

Production of Bread Wheat

Control of Quality and Safety in Organic Production Chains

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This leaflet provides a practical overview for producers and others involved in wheat production and storage, on what can be done at these steps to improve the quality and safety of organically produced wheat, in addition to certification and general food safety requirements. A separate leaflet covers the milling and baking steps, and other leaflets cover other commodities and separate leaflets aim at consumers and retailers.

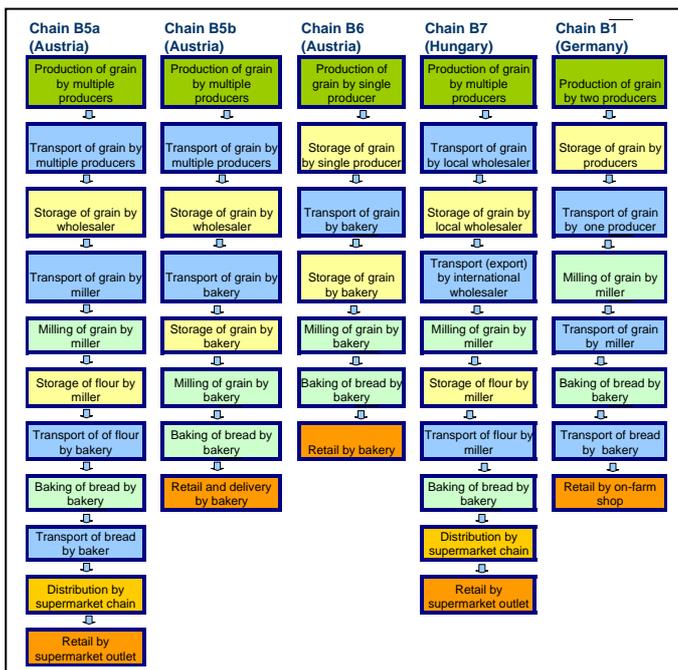


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The Organic HACCP Project leaflets

This is no. 9 of a series of 14 leaflets comprising information on how control of quality and safety can be further improved in organic supply chains across Europe. The Organic HACCP project has reviewed studies of consumer concerns and preferences in relation to organic production systems and collected information about typical production chains for 7 commodities in regions across Europe. For each of the criteria listed below, the information was analysed to identify Critical Control Points (CCPs), defined as the steps in supply chains where the qualities of the final product can be controlled most efficiently. CCPs were identified using methods developed for Hazard Analysis by Critical Control Points (HACCP), a standard procedure to prevent food safety risks. The new aspect is thus to improve how consumer concerns are addressed, through the use of the CCP concept for a wide range of criteria, not only safety: 1. Microbial toxins and abiotic contaminants; 2. Potential pathogens; 3. Natural plant toxicants; 4. Freshness and taste; 5. Nutrient content and food additives; 6. Fraud; 7. Social and ethical aspects.

Overview of the examined wheat and bread chains



The diagram shows the analysed organic supply chains for wheat and bread throughout Europe. On the project's homepage (www.organicaccp.org) they are shown in more detail and each of the CCPs are shown and described.

Seed and variety selection

Important issues to control at this step

Wheat varieties for bread making should provide a sufficiently high content of protein of a type that gives good dough properties and good baking, nutritional and flavour qualities. Some fungal diseases, such as *Fusarium* and *Penicillium* can produce mycotoxins, which can damage human health.

Specific problems for organic production

Many varieties have not been tested for baking quality and susceptibility to seed borne diseases when grown organically, or not in the relevant area (climate and soil type). The fungal diseases can be spread through infected seed and seed borne diseases can be difficult to control.

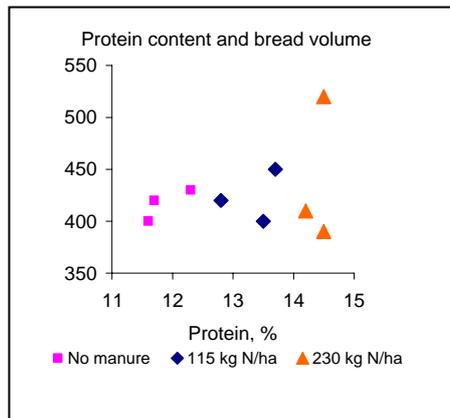
Recommendations

- If data from organic variety trials in the region are not available, try to organise small-scale trials by yourself or together with other organic farmers.
- Discuss the choice of the variety with baker or processing company, and ask them to test the baking quality of samples from your trials and to tell you the results.
- Use only seed that has been tested for seed borne diseases.

Growing of wheat

Specific problems for organic production

Plant residues and other organic fertilisers release the nutrients slowly during the growing season, so organic wheat tends to have relatively low protein content. However, other factors than protein content are also important for baking quality.



