

# Spelt - a pilot crop to strengthen co-operation between farmers, food processors, distributors and consumers

Winfried Schäfer, *MTT Agrifood Research Finland, Agricultural Engineering Research, Vakolantie 55, 03400 Vihti, tel. +358 9 2242 5220, e-mail: winfried.schafer@mtt.fi*

## Abstract

In the beginning of the 1990's, spelt cultivation in Finland was rather unknown. First cultivation experiments at the organic research farm of MTT/Agricultural Engineering Research (Vakola) were done in co-operation with some farmers since 1993. Many farmers showed interest in cultivating spelt because of curiosity about crops suitable for organic farming, competition leadership by marketing new niche products, and consumers demand for healthy and high quality food produced pro-environmentally. Constraints like lack of certified organic seeds, missing national legislation for propagation of spelt seeds, unsuitable drilling machines, inappropriate dehusking machinery, and lack of marketing infrastructure are compensated by a wide product range made of spelt: whole grains, flours, break flour, flakes, semolina, and green kernel (made of yellow ripe spelt dried with smoke of beech wood). Spelt husk is used to fill mattresses and cushions or as litter.

Cultivation of spelt and marketing of spelt products in Finland showed that this versatile cereal created new initiatives amongst farmers, processors, traders, and consumers. Consequently, farmers, millers and retailers established processing sites, arranged local marketing of spelt products in healthy food shops, schools, and kindergartens, participated in exhibitions and organised seminars. The "new" crop also rises questions concerning legislation, research, nutrition, and health. There is a strong need for research in nutritional and allergy issues.

The most important challenge for the future will be to find new ways learning co-operation between all members the food chain. This concerns the development of common strategies for production, processing, marketing, and research in the sense of brotherliness in economic life. Spelt offers ideal opportunity to train the required faculty and social capacity of farmers, processors, traders, and consumers.

**Keywords:** Spelt, processing, marketing, co-operation

## 1. Introduction

In 1993 a farmer and baker producing biodynamic food asked me about a source of supply for spelt seeds in Finland. This question awakened my interest in spelt cultivation because I found out, that spelt seed is not sold in Finland although already some cultivation experiments were done at the University of Helsinki and among other places in Turku and Vihti. So I ordered some seed from Germany and we tried in 1994 cultivation of spelt at his farm, in my garden at Helsinki and at the research farm of the Agricultural Engineering Research unit.

The Finnish biodynamic journal "Demeter" published the outcome of our trials in 1996 followed by the journal of Finnish organic farming union in those days named "Omavarainen maatalous" (=self-contained agriculture). Consequently, in 1998 some farmers founded the Finnish spelt association following a spelt seminar held at Agrifood Research in Jokioinen to promote cultivation, processing, and consumption of spelt. Meanwhile I estimate the cultivated area of spelt in Finland at about 200 ha.

The following observations and conclusions about processing and marketing spelt products in urban areas are based on my experiences as chairman of the Finnish spelt association during the year 2000, on co-operation with the farmer couple Sirkka and Kalervo Rekola at Raikku near the city of Tampere, and on co-operation with Kari Kaipainen, chairman of organic farmers association Vihti. Kalervo Rekola started spelt cultivation in 1995 and his wife is baking and selling bread from biodynamic cereals cultivated on their farm. Mr. Kaipainen started marketing the spelt yield of our research farm this year.

## 1.1 Special properties of spelt

Spelt (*Triticum spelta* L.) is ancient wheat, widely grown in Central Europe until the end of the 19<sup>th</sup> century. Lower yield compared to wheat, brittle spikes consisting of spikelets containing 2-3 grains, and high proportion of difficult removable husk is compensated by high protein content, high straw yield, and the ability to reach acceptable yield under unfavourable conditions. Hildegard von Bingen mentioned spelt in her medical textbook written in the 12<sup>th</sup> century because of its healthy nutritional properties and it is said that wheat allergic persons tolerate spelt products.

