



Erikoiskasvi-ilta Hämeenlinnassa
28.11.2013



Experiences of the first steps of the production of Andean pseudocereals in Finland

International Congress of Quinoa and Andean Grains
November 14 and 15, 2013
National Agrarian University La Molina, Lima Peru

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The World

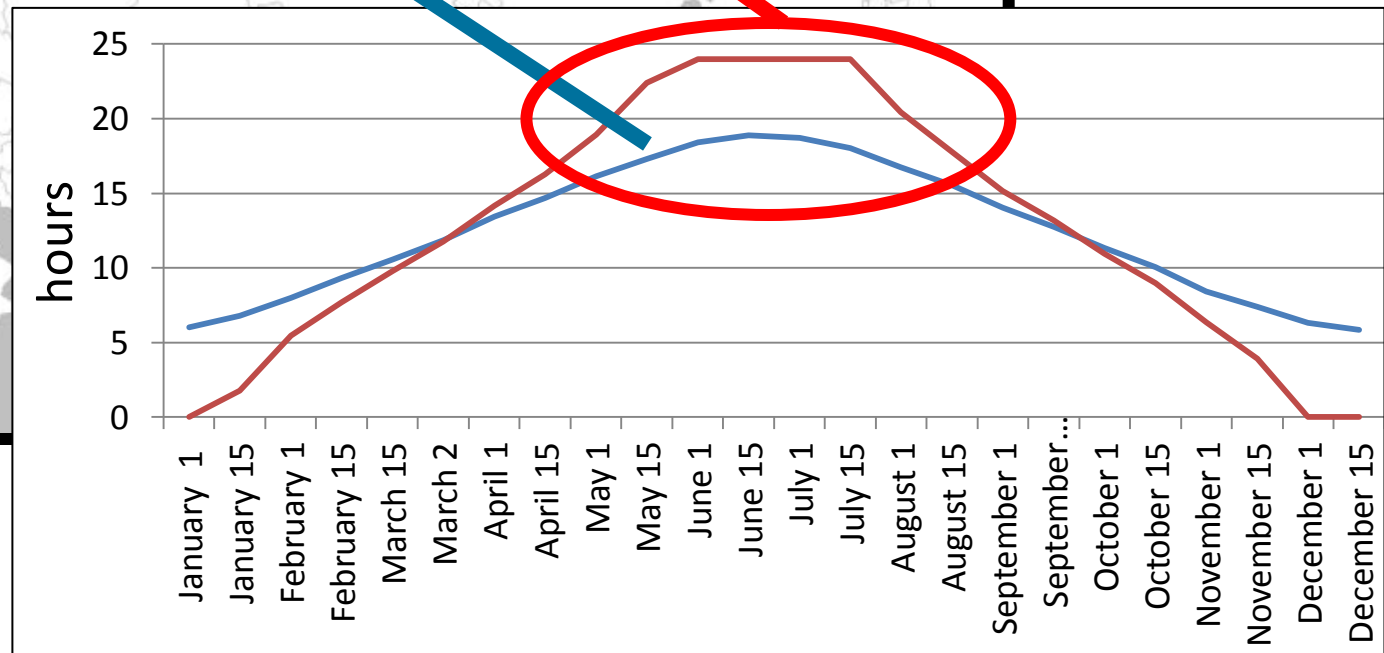


FINLAND

Utsjoki

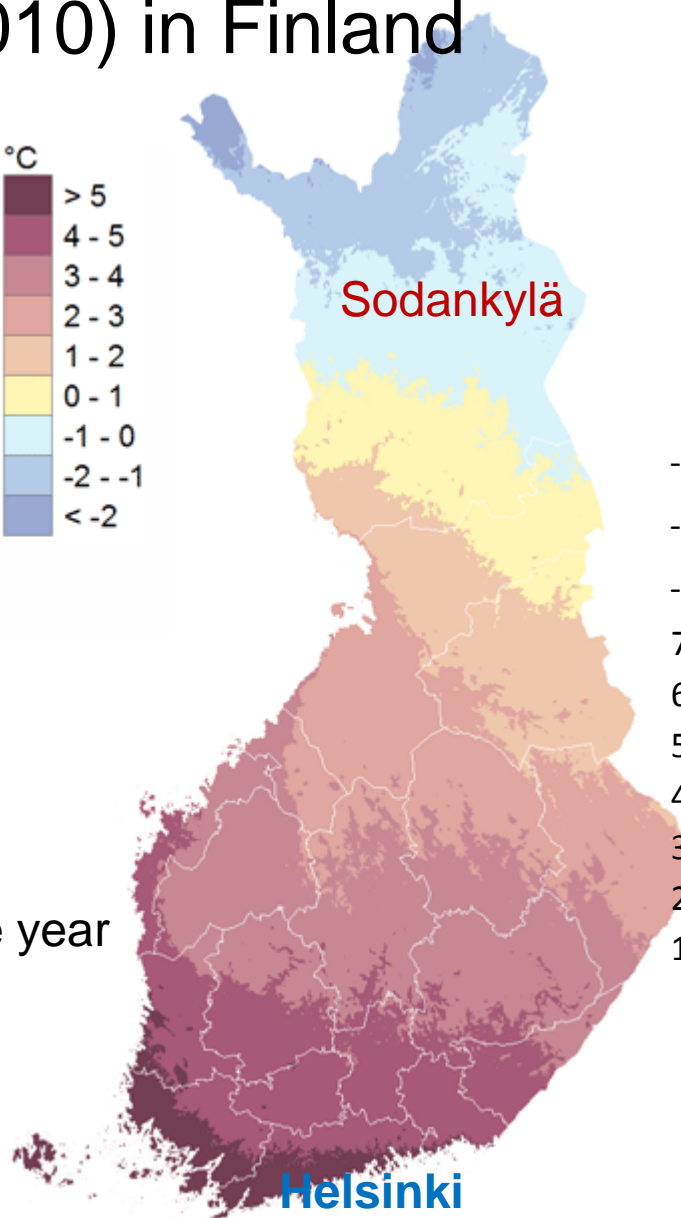
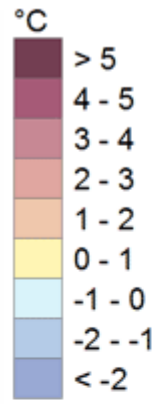
Helsinki

The time (h) between the sun rise and sun set in Finland is in the growing season between 15 to 24 h



