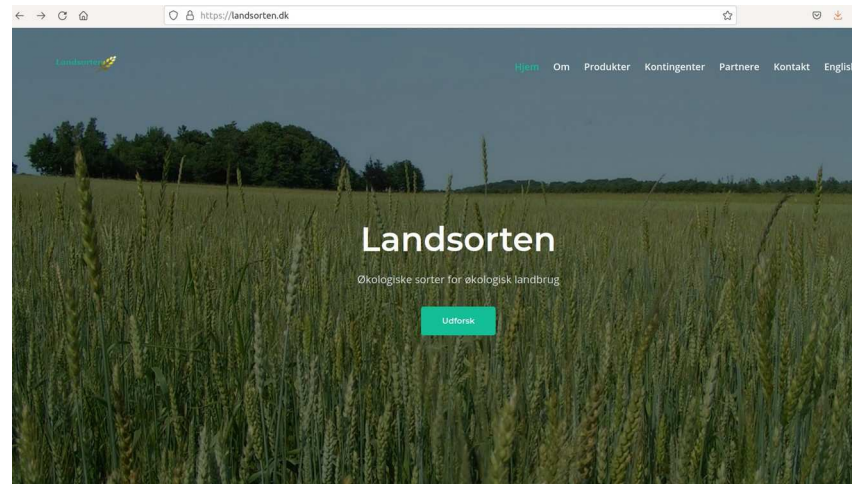


Organic plant breeding and seed production

- an example from Denmark



ECO-PB

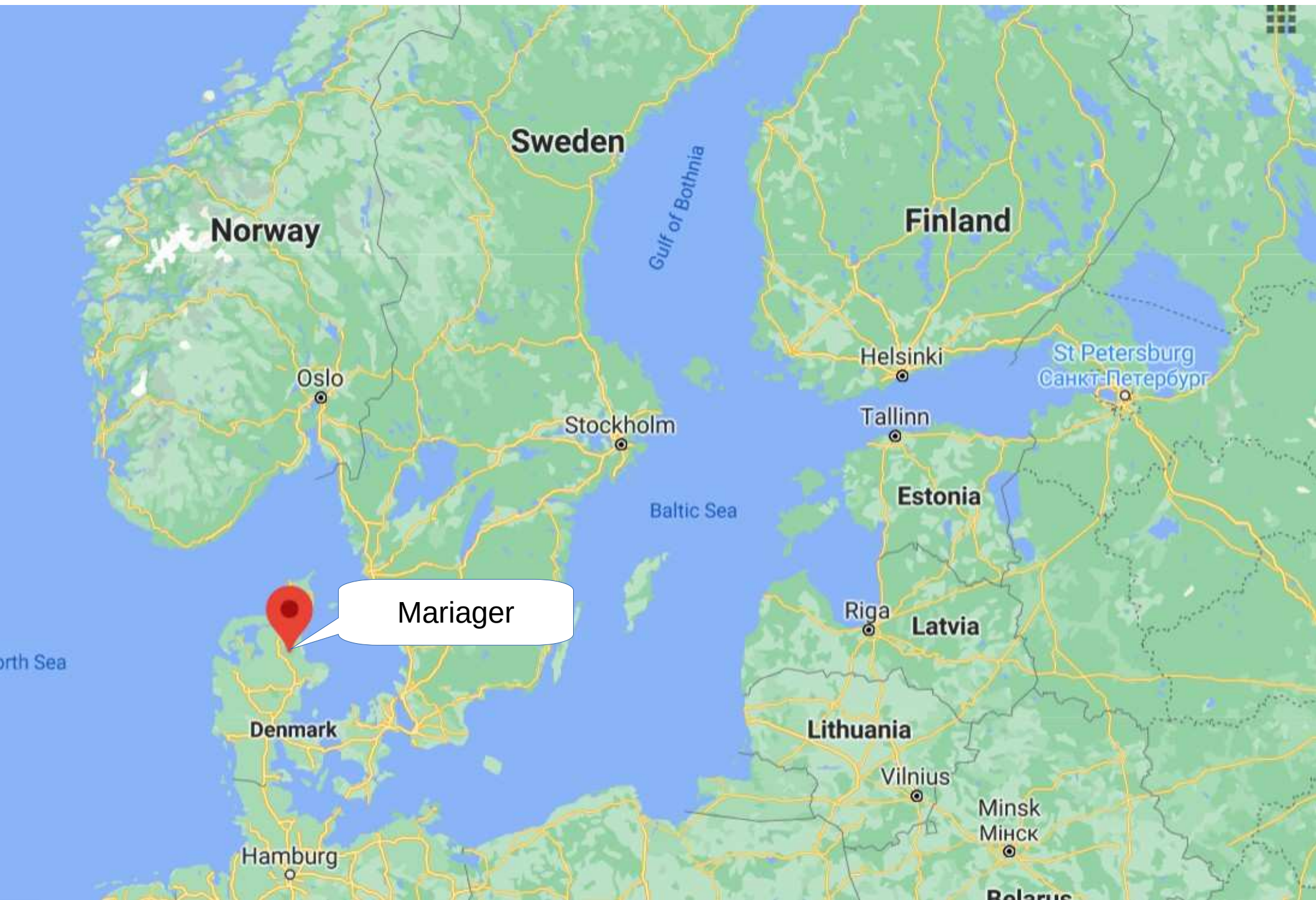
Young Breeders Network

Florence, Italy, 2nd – 3rd June 2022

Anders Borgen,
Agrologica, Denmark

Take home messages

- The life of a plant breeder is a wonderful combination between knowledge and gardening. Enjoy it!
- You will not be remembered for the diversity in your breeding. You will only be remembered for the varieties that were set in production. It is better to develop a few good varieties than to develop a lot of crap.
- Plant breeding is not just plant science and genetics, but is a business in a frame of seed production and marketing.
- You need to know the farmers and consumers needs in order to fulfil them. Breeding must be embedded into organic farming society.
- Developing new varieties is a piece of cake. The difficult part is to make the business profitable.



Norway

Sweden

Finland

Oslo

Stockholm

Helsinki

St Petersburg
Санкт-Петербург

Tallinn

Baltic Sea

Estonia

Riga

Latvia

North Sea

Denmark

Lithuania

Vilnius

Minsk
Мінск

Hamburg

Belarus

Mariager











L07

L08

L09

L10

L11

L12

L13

L14

L15

L16

L17

L18

L19

L20

L21

L22

L23

L24

L25

L08
Plot 14
0.25m²

L09
Plot 14
0.25m²

L07
Plot 14
0.25m²



Winter wheat trail 2020



Harvest 2020



Background

- Only certified seed can be legally marketed within EU
- Only approved varieties in the Common Catalogue can be certified
- Varietal approval costs 5-10.000€ per variety plus a lot of work to meet the requirements

