in popularity among gourmets and the health-conscious, who sing the grain's praises for its high nutritional value and adore the hearty, flavourful taste of the 'Pharaoh's Wheat'."
Giuliani (2007)	Turkey	Emmer	In Turkey, city dwellers and farmers consider emmer bulgur healthier and tastier than wheat bulgur. There is evidence of growing appreciation of emmer among niche consumers in towns. New market opportunities may occur due to emmer's nutritional and health properties. Traditionally, emmer is considered a tasty health food. The market for organic health products is growing. The awareness of emmer's

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Author	Country	Topic	Statements/Results
			nutritional benefits is increasing.
Grunert et al. (2014)	UK, France, Germany, Spain, Poland, Sweden	Sustainability labels and their use	An increased number of sustainability-related logos and labels are used in stores or on packages to inform the consumer (e.g. fair trade logo, rainforest alliance logo, animal welfare-related logos). The study on European consumers' understanding, motivation, and use of sustainability labelling shows that sustainability labels do currently not play a major role in consumers' food choice. Future use will depend on the extent to which consumers' concern about sustainability is translated into action.
Habeck & Longin (2014.)	Germany	Successful marketing of emmer	Ancient grains are getting more popular with consumers. Emmer is one of the oldest crop varieties. It might become a real alternative on the cereal market. Compared to other ancients grains (Urgetreide), emmer has the highest potential in terms of cultivation.
Hoeschle-Zeledon et al. (2009)	Italy, Turkey	Underutilized crops	In Italy, health-conscious people and gourmets living in cities started to demand emmer in the 1980s. Today, the increased interest in emmer in Italy is related to the public's growing concern about old traditions and the search for naturalness. Emmer products are especially demanded from consumers who are health- conscious, trendy, and prepared to pay premium prices for speciality food. In Turkey, "there seems to be a new attitude in the major cities towards healthy food, preferably from organic production. This is reflected in the choice of certified organic whole wheat pasta and bulgur available in super markets and shops in wealthier areas of the cities." (see also Giuliani et al. 2009).
Kearney (2010)	Global, EU	Food consumption trends	Trends in organic foods: The demand for local, sustainable, organic food production has increased. Across Europe, the import rate of organic products is high. The consumption demands are far higher than the rate of production of organic produce. Trend in functional foods: "Functional food consumption is increasing in almost all indus-

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Author	Country	Topic	Statements/Results
			trialized countries. Interest in functional foods and drinks has been fuelled by the desire for convenience and health. Busier lifestyles are making it harder to meet nutritional requirements using traditional food and drinks." Consumers remain sceptical towards health-related claims on food and drink products and their efficacy.
SAVE Foundation (2012, 2014)	Europe	Heritaste® quality label	Heritaste® quality label: "the label for marketing the products and services of indigenous livestock breeds and crop varieties". HERITASTE is meant to tag high quality, tasty products or corresponding services. The word is composed of the words heritage and taste.
Stiftung Kaiserstühler Garten (2011)	Germany, Switzerland	Initiatives on re-launching and processing ancient grains	Agrobiodiversity disappears, or is getting reduced; in this light the PLENUM Project "to promote crop variety through extensive cultivation with field weeds and develop new products from old varieties" aims at: 1) Extension of today's range of crop species and crop varieties for cultivation 2) Identification of contributions of rarely grown crops to nature conservation 3) Development of new products from different old crop or new breeds.
Universität Hohenheim (2014)	Germany	Ancient grains as a trend	Ancient grains are in line with the trend: labels which designate place of origin (region) and tradition increasingly attract new consumer groups. The newly discovered varieties constitute a chance for organic farmers to strengthen their individual profile.
Vanhonacker et al. (2010)	Belgium, France, Italy, Norway, Poland, Spain	Traditional food products and its definition	There is an increasing interest in traditional food as a food product category at the producer, industry, government, retail and consumer levels. On the basis of a consumer survey in different EU countries, the following definition was developed in order to define the concept of traditional food products (TFP): "A traditional food product is a product frequently consumed or associated to specific celebrations and/or seasons, transmitted from one generation to another, made in a specific way according to the gastronomic heritage, naturally processed, and distinguished and known because of its sensory

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Author	Country	Topic	Statements/Results
			properties and associated to a certain local area, region or country." The definition does not constitute one fix option. It is an overview of different elements which may mean traditional food. The importance of the different elements can vary dependent on the individual. The meaning of TFPs may fluctuate over time with the individual. It can also be influenced in a certain direction by e.g. communication, marketing and media.
Hellyer N. E. et al. 2012	UK	Food choice, health information and functional ingredients in relation to bread.	Research has shown that consumers of whole grain products are typically older (Lang and Jebb, 2003). In this investigation from the UK, it seems that there may be changing attitudes to whole grains and that this group became more interested in health aspect. This group depends on the information about health coming along with the product, e.g. health claims.

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The analysis of scientific and grey literature, product, and project homepages suggests that current consumer trends in relation to cereals are:

- (Agro-)biodiversity, environmental protection, conservation of species (animal, plants)
- Ancient grains – Urgetreide
- Authenticity, credibility
- Colour
- Convenience
- Gluten-free
- Health and nutrition, Hildegard von Bingen
- Health/indulge me - quality, taste, luxury and, not low fat and reduced calories -
- Health/wellness
- Naturalness
- Organic, sustainability
- Pleasure
- Quality
- Other cuisines
- Premium/luxury
- Region, local
- Retrophilia, „back to the roots."
- Social, hand-made
- Taste, Texture, flavour
- Tradition, heritage, history
- Variety, specialty, uniqueness, rarity
- small portion sizes

Concerning buyers, our results imply that the demand for MCs products is highest in cities and among tourists. In rural areas, products from MCs are not that popular.

- The urban population is interested in healthy, organic products and is willing to pay higher prices for premium products. Products that indicate the country or region of origin are popular among these buyers. They imply tradition, which is highly valued among this consumer group. Moreover, regional products might be popular as they remind the buyers of their home country or region of origin. Many people living in cities have migrated to these cities. In this way, some traditions such as rye bread consumption might migrate to other countries, too. In Switzerland, for instance, rye bread produced according to German recipes is sold as "German rye bread". Many Germans are living in Switzerland. This might increase the consumption and demand for rye bread in Switzerland as a whole.

- The rural population is not as sensitized for regional produce from local grains as for cheese and meat produce from the region. They purchase cheese and meat produce but not products from locally-grown grains. In the case of locally-grown grains or products thereof, efforts have to be made in order to attract local consumers. As the example of Gran Alpin products in Switzerland shows, products from local grains are more attractive for tourists than for the local, rural population. In Germany, the rural population might be more aware of regional produce from local grains (see the region Franken, GE).

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– As the case of Italy shows, agro-tourism might be a good opportunity to make products from local, ancient grains more popular on a wider scale. In Italy, products from ancient grains such as emmer were sold to tourists (mainly Italians) via direct marketing in farmers' shops. This way they became more popular also among Italians living in the region or outside the region.

In addition, there is a lot of research done on general consumer trends in food. In order do not miss relevant trends, we cross-checked our results with three publication in general consumer trends: Canadian international market office 2011, Working paper on "Consumer trends and preferences in the demand for food" and GDI Impuls, Surprisingly, even though we focused our investigation on trends related to cereals, most of the major food trends showed up. However, we added some general trends to our list:

– According to the Canadian international market office *Gluten-free*, *ethical*, *vegetarian*, *vegan* and *no additives* are all very popular product claims and characteristics in this developed market. From January 2011 to July 2011, the "*no additives/preservatives claim*" was the most popular for bakery and desserts in Western Europe The most popular product claims for breakfast cereals were "*wholegrain*" and "*high/added fibre*".

– The working paper on food trends identifies the following trends: *Food safety and health benefits, Corporate social responsibility (*production sustainability, ethical food sourcing, and food miles), *Production systems and innovations (*organic foods benefits from the negative perception of genetically modified products and nanotechnology) *sustainability (*fish stock, forest depletion, climate change), *country and region of origin*

– GID names "think globally, act locally", "cooperation between producers and consumers", "sharing economies" and "urban food production" as mainstream trends.

In the context of MC, we include the following new issues to our list of consumer trends

– vegan and vegetarian,
– no-additives
– high fiber
– ethical food sourcing
– Urban

5.1 Trends used by market initiatives in UK, Switzerland, Austria and Germany

Increasingly over the last years, groups of farmers have come together to form initiatives to market collectively the food that they produce. Such schemes were often essential as the only means of finding markets for their products.

In other cases, Market Initiatives (MIs) are not only initiated and managed by farmers but also by consumers, processors or local authorities, for example, to promote and support regional food production, environmentally friendly farming systems or the availability of high quality food.

In the context of this project, a MI was defined as an organisation of actors (privately or cooperatively owned), which aims to improve the marketing of minor cereals. MC in Austria, Germany, Switzerland, and the UK (Table 24) were identified und analysed for their marketing strategies and promotion.

In Switzerland, there are several initiatives in support of MC existing already for several years. In most of the cases, the Interest Group (IG Dinkel, IG Emmer-Einkorn, Gran Alpin) organizes the

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collection and trade with the cereals. Used trends in the marketing are *biodiversity* (emmer, einkorn), *regional provenance, tradition, health, ancient grains and sustainability*.