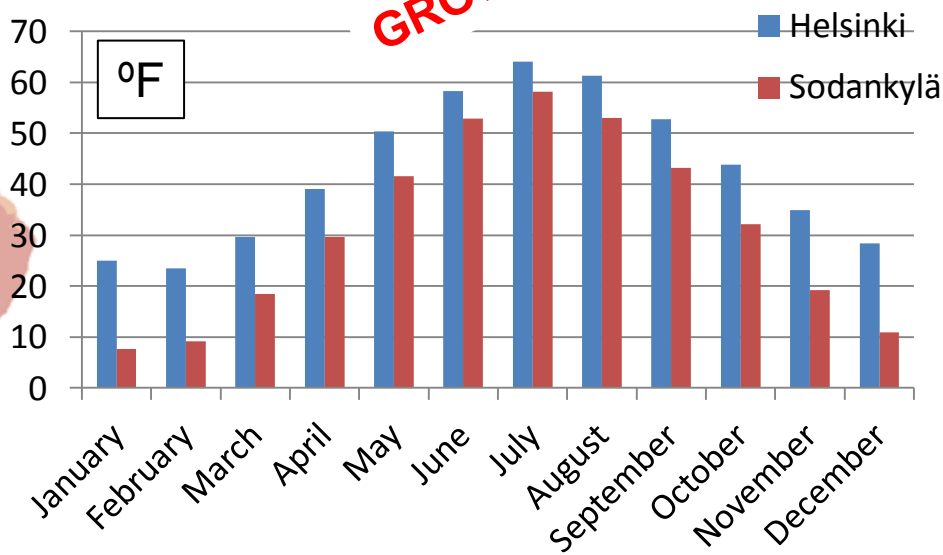
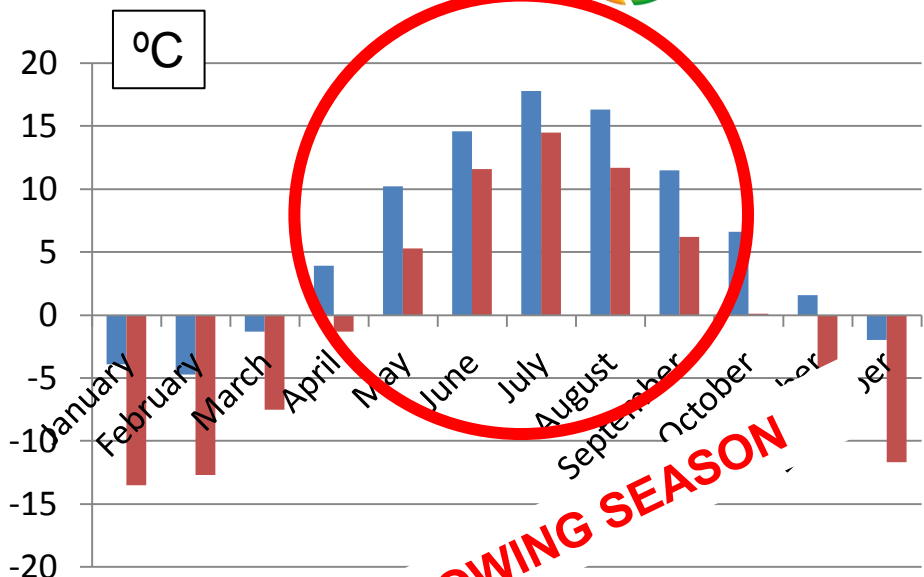
The average temperature (1981-2010) in Finland

C	F
5	41
4	39,2
3	37,4
2	35,6
1	33,8
0	32
-1	30,2
-2	28,4
-3	26,6

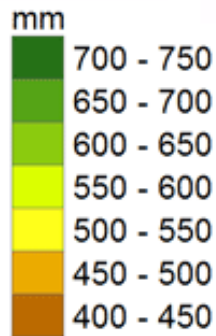


The average year temperature

The average monthly temperature



The average precipitation (mm) in Finland 1981-2010



Sodankylä

Helsinki

-> Autumn is the rainy season
Autum is also the harvest season!

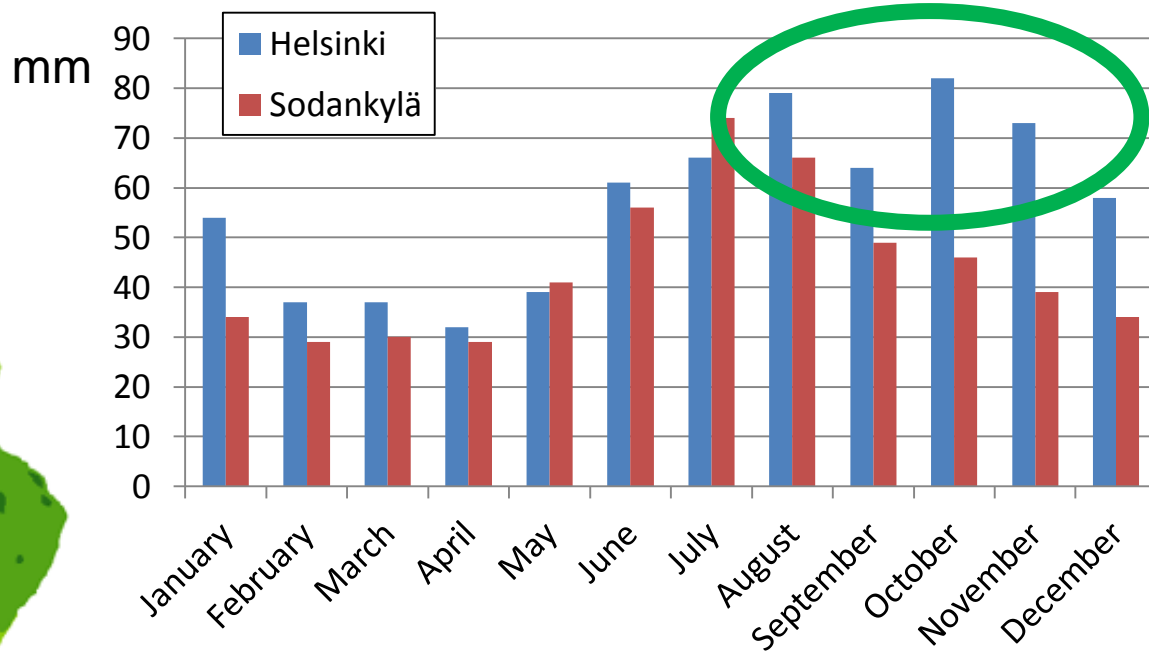




Fig.1. Field experiment at MTT Agrifood Research Finland in 2000. The first experiments on quinoa was carried out in 1980's by Miguel Carmen.



Fig. 2. Flowerheads and seeds of different quinoa accessions in MTT´s field experiment in 2000 (18.11.2000).