## 1.2 Motives to cultivate spelt and to market spelt products

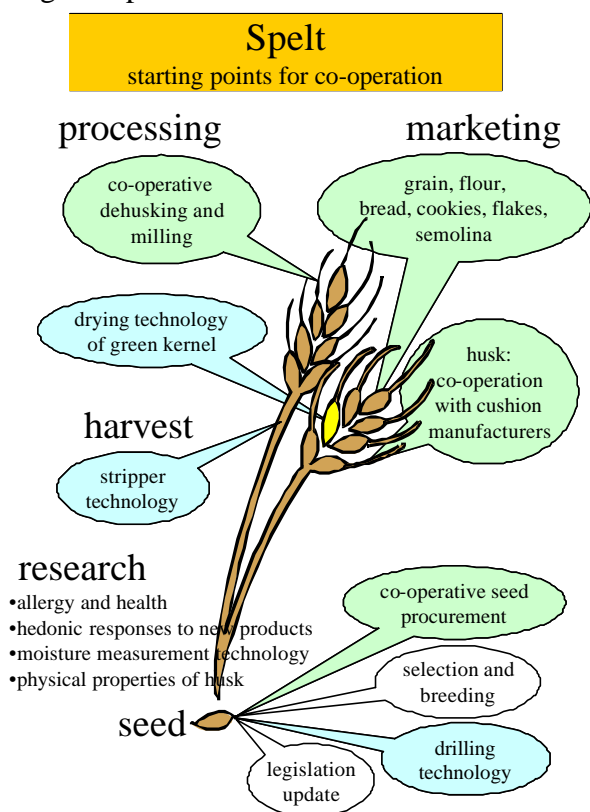
There are three reasons, why spelt was interesting for Finnish farmers and researchers: Curiosity about crops and local breeds suitable for organic farming, economic benefits and competition leadership by marketing new niche products, and consumers demand for healthy and high quality food produced pro-environmentally. **Figure one** shows how the special properties of spelt and the reasons for cultivating spelt offer starting points for co-operation. Chapter two follows the structure of this figure.

## 2. Starting points for co-operation

### 2.1 Seed

#### 2.1.1 Procurement

The first barrier cultivating spelt is the difficulty of seed procurement. At the beginning of spelt cultivation, seeds were imported from German, Swiss, and Belgium seed companies. Later on, when certified organic seed was asked for, a Finnish wholesaler of organic products in Helsinki, Itu Ltd., co-ordinated collective order of seed. Importing small quantities of seed resulted in high seed cost where transport share was more than 50 %. Two farmers near the city of Kauhajoki established in 1997 an enterprise, Merinomi Ltd., which imports organic certified spelt seed in quantity lowering transport share cost to 30 %.



#### 2.1.2 Propagation of spelt seed

Efforts of the Finnish spelt association to lower seed cost by propagation of certified spelt seed in Finland revealed, that propagation is presently not legally possible because the official seed variety list of state authorities does not include any spelt variety. It seems that the national legislation is not yet adapted to EU-legislation.

#### 2.1.3 Selection and breeding

MTT Agrifood Research Finland started first preliminary cultivation trials comparing different varieties of spelt in 1995 at the research station in Peipohja and continued since 1996 at the research station in Ylistaro. Aim is to find out best suitable varieties of spelt for Finnish conditions. Selection and breeding of suitable varieties adapted to Finnish conditions will be a task for the future.

**Figure 1:** Spelt - starting points for co-operation

### **2.1.4 Drilling technology**

Drilling spelt spikelets is difficult, because of their size. Especially, when row distance is increased, modern drills easily stuck. According to farmers' reports, old-fashioned cam gear drilling machines show best results. Distribution of grains is unequal because spikelets may contain one to three grains. The ISO-standard 7256/2 for drilling machines concerning cross and longitudinal distribution accuracy of grains is not applicable because it is created for single grain drilling not for spikelets drilling. Some researchers avoid drilling problems by dehusking spelt seeds before drilling. However, this may influence germination and disease tolerance.