In the UK, some of the MI are aiming at improving food quality by using MC. In addition, durum wheat is produced and processed into pasta by the Padstow Farm, which is part of the Watson Smyth family farming enterprise. For marketing, they use the trend for "fresh,seasonal,local & high quality produce" A short compilation is given in (Table 24) Due to the fact, that MC are rarely produced in the UK, there is no need to organize the supply from farm gate to the processor.

In Germany, researchers and breeders seemed to be more involved in MI than in Switzerland. In addition, initiatives are sometimes supported by a regional policy[7]. An example of a supporting initiatives is the city of Nürnberg including counties of Nürnberger Land and Roth aiming at enhancing the production of emmer in the region (Bio-Metropole Nürnberg: 100% Emmer Initiative). The city supports emmer production and processing with professional marketing support for producers, bakers, breweries, retail sector. Main attributes for the marketing are regional production and economy, sustainability, organic, tasty.

Another initiative funded in 1995 is the so called *Verein Artenreiches Land - Lebenswerte Stadt e. V*. Main driver was enhancing biodiversity on arable land by planting emmer. Today, the initiatives also cover other regional products. For emmer, field visits (emmer field) including tasting are organised. Biodiversity and regional development and regional provenance are still important drivers. In Germany, we see also a strong involvement of breeders in the initiatives. Lichtkornroggen is a product of Darzau breeding company and well accepted among Demeter farmers, millers and bakers. Other examples are given in Table 24.

In Austria, the initiatives GOURMET REGION AUSTRIA, which is a registered trademark of Agricultural Austria Marketing GmbH and the Federal Ministry of Agriculture, Forestry, Environment and Water, includes some activities with MC, e.g. *Schlegler Roggen*, spelt (Mittelburgen), *Waldstaudekorn* (rye). The initiative makes the regional agricultural products and specialties visible.

However, there are many farms in the arable region (Waldviertel, Mühlviertel, Burgenland) of Austria producing rye, oats and spelt. A few of them are described in Table 24. In most of the cases, the producers organize the collection and trade with the cereals.

Different from other countries, Austria supports the production of rare cereals with direct payments (ÖPUL Massnahmen), what makes the production less expensive and more attractive for farmers.

[7] Marketingverein der Europäischen Metropolregion Nürnberg e.V. (founded by representatives of state and economy)

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Table 24: Examples of market initiatives for MC in Switzerland, Austria, Germany, and UK

Initiative	Initiator:	Partners	Supporting Trends
Switzerland			
Production of Emmer and Einkorn, Klettgau (Schaffhausen)	NGOs; Schweizerische Vogelwarte Sempach in cooperation with LBL (AGRIDEA), WWF Schaffhausen, Pro Specie Rara (1995) Since 2005: IG Emmer & Einkorn	The whole supply chain incl. large retailers. Craft bakeries, pasta producers and breweries.	Biodiversity (animals/plants), tradition, organic
Production of Dinkel/UrDinkel in Switzerland	IG Dinkel funded 1996 (farmers and millers) Trademark: Urdinkel	The whole supply chain for so-called Urdinkel	Regional provenance, tradition, origin, ancient grain, health
Cereal production in mountainous regions	Cooperative, incl. producers, Cooperative GranAlpin (1987) funded by mountain farmers Trademark: Gran Alpin	The whole supply chain for spelt, oats, rye, buckwheat, wheat and barley.	Taste, health, organic, sustainability, tourism, cultural landscape
UK			
„Ancient Grains" (wheat, rye, spelt, emmer, einkorn)	Gilchester Organics	Supply Chain/important Actors: Cooperation with research institute	Heritage, wildlife conservation, organic
Dove Farm	Dove Farm Foods in cooperation with agricultural institute	The company now buys a range of different grains from the UK and overseas farmers and supplies bakers, food manufacturers as well as being a brand leader in the retail specialist home-baking market.	Organic Heritage Gluten free
Brockwell Bake	Urban farmer and consumers, bakers	Cooperation with people with allotment gardens, school and community gardens and farmers close to London. They stone mill and bake wheat and do real baking workshops with local schools.	Urban Farming, food quality
Germany			
Regionalsortenprojekt, Lake Constance (wheat, rye, spelt)	Initiator: breeding, research, NGO (incl. producers)	Breeding and research (Keyserlingk Institute), NGO (Verein zur Förderung der Saatgutforschung im biologisch-dynamischen Landbau	Biodiversity, organic

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Initiative	Initiator:	Partners	Supporting Trends
		e.V.), producers, miller, bakeries, trading companies (Spielberger Mühle, Bodan)	
KraichgauKorn®, Wheat, spelt, rye, oats, einkorn,	Association of farmers from the regions Kraichgau und Kurpfalz, 1990	Regional bakers and millers	Regional provenance
Linzgau Korn®; Wheat, spelt, rye, oats	Familie Baader, Landbäckerei Baader	Regional farmers, bakers and millers	Regional provenance Biodiversity Fairness
Austria			
Biohof Brenner *Sonnentor*	SME funded in 1988	Local farmers, milling, processing, sales	regional provenance, support of small farmers, taste, organic indulgence
Meierhof	farmer		Organic, regional provenance, taste
Bio Hof Kettler	farmer		Organic, regional provenance, taste
Getreidehof	farmer		Organic, regional provenance, taste
Lebendige Vielfalt	Demeter farmers	Connects producers, consumers and processors of anthroposphic products.	Organic, regional provenance, diversity,

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6. Conclusions for the market potential of Minor Cereals

In order to assess the market potential of MC, we apply a simplified version of Porter's five-force framework (2008). As described in chapter 2 of this report, Porter assumes that there are two forces from a 'vertical' competition: the power of suppliers and the power of Customers and three forces from the 'horizontal' competition: the direct competition between existing companies, the threat of new entrants and substitute products.

Porter referred to these five forces as the 'micro environment' of a company, to contrast it with the more general term 'macro environment' (e.g. policy, consumer trends, and environment). The result of our investigation resulted in a better understanding of Porters five forces (Figure 15).

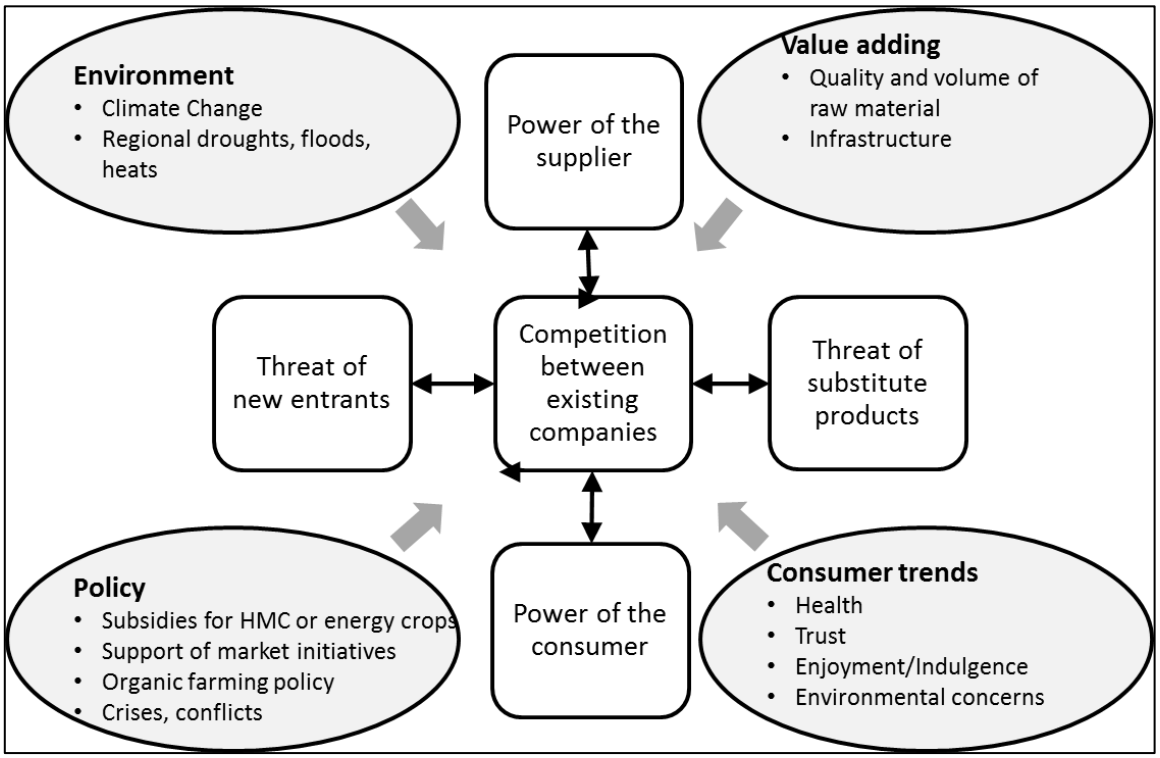

Figure 15: Factors (grey) influencing the market with minor cereals in Europe. Companies are processors and traders, suppliers are farmers and collectors of MC, customers are retailers. The same factor affects the different market actors in a different way.

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6.1 Horizontal forces in the cereal market according to Porter's framework

6.1.1 Power of suppliers

Farmers, collectors/owner of elevators and mills are suppliers in this context. To assess their power the area dedicated to minor cereal production was used as indicators.

High production shares of MC illustrate their importance to the food industry and their availability on the large-scale cereal market. Divers product products available for consumer indicate a developed market for MC.