Therefore, diversity is decreasing because there is no profit in releasing new varieties with a market potential of less than ~50.000ha

Loopholes and new opportunities

- Cheap registration for heritage varieties
- New organic regulation opens for Organic Heterogeneous Material
 - cheap in fees
 - cheap in production (purifying)
- Seed for trials and research is exempted from requirements
 - also farmers and millers can do trials (and they can do very big trials)

The Øland example

- Most grown heritage grain in Scandinavia
- 25% of all organic spring wheat in DK
- Still no economic return to the breeder

Landsorten

- Membership organisation established 2021
- Promoting heritage and organic bred varieties
- Annual fee (most of which is to be returned to the breeders):
 - ~30€ for private non producers
 - ~120€ for producers
 - ~30€ per hectare + ~25€ per ton flour
- 125 members
 - incl. ~70 producers
 - 90% from Denmark

The set up

- As far as possible based on home saved seed. Logistic support for home saving.
- No central seed production. All seed is produced by members and sold directly farm to farm.
- Landsorten plans the production
- Bread wheat, malt grain and feed
 - Certified Organic Heterogeneous Material or heritage varieties certified by Landsorten
- Minor crops and varieties are sold as seed for trial production
 - durum wheat, spelt, purple wheat.....

The BOOST project

- Landsorten
 - development of the seed system
- Agrologica
 - breeding varieties and seed research
- Gammel Buurholt Hovedgård
 - Quality seed sorting
- Copenhagen University
 - Seed analysis
- KOST
 - Market development



