

**Report to SLU EkoForsk year 1 for the project:
Locally adapted cereal cultivars in organic farming; for quality in production and
product**

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Summary

The aim of the present project is to increase the option for sustainable cultivation of locally adopted cereals through organic cultivation. During the first and second year, locally adapted cereal cultivars have been selected for the four selected localities using the normally used crop rotation systems at each farm. The four farms used were; Alnarp in Skåne, Ekhaga and Krusenberg in Uppland, and Lövsta on Gotland. A total of 25 cereal spring cultivars have been grown in each of the selected localities. Further, 25 cereal winter cultivars have been grown during year one on each locality, and been sown for year two although not being harvested yet. Some of the selected cultivars were the same in all localities being measuring cultivars to be able to compare results between localities. The rest of the cultivars were locally adopted ones. Cultivars included are the following: Spring emmer (old variety from Gotland); spring spelt (selected from land races from Gotland); spring rye – Jusso; wheat landraces from Gotland, Öland, Halland and Dalarna; naked barley (2 row and 6 row); naked oats; land races of oats; summer oats Gotland; Ur Gotland landrace oats; landrace barley – Gotland barley; 2 row barley – Svanhals, Domen, Gullkorn, Rika, Balder, Ingrid, Freja, Lina, Alva; 6 row barley – Kajsa; back oats – Klock, Osmo, Stormogul, Engelbrekt, Orion, Extra Klock, Argus; white oats – Selma, Seger, Palu, Virma, Sol, Sisu, Bambu, Blenda; wheat – Ella, Diamant, Atson, Atle, Algot, Dragon, Walter, Dacke, Kärn, Prins; winter rye (populations of old cultivars); T. monococcum einkorn wheat from Gotland; black emmer from Gotland; spelt wheat – Oberkulmer, Albihn; Spelt wheat Gotland; Triticum turgidum – Rauweizen; landraces - borstvete Gotland, Jacoby, LV Gotland, Lv Halland, Lv Uppsala, Sammetsvete, Olympia; Swedish winter wheat – Robur, Holger, Aros, Walde, Svale, Odin, Eroica, Sol, Starke, Banco, Ertus; foreign winter wheat – Erbe, Red prolific, Aura, Vakka, Ure, Russisk vete, Krachi, Vama. The plant material has been evaluated as related to adaptation and performance on each of the localities. Further, the quality of the cultivars has been evaluated using falling number, protein content, thousand kernel weight, volume weight and essential minerals. Generally, a large variation for all evaluated parameters was found in the material. Evaluations of cultivation parameters and local adaption will be fully performed after three years of field trials for a full understanding of influences and interactions between locally produced genotypes, organic cultivation and quality. Nutritional value of some organically grown locally adapted cultivars was evaluated by analyses of minerals, heavy metals and tocopherols. Generally, high amounts of essential minerals were found in organically produced locally adapted cultivars from Sweden as compared to modern, conventionally grown wheat from other countries. High levels of essential minerals could be obtained by consumption of organically produced cereals and none of the tested samples were found to contain heavy metals above permitted levels. Primitive wheat (einkorn and emmer) was as a group found of specific interest due to high levels of essential minerals, low content of cadmium and high levels of tocotrienols. However, all evaluated groups contained some interesting genotypes with promising values on some of the evaluated parameters. The most promising genotypes as related to these nutritionally relevant compounds were; 6356 spelt,

Triticum monococcum, Ölands 17 borst Spelt, Lv Dal 16 brun borst and Fylgia. A large variation in protein polymerisation in the grain and after mixing was found in the evaluated material indicating variation in bread-making quality. Genotypes with interesting protein polymerization behavior were Agron, Hjelmqvist 6357 blå and Effrada.

Publications;

Hussain A, Larsson H, Kuktaite R, Johansson E (2012) Healthy food from organic wheat: Choice of genotypes for production and breeding. *J Sci Food Agric* 92:2826-2832.

Hussain A, Larsson H, Kuktaite R, Prieto-Linde ML, Johansson E (2012) Towards the understanding of bread-making quality in organically grown wheat: Dough mixing behaviour, protein polymerisation and structural properties. *J Cereal Sci* 56:659-666.

Hussain A, Larsson H, Kuktaite R, Prieto-Linde ML, Johansson E (2013) Amount and size distribution of monomeric and polymeric proteins in the grain of organically produced wheat. *Cereal Chem.* 90:80-86