As the European cereal production is dominated by wheat and barley. In terms of quantity and area, wheat is by far the most popular cereal grown in the EU, making up nearly half of the total arable utilized land. Of the remaining 50%, about one-third is maize and one-third barley. Other cereals (triticale, rye and oats) are grown in smaller quantities.

Out of MC, rye production is relevant in Poland and Germany and to a lower extent in Austria, Estonia and Hungary. Oats production is important in Estonia, the Czech Republic, Hungary, Poland and UK(also in Finland, Sweden and Spain). In Turkey and Italy durum wheat is relevant.

According to the EU statistics, the high cereal production is leading to saturated markets for wheat, barley, rye and oats. For rye, the situation was different from 2004 – 2006, where the self-sufficiency was only around 90%. Another exception is durum wheat; it is the only cereal with a consistent supply deficit in the EU.

On a national lever, Switzerland the lowest self-supply in cereals with 57% followed by Italy with 71%. The supply deficit is driven by the feed market. For all other countries investigated in this compilation, the self-sufficiency is higher than 90%. In the EU, lowest self-sufficiency for cereals is calculated for The Netherlands, Greece, Ireland and Portugal (CSO 2011).

EU-wide, there is a strong competition among producers, large traders and processors in the cereal sector. They compete in terms of price, product quality and diversity. The fact that the prices for oats and rye were the lowest on the large scale or XXL cereal market indicates that the power of the suppliers of these cereals is limited.

As mentioned, the market situation is different for durum wheat, where the self-sufficiency is around 90%. Here, the position of suppliers is stronger, even if there is only the pasta industry using durum wheat.

No official data on import and export of spelt, emmer or einkorn are available. Even if there is limited information about spelt, we assume that the cereal is traded internationally. In 2013/14, spelt was sold out for weeks, and the prices increased and remained high: the price for spelt in Germany rose from 498 €/t in 2013 up to 766 €/t for processors.

If these prices lead to higher prices at farm gate, spelt could become a more interesting crop for farmers. Spelt suppliers thus have a lot of market power. As the market for spelt, emmer and einkorn is still a niche, this situation can change rapidly. It only takes a few bigger producers from in or outside Europe to result in an oversupply in spelt, emmer and einkorn and a connected decrease in prices.

In the niche markets, we see strategies to strengthen the position of suppliers in a saturated market by controlling the supply chain:

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– In Switzerland, Urdinkel (ancient spelt) is mostly cultivated according to IP-Suisse (Integrated Production) guidelines, whereas in other countries, spelt is produced mainly according to organic guidelines. The "IG Urdinkel" controls the spelt market and owns the trademark "Urdinkel". Prices for spelt are interesting for producers and traders.

– Emmer, einkorn and other old varieties of wheat, rye, oats and spelt are cultivated for niche markets. Examples are Schlägler Roggen in Austria, beer made from einkorn in Hungary alakorsor.com. The supply chains are short and controlled.

– Products from old cereal varieties are often labelled organic and are only traded in sales channels for organic products e.g. Bohlsener Mühle, Alnatura or Rossmann also in Germany.

6.1.2 Power of Customer

In this study, the power of customer (or buyer) is estimated by the variety and kind of sales channels for MC and information about price. The consumers in this context are retailers, processing industry (starch production, beer), feed industry and energy companies in Europe. The consumer defined as the general public, is part of the trend analysis described in the chapter on the macro environment (see chapter 6.3)...

For oats and rye traded on the large-scale market, the food and feed industries, as well as the energy sector, are relevant customers. However, the highest prices are achieved in the food sector although buyers in the food sector try to find the highest quality for the lowest price. Hence, the power of the consumer is high.

The price for durum wheat is the highest in the European cereal market. The supply deficit for durum wheat explains the high prices. We assume that the power of the consumer is lower than in the case of rye and oats.

As mentioned already, the price for spelt increased and became more attractive for farmers. The power of the consumer is limited in the case of spelt. The production of emmer and einkorn is often organic. Most of the organic production is contract farming. Hence, the power of the consumer is limited too.

In Poland, the price for triticale was higher than the price of rye for food use. The production of triticale is more attractive than the production of MC. Hence, the price of the dominant cereals have an impact on the abundance of MC on the market.

Strategies to offset the power of customers are to organise the producers and lasting cooperation with a few traders or contract farming. Also direct marketing via farm shops, farmer markets, online shops or specialized shops are strategies to reduce competition. *Doves Farm Foods* or *The Village Bakery Melmerby* from the UK or *Azienda Agricola Dolci Giuseppina* and *Borghini* from Italy are examples for a strategy of direct marketing in niche markets.

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6.2 Vertical forces in the cereal market according to Porter's framework

6.2.1 Competition between companies:

The competition between companies is assessed by using the number and kind of competitors in the cereal market. In the large cereal market for food use, only four companies –*Archer Daniels Midland (ADM), Bunge, Cargill* and *Louis Dreyfus*, are dominant. They have contract farmers, elevators, milling, transport, processing. They control the market and supply different Customers including the feed, food additives, and energy market. They supply a few processors: *Kraft, Nestlé, Unilever,* and *General Mills*. For breakfast cereals, only one company, the *Dailycer Group* dominates the market.

We assume that these companies still compete but with low intensity. However, they are looking permanently for new consumer trends, new products, and new distribution channels.

We assume that in the national or regional large-scale markets, the diversity of actors in the cereal market is more diverse and competition is stronger (compilation of small and medium size companies in Table 9). In general, when the competition among companies is high, price or additional features like taste can attract customers, processing quality or health. The use of regionally typically produced cereals, organic production, ancient grains, use for vegan products (oats milk, meat substitutes), claims on health benefits are examples of strategies used by companies in situations of strong competition. New products made of rye, oats, durum and spelt could be an attractive option if information on additional benefits is available.

6.2.2 Threat of substitution

Products produced regionally or traditional cereals or ancient grains etc. do not challenge the mentioned companies in the large-scale market with wheat or barley. The wheat market is established and worldwide organised. The trades supply the food industry with homogenous raw material for industrial processing. In some countries (PL), rye bread consumption is decreasing, and the product is replaced by cheaper white wheat bread.

The share of minor cereals covers between 5 and 10% of the arable land. If 1% of the wheat production area would be replaced by emmer or einkorn, it would be a huge push on the market of MC while remaining within the normal fluctuations of the wheat market. The power of MC to substitute a relevant share of wheat is negligible with one exception: The substitution of wheat, but also rye, durum, spelt, happens in the growing market of "*gluten free*" products. For the small and medium size companies, especially bakeries and pasta producers, the trend toward gluten free products could be more challenging.

Oats, maize, rice, sorghum, and pseudo-cereals e.g. amaranth are used for pasta, bread or breakfast cereal production. With a narrow view to the MC investigated in this study, there is the possibility that producers could substitute rye or spelt by e.g. millet, which is also traditionally grown in Europe e.g. in Hungary. As the overall goal of the project is to enhance the cereal diversity, this is not seen as a threat.

For some companies, the production of cereals for vegan products (oats milk, meat substitutes) or pasta from emmer, spelt or durum wheat could be of interested.

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6.2.3 Danger of new entrants:

The large-scale cereal market is well organised. We do not expect new competitors able to challenge the established companies in the large-scale market.

Surprisingly, we identified situations in the niche markets, where the power of new entrants is relevant. On an informal meeting with practitioners (plant breeding sector) in Switzerland, we discussed the ancient grains or "Urgetreide" trend. It was mentioned that the protected "*Urdinkel*" is dominating the spelt market in Switzerland. The trademark excludes newly bred spelt varieties. Consequently, it is difficult to find mills, which accept new breeds of spelt. Thus, the power of new entrants is low.

Further examples are Poland, Hungary where spelt, emmer and einkorn are produced to a very low extent, but a variety of spelt, emmer, and einkorn products are available on the market. These products are available also in large international retailers like ALDI, LIDL; Eurospar. Hence, they are produced internationally and do not depend on domestic production.

We identified a supply deficit for spelt in most of the countries, and, for emmer and einkorn in some countries. Driver for this supply deficit is the trend; that the consumer is interested in regional produced ancient crops.

The situation for oats and rye is not clear. Both crops are used by the food and feed industry. The demand and prices were stable or slightly increasing during the last years. Some trend researchers expect a slight increase in the demand for oats and rye (grain and green rye) driven by the food and feed industry and for rye due to energy production (Canadian international market office 2011).

6.3 Macro environment

6.3.1 Policy:

According to national statistics, the share of MC compared to total cereals is highest in Austria. The fact, that Austrian farmers receive subsidies for the production of MC explains this difference.

In addition, subsidies for energy crops could hinder the expansion of the minor cereal production.

Conflicts and political instability affect wheat production and yield worldwide. A shortage in wheat yield and related higher prices makes the growing of MC less attractive.

6.3.2 Environment:

The global wheat production and trade also influence the European cereal market. If there is a shortage in wheat supply from Canada caused by, e.g. weather conditions, the price for wheat rises. This could make wheat production attractive for farmers, especially, if price peaks are frequent.

6.3.3 Consumer Trends:

From the consumer side, we see several trends in support of the marketing of MC mentioned in the scientific literature (Table 25). Producers and traders of MC, mainly from the niche market, are using these trends already: *Gluten-free*, *ethical*, *vegetarian*, *vegan* and *no additives* are all very popular product claims and characteristics in this developed market. From January 2011 to July 2011,

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the "no additives/preservatives claim" was the most popular for bakery and desserts in Western Europe according to the Canadian international market office. The most popular product claims for breakfast cereals were "wholegrain" and "high/added fibre" (Canadian international market office 2011).

