

# From research to consumer...



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The multidisciplinary HealthyMinorCereals project responds to consumers' increasing demands for healthy, nutritious, and innovative food produced sustainably

The area used for cereal production (incl. grain maize) is about 57 million ha and decreasing slightly across the EU since 2008. Even if there are regional differences, common wheat (*Triticum aestivum*), grain maize (*Zea mays*) and barley (*Hordeum vulgare*) are the most important cereals grown in the EU. The three crops accounted for more of 85% of the cereals produced during the last decade and covered more than 78% of the area used for cereal production. Although the productivity of European and global agriculture has been vastly improved through focussing on a relatively small number of crop species, this strategy has left agriculture with dependence on high inputs, leading to environmental damage. Moreover, the reduced genetic variation caused by the breeding for high yields can make crops more vulnerable to biotic and abiotic stresses that are likely to increase with climate change, and these problems cannot be solved simply by most use of pesticides.

Many of the other diverse cereal species (spelt, einkorn, and emmer) were domesticated during the Bronze Age and although they are no longer grown as major food crops, they have remained part of the cultural heritage of several European countries. There is no data available for the last five years on the area under cultivation or production of emmer, einkorn or spelt in the EU. This illustrates that there is hardly any economic interest in this ancient crops in the EU. However, these minor wheat species have received renewed interest mainly due to their suitability for low input and the organic production where they grow well, and as a source of new genetic diversity for modern wheat.

Rye and oats are cereal crop species which have also been traditionally grown in several European countries; however, due to the changes in agriculture as well as consumer demand during the last 70 years, both crops have almost been replaced by common wheat. But given that both

**The HealthyMinorCereals project, funded by the EU 7th Framework Programme during 2013-18, is supporting minor cereals by (see below):**

<b>Breeding</b>	<ul style="list-style-type: none"> <li>• Integration and exploitation of available germplasm for each minor cereal species and their wild relatives</li> <li>• Identification of chromosome segments responsible for disease and quality traits by association mapping.</li> <li>• Identification of different alleles for sequenced resistance genes by sequencing</li> <li>• Comprehensive phenotyping and genetic characterisation, including the identification of duplicate genotypes</li> </ul>
<b>Agronomy</b>	<ul style="list-style-type: none"> <li>• Utilization of new breeding strategies for minor cereals, and adaptations of research methodology specifically for minor cereals, e.g. in relation to agronomic management, grain processing, nutritional quality, health promoting effects etc.</li> <li>• Identification of genotypes with promising traits for yield, resistance to important fungal diseases, improved nutrient use, quality, suitability for food processing and other beneficial traits</li> <li>• Optimisation of agronomy of selected minor cereal genotypes in four European countries representative of diverse climatic zones, through on-station and on-farm field trials, with a focus on organic fertilisation and advances in agronomic management</li> </ul>
<b>Processing</b>	<ul style="list-style-type: none"> <li>• Investigating the diversity of micronutrient, phenolic and antioxidant content in minor cereals, any potential harmful/antinutritive components through the high-throughput profiling analysis, and possible beneficial effects on human health through the bioassays using human cell cultures</li> <li>• Development of know-how in milling and other food preparation methods suitable for minor cereals for improving quality, consumer acceptance, processability and stability</li> </ul>
<b>Marketing</b>	<ul style="list-style-type: none"> <li>• Understanding how new products based on minor cereals can be best introduced to the market, taking into account regional differences within Europe with a programme of case studies</li> </ul>
<b>Demonstration</b>	<ul style="list-style-type: none"> <li>• Demonstration of project results through farmer-participatory field trials and production and quality evaluation of new food products using minor cereals</li> </ul>

cereals are known to have health benefits, there is a strong argument to encourage their greater use in the European diet and cultivation by EU farmers.

The expansion of minor cereals use in Europe could be a benefit for:

- The environment and crop diversity;
- The economic viability particularly of small and medium enterprises (SME) and farmers;
- The diversity and nutritional quality of cereal-based foods offered to consumers.

Minor cereals have not been studied to the same level as major cereals using modern research methods. Although there are benefits, underutilised crops like oats, rye or spelt have been hardly developed as commercial crop varieties and no investment in using the genetic diversity in breeding programmes, in promoting the crops among farmers and in optimising the crops of industrial processes were undertaken. Some of the crop varieties are stored in genebanks and rarely further used or developed by breeding. By doing so, the plants do not further adapt to new growing conditions.