Kvinoakantojen sato 1999 kokeessa

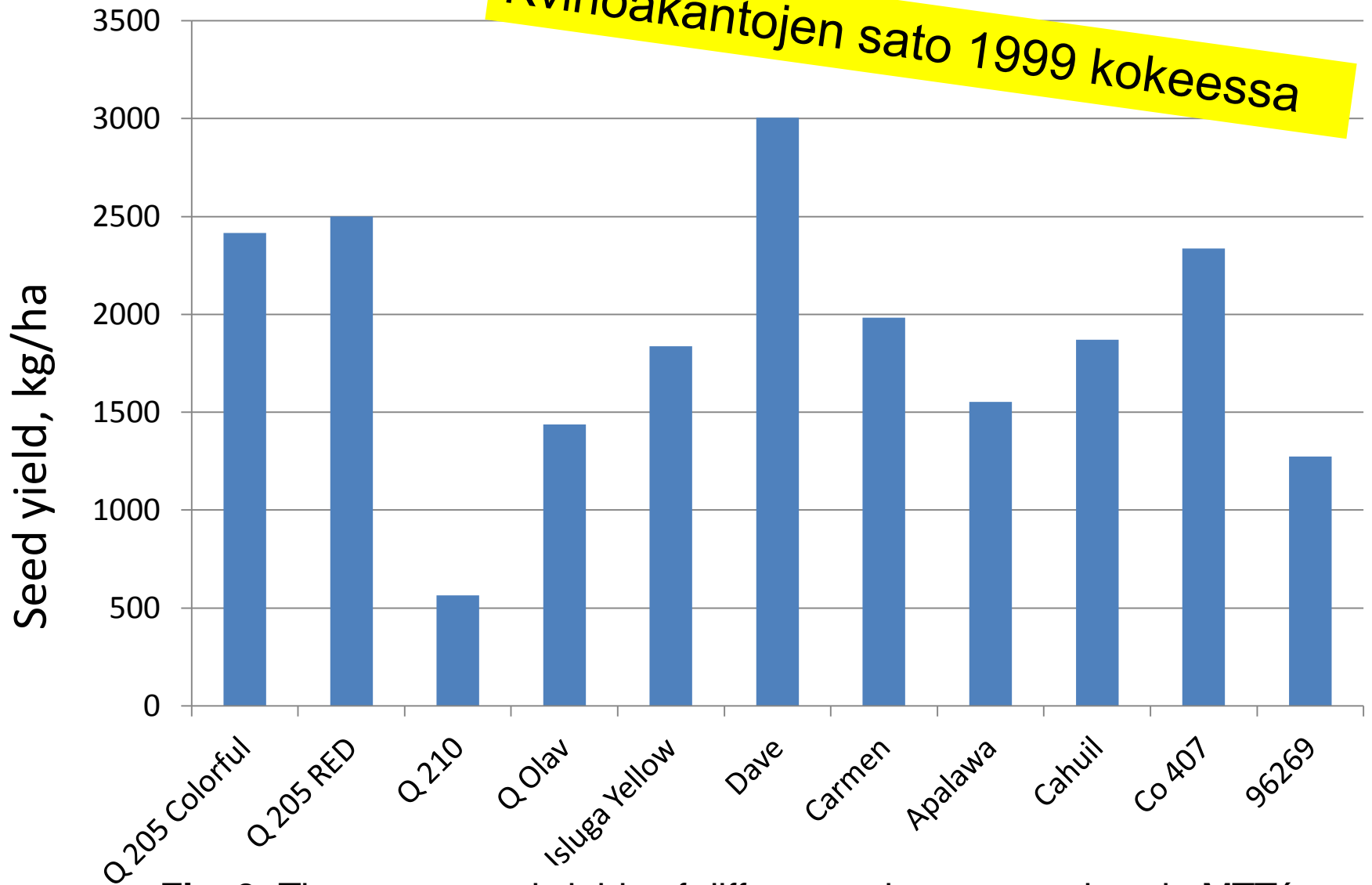


Fig. 3. The mean seed yields of different quinoa accessions in MTT's field experiment in 1999.

-> Protein content of quinoa accessions were comparable or ever higher than cereals

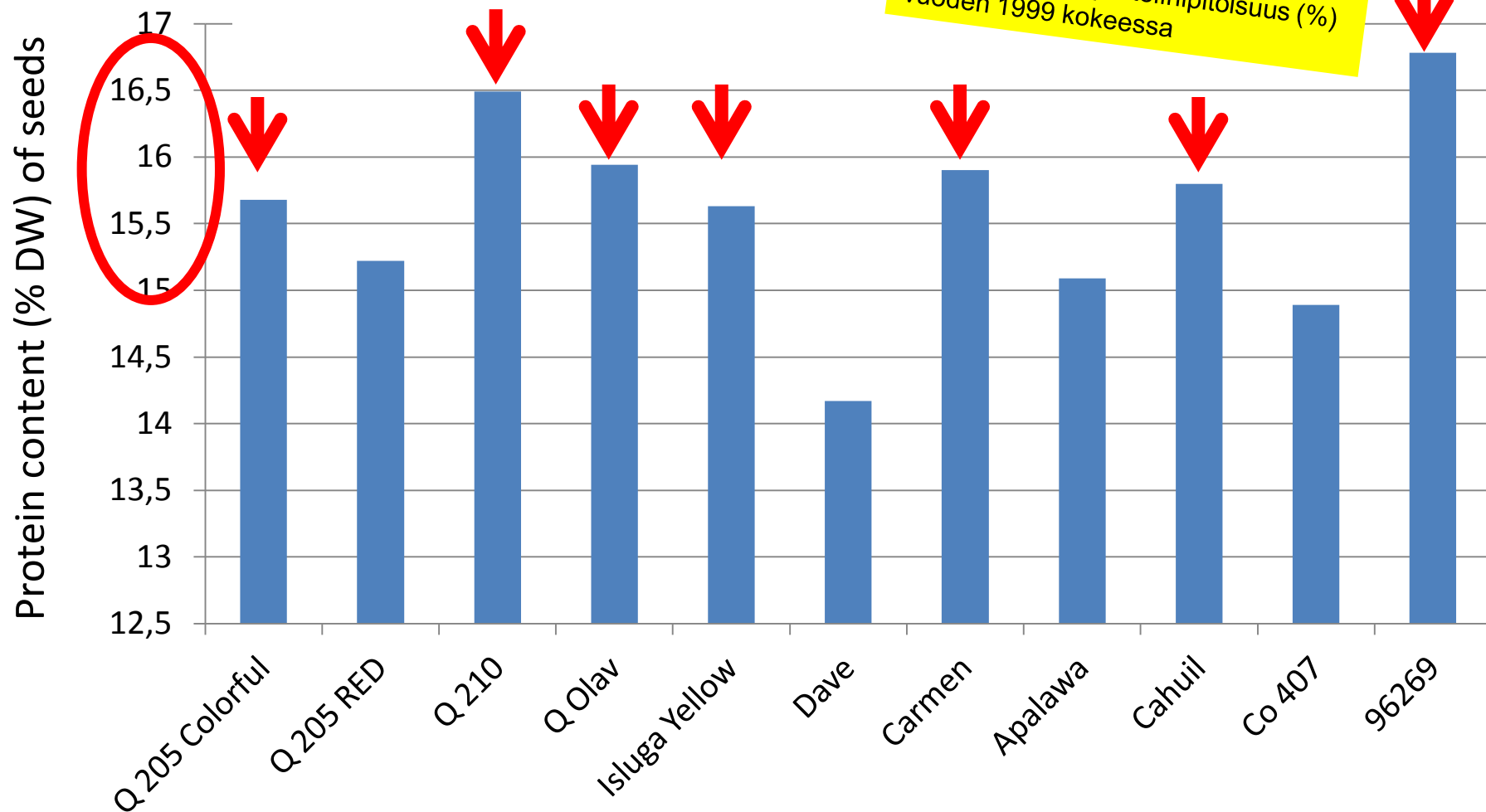


Fig. 4. The mean protein contents (% of DW) of seeds from different quinoa accessions in MTT's field experiment in 1999.