Table 25: Opportunities for the marketing of MC based on consumer trends and ways of implementation

Factor	Trends	Implementation
Environmental concerns	Organic, sustainability	MC production according to organic guidelines Promote the environmental benefits
	(Agro-)biodiversity, environmental protection, conservation of species (animal, plants)	
Health	Health and nutrition, "Hildegard von Bingen" Health recommendations, High fibre content; Whole grain,	Develop products, incl. fast food containing MC Use reliable health claims
	Gluten-free	Promote oat products as gluten free
	Vegan/vegetarian	Cereal based drinks and meat substitutes
	No additives	Avoid, reduce additives
	Retrophilia "back to the roots",	Name plant variety and speciality,
Enjoyment	Taste, new texture, flavour, colour	Do not forget taste, flavour, There are consumers just interested in taste
	Wellness, pleasure	
Trust	Social, hand-made, quality	Trends for craft bakeries Reduce processing Speak about short supply chains Products for tourists/migrants, tell stories Cooperation with regional farmers
	Authenticity, credibility	
	Regional	
	Traditional, heritage, history	
	Ethical, social responsible food sourcing	
Lifestyle	Other cuisines Uniqueness, rarity Indulgence	Use poetic names for new varieties (Lichtkornroggen) Adapt size of the package or bread loaf.
	Urbanism	Products for urban areas incl. migrants,

Table 26: Ambiguous trends for the marketing of MC, representing an opportunity but also threats for the marketing of MC

Factor	Trend	Constraint
Health	Gluten-free	With the exception of oats, MC produce gluten. Some information portals for people with coeliac disease recommend the avoidance of oats. Hence, the situation is confusion for consumers.
	Whole grain	In regions, where rye bread is part of the traditional food, the health benefit of rye is underestimated compared to whole grain products.
	Reduced calories, low carb	Cereals contain carbohydrates,
Enjoyment	Convenience	MC not yet adapted to industrial processing
	Premium/luxury	In some regions, MC food is for poor people e.g. rye bread
Trust	Region, local	Imports of MC MC produced at large scale without identification. For consumers relevant concerning fruits, vegetables, milk and cheese. Less relevant for cereals.

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Factor	Trend	Constraint
		Convenience food
	Authenticity, credibility Variety, speciality,	MC in the mass markets does not fulfil these expectations, whereas MC for niche markets are in line with it.
	Ancient grains Retrophilia, „back to the roots."	For consumer interested in ancient grains like Emmer, Einkorn, Spelt, Kamut, etc. do not accept breeding/improving these cereals
Lifestyle	Premium/Luxury Indulgence	High prices. MC stay in a niche market with high prices.
Technics/Innovation	Healthy, naturalness	European consumers link healthiness to naturalness and a low degree of processing. Conflict with large-scale markets and breeding.

However, some trends identified are ambiguous and therefore a challenge in the marketing of MC (Table 26). Even if most of the supermarkets offer a small choice of organic produce made of MC, the price for organic food is still prohibiting for most consumers and limiting the extension of the production. Organic products are seen as luxury goods and the price premiums reflect this: the price premium is about 10 – 30% (in Germany and Austria) while reaching often at 100% or more e.g. in the Czech Republic (organic market info 2015).

6.3.4 Value adding:

In this report, we did not focus on *value adding* because we did not yet analyse a company or supply chain in detail. However, in the HMC workshop held in Budapest, some participants stated, that the production of MC is a way of value adding in agriculture similar to organic. Value adding with MC could also happen through a particular production process, e.g., *organic, regionally-branded, handmade, manufactured* or product attributes like *healthy, environmental friendly, fair trade*. Claims and certification on products could increase consumers' willingness to pay a premium over similar but undifferentiated products.

Even if there is a higher price at farm gate for spelt, emmer and einkorn there are also additional costs for farmers in terms of lower yields per hectare, additional costs for dehulling, and lower quantities traded. The specialised infrastructure needed to process and trade low volumes of MC increases the price.

Schelske et al. (2003) calculated the additional cost for bread when wheat is replaced with emmer. The price for emmer is 50% higher than that for wheat. This leads to a higher price for the end product of 3% to cover the costs. In Germany, the price of specialty bread (made of emmer, einkorn, kamut) in 2013 was 10-20% higher than bread made of spelt. This indicates a certain willingness to pay (Lehmann 2013).

Consumers' willingness to pay higher prices is given when the product quality is high. Trustful labels, which indicate the place of origin or way of production enhance the willingness to pay for higher products. Traditional food products have a positive image among consumers in Europe. Consumers appreciate taste, quality, appearance, nutritional value, healthiness and safety of traditional food and accept the relative expensiveness and time-consuming preparation.

Consumers are reluctant to acceptance of unfamiliar food. Hence, in the context of new products or dishes containing MCs it is important to sufficiently inform consumers about these products.

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Price is relevant for the consumer. There are only some studies available on the willingness to pay for bread, beer or pasta. From Hellyer et al, (2012) who investigated the willingness to pay for a loaf of bread in the UK, we can conclude, that consumers prefer whole grain bread as food to provide health benefits. Thus, despite the ability of bakers to make a healthier white bread, consumers did not appear willing to pay more for this product compared to bread that already contains whole grain. The same willingness to pay exists for organic products or product labelled as "*regional*", "*traditional*".

However, consumer behaviour and foods markets in Central and Western European countries differ. Consumers do not have the same prerequisites. Price, well as food quality play an important role in Central Europe.

6.4 Validation of results in an expert workshop

Based on the Porter analysis and literature research, first factors supporting or constraining the marketing of MC were identified. The project partners (consisting of researchers and SME) validated this compilation during a workshop held at the second general assembly of the HMC project in November 2014 (see Annex 15Detailed outcome of the Workshop).

Based on the findings from the workshop, some elements were added to figure 15 (Figure 16).

6.4.1 Power of supplier

– The availability of **seeds** of MC is a relevant bottleneck for farmers. Due to the small area planted with MC, the attractiveness for seed companies is limited.

– Seeds need to be improved. This includes *(i)* resistances to pathogens, *(ii)* reduced logging, *(iii)* high, stable yields, *(iv)* quality adapted to industrial processing. If large-scale markets are aimed at, reduced plant height is important.

– Farmers and breeders interested in ancient cultivars/heritage cultivars have difficulties in accessing them.

– The potential of MC in the feed market could not be assessed on the basis of the available information. Still, animal health issues could be relevant for future marketing of MC.

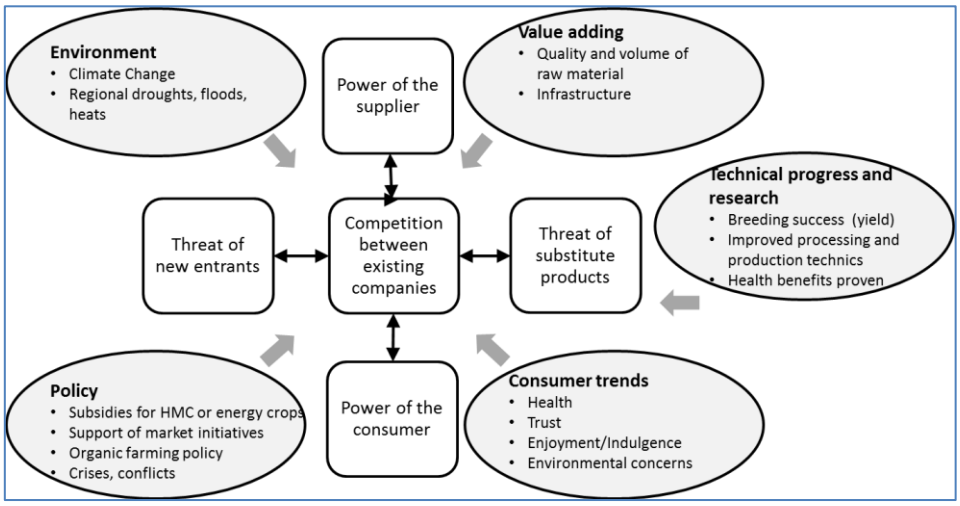

Figure 16: Factors (grey) influencing the market with minor cereals in Europe based on figure 13 with additional information from the validation workshop. The same factor impacts the different market actors in a different way.

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6.4.2 Value adding:

– The costs are especially high for pioneer farmers and processors. The additional costs can be covered in the niche markets, where the earnings are higher than in large scale or XXL markets.

– In relation to higher costs, dehulling for spelt, emmer and einkorn but also for oats is relevant. In regions, where dehulling is not feasible, the costs rise and the attractiveness of the crop for farmers and processors declines.

– A difficulty is perceived to communicate the added value of MC like spelt, emmer and einkorn in a mass market

6.4.3 Technical Progress and Research (Innovation)

– Seeds of MC need to be improved. This includes *(i)* resistances to pathogens, *(ii)* reduced logging, *(iii)* high, stable yields, *(iv)* quality adapted to industrial processing. If large-scale markets are aimed at, reduced plant height is important.

– The successful cultivation of MC needs experience, knowledge but also new machinery. Therefore, training and information for farmers is needed but also technical improvements

– Information about benefits of MC for human health, environment but also in crop rotation and marginal areas must be available.