**Table 1: Clear consumer trends relevant for the marketing of minor cereals**

Environmental concerns	Organic, sustainability, environmental protection (Agro-)biodiversity, conservation of species
Health	Health, nutrition, "Hildegard von Bingen", high fibre content; whole grain Gluten-free Vegan/vegetarian No additives Retrophilia "back to the roots"
Enjoyment	Taste, new texture, flavour, colour Wellness, pleasure
Trust	Social, hand-made, quality Authenticity, credibility Regional Traditional, heritage, history Ethical, socially responsible food sourcing
Lifestyle	Other cuisines, uniqueness, rarity, indulgence Urbanism Silver generation

This article is focused on the findings of socio-economic sciences research led by Swiss HealthyMinorCereals partner FiBL ( <http://www.fibl.org> ) surveying the trends and habits of consumers in selected countries relating to minor cereals, to better understand how to market these crops and their products.

According to the EU statistics, high cereal production is leading to saturated markets for wheat, barley, rye and oats. An exception is durum wheat; the only cereal with a consistent supply deficit in the EU. As saturated markets promote diversification, there could be a market chance for currently underutilised crops, and there are a few examples e.g.

- Spelt in Switzerland, has become the most important minor cereal;

- Old cereal varieties like Schlägler Roggen, Purpurweizen, Schwarzhafer, mainly produced by organic farms, in Austria;
- Emmer, einkorn and spelt (also called *farro*) are minor cereal crops produced in Italy and traded by using a Protected Designation of Origin label;
- Organic spelt, rye and oats in the Czech Republic.

Across Europe, diverse products made from oats, spelt and rye are available on the markets e. g bread, flour, pasta, beer, pastries and breakfast cereals. Especially for spelt, emmer and einkorn, the domestic production might not meet the market demand. Old cereal varieties or newly bred varieties of minor cereals are found mainly in combination with an organic label and varieties.



Farmers will only produce new cereal crops and varieties if there is a chance to market them successfully. Marketing needs adapted supply chains and infrastructure. That might not be the case in all regions of the EU.

However, one important driver for crop production is consumer's interest in the product. Based on our analysis of the small amount of scientific literature available on consumer trends concerning cereals, we see that there is a market potential for currently underutilised crops in Europe if the production could be linked to tradition, regions, health, taste or sustainability (Table 1). However, some trends are ambiguous for cereals, especially the trend for gluten-free products and the fact that they are traded globally, so the link to local production is difficult to establish (Table 2). Based on the literature review, we come up with the following general guidelines for marketing of minor cereal crops:


- European consumers link healthiness to naturalness and a low degree of processing;
- Whole grain products are especially demanded by consumers who seek a healthy lifestyle and nutritional benefits;
- Traditional rye bread is not associated with health benefits whereas whole grain products are;
- The demand for gluten-free products is increasing as the awareness of coeliac disease and gluten sensitivity is rising. Marketing oat products as gluten-free might be advantageous;
- Information increases the acceptance of unfamiliar food. Hence, to support the introduction of new products or dishes containing minor cereal as rye, oats or spelt, it is important to inform consumers sufficiently;
- It might be easier to introduce new products or dishes on the market if they are similar to products/dishes consumers are familiar with;
- Health claims alone do not convince consumers;
- Consumers who prefer "tasty" products to "healthy" products might be less interested in products labelled as healthy. Consequently, the labelling of cereal products may not only be focused on health and nutrition. It might hinder consumers preferring tasty food from purchasing these products;





- Emmer products may be successfully introduced on the market when linked to history, folklore and region, as the case of Italy shows;
- When minor cereal 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;
- Foods markets in Central and Western European countries differ. Consumers do not have the same prerequisites. Price, as well as food quality plays an important role in Central Europe;


- As consumers are increasingly interested in variety and speciality, ancient grains become more popular, too. This trend is directly linked to products of currently underutilised cereals and it constitutes a big market potential.

We then explored how currently underutilised minor cereals products are differently marketed across Europe, in a series of case studies.

 In Switzerland, with a highly segmented market, there are several examples for the successful trading of minor cereals. In most of the cases, an Interest Group (IG Dinkel, IG Emmer-Einkorn, Gran Alpin) organises the collection and trade with the cereals. Trends used in the marketing are biodiversity, regional provenance, tradition, health, ancient grains and sustainability.

 In the UK, we found similar market approaches but using fresh, seasonal, local & high-quality products in the marketing.