### **2.2 Harvest**

Harvest is done usually by common combine harvester. The brittle spike breaks easily from stem causing harvesting losses. The use of stripper technology may improve harvest results. In case, that the stripper combine harvester reveals to be the best technology in terms of losses and efficiency only harvest done by a contractor is economical.

### **2.3 Processing**

Before milling, spelt has to be dehusked. Both, husk and grain are marketed. Most farmers cooperate with local millers for dehusking. Most of these mills dehusk spelt using equipment designed for oats. Gathering experiences those mills succeeded in reducing losses but they are still high, up to 50 %. Another problem is that millers need an appropriate batch for processing. Because some farmers want to sell their own spelt products one batch is milled immediately after dehusking. If the whole batch can not be baked or sold at once, flavour, break and flakes are ageing and product quality may suffer.

Special dehusking equipment is available from German manufacturers, but the equipment is expensive. Up to now two dehusking devices are working in Finland. The Birkkala farm in Suomusjärvi owns one. The farm processes own spelt to flour, flakes, and crisp.

Merinomi Ltd. owns the other machine. Both offer dehusking services to other farmers. Because of long transport distances and the limited production of spelt presently the best solution would be a mobile dehusking machine, mounted on a car trailer ready for transport. The Finnish Spelt Association should tackle this solution since dehusking and cleaning of both grain and husk requires proficiency.

A local speciality in Franconia is Grünkern (=green kernel). This is a product made of yellow ripe spelt (variety Bauländer Spelz) dried with smoke of beech wood. Production of green kernel requires a special drying technology. Up to now there is no green kernel production in Finland. Recently the MTT Agricultural Engineering Research Unit launched a project on technology of disinfecting seeds by smoke. Therefore, the drying technology for green kernel production is available.

### **2.4. Products**

Beside Grünkern there are many different products made of spelt: Whole grains, flours, break flour, flakes, semolina, and noodles. Boiled whole grain substitutes rice and germ products substitute vegetables. Excellent bread and cookies are baked from flour. Husk is used to fill mattresses and cushions or as litter.

#### **2.4.1 Marketing**

Many farmers are marketing their own spelt products. E.g., the Birkkala farm sells the products through ten retailers mostly in Turku and Espoo but also in Jyväskylä. Many customers also buy the products by cash in delivery.

Rekola's farm established its own bakery with a turnover of about 10 tons of biodynamic cereal products per year, 10% of them spelt products. Beside bread also muesli, flakes, and break flour products are manufactured and transported to healthy food retail shops in Tampere and Helsinki.

The baking period starts in autumn and ends in spring. The products are signed with the Demeter label and with Rekola's label. Demand is greater than supply and spelt products are mainly asked for because of diet and health reasons. Co-operation between farm and retail traders is close. In addition, the relationship to customers is very important. A group of about ten customers visits the farm monthly and organises once a year an event. Dehusking is done in co-operation with an interested miller at a local mill that processes 800 kg batch at once. Good quality husk is sold to cushion manufacturers and the rest is used as litter for cowshed. Rekola observed that cows also like to eat the husk.

Spelt produced at the MTT Agricultural Engineering Research Unit was in 2000 sold to a local mill at Mustio near Helsinki, which processes only organic products. Spelt products of this mill are marketed by the miller himself and by a wholesale company for organic products in Helsinki. In 2001, the chairman of the local organic farmers association at Vihti, Kari Kaipainen, contacted the MTT Agricultural Engineering Research unit for buying spelt. He is a salesperson by profession and convinced that spelt is a healthy product, environment-friendly produced. His vision is that agricultural products should be marketed locally to make consumers independent from marketing strategies and nutrition philosophy of main stream agrifood industry. Further, he wants to promote small-scale industry at countryside. To support his vision, he applied for project funds at the Employment and Economic Development Centre for Uusimaa. The project aim is to co-ordinate processing of spelt and to analyse markets for spelt products.