Buurholt
Mobile seed cleaning and milling



Farmers



Bakers



Millers

Landsorten



KOST
Culinary development
and marketing



University of Copenhagen
quality analysis and research



Agrologica
Breeding and research



Mobile seed cleaning



Mobile stone mill



TriQ protein improve- ment

BoMill Technology



VIDEOR

developing
this

BoMill

TriQ



Upgrading
populations from feed
to baking quality



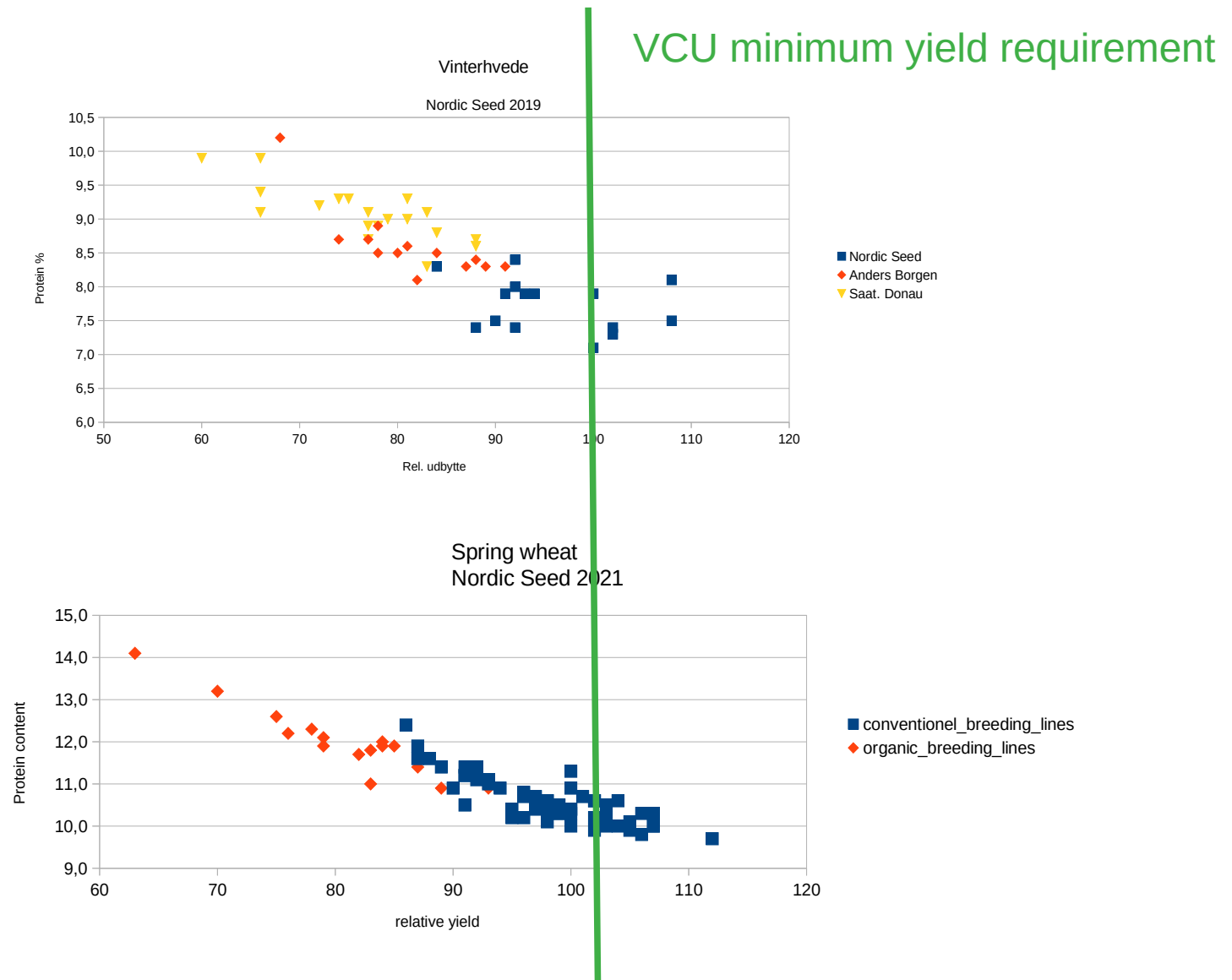
Breeding programs

- Oat
 - increased oil content
 - Naked oat (spring + winter)
- Spring rye
 - improved straw strength
- Barley
 - Improved baking quality in naked barley
 - different colours in naked barley
 - GN-free malting barley
 - resistance against CCN
- White lupin
 - earliness
 - oil content, anthracnose resistance
 - culinary quality
- Lentils
 - growth habit
 - culinary quality
- Millet
 - Foxtail, Barnyard and Proso millet
 - Earliness
- Wheat
 - Resistance to common bunt and CCN
 - Purple, blue, black, yellow and white
 - Dietary fibres, ATI and Fructans and allergies
- Durum
 - Kernel hardness and endosperm colour
- Spelt
- Tritordeum
- Indian dwarf wheat
- Xinchang rice
-
-