Graph: Baking quality of spring wheat grown after a clover/grass ley with different amounts of manure added. (Pedersen et al. 2003, DARCOF e-news No. 4).

Organic fertilisation methods may also favour uptake of mineral nutrients. But too much organic fertiliser can lead to pollution due to continued leaching of nutrients during periods when no crops are growing.

Conventional and organic farmers have a common interest to prevent contamination by e.g. pesticide drift, since both will lose money if it happens.

Recommendations

- Grow baking wheat on soil with good fertility, but note that a too high nutrient level increases the risk of diseases and leaching and does not always improve quality.
- Establish a catch crop or a deep-rooted new crop as soon as possible after harvest, to prevent leaching of nutrients.
- Establish hedges or other barriers to protect the crop from spray drift from neighbours.
- Agree with neighbours on special safety measures such as not spraying the adjoining 10 metres of the conventional field, and to sell the wheat from the outer 10 metres of your field to the neighbour as conventional.
- If you suspect contamination anyway, get a crop sample analysed. If residues are found, then ask your conventional neighbour for a reasonable compensation, as motivation to be more careful in the future.
- Adjust the harvester carefully to avoid mechanical damage and infection of damaged kernels, and remove plant residues that might carry fungal spores.

Drying and storage

Important issues to control at this step

Incorrect temperature and humidity in the grain after harvest can destroy the baking quality and cause high levels of mycotoxins.

Specific problems for organic production

Often good quality organically certified facilities for drying and storage are not available in the local area.

Some large-scale drying and storage facilities are parallel operations, certified to handle both organic and conventional products. This gives more options for the farmers, but introduces a risk of mixing with conventional wheat or accidental use of non-allowed agents. The agents to control storage pests in organic production are limited, making prevention and early detection of storage pests very important.

Many consumers of organic products want to know who produced it, since they see such information as a sign that he/she is willing to take responsibility for the product.

Recommendations

- Make sure before harvest that your equipment for drying and storage facilities are completely clean and have capacity to handle the entire harvest with good control of humidity and temperature, even in a year with bad weather conditions.
- Ensure swift drying to correct water content, normally 14-15% (depending on temperature).

- Establish a quality control routine, where the appearance (smell, colour) of the grain and signs of insects or other pests are checked and humidity and temperature measured, regularly during the drying process and at least weekly during storage. Plot the values on a chart and act immediately if the values are unusual. Keep the charts from previous years, and compare with information received from the customer/ bakery about the resulting quality (baking tests, mycotoxin levels etc.).
- In parallel operations, as far as possible use dedicated trucks and other equipment for organic material, and mark them clearly, e.g. by painting in different colours.
- Plan in advance for foreseeable problems. For example, instruct employees who would not normally work with organic material about the special procedures for it, in case a 'flu epidemic or other exceptional situation occurs.
- If handling material from more than one farm, keep material from each farm as separate batches and include information about origin on the invoices when it is sold.

General Recommendations

Exchange information about your quality control and their quality measurements with the companies and persons in charge of the other parts of the chain. Formal or informal collaboration agreements can ensure that quality and safety is controlled at every step of the supply chain, and that the costs of this are shared fairly among the participants.

Continuation in the QLIF project

The work of Organic HACCP identified several areas where more research is needed to understand the quality of organic products and to find better ways to fulfil consumer expectations. In 2004 the project QualityLowInputFood (QLIF, www.qlif.org) was started to broaden the understanding of quality of organic food. QLIF is an Integrated Project in the European Commission's 6th Framework Programme with 31 participants in 15 countries. QLIF is a 5-year project aiming to provide research and development on quality, safety and efficiency of organic and other low-input farming methods in Europe.

The following topics relevant for quality and safety of wheat for bread making will be investigated in QLIF:

- Studies of relations between different aspects of food quality, consumer perceptions and buying behaviour (Consumer expectations and attitudes, 2004-2007).
- Studies of effects of growing conditions and variety choice on mycotoxin contamination, mineral content and baking quality (Effects of production methods, 2004-2008).
- Development of seed treatments to prevent transmission of *Fusarium* (Crop production systems, 2004-2008).
- Development of HACCP procedures for control of quality and safety in organic supply chains and training courses for advisors (Transport, trading and retailing, 2006-2008).

Editorial Notes

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Printed versions can be ordered from the FiBL Shop at www.shop.fibl.org.

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About Organic HACCP

The main objectives of this Concerted Action are to assess current procedures for production management and control in organic production chains, with particular reference to the characteristics valued by consumers, and from this to formulate and disseminate recommendations for improvements.

The 2-year project started in February 2003. The results of the project, including a database of Critical Control Points in the analysed chains, are available on the project website www.organichaccp.org.

The Project Partners

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