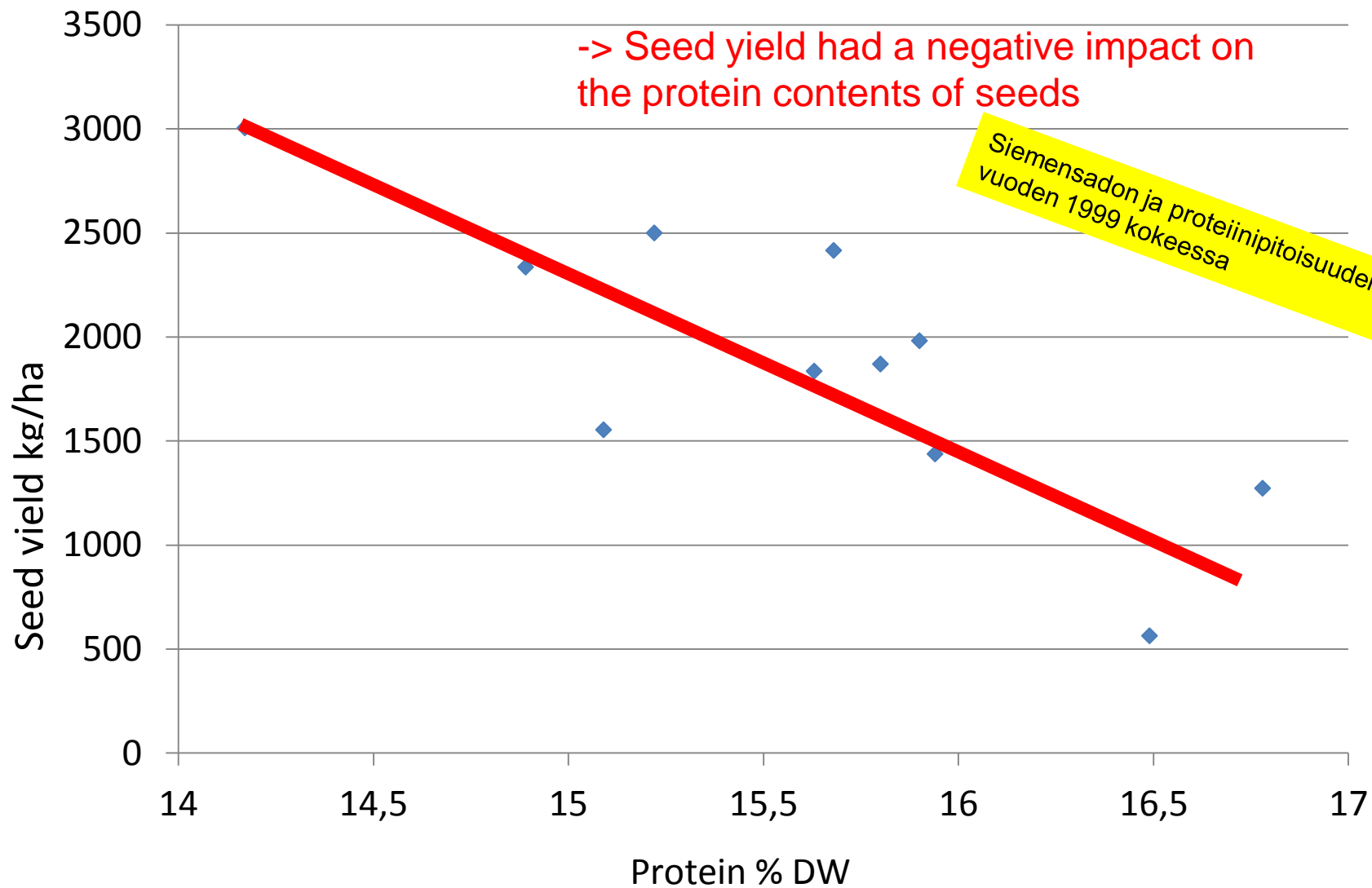


Fig. 5. Relationships between seed yield (kg/ha) and protein content (% DW) of different quinoa accessions in 1999.

Kvinoan viljely nk. Silmu-kasvihuoneessa vuonna 2009



Fig.6. The potential seed yield formation was studied in the greenhouse, where the daily mean temperature was about 4 °C higher than the ambient one. Also, the growing season in the greenhouse was one month longer than outside.