 In Germany, an example of initiatives in support of minor cereal production is the city of Nürnberg. The city supports emmer production and processing with professional marketing support for producers, bakers, breweries, retail sector. The main attributes for the marketing are regional production and economy, sustainability, organic, tasty.

 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 minor cereals, e.g. Schlägler Roggen, spelt (Mittelburgen), Waldstaudekorn (rye). They use the traditional, regional agricultural products and specialities.

Hence, on a regional level, we identified a consumer interest in special foods that could be seen as a market potential for currently underutilised minor cereal crops like oat, rye, spelt or emmer and einkorn. However, the infrastructure for seeding, harvesting, collection and processing (milling or backing) of these crops might often not be available.

**Table 2: Ambiguous trends for the marketing of minor cereals (MCs)**

Factor	Trend	Constraint
Health	Gluten-free	MCs, besides oats, produce gluten. However, some information portals for people with coeliac disease recommend avoiding oats. Hence, the situation is confusing for consumers.
	Whole Grain	The health benefit of rye is underestimated compared to whole grain products.
	Reduced calories, low carb	Cereals contain carbohydrates, especially spelt, emmer and einkorn.
Enjoyment	Convenience	MCs not adapted to industrial processing.
	Premium/luxury	Historically, MCs food is seen as food for poor people, e.g. rye bread.
Trust	Region, local	Supply chains for cereals are mainly internationally.
	Authenticity, credibility Variety, speciality,	MCs in the mass markets do not fulfil these expectations, whereas MCs for niche markets are in line with it.
	Ancient grains Retrophilia, "back to the roots"	Consumer interested in ancient grains do not accept breeding/improving these cereals.
Lifestyle	Premium/Luxury Indulgence	Higher prices. MCs stay in a niche market with high prices.

Although consumers are interested in regional, traditional, healthy and sustainably produced cereals, this potential cannot only be achieved by investing in plant variety breeding. Rather, it also requires an investment in an adapted infrastructure such as mills, collecting points and processors, which can connect producers with interested customers.

For more detailed information follow our web-page: [www.healthyminorcereals.eu](http://www.healthyminorcereals.eu)



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# Water and Agriculture in Europe

Commissioner Phil Hogan recently shared his thoughts on the role of agriculture in water sustainability, during a speech at European Policy Centre Dialogue

**T**he role of water and agriculture sustainability is a complex policy issue and must be approached in a holistic way. We know that a clean and reliable water supply is absolutely fundamental to human, animal and plant health.

We know that agriculture is a water-intensive industry. We know that as the global population continues to increase, there will be more mouths to feed from a farming point of view. And we know that farming and food production need to do meet this challenge while also doing more to fight climate change, preserve biodiversity and maintain the environment.

So how do we make progress? The first step is to create a broad awareness among policymakers and stakeholders about the magnitude of the challenge.

Thankfully, there are positive signs that water and agriculture are growing in importance on the international agenda. The Agriculture Ministers' Declaration at the 2017 G20 meeting underlines that agriculture and forestry can provide valuable solutions for water sustainability.

Water and agriculture are also at the core of the 2030 Agenda for Sustainable Development. The Sustainable Development Goals on sustainable water management (SDG6) and sustainable agriculture (SDG2) outline some of the challenges involved, and present some useful targets.

Sustainable water management is the explicit target of Sustainable Development Goal (SDG) 6,

which calls for a global agriculture able to enhance farming productivity while reducing the impact on the availability and quality of water.

At European level, we take these international commitments seriously and we are in the process of formulating a roadmap for action. And it is clear that we have to act now. We cannot wait, the challenges are pressing and we all have an interest in tackling them immediately.

For this reason, EU Environment Commissioner Vella and I established a Task Force on Water to develop a long-term alliance between different Commission services. The task force looks at various ways of improving water status in the EU in a cross-sectoral manner and with immediate effect.

Joint work has been initiated to improve the implementation of existing legislation, to boost necessary investment and spread best practice with a view to improving water sustainability in EU agriculture.

The Water Task Force spearheaded the Commission Staff Working Document on "Agriculture and Sustainable Water Management in the EU", published on 28th April 2017.

This document shows in a clear and specific way the Commission's commitment to achieve these goals. It finds that current EU agricultural and water legislation provides a wide range of adequate policy tools for improving water status, boosting investment and increasing knowledge and innovation roll-out.





Dedicated rural development measures can do important work by supporting environment and climate action, Water Framework Directive-targeted measures, knowledge transfer, and especially investment support.