– For industrial processing, the heterogeneous quality of minor cereals is a relevant obstacle.

– Some MC are difficult to process. Adapted technology is needed but not available.

6.4.4 Consumer Trends

– Consumer trends like healthy eating, ancient grains, whole grains, taste and texture are seen as supporting the marketing of MC. On the contrary, gluten free could be a challenge. Most of the consumers do not know about the benefits of MC and just specialists or gourmets are informed about their quality.

– Consumers trust in products produced regionally and short supply chains.

– MC, regionally produced, are products for niche markets. Discounters and supermarkets cannot communicate in particular the additional benefit of them.

– MC with a special heath aspects, could be offered to the consumers also via supermarkets and discounters.

– Surprisingly, the product price is not seen as a relevant factor for the marketing of MC.

– The general tendency toward pig and chicken meat could open an opportunity for cereal producers in the feed market. If it will be a future market for MC producers remains unclear.

6.4.5 Environment

– Poor soils

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6.5 Conclusions for the next step in the project

The first market potential of MC is identified in countries in which products made of spelt, oats and rye are available on the large-scale market, with only a small portion coming from domestic production (Table 27). This demand on a national level could be a promising market potential for producers of MC, especially combined with the trend of consumers looking for regional, hand-made, healthy products.

Nevertheless, for producers of MC, the niche market seems to be the most promising first step when marketing MC. The large scale or XXL markets increase the availability to consumers, but the price is low.

There are several consumer trends in support of MC. However, it could be different in different European regions. For a successful marketing, these trends can be used.

There are several consumer trends in support of MC. However, the could vary to some extent in different European regions. But based on the data collected, we conclude, that some trends occur overall in Europa, especially healthy food, low pesticide, convenience, regional/local food, higher quality/indulgence, sustainable/organic production. For a successful marketing, these trends could be used

– In niche markets: regional products, short supply chains, manufactured, high quality, environmental friendly, sustainability, indulgence

– MC with a special heath aspects, convenient or “pesticide free”, could be offered to the consumers also via supermarkets and discounters.

Besides the consumer trends, also other factors e.g. policy instruments, infrastructure, seed availability are relevant (Figure 16).

In the next step of the HMC project, we will investigate these findings on market potentials and influencing factors further by studying specific cases of MC marketing projects in four countries: Switzerland, because of the importance of spelt; Estonia, Hungary and the Czech Republic, because there is a growing market and SME and breeders are interested in MC.

In the planned case studies, we will use the information from this investigation as a background, and we will discuss the findings with the relevant experts and stakeholders.

From all the information gathered during this first project phase, we conclude, that there are several topics, relevant for the marketing of MC. Consumer trends. Policy and available infrastructures are among them.

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Table 27: Comparison of MC production (area dedicated to MC production) and MC product market (trade) in different European countries. If the production is small scale (< 2%), but the products are traded on the large scale market, we assume a potential supply deficit, currently covered by imports, mostly from within the EU. By using the trend for regional or domestic produces food, there is a market potential for some MC in some countries. However, as the member states of the EU have an open market, this potential is limited. ◗: Niche/small scale (market), < 2 % of the arable used land covered with MC; ●large scale (market); > 2% of the arable used land covered with MC; ○ no data on area/no market. → market saturation, balanced market, ↗ supply deficit.

Country	Oats			Rye			Spelt			Durum			Emmer/Einkorn		
	Area	Market	MP	Area	Market	MP	Area	Market	MP	Area	Market	MP	Area	Market	MP
Austria	●	●	→	●	●	→	◗	●	↗	◗	●	↗	○	◗	↗
Czech Republic	◗	●	↗	◗	●	↗	◗	●	↗	○	?	→	○	◗	↗
Estonia	●	●	→	●	●	→	○	◗	↗	○	?	→	○	○	→
Germany	◗	●	↗	●	●	→	◗	●	↗	◗	●	↗	○	◗	↗
Hungary	●	●	→	◗	●	↗	◗	◗	→	◗	?	→	○	◗	↗
Italy	●	◗	→	○	◗	↗		●	↗	●	●	→		◗	↗
Poland	●	●	→	●	●	→	○	◗	↗	○	?	→	○	○	→
Switzerland	◗	●	↗	◗	●	↗	●	●	→	○	●	↗	○	◗	↗
Turkey	◗	◗	→	◗	◗	→	○		→	●	●	→	○		↗
UK	●	●	→	◗	●	↗	○	●	↗	○		→	○	◗	↗

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8. Annex

Annex 1Cereal Production in the EU

Diagram 2.6: EU-27 yields per hectare of major cereal crops and rapeseed

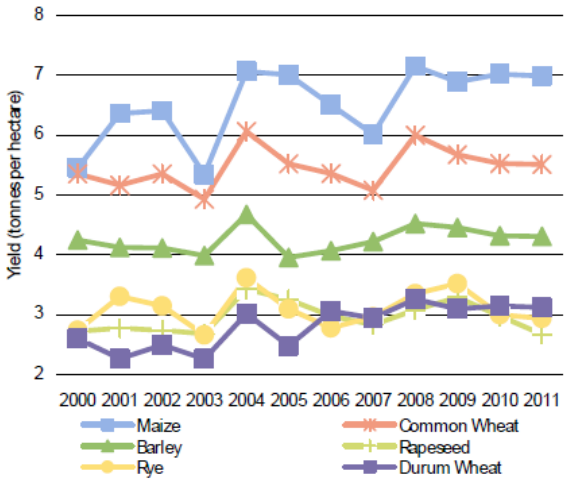
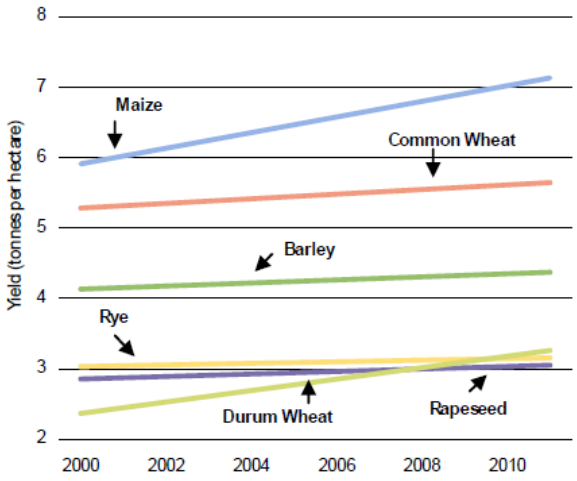


Diagram 2.7: Linear trends in EU-27 yields of major cereal crops and rapeseed



Source: Marketing year data from DG Agri, 'Prospects for Agricultural Markets and Income', December 2011; Eurostat.

Annex 2 Supply/demand balances

Table 2.5: EU-27 annual supply/demand balances for the cereals sector (million tonnes)

		2000-2003	2004-2006	2007-2010
Common wheat	Production	116.41	126.70	127.33
	Consumption	110.59	115.90	115.30
	Net Exports	6.49	8.45	14.43
	Self-sufficiency (%)	*105.3%*	*109.3%*	*110.4%*
Durum wheat	Production	8.97	10.12	8.98
	Consumption	9.52	10.63	9.66
	Net Exports	-0.54	-0.52	-0.45
	Self-sufficiency (%)	*94.2%*	*95.2%*	*93.0%*
Barley	Production	58.49	58.33	59.66
	Consumption	51.19	54.98	52.80
	Net Exports	6.97	6.09	5.72
	Self-sufficiency (%)	*114.2%*	*106.1%*	*113.0%*
Maize	Production	56.18	63.21	56.79
	Consumption	59.68	62.51	63.20
	Net Exports	-2.09	-1.82	-5.46
	Self-sufficiency (%)	*94.1%*	*101.1%*	*89.8%*
Rye	Production	9.61	7.83	8.51
	Consumption	9.49	8.66	8.25
	Net Exports	0.45	0.44	0.07
	Self-sufficiency (%)	*101.3%*	*90.4%*	*103.1%*
Oats	Production	8.99	8.29	8.38
	Consumption	8.32	8.08	8.26
	Net Exports	0.67	0.23	0.14
	Self-sufficiency (%)	*108.1%*	*102.7%*	*101.4%*

HealthyMinorCereals has received funding from the European Union's Seventh Framework Programme under grant agreement no 613609.

Annex 3: Status report MC Austria

Area (ha) Yield (dt/ha) Production (t)	Crop	2007	2008	2009	2010	2011	2012	Crop
ha	AUA (total) [1]	1'919'546	1'926'474	1'936'586	1'912'442	1'891'960	1'893'597	AUA (total)[1]
ha	Cereals	617'755	624'683	634'795	610'651	590'169	591'806	Cereals
ha dt/ha t	Common Wheat [2]	271'340 49.0 -	271'997 58.0 -	282'604 50.7 -	276'266 51.2 1'414'150	280'056 59.9 1'677'311	284'870 42.4 1'207'980	Common Wheat[2]
ha dt/ha t	Durum[2]	15'418 34,5 -	17'874 51.1 -	16'865 39.5 -	17'503 45.0 78'733	15'315 50.9 77'999	14'248 30.7 43'681	Durum[2]
ha dt/ha t	Barley[3]	193'332 - -	185'857 - -	181'525 - -	168'892 46.1 777'960	153'285 56.1 859'374	150'576 44,0 662'465	Barley[3]
ha dt/ha t	Oats[4]	31'125 31.8 -	26'571 40.7 -	27'600 39.6 -	26'576 36.8 97'889	25'029 43.9 109'807	24'815 37.7 93'491	Oats[4]
ha dt/ha t	Rye	46'702 40.4 -	53'171 41.1 -	48'528 37.8 -	45'699 35.3 161'148	45'943 44,0 202'002	48'525 42.2 204'697	Rye
ha dt/ha t	Spelt	6'218 26.2 -	6'905 28.5 -	9'566 26.3 -	9'082 27.4 24'921	8'963 29.6 26'527	9'062 26.3 23'836	Spelt
ha dt/ha t	Emmer/Einkorn[5]	750 - -	1210 - -	1318 - -	552 - -	689 - -	830 - -	Emmer/Einkorn[5]

HealthyMinorCereals has received funding from the European Union's Seventh Framework Programme under grant agreement no 613609.