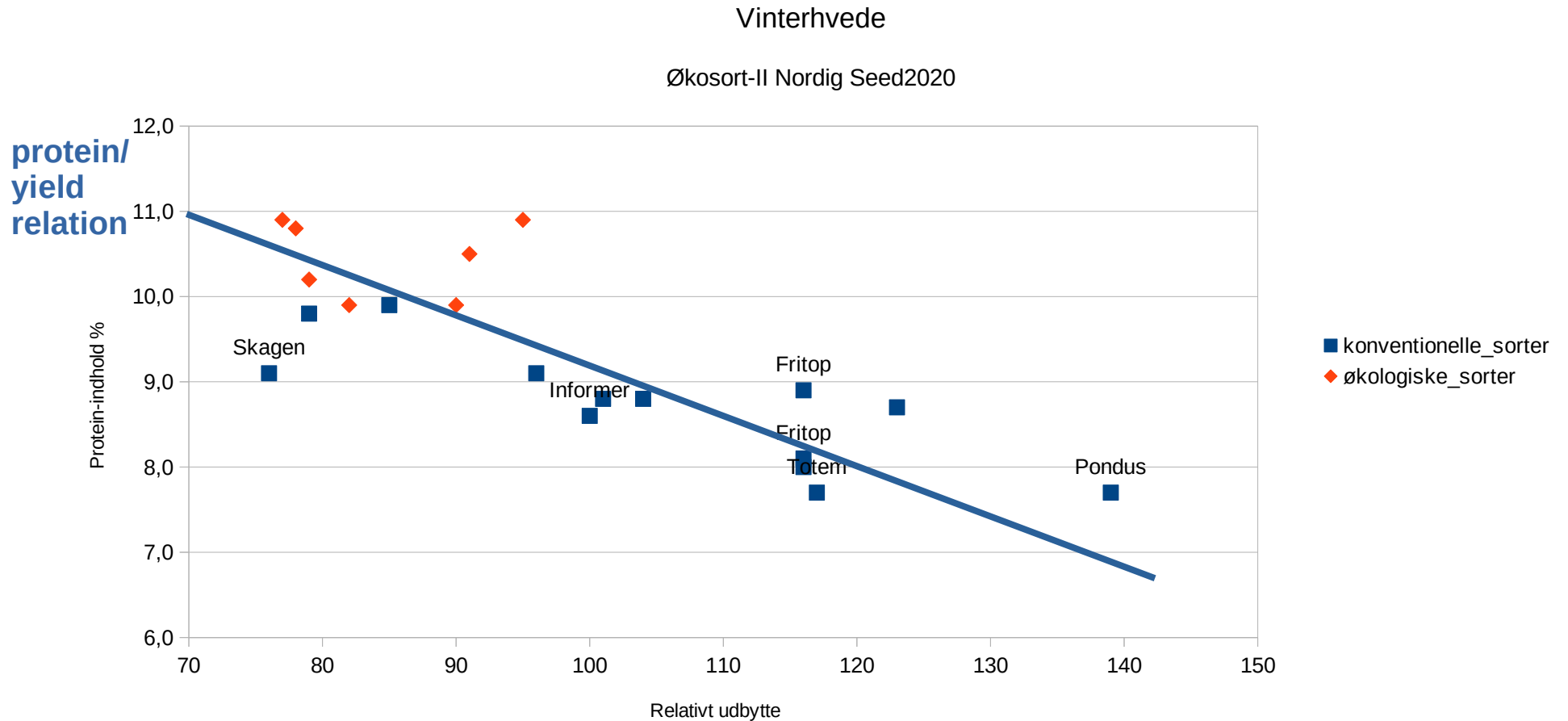
Priority traits

- Protein content in bread wheat
- Weed competition (barley and wheat)
- Diseases (rust, mildew, common bunt, CCN...)
- Quality traits (purple wheat / taste / seed hardness / gluten allergy /)
-