Kvinoan viljely nk. Silmu-kasvihuoneessa vuonna 2009

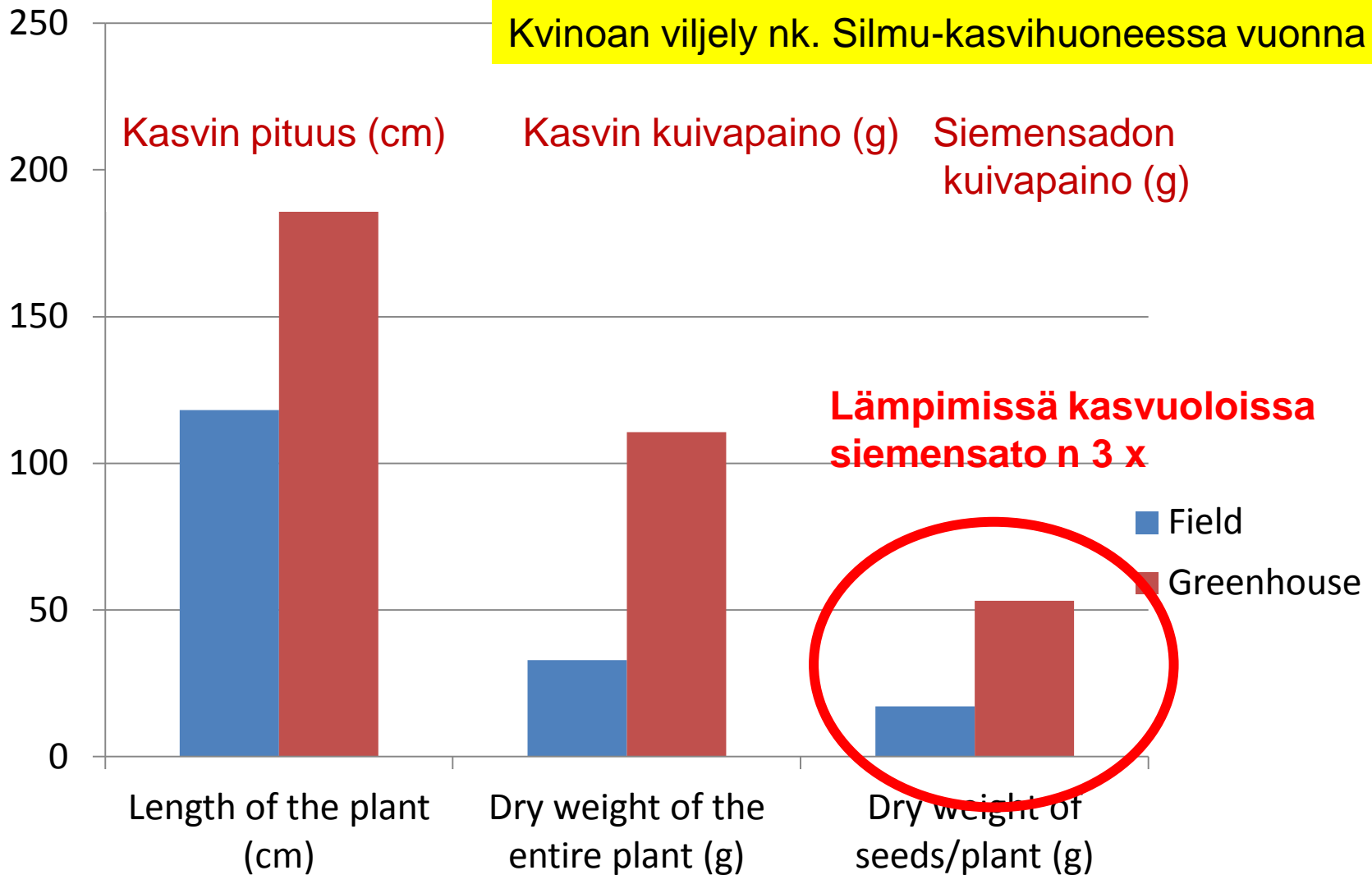


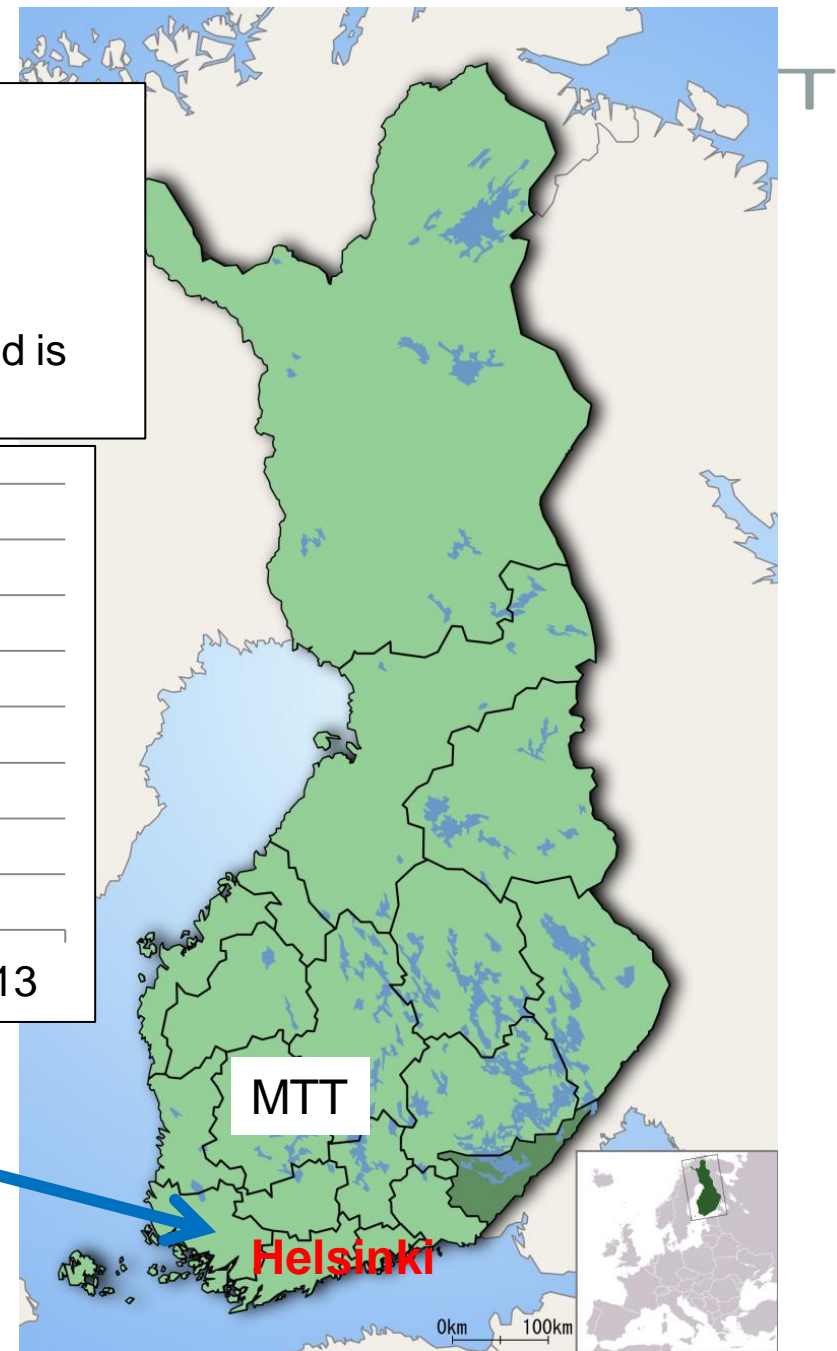
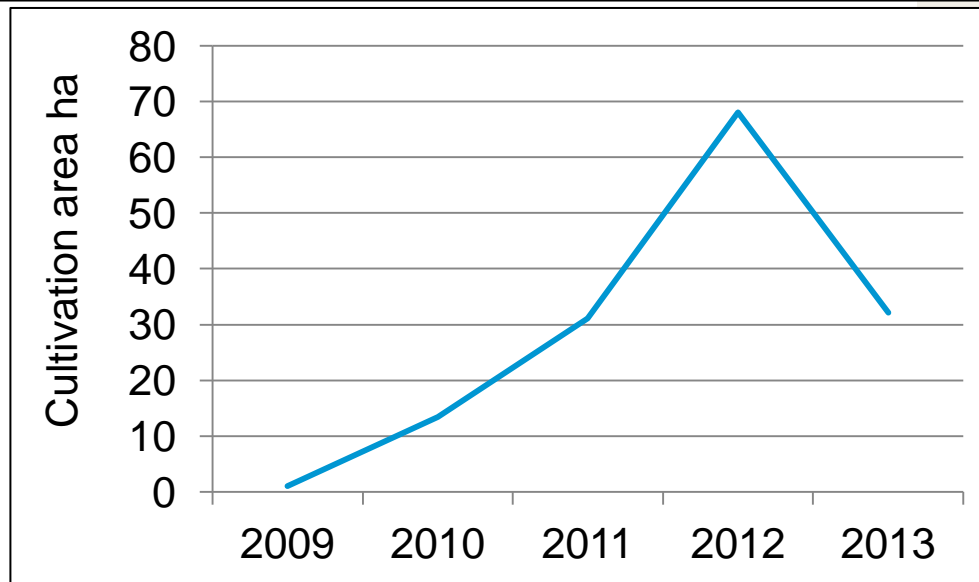
Fig. 7. The comparison of yield formation of quinoa produced in the field and in the greenhouse, where the temperature was about 4° C higher than in the ambient conditions.