Annex 4 Status report MC Switzerland

Area (ha) Yield (dt/ha) Production (t)	Crop	2007	2008	2009	2010	2011	2012	Crop
ha	AUA (total)		325'267	319'456	314'886	305'693	308'447	AUA (total)
ha	Cereals (total)		138'512	136'225	134'614	129'719	130'772	Cereals (total)
ha dt/ha t	Common wheat[1]		88'433 - -	87'930 - 394'622	86'910 - 376'028	83'535 - 405'729[2]	85'387 - 393'307	Common wheat[1]
ha dt/ha t	Durum		- - -	- - -	- - -	- - -	- - -	Durum
ha dt/ha t	Barley[3]		32'958 - -	30'891 - 193'720	28'949 - 169'920	28'336 - 179'355	28'454 - 179'948	Barley[3]
ha dt/ha t	Oats[3]	- 58.2 -	1'861 59.0 -	1'917 60.7 9'868	1'789 56.8 7'948	1'682 63.9 7'678	1'642 58.5 7'781	Oats[3]
ha dt/ha t	Rye	- 56.7 -	2'014 60.1	2'495 63.6 14'273	2'248 61.0 10'072	1'928 66.1 8'086	1'771 59.2 7'699	Rye
ha dt/ha t	Spelt	- 39.6 -	2'822 39.4 -	3'288 37.9 11'090	4'136 38.9 12'826	4'164 44.3 17'408	3'680 37.4 12'550	Spelt
ha dt/ha t	Emmer/Einkorn	- - -	- 39.3 -	- 37.9 229	- 38.9 280	- 44.4 409	- 38.4 454	Emmer/Einkorn

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Annex 5 Status report MC Czech Republic

Area (ha) Yield (dt/ha) Production (t)	Crop	2007	2008	2009	2010	2011	2012	Crop
ha	AUA (total)	5'525'070	5'400'866	5'582'212	5'474'164	5'403'224	5'412'344	AUA (Total)
ha dt/ha t	Cereals (total)		1'468'125 53.7 8'369'503	1'444'891 50.8 7'831'998	1'436'412 47.0 6'877'619	1'359'478 56.0 8'284'806	1'335'102 45.3 6'595'493	Cereals (total)
ha dt/ha t	Common Wheat		802'325 57.7 4'631'502	831'300 52.4 4'358'073	833'577 49.9 4'161'553	863'132 56.9 4'913'048	815'381 43.2 3'518'896	Wheat (total)[1]
ha dt/ha t	Durum		- - -	- - -	- - -	- - -	- - -	Durum
ha dt/ha t	Barley		482'395 46.5 2'243'865	454'820 44,0 2'003'032	388'925 40.7 1'584'456	372'780 48.7 1'813'679	382 330 42.3 1 616 467	Barley
ha dt/ha t	Oats		49'049 31.8 155'868	50'021 33.2 165'993	52'278 26.4 138'244	45'236 36.3 164'248	50'770 33.9 171'976	Oats
ha dt/ha t	Rye		43'399 48.3 209'787	38'453 46.3 178'070	30'249 39.1 118'233	24'985 47.4 118'456	30'557 48.1 146'962	Rye
ha dt/ha t	Spelt[2]		- - -	2'560 28.2 6'586	2'232 29.1 6'136	2'158 27.5 5'638	- - -	Spelt[2]
ha dt/ha t			- - -	- - -	- - -	- - -	- - -	Emmer/Einkorn

HealthyMinorCereals has received funding from the European Union's Seventh Framework Programme under grant agreement no 613609.

Annex 6 Status report MC Estonia

Area (ha) Yield (dt/ha) Production (t)	Crop	2007	2008	2009	2010	2011	2012	Crop
ha	AUA (total)	871'900	886'700	883'000	877'544	882'479	859'448	AUA (total)
ha[1] dt/ha t	Cereals (total)	292'300 30.1 879'500	309'300 27.9 864'200	316'400 27.6 873'500	275'300 24,6 678'400	297'000 26.0 771'600	290'500 34,1 991'200	Cereals (total)
ha[1] dt/ha t	Common Wheat	99'500 - 345'800	107'600 - 342'500	113'600 - 342'500	119'400 - 327'600	128'400 - 360'200	124'300 - 484'700	Wheat (total)
ha[1] dt/ha t	Durum	0- - 0-	0- - 0-	0- - 0-	0- - 0-	0- - 0-	0- -' 0-	Durum
ha[1] dt/ha t	Barley	144'200 - 362'700'	143'700 - 349'100	140'700 - 377'000	104'800 - 254'800	118'300 - 295'000	109'000 - 341'300	Barley
ha[1] dt/ha t	Oats	31'500 27.1 85'200	34'200 22.6 77'500	36'100 23.9 86'500	30'400 17.9 54'500	28'400 22.1 62'800	31'800 24,7 78'400	Oats
ha[1] dt/ha t	Rye	16'800 36.2 61'000	21'400 30.7 65'600	15'300 25.6 39'100	12'600 19.8 25'000	13'300 23.3 31'000	16'900 33.8 57'100	Rye
ha dt/ha t	Spelt				243'882 276'173	179'412' 211'73	148'062 205'163	Spelt
	Emmer/Einkorn	-	-	-	-	-	-	Emmer/Einkorn

HealthyMinorCereals has received funding from the European Union's Seventh Framework Programme under grant agreement no 613609.

Annex 7 Status report MC Germany

Area (ha) Yield (dt/ha) Production (t)	Crop	2007	2008	2009	2010	2011	2012	Crop
ha	AUA (total)	18'047'000	18'450'000	18'338'000	17'946'000	17'855'500	17'808'000	AUA (total)
ha	Cereals (total)	6'170'000	6'518'000	6'393'000	6'099'000	5'981'500	5'974'000	Cereals (total)[1]
ha	Common Wheat	2'985'000	3'207'000	3'164'000	3'255'000	3'212'500	3'027'000	Common Wheat
ha dt/ha t	Durum	8'000	6'000	11'000	21'000	15'000 47.3 73'000	12'000 49.2 57'000	Durum
ha dt/ha t	Barley	1917000	1962000	1878000	1641000	1'598'000 54,7 8'734'000	1'678'000 61.9 10'391'000	Barley
ha dt/ha t	Oats	178000	179000	163000	141000	143'000 43.7 627'000	145'000 52.0 757'000	Oats
ha dt/ha t	Rye[2]	681000	747000	759000	627000	614'000 41.1 2'521'000	709'000 54,7 3'878'000	Rye[2]
ha dt/ha t	Spelt[3,4]	- - -	- - -	21'000 - -	22'000 - -	20'500 - 69'000	18'000 - 69'000	Spelt[3,4]
ha dt/ha t	Emmer/Einkorn[3]	- - -	- - -	- - -	- - -	- - -	- - -	Emmer/Einkorn[3]

HealthyMinorCereals has received funding from the European Union's Seventh Framework Programme under grant agreement no 613609.

Annex 8 Status report MC Hungary

Area (ha) Yield (dt/ha) Production (t)	Crop	2007	2008	2009	2010	2011	2012	Crop
ha	AUA (total)	4'297'000	4'473'000	4'566'000	4'117'602	4'131'602	4'324'643	AUA (total)
ha	Cereals (total)	1'532'000	1'565'000	1'684'000	1'522'602	1'453'602	1'566'643	Cereals (total)
ha dt/ha t	Common Wheat (total)	1'111'000 35.9 3'987'000	1'130'000 49.8 5'631'000	1'146'000 38.5 4'419'000	1'011'000 37.1 3'745'000	978'000 42.0 4'107'000	1'070'000 37.5 4'011'000	Wheat (total)
ha dt/ha t	Durum[2]				13'512 32.7 44'160	13'512 32.7 44'160	12'214 37.4 45'633	Durum[2]
ha dt/ha t	Barley	321'000 31.7 1'018'000	330'000 44,5 1'467'000	321'000 33.2 1'064'000	281'000 33.6 944'000	261'000 37.8 988'000	275'000 36.2 996'000	Barley
ha dt/ha t	Oats	60'000 20.9 125'000	61'000 29.7 182'000	52'000 21.3 111'000	51'000 23.2 118'000	54'000 24,1 129'000	53'000 25.9 137'000	Oats
ha dt/ha t	Rye	40'000 20.4 81'000	44'000 25.8 112'000	40'000 18.1 73'000	37'000 21.1 78'000	33'000 23.0 75'000	35'000 22.4 79'000	Rye
ha dt/ha t	Spelt[2]				3'062 20.5 6'272	3'062 20.5 6'272	4'333 30.0 12'996	Spelt[2]
ha dt/ha t	Emmer/Einkorn[1,2]				28 5.7 16	28 5.7 16	96 21.4 206	Emmer/Einkorn[1,2]

HealthyMinorCereals has received funding from the European Union's Seventh Framework Programme under grant agreement no 613609.