He is co-operating with a miller at Iittala who is dehusking the spelt and milling semolina, flour, flakes, and break flour. The mill does not limit the batch size. This year he sold about 2500 kg of spelt products. He presently counts about 300 customers in the area of Uusimaa. They are relatives, friends, neighbours, kitchen personnel of day-care centres, schools, and restaurants. About 30% of his customers knew already about spelt.

The Finnish spelt association aims to promote spelt cultivation and marketing. The association organised two seminars in co-operation with the vocational training school for Agriculture of the City of Kauhajoki. The school had started a project to develop spelt cultivation on initiative of two spelt farmers. The project was funded by EU 5b Leader programme. Additionally the project offered space on a website for the Finnish spelt association ([www.spelt.net](http://www.spelt.net)). Members of the association attended numerous exhibitions to inform the public about spelt cultivation and spelt products and to recruit new members. The Agricultural Engineering Research unit of MTT Agrifood Research Finland also attended several exhibitions and trade fairs, **figure two**.

#### **2.4.2 Research**

Dealing with spelt rises many questions still waiting for an answer concerning properties and cultivation of spelt as well as the impact of spelt on nutrition and health. It is said, that wheat allergic persons may eat spelt products of old and genuine spelt varieties. The term wheat allergy is scientifically unclear. However, what means "old" and "genuine" in terms of physiological or chemical properties? Celiac disease is caused by gluten, a protein that is also part of spelt proteins. Nevertheless, members of the Holy Hildegard Society, which is active in several towns of Finland, and several other people state that even patients suffering from celiac disease can eat spelt products. However, scientific publications that confirm such a claim could not be found so far.

Another field of research is the development of new products made from spelt. Grünkern products may substitute meat similarly as soybean products because of its flavoursome taste. Co-operation with the Department of Food Technology of the University of Helsinki resulted in a study about consumers' acceptance of products made from Grünkern.

Many open questions concern physical properties of spelt and spelt husk. Answers to these questions are important for successful cultivation and husk product development. E.g., present grain moisture meters do not indicate right figures when measuring spelt moisture. The special physical properties of husk that favour them for filling mattresses and cushions are still unknown.

# Spelt

*the versatile winter cereal*

what is spelt?



Spelt *Triticum Spelt L.* is an ancient wheat variety, which was still in the 19<sup>th</sup> century an important bread cereal in Southern Germany and in Switzerland. (Württemberg 1850: 200 000 ha spelt, 12 000 ha wheat. It is known in many countries like Poland, Sweden and Lithuania. Nowadays about 200 ha of spelt are grown in Finland.

Spelt is cultivated at the organic research farm of MTT Agricultural Engineering Research since 1995.

## Questions concerning spelt research

- Spelt matures from leave to grain in other words the spikes become yellow after the leaves (wheat matures the other way round). Does maturing process influence quality of protein?
- Why some people allergic to wheat (not celiac disease) may eat spelt products? How many people in Europe suffer from wheat allergy?
- What is the secret of green kernel taste?
- How is the cross and longitudinal distribution of spelt spikelets measured according to ISO-standard 7256/2? What kind of calculation model is most suitable (Voronoi polygon, Delaunay triangulation, square net, triangle net)?
- Is the stripper combine the best suitable harvest method?
- What is the moisture relationship between husk and grain depending on maturity stage and air humidity? Is there a hysteresis of equilibrium moisture between air and grain humidity?
- How to husk spelt saving germinating ability?
- What is the k-value and vapour diffusion coefficient of spelt husk? Is spelt husk a suitable renewable raw material for heat insulation? Is spelt husk competitive with pulp based heat insulation products?




To separate husks from grain a special husking machine ("Gerbsgang") is needed.