Suomen suurin kvinoapelto vuonna 2009

In 2013 quinoa was cultivated on 32 hectares

Comparison - the total area of arable land in Finland is 2,3 milj ha



LIETO,
the main cultivation area of quinoa
in Finland

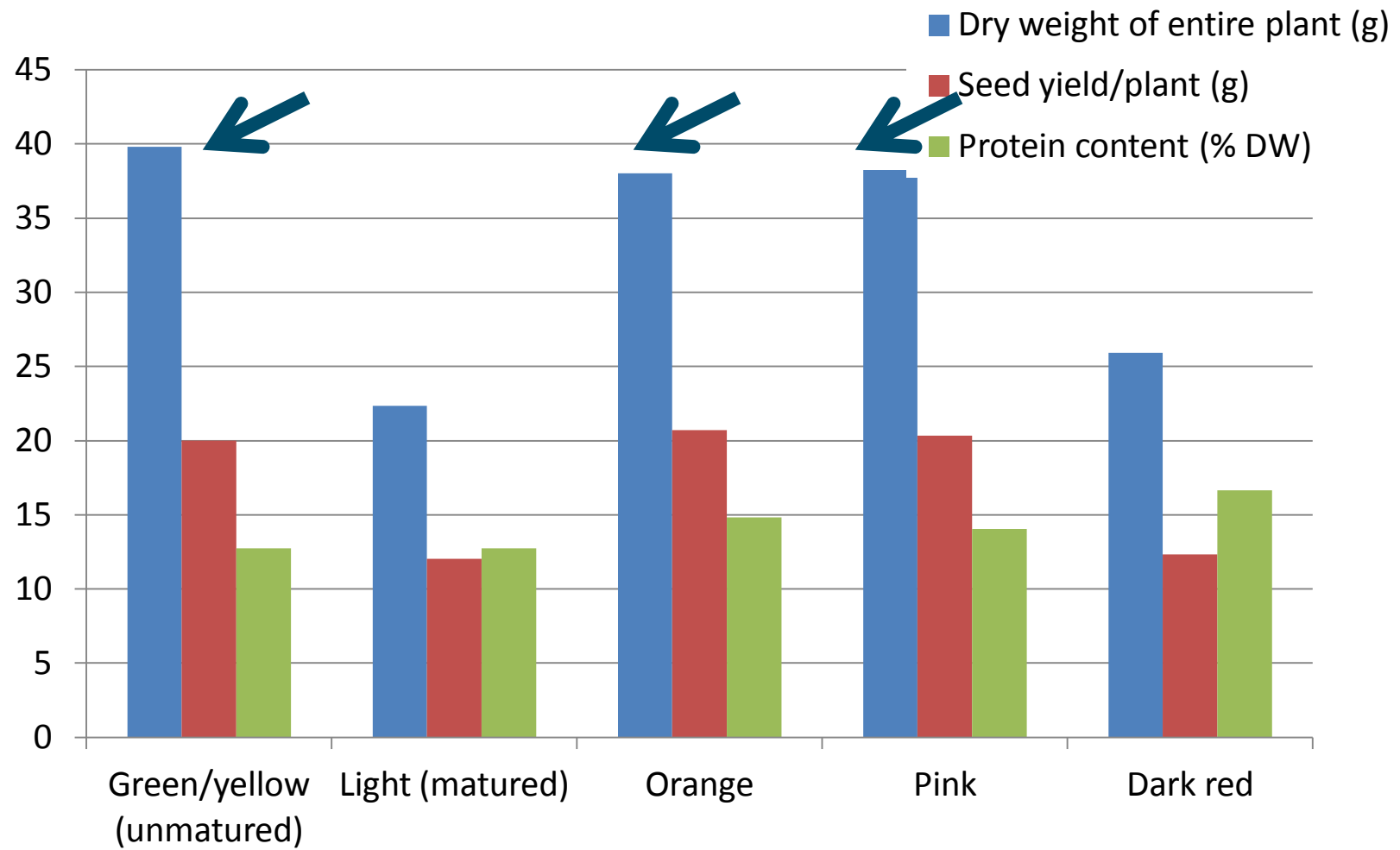


Fig 8. The dry weight of entire plants and seeds (g), as well as the seed protein contents (% dry weight) of quinoa based on differently coloured flowerheads

Eriväristen kvinoakantojen kuivapainot ja siementen proteiinipitoisuudet (%)

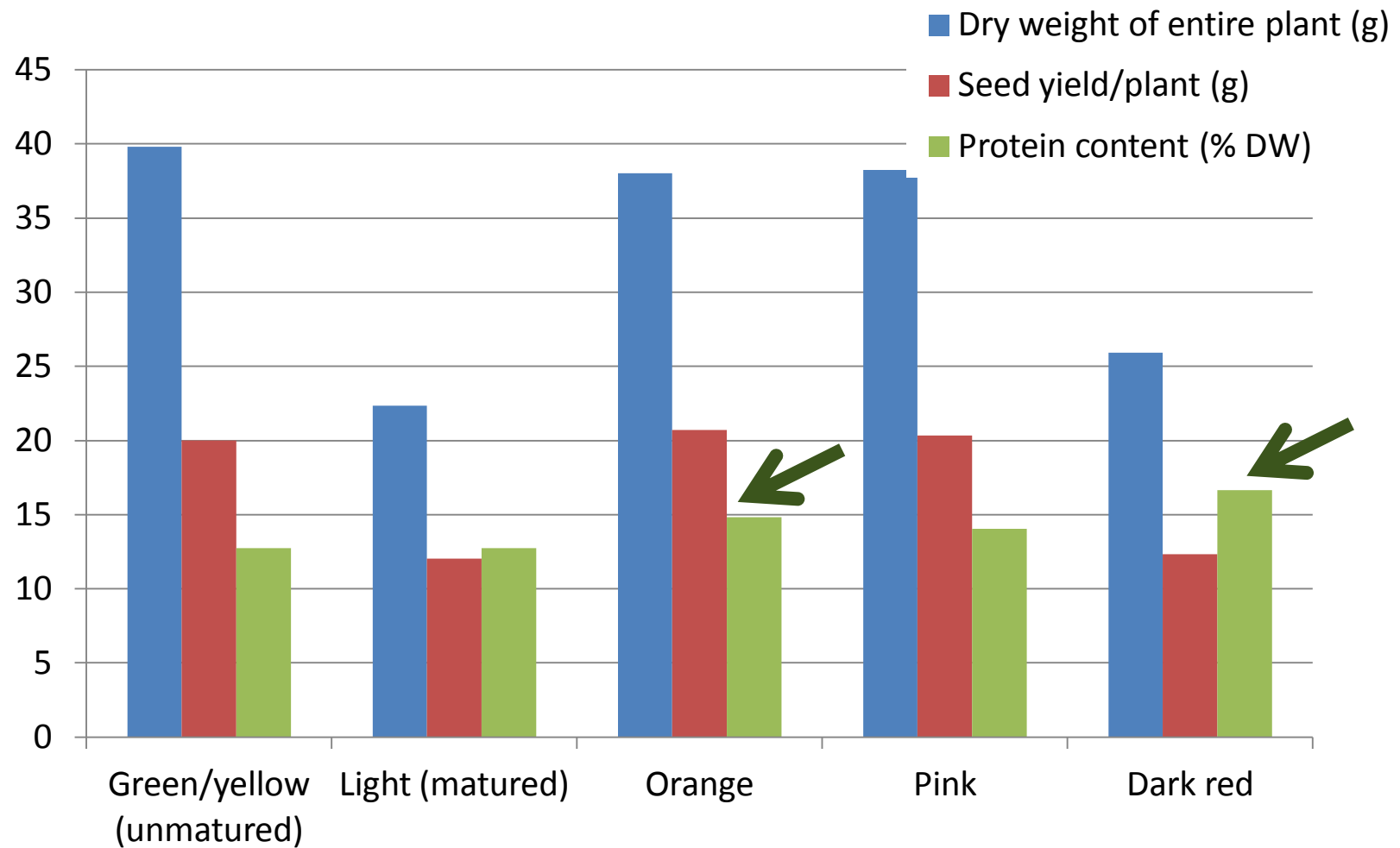


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Eriväristen kvinoakantojen kuivapainot ja siementen proteiinipitoisuudet (%)

