



Northern Cereals



**Northern Periphery and
Arctic Programme**
2014-2020



EUROPEAN UNION

Investing in your future
European Regional Development Fund

Northern Periphery and Arctic Programme
Northern Cereals – New Markets for a Changing Environment

Test malting of seven barley varieties in Norway

Activity T4.1.2

Mette Goul Thomsen

Norwegian Institute of Bioeconomy Research

May 2016



NIBIO

NORSK INSTITUTT FOR
BIOØKONOMI

Northern Periphery and Arctic Program
Northern Cereals – New Markets for a Changing Environment
NPA CAV Diary Number 304-8673-2014

Title: Test malting of seven barley varieties in Norway

Author(s): Mette Goul Thomsen

With contributions from:

Hilde Halland
Ólafur Reykdal
Peter Martin

Northern Cereals Partners:

Matis – Icelandic Food and Biotech R&D

Agricultural University of Iceland

Norwegian Institute of Bioeconomy Research

Agronomy Institute, Orkney College UHI

Agricultural Centre, Faroe Islands

Forestry and Agrifoods Agency; Newfoundland and Labrador, Canada

Introduction

The background for this test was to start an evaluation of the malting quality of seven varieties of barley grown in Northern Norway. We did regular cereal tests together with a test malting of the samples. The malt quality will be further evaluated in the next step. This test is part of WP4 'Technical development' where '*The primary aim is to provide the basis for cereal cultivation and processing of the grain and thus creating the know-how necessary for supporting stakeholders in their goal to use cereals to produce higher value feed and food products*'. The results presented here are therefore preliminary and will be followed by further testing also of new samples.

The Barley was grown in 2015 at NIBIO, Holt in Tromsø, Northern Norway. The seven varieties were selected for expected tolerance to the northern climate, except for Saana that was included for its qualities as a malting barley breed in Finland. The barley was then threshed, analysed for quality parameters and stored at the NIBIO research station location Apelsvoll in the south eastern part of Norway. Malting was started at April 1st 2016 after storage of the seeds from end of August 2015.

Quality testing

The barley samples were analysed at NIBIO Apelsvoll (Table 1). Germination was tested by placing 100 kernels in soil at 20°C for 10-12 days.

Table 1. Quality parameters measured on seven barley varieties grown in Northern Norway.

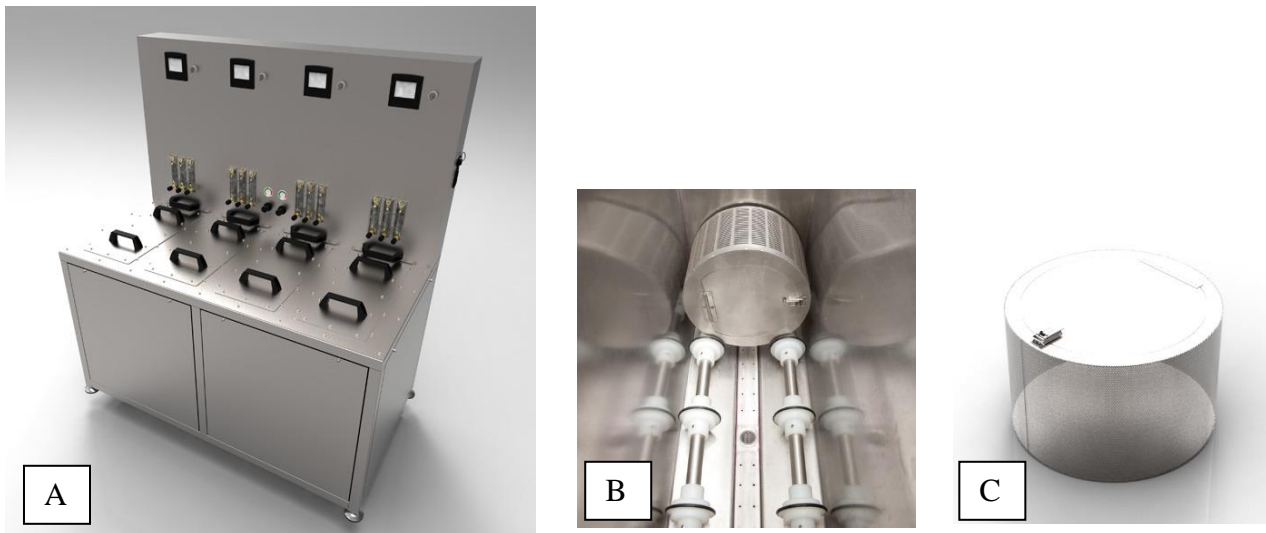
Variety	Weight after threshing, g	Water %	Protein %	HL weight	Starch % of DM	1000 kw, g	Germination %
06 72	1454	9,3	8,5	73,3	65,2	41,6	99
Iskria	5876	9,4	10,4	72,5	63,8	43,0	98
NL 3	3665	9,5	9,4	69,7	63,5	46,1	99
Saana	1996	9,2	9,2	73,1	64,3	45,5	98
Skumur	2544	9,1	10,2	70,4	63,7	35,6	99
Teiste	5814	9,3	11,3	72,4	63,1	42,1	100
Tiril	8182	9,3	9,0	71,8	64,7	40,1	100

The samples were threshed in a small lab ear thresher. Protein, HL weight and Starch was determined using a INFRA-Tec machine by infrared transmission; for 1000 kw an OPTO AGRI was used counting the number of kernels by picture analysing and water% was calculated from weight after harvest, weight after air drying and also using the Infrared transmission machinery.

Malting

Equipment.

Malting was performed on a micromalting plant (Fig. 1) at the Norwegian University of Life Sciences.



Figur 1. A micromalting plant from Custom lab. (A) shows the malting machine with four chambers for malting. (B) A look into the malting chamber and (C) each chamber contains four malting vessels that take up to 0,5 kg each.

Malting process.

The malting procedure followed the guidelines for a standard pale ale malt (Table 2). Germination was assessed as optimal when the shoot is $\frac{2}{3}$ of the kernel length and we tried to reach this stage.

Table 2. Program for steeping, germination and kilning (drying).

Steeping Program			Drying			
Treatment	Hours	Temp °C	Time, hours	Temp °C	Airflow, m/s	
Wet	8	16	16	65	6	
Dry	16		2	85	5	
Wet	8		2	90	5	
Dry	16		2	95	5	
Wet	2					
Germination	5 days at 16 °C					

Germination took approximately twice the expected time. After 2.5 days in the germination procedure the length of the shoot was assessed in 30 kernels from each variety (Table 3).

Table 3. Assessment of germination after 2.5 days.

Variety	Number of kernels with shoot > 2/3 of the kernel length	Number of kernels with shoot < 2/3 of the kernel length
Tiril	10	20
Teiste	7	23
NL 3	12	18
06 72	12	18
Skumur	0	30
Iskria	3	27
Saana	15	15

The pictures below shows the malted samples of the seven varieties.





Conclusion

Apart from the slow germination the malting seems to have given a fine result. We have however, not done any assessment of the malt quality, but from tasting there could be variation in the sugar content. We will try to do a simple test of extract for assessment of the malt quality. We have malted approximately 1 kg of each variety and may attempt to do a small brew of the remaining samples. So far the conclusion is that the varieties grown in 2015 in Northern Norway have developed satisfying and have potential for malting .