Franconia's local speciality ("Grünkern") is produced drying yellow ripe spelt with smoke of beech-tree wood

**Enjoy spelt in manifold ways:**  
boiled grain, flakes, green kernel, germinated grain, sprout, baked produce

**Useful husk:**  
Filling cushions and mattresses

Hildegard of Bingen mentioned spelt because of its dietical properties in her medical textbook written in the 12<sup>th</sup> century



Winfried Schäfer MTT/Agricultural Engineering Research 03400 VIHTI winfried.schafer@mtt.fi Tel. +358 9 2242 5220



Figure 2: Spelt poster of MTT Agricultural Engineering Research

### Conclusion

Introduction of spelt cultivation to Finland showed that this versatile cereal created new initiatives amongst farmers, processors, traders, and consumers, because there has been no established infrastructure to process and market locally produced spelt products. The "new" crop also rises questions concerning legislation, research, nutrition, and health. To answer the open questions, financial support is necessary. However, in spite of missing public financial support, farmers already successfully contributed to bridge the gap between consumers, traders, and producers. The most important challenge for the future will be to find new ways to learn co-operation. This concerns not only sharing common purchased equipment but also the development of common strategies in the sense of brotherliness in economic life. Spelt offers ideal opportunity to train the required faculty and social capacity of farmers, processors, traders, and consumers.



## References

- BECK, A. MIECZYSLAW, G. FEHLHABER, R (1997): Backtechnische Eignung von Dinkel aus biologisch-dynamischer Landwirtschaft. Lebendige Erde 4, 317-321.
- BELITZ, H.-D., SEILMEIER, W., WIESER, H. (1989): Die Proteine des Dinkels (*Triticum spelta*). Lebensm. Unters.-Forsch. 189, 1-5.
- BLEIKER, U. WINZELER, H. (1991): A simple device to prepare single ears of spelt (*Triticum spelta* L.) for seeding with the "Seedmatic-System". Plant Breeding 106 (3), 258-260.
- DINKELACKER STIFTUNG (1991): Berichtsband des 2. Hohenheimer Dinkelkolloquiums vom 21.-22. März 1991. All design Verlag Stuttgart.
- KARLSSON, T. (1994): "Urvete" en ny alernativgröda. Lantmannen 3, 28.
- KUNZ, P. (1999): Reife Sorten Qualität. Das Ausreifungsverhalten bei Getreide als Kriterium fuer Nahrungsqualität. Lebendige Erde 1/99, 34-36.
- MOUDRÝ, J.; DVO Á EK, V.; CAPOUCHOVÁ, I. (2000). Evaluation of quality of 10 spelt varieties cultivated in organic farming. Proceedings of the 13<sup>th</sup> International IFOAM Scientific conference, Convention Center Basel, 28.-31. August 2000. vdf Hochschulverlag AG an der ETH, 241.
- REENTS, H.J.; MÜCK, U. (1999): Alte und neue Dinkelsorten. Anbaueignung, Back- und Nahrungsqualität. Schriftenreihe Band 10, Institut für biologisch-dynamische Forschung, Darmstadt, 72p.
- SCHÄFER, W. (1996): Speltti menestyy Suomessakin. Demeter No 1, 18-20.
- SCHÄFER, W. (1996): Alppimaisemien speltti kotiutuu Suomeen. Omavarainen Maatalous Nro 5, 19-20.
- SCHMID, R. HAUGSTÄTTER, M. (1997): Winterweizen und Dinkel im Sortenversuch auf Öko-Betrieben in Baden-Württemberg. Lebendige Erde 4, 301-309.
- STREHLOW, W. (1990): Die Ernährungstherapie der heiligen Hildegard. Verlag Hermann Bauer, Freiburg.
- SZYMONA, J., BECK, A. (1994): Ergebnisse von Feldversuchen mit Dinkel in Lublin - Ostpolen. Lebendige Erde 1, 21-25.

## Soup of grünkern

Ingredients: 40g of ground grünkern, 40g fat, 1 1/4 litres bouillon, 1 egg yolk, and sour cream according to taste. You can add dumplings, roasted cubes of bread or mushrooms. Take the ground grünkern and roast it in sizzling fat until it turns to a light brown. Pour in the bouillon and simmer for 5-10 min. Thicken with egg yolk and add other ingredients.

(from: Küchendüfte aus Wölchingen und Boxberg, Herausgeber: Evang. Kirchengemeinde Boxberg-Wölchingen)