Annex 9 Status report MC Italy

Area (ha) Yield (dt/ha) Production (t)	Crop	2007	2008	2009	2010	2011	2012	Crop
Ha	AUA (total)		7'610'000	6'612'000	6'267'000	6'468'000	6'238'000	AUA (total)
ha	Cereals (total)		2'823'000	2'326'000	2'286'000	2'190'000	2'281'000	Cereals (total)
ha dt/ha[1] t	Common Wheat		702'000 - 3'746'800	568'000 - 2'929'100	572'000 - 2'952'800	531'000 - 2'828'800	593'000 59.0 3'499'100	Common Wheat
ha dt/ha[1] t	Durum		1'587'000 - 5'113'200	1'254'000 - 3'605'600	1'257'000 - 3'824'500	1'194'000 - 3'793'100	1'258'000 33.1 4'160'600	Durum
ha dt/ha[1] t	Barley		330'000 - 1'236'700	307'000 - 1'049'200	274'000 - 990'700	269'000 - 949'500	246'000 38.2 939'500	Barley
ha dt/ha[1] t	Oats		148'000 - 356'100	134'000 - 314'400	114'000 - 279'200	127'000 - 299'300	120'000 24.4 292'900	Oats
ha dt/ha[1] t	Rye		5'000 - 10'800	4'000 - 12'200	5'000 - 13'900	5'000 - 14'400	5'000 32.2 16'100	Rye
ha dt/ha t	Spelt		-	-	-	-	-	Spelt
ha dt/ha t	Emmer/Einkorn		-	-	-	-	-	Emmer/Einkorn

HealthyMinorCereals has received funding from the European Union's Seventh Framework Programme under grant agreement no 613609.

Annex 10 Status report MC Poland

Area (ha) Yield (dt/ha) Production (t)	Crop	2007	2008	2009	2010	2011	2012	Crop
Ha	AUA (total)				17'626'000	17'776'000	17'308'000	AUA (total)
ha[1]	Cereals (total)				7'303'000	7'470'000	7'161'000	Cereals (total)
ha[1] dt/ha t	Common Wheat				2'142'000[2] 43.9 9'408'100	2'259'000 41.3 9'339'200	2'077'000 41.4 8'607'600	Wheat
ha dt/ha t	Durum				-	-	-	Durum
ha[1] dt/ha t	Barley				974'000[2] 34,9 3'397'200	1'018'000 32.7 3'325'900	1'161'000 36.0 4'180'200	Barley
ha[1] dt/ha t	Oats				577'000[2] 26.3 1'516'500	546'000 25.3 1'381'600	514'000 28.6 1'467'900	Oats
ha[1] dt/ha t	Rye				1'063'000[2] 26.8 2'851'700	1'085'000 24,0 2'600'700	1'042'000 27.7 2'888'100	Rye
ha dt/ha t	Spelt				-	-	-	Spelt
ha dt/ha t	Emmer/Einkorn				-	-	-	Emmer/Einkorn

HealthyMinorCereals has received funding from the European Union's Seventh Framework Programme under grant agreement no 613609.

Annex 11Status report MC Turkey

Area (ha) Yield (dt/ha) Production (t)		2007	2008	2009	2010	2011	2012	Crop
ha	AUA (total)	25'219'935	24'327'406	24'409'281	24'595'802	24'263'788	22'825'774	
ha[1] dt/ha[3] t	Common Wheat	6'743'200 21.3 17'234'000	6'750'000 22.0 17'782'000	6'765'200 25.4 20'600'000	6'769'400 24,3 19'674'000	6'758'000 26.9 21'800'000	6'339'604 26.7 20'100'000	Common Wheat
ha dt/ha t	Durum	1'354'500 20.0 2'709'000	1'340'000 20.8 2'782'000	1'335'000 28.0 3'740'000	1'334'000 25.9 3'450'000	1'338'000 28.8 3'850'000	1'190'036 27.7 3'300'000	Durum
ha[1] dt/ha[3] t	Barley	3'428'017 21.3 7'306'800	2'950'000 20.1 5'923'000	3'010'000 24,3 7'300'000	3'040'000 23.8 7'250'000	2'868'833 26.5 7'600'000	2'748'766 25.8 7'100'000	Barley
ha[1] dt/ha[3] t	Oats	94'477 20.0 189'099	91'036 21.5 196'099	92'778 23.5 218'286	88'390 23.1 203'870	85'863 25.4 218'040	89'327 23.5 210'000	Oats
ha[1] dt/ha[3] t	Rye	132'778 18.1 240'540	125'962 19.6 246'521	138'778 24,7 343'330	141'000 25.9 365'560	127'653 28.7 365'750	143'222 25.8 370'000	Rye
ha[1] dt/ha[3] t	Spelt	0	0	0	0	0	0	Spelt
ha[1] dt/ha[3] t	Emmer/Einkorn	4'450 15.7 6'977	4'481 16.4 7'361	4'562 16.5 7'524	3'878 19.8 7'675	3'516 20.0 7'018	3'988 16.5 6'565	Emmer/Einkorn[4]

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Annex 12Status report MC UK

Area (ha) Yield (dt/ha) Production (t)	Crop	2007	2008	2009	2010	2011	2012	Crop
ha	AUA (total)	9'102'095	9'344'489	9'167'279	9'028'479	9'181'284	9'399'577	AUA (total)
ha	Cereals (total)	2'887'000	3'274'000	3'075'000	3'013'000	3'075'000	3'142'000	Cereals (total)
ha dt/ha t	Common Wheat	1'830'000 72.0	2'080'000 83.0 17'227'000	1'775'000 79.0 14'076'000	1'939'000 77.0 14'878'000	1'969'000 77.0 15'257'000	1'992'000 67.0 13'261'000	Common Wheat
ha dt/ha t	Durum[4]	-	-	-	-	-	-	Durum[4]
ha dt/ha t	Barley	898'000 57.0	1'032'000 60.0 6'144'000	1'143'000 58.0 6'668'000	921'000 57.0 5'252'000	970'000 57.0 5'494'000	1'002'000 55.0 5'522'000	Barley
ha dt/ha t	Oats	129'000 55.0	135'000 58.0 784'000	129'000 58.0 744'000	124'000 55.0 685'000	109'000 56.0 613'000	122'000 51,0 627'000	Oats
ha dt/ha t	Rye	27'000 57.0	27'000 61,0 -	28'000 66.0 -	29'000 63.0 -	27'000 54,0 -	26'000 52.0 105'000	Rye
ha dt/ha t	Spelt[4]	-	-	-	-	-	-	Spelt[4]
ha dt/ha t	Emmer/Einkorn[4]	-	-	-	-	-	-	Emmer/Einkorn[4]

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Annex 13 Additional information on Porter's five force analysis

According to Porter, a company interested in increasing their market share of MC could use the following information in order to reduce a threat of a new entrant:

- Are there barriers to entry the markets (patents, rights, etc.). The most attractive segment is one in which entry barriers are high and exit barriers are low. Few new firms can enter and non-performing firms can exit easily.
- Government policy in support or in favour of the new product
- Price, costs and investment needed
- Economies of scale
- Expected retaliation
- Access to distribution
- Customer loyalty to established brands
- Profitability (the more profitable the industry the more attractive it will be to new competitors).

In the context of MC, we are interested in the wheat market, because wheat is a substitute for MC. The threat of substitute products is characterized by the following factors:

- Buyer interest to substitute
- Relative price performance of substitute
- Number of substitute products available in the market
- Ease of substitution
- Quality depreciation

Porter also describes the power of suppliers. Suppliers of unique raw materials and components to a company have a certain power especially when there are just a few substitutes. If a company is producing Emmer beer and there is only one company, who supplies the Emmer, there is no alternative but to buy it from them. Therefore potential factors are:

- Supplier switching costs relative to firm switching costs
- Impact of inputs on product
- Presence of substitute inputs
- Strength of distribution channel
- Supplier concentration to firm concentration ratio
- Employee solidarity (e.g. labor unions)
- Supplier competition: the ability to forward vertically integrate and cut out the buyer.

And Porter also describes the power of the consumer by using the following factors:

- Channels of distribution
- Buyer information availability
- Availability of existing substitute products
- Buyer price sensitivity
- Differential advantage (uniqueness) of products

But for most industries the intensity of competitive rivalry is the major determinant of the competitiveness of the industry. Potential factors are:

- Sustainable competitive advantage through innovation
- Level of advertising expense
- Powerful competitive strategy
- Degree of transparency

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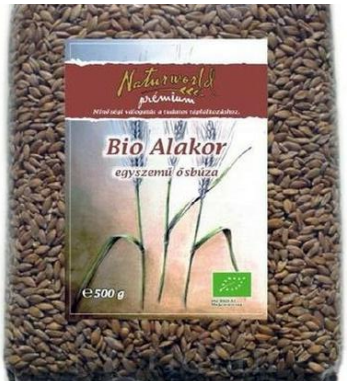
Annex 14 Example Hungary: Products made of Einkorn an Emmer from

Einkorn bakery products from Piszkei Öko Ltd., the organic bakery participating in the research project.