But using existing legislation is not enough. Sharing best practice and boosting innovation and related investment is the key to success. Numerous EU research and innovation funds are already supporting projects to improve both the quantity and quality of our water supply. We have compiled a detailed report outlining farm level adaptation strategies which already exist or can be developed to deal with water scarcity.

We have invested in new technologies such as robots measuring water consumption in wine production, 3D sensors to measure plant growth, and Unmanned Aerial Vehicles (UAVs) for precision agriculture applications such as water stress monitoring, detection of nutrient deficiencies and crop diseases.

And this year we are backing new projects to tackle the pollution of water sources from pesticides and fertilisers used in farming systems.

In addition, my services in DG AGRI have demonstrated a clear commitment to the Commission's Circular Economy Action Plan. Water reuse is an area that can have both quality and quantity implications. The minimum quality requirements currently under preparation aim to support the reuse of treated wastewater in safe and cost-effective conditions.

All these measures have a role to play, but the mobilisation of additional funding for necessary investment is crucial.

On top of the Structural Funds, the potential provided by new financial instruments should be seriously explored. In this respect, the new agriculture window under EFSI 2.0 is an opportunity to be seized. Work is currently ongoing to identify a portfolio of investments and projects.



Image: © European Union

But whatever we do, there is one obvious fact that we must not forget: We need to work with farmers and incentivise their ability to achieve environmental and climate targets. This means giving them better tools both from a policy and practical point of view.

This is why the Commission has taken concrete action to support data-driven farming and precision agriculture as one important step in dealing with the problem.

Water efficiency and water can only be fully addressed by making proper use of new technologies, such as big data, remote sensors, and artificial intelligence. These will help farmers to maximise both the economic output and environmental performance of their farms.

It is absolutely crucial that we ensure the sustainable use of fertiliser and pesticides, including proper management of manure and slurry. Many of the challenges we face related to

water stem from an inappropriate use of inputs.

Therefore, I deem it absolutely essential to enhance our policy tools in relation to inputs. Proper nutrient management on farms is vital and will receive more attention in the future CAP than is currently the case.

### **New solutions**

In this respect, I am happy to announce that various Commission services are collaborating to set up a platform for on-farm nutrient management.

This tool will be directly accessible for farmers and integrates information from various sources including satellite data. On this basis farmers can make informed decision about nutrient requirements for each land parcel.

This will enable not only a more efficient nutrient use overall but can also have the positive knock-on effects of boosting water use efficiency and emissions reduction.

Image: © European Union



*Phil Hogan, Commissioner for Agriculture & Rural Development*

If we can apply this tool on a majority of farms across Europe, it will be a major achievement and a game changer in farm management practices. And I am happy to announce another major achievement: we are setting up a Knowledge Hub on Water and Agriculture.

Whatever we do, information is the key to success. Knowing where the real problems are crucial if we want to develop appropriate solutions. Therefore, one of the first steps of our water task force was to make sure that all relevant and existing data is compiled and accessible to the wider public. This is why we set-up a Knowledge Hub on Water and Agriculture in partnership with the European Joint Research Centre.

This Knowledge Hub will link and integrate existing sources of information and generate new knowledge as well. The information will be widely accessible via an internet portal. It can therefore be used by the Commission, by Member State administrations, as well as by stakeholders to

identify the best solutions for developing targeted and tailor-made policy tools in the field of water and agriculture.

As you can see, my colleagues and I have worked hard over the past two years to place water sustainability at the core of our work. The Commission is pleased to be leading from the front in this shared challenge, but we need our national, regional and local authorities to also take up the fight.

I therefore call on all participants to highlight these possibilities at national level and encourage your Member State authorities to actively engage with the Commission services in these endeavours.

This is an issue that concerns all of us, and it is only when all of us are working together that we will begin to make real headway. It is a field which will remain relevant – today and in the future.

Water sustainability will remain a central challenge for the future CAP. But as I hope I have outlined, we can already make real progress with the tools we currently have and this is what we should focus on.

This article is based on a speech given by Commissioner Phil Hogan at European Policy Centre Dialogue on “Water & Agriculture in Europe”, Thursday 28th September 2017, Brussels. You can read more at:

[https://ec.europa.eu/commission/commissioners/2014-2019/hogan/announcements/speech-european-policy-centre-dialogue-water-agriculture-europe\\_en](https://ec.europa.eu/commission/commissioners/2014-2019/hogan/announcements/speech-european-policy-centre-dialogue-water-agriculture-europe_en)

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