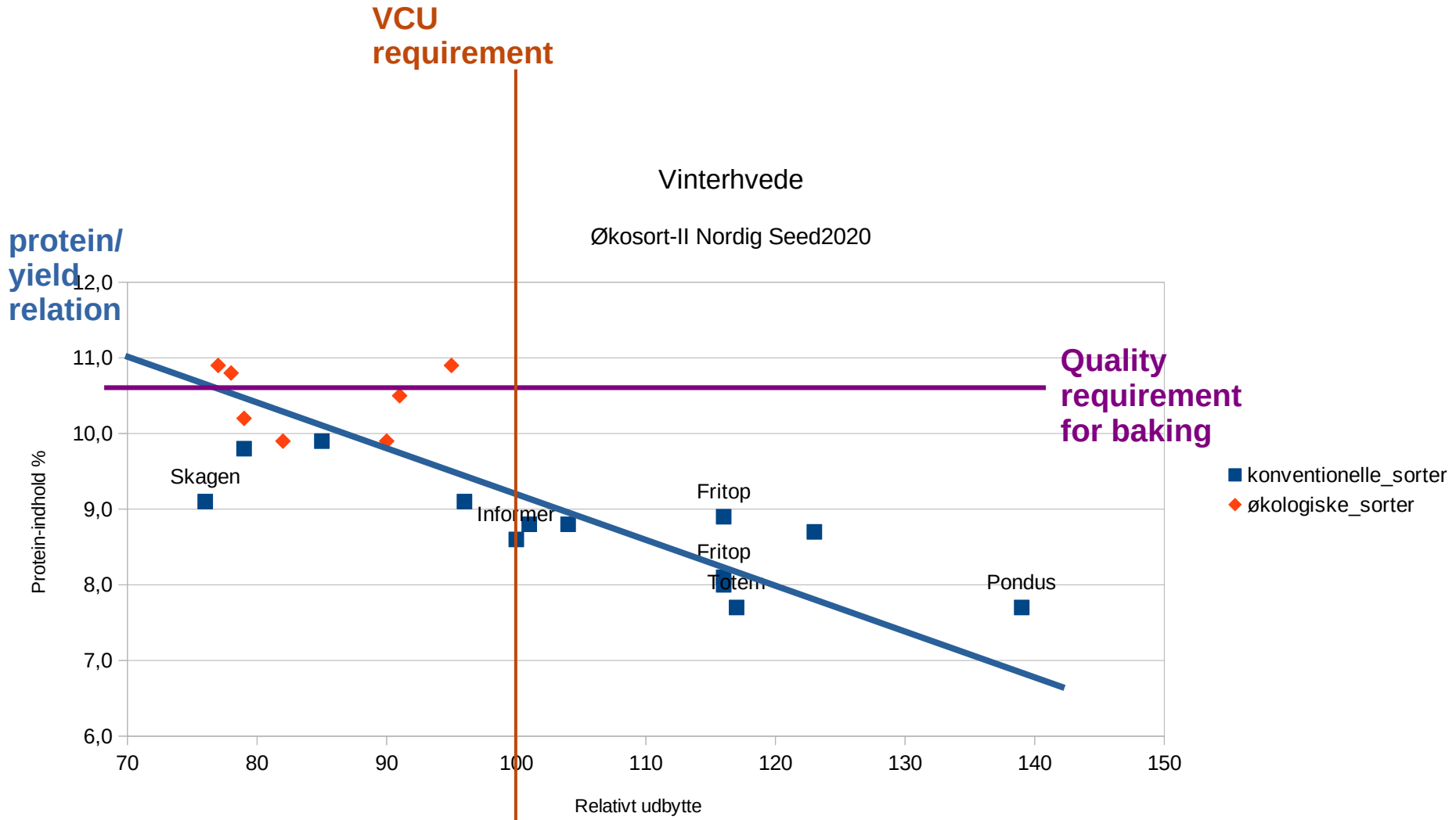
Protein content in organic wheat



Protein content in organic wheat



Protein content in organic wheat



Weed competition in organic cereals



Weed competition in organic cereals



Weed competition in organic cereals





Klosner Disentis

Evergreen og Leurika

Obersaxen

OHM if possible



OHM in production from Landsorten

- **Mariagertoba:** Spring wheat. High gluten content and high gluten index. Mixture of 25 breeding lines. Resistant to common bunt
- **Popkorn:** Winter wheat. High gluten content and high gluten index. Mixture of 50 breeding lines. Resistant to common bunt
- **Pop Nørregade:** Winter wheat. High gluten content and moderate gluten index (GI= \sim 80). Mixture of 25 breeding lines. Resistant to common bunt
- **Pop Feed:** High yielding winter wheat. Mixture of 15 breeding lines. Resistant to common bunt
- **Pop Pjerrot:** White winter wheat. High gluten content. Mixture of 15 breeding lines. Resistant to common bunt
- **Pop Othello:** White winter wheat. Low gluten content for cakes. Mixture of 15 breeding lines. Resistant to common bunt
- **Pop Giraf:** Tall winter wheat (+95cm). Mixture of 150 breeding lines. Resistant to common bunt

Please have a look at: <https://landsorten.dk>

**and <https://agrologica.dk>
(sign up for newsletter)**



Thank you for your attention