Manufactured by: Piszkei Öko (HU)



http://www.agroinform.com/aktualis/Feltamasztottak-az-osi-alakor-buzafajtat/20131018-22934/

http://www.dolcevitakonyha.hu/index.php/elelmiszer/liszt/monococcum-1-kg.html

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SPELT:

Spelt crackers (Ingredients: wholemeal spelt flour, water)(product in HU)

Spelt breakfast flakes (made in Hungary) http://www.biopont.com/en/home

Oat and spelt cookies (made in Hungary) http://www.biopont.com/en/home

Buttery Spelt "Pogácsa"(Ingredients: whole wheat spelt flour, sour cream, butter, yeast, sesame-seeds, himalaya salt) Manufactured by: Ballagó Attila (HU)

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Wafer with Almond Ballagó (Ingredients: malt syrup*, whole wheat spelt flour*, coconut oil, almond, carob*, water, soya lecithin, sodium bicarbonate) Manufactured by: Ballagó Attila (HU)

Organic Rolls with Pumpkin seeds (Ingredients: wholewheat spelt flour*, water, palmoil*, pumpkin seeds*, yeast, seasalt) Manufactured by: Piszkei Öko (HU)

Diffrent wholewheat spelt flour bread Manufactured by: Piszkei Öko (HU)

Pasta1 (Ingredients: spelt flour*, spinach*, tomato*, water) and Pasta2 (Ingredients: organic wholewheat spelt flour, water) Product of Hungary

HealthyMinorCereals has received funding from the European Union's Seventh Framework Programme under grant agreement no 613609.

RYE:

rye products Manufactured by: Piszkei Öko (HU)http://biobarlang.hu/spd/bio_15207/Etkezesi-rozs-korpa-bio-Piszkei-Oko-250-

Teabiscuit with Rye Ballagó (Ingredients:whole wheat rye flour*, water, honey, sesame seeds, coconut oil, shredded coconut, sodium bicarnonate, vanilla) Manufactured by: Ballagó Attila (HU)

Rye Pasta (Összetevők: bio rozsliszt, ivóvíz) manufactured: HU

HealthyMinorCereals has received funding from the European Union's Seventh Framework Programme under grant agreement no 613609.

Annex 15Detailed outcome of the Workshop

Factor		
Markets/		
Breeding/Seed Market		– Low suitability of the crop for breeding success – No availability of seeds in the market – Competition between old varieties and new bred varieties
Cultivation	Minor cereals have unhulled grains, husks protect grains against external influences, e.g. microorganisms, mycotoxins, radioactivity, etc. Contaminants are removed with husks during peeling	– No suitable form to reach the farmers, and no education of farmers – Seeds affordable – Seeds available and sold by large companies – Technology for seeding not available – Grow well in extensive production systems give benefit for organic production – Low yields and therefore lower income for farmers
Distribution	Adapted logistics and distribution	Investment in new logistics necessary
Marketing	For oats and rye: possibility to enter the feed market Strong interest of large and small traders in MC	– Small quantities of different MC Varieties and therefore unpredictable quality – Feed market not interesting due to low prices Constant large supply and high quality – Higher price for raw material – Higher costs for processing – Price not affordable for consumer
Processing	Novel processing technologies available Infrastructure for dehulling and storage	
Price/Costs	Low price for raw material and products for processors Price premiums/Subsidies for MC	Low prices for farmers
Retail		Producers, suppliers, retailers on the MC supply chain are often not organised in a market initiative to establish a reliable supply chain for MC Production for own consumption and grain collection not organised I International buyers looking for large quantities

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		Regional or national actors
Consumer	Proven health benefits for advertising Information on use and advantages of MC available for consumer Give children taste experience MC fit in main consumer trends like – healthy food, – regionally produced food, – traditional products, – wheat intolerance – taste diversity	No data on health available Communication of added values are difficult
Policy	EU wide/national governments support (as for biofuels) Subsidies/policy for the growing of MC	MC contribute to health nutrition, but one "can not feed the world with emmer and einkorn". Subsidies for energy crops (maize) or high yielding crops
Research	Improvement of agronomic characteristics - plant height - high yields Innovative, healthy products Genetic improvement also for processing Identification of healthy compounds Data on health effects and biodiversity Breeding to achieve – higher yields and yield stability. – Lodging-resistance robust varieties	Lack of interest Breeders do not know what the market, processors and retailers are looking for. Hence it is impossible to meet their needs if nobody knew them.

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Large Scale Markets	Support	Restraint
Breeding		
Seed Market		
Cultivation		
Infrastructure		
Price		
Traders		
Distribution/Logistics	Organisation of distribution Integrated logistics Involvement of supermarkets	
Retail		Producers not organised or scatterd in a large area.
Policy		
Research	–	
Processing	Adapted technology to process/mill MC	Technology to process/mill MC are not available The food industry optimized all the processes for wheat. They need to adapt them to MC, which is cost intensive and time consuming. No stable quality
Consumer	–	Avoidance of all gluten cereals*"Gluten free"* Low acceptance of new products (taste, colour) Access to information Lack of data on health issues MC are "Poor food for poor people"
Niche Markets		
Seed Market	Access/availability to ancient/heritage cultivars	
Breeding		High cost, low income and therefor high risk
Cultivation	Information/trainings for farmers about MC Info on rotational benefits	No seeds available High price for seeds No knowledge about production of some varieties. For early adopters high costs

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Price	Niche markets supports high prices	
Processing	New product development Diversification of use (Bread, bakery products) Suitability for local/regional dishes	
Policy	Import barriers Support for breeders to supply the market with seeds Focused subsidies for MC	
Organisation of distribution	Reliable customers Reliable supply chain for farmers Access to markets	Small producer – small quantities – small potential Missing link between producers and consumer Health benefits of MC cant be described on package
Research	Evidence for health/taste benefits	No budget for research on health effects of MC MC producers are to weak against market leaders
Marketing	Education of consumers (e.g. about health, taste, benefits, processing) Additional "organic and local label" Shop assistant training on benefits and potential usage of MC	Shop assistant do not introduce HMC to consumers Small product line No money for advertisement MC do not belong to food habits/traditional dishes

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Annex 16: History of rye breeding in Poland

Rye improvement by breeding in Poland has a long and a rich tradition. The first known rye cultivar *Szklane* was grown in 1835 on Suchorzewski farm nearby Września in Western Poland. The first plant breeding companies that also were involved in rye breeding were established in 1880 by Władysław Żeleński in Grodkowice nearby Cracow and by Aleksander Janasz in Dańkow. Cultivars with an epithet *Dańkowskie* are known for more than a century.

Dańkowskie Selekcyjne was the first cultivar released after a purposeful crossing of parental forms. This cultivar was grown commercially over 90 years and despite of its withdraw from the Polish register in 1988 it is still being met on farmers' fields in Poland. The other cultivar *Dańkowskie Złote* was released in 1968 and it is being cultivated. Its shares in commercial and certified seed production in 1999 and 2000 were 49.4% and 71%, respectively. So far, over 80 rye cultivars were under production in Poland. Up to 1995, these were in great majority population type cultivars.

Because of this fact, Poland has been well known from population rye breeding. Population rye cultivars from Poland are in the registers and on the fields of many countries around the world.

POZNAŃ Plant Breeding Company, Ltd., DANKO Plant Breeding Co. Ltd. and SMOLICE Plant Breeding Company, Ltd. of IHAR are the main breeders and competitors since 1950s. In 2001, twenty one rye cultivars were officially registered in Poland 7 released by DANKO plant breeders, 4 by POZNAŃ plant breeders, 6 by SMOLICE plant breeders, and 3 were of German origin.

The first hybrid rye cultivar was registered in Poland by German breeders in 1995 under the name *Marder*. Afterwards, other hybrid cultivars have been releasing on Polish market. These were: *Esprit* (1996), *Nawid* (1998), *Luco* (1999), *Klawo* and *Ursus* (2000). Among registered cultivars, only one is of the spring type. In conclusion, it should be pointed out that the rye production technology in Poland is extremely extensive what delays the introduction into commerce modern high yielding population and hybrid cultivars. This way the genetic yielding potential of cultivars is not properly utilized what stops the release of new cultivars and the development of rye breeding technology. Average rye grain yields in Poland under regular production conditions are 29% to 40% lower as compared to experimental cultivar testing ones. Thus, there is an urgent need to improve not only the crop itself but also its production as well as grain handling, marketing and utilization technologies. It is also to underline that the situation results also from low incomes of farms.

If farmers would get higher incomes, they would also be more willing to introduce modern production technologies in their farms.

Oat breeding in Poland started at the end of 19th century. Oats was mainly cultivated as animal feedstuff. Oat growing area at that time was much bigger than now due to a large number of horses being kept. Before the Second World War oat was grown on the area of over 2 million ha. The first Polish oat varieties were: *Sobieszyński*, *Najwcześniejszy Niemierczański* and *Teodozja*. Varieties developed in the third decade of the 20th century were grown up to the eighth decade (cv. Biały Mazur and Udycz Żółty). In 1975 and 1976, no Polish oat varieties were in the register. New good varieties were entered to the register starting from 1979. Among them were Markus and Dragon, the most important in Polish agriculture after 1980.

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