-> Satoindeksi 50 on varsin suuri verrattuna esimerkiksi viljoihin

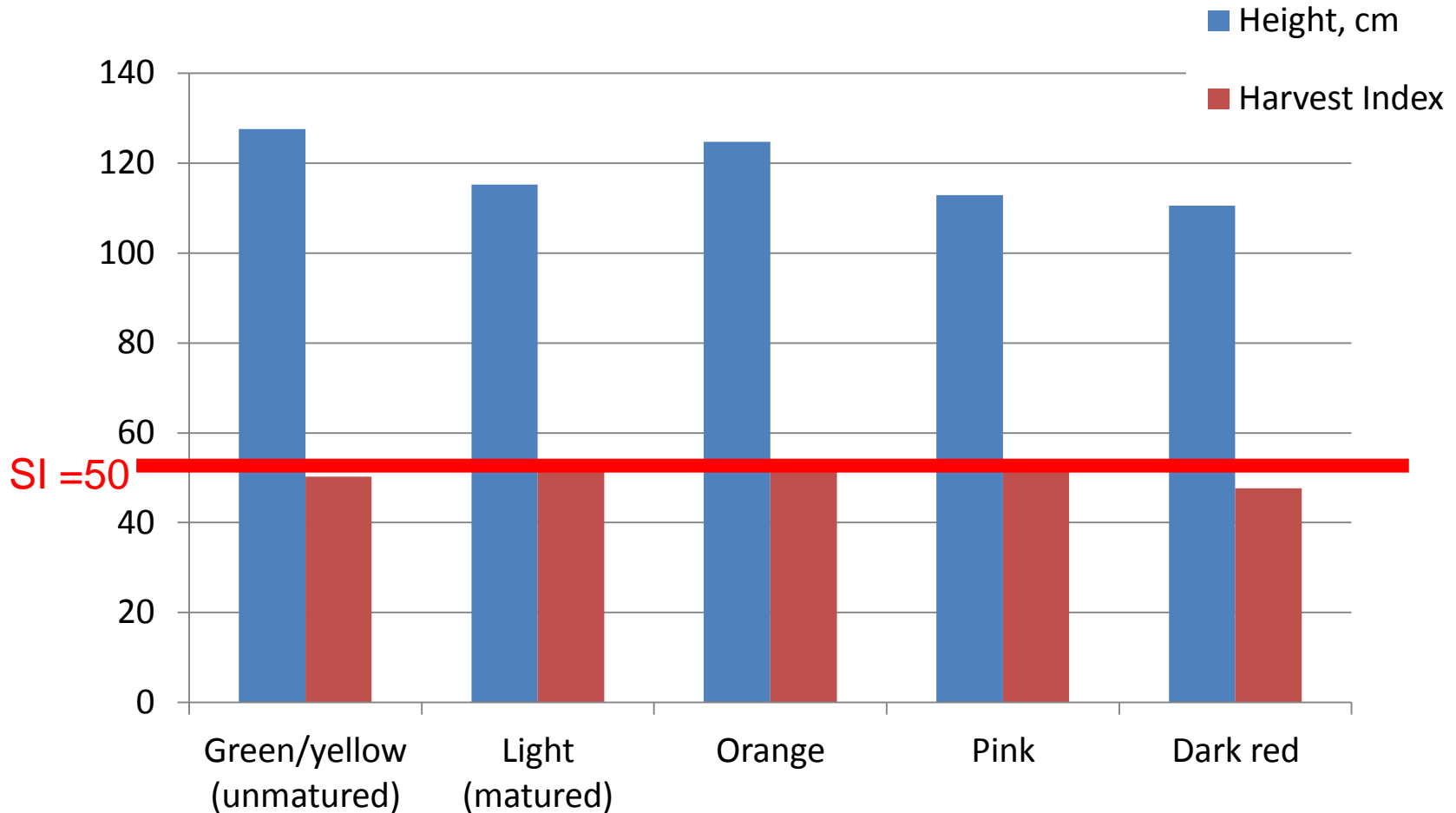


Fig 9. The height of the plant and the harvest index ((seed yield/plant entire biomass)*100) of quinoa based on differently coloured flowerheads in 2009.

Eriväristen kvinoakantojen kasvin pituudet (cm) ja satoindeksi

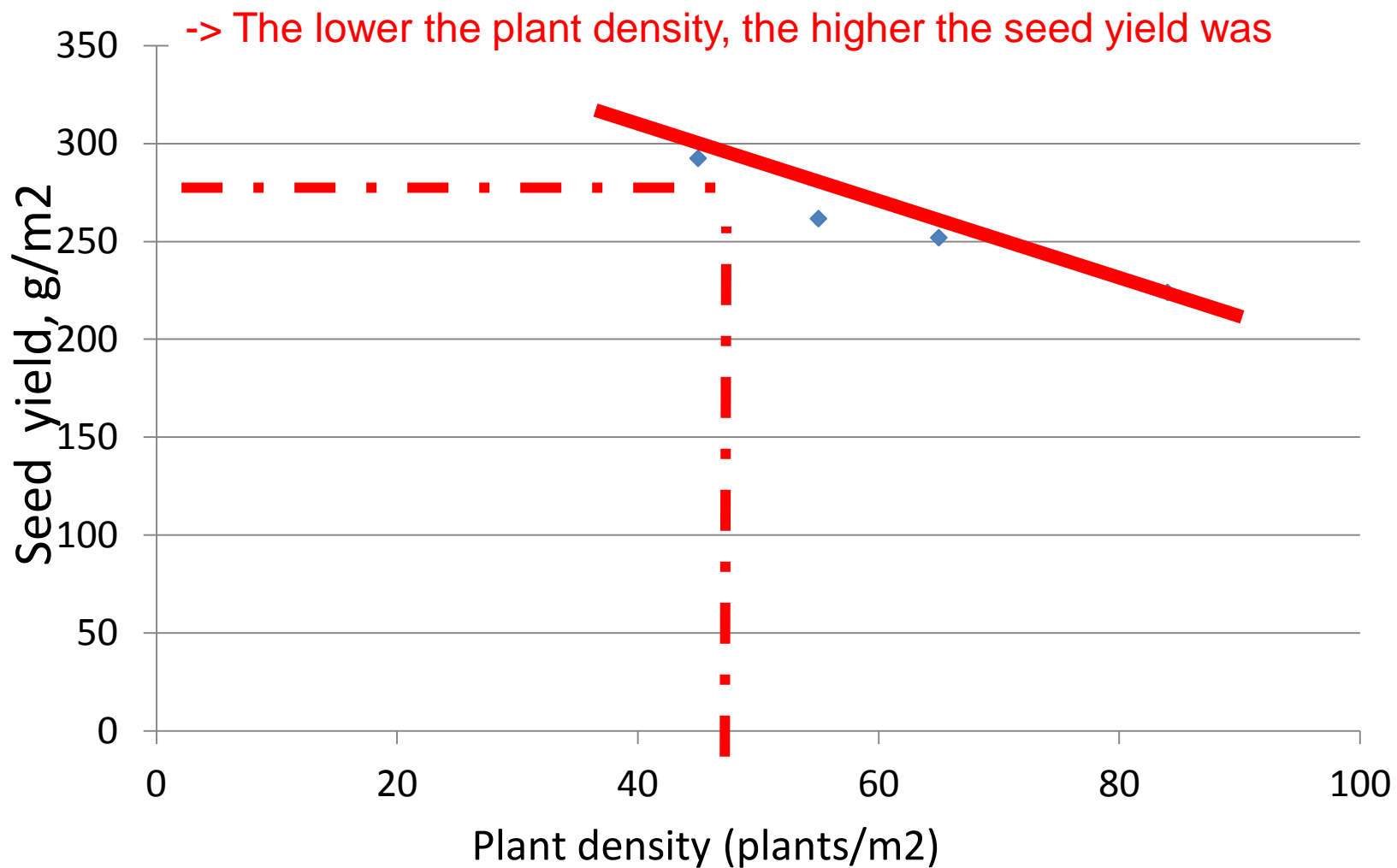


Fig. 10. Siemensadon (g/m²) ja kasvitiheyden (kpl/m²) yhteys

Problems:

(Too) Low plant density

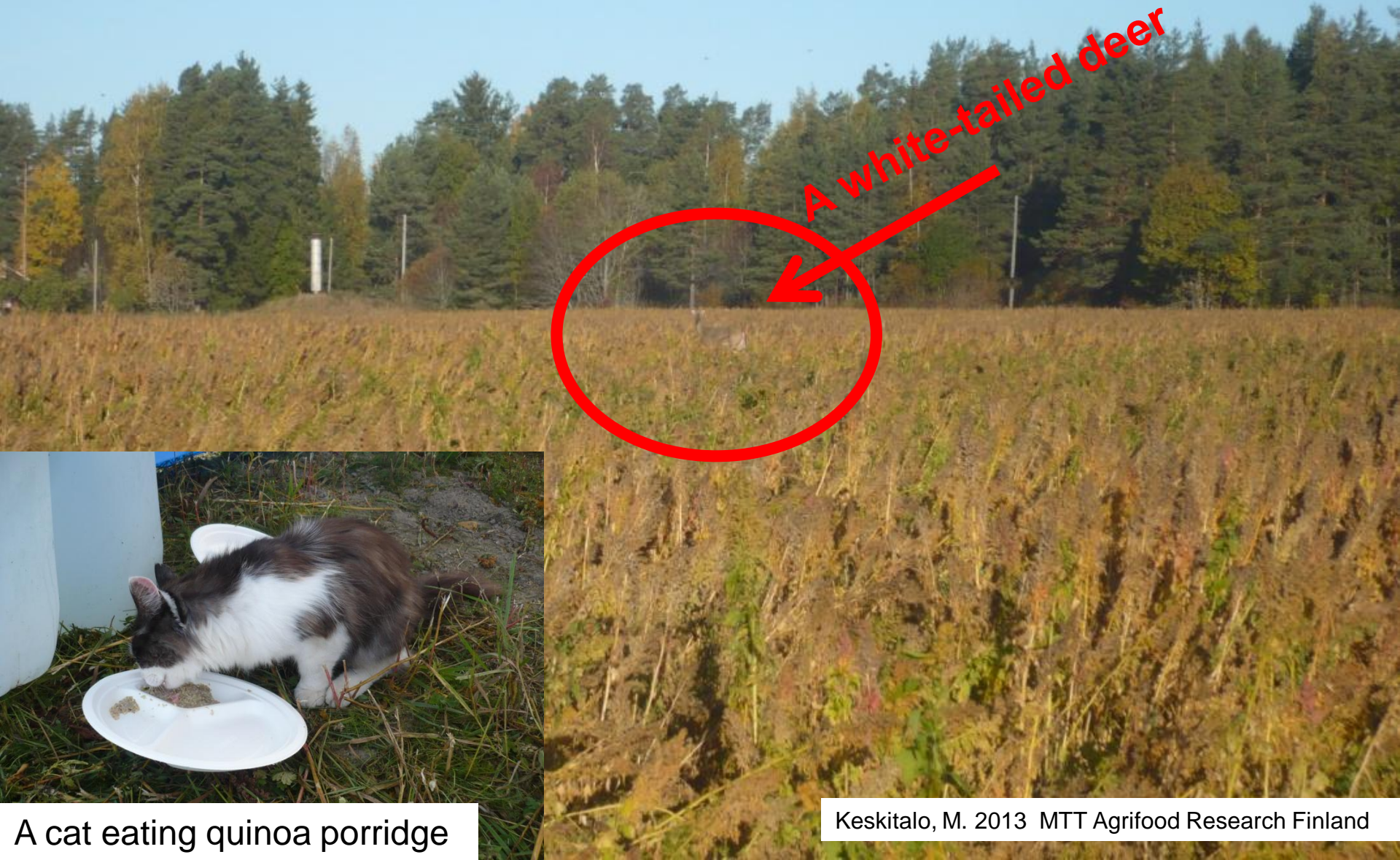




Problems:

Aphids in the flowerheads
- consequences?

Other animals like quinoa also...



A white-tailed deer



A cat eating quinoa porridge



Kvinoa MTT:n kenttäkoessa



Kuva 28.9.2013

Quinoa is late maturing crop in Finland and in some years frost may occur before crop is ready for harvest



Quinoa field at MTT in October 2nd, 2013





Harvest time in 2013



Kvinoan korjuu 3.10.2013 MTT:ssä ja
4.10.2013 Rainingoilla



Siemenen pinnalla olevat saponiinit tulee poistaa ennen käyttöä



Käsitellyt siemenet

Käsittelemättömät siemenet

Conclusions (1)

- Quinoa may produce seed yields (1000 – 3000 kg/ha), which are comparable with other alternative crops in Finland – it is a promising new crop
- There are now major pest or diseases hampering the production
- The protein content of seeds may be the same or even higher compared to cereals.

Conclusions (1)

- Quinoa may produce seed yields (1000-3000 kg/ha), which are comparable with other alternative crops in Finland – it is a promising new crop
- There are no major pests or diseases hapering the production
- Protein content of seeds may be the same or even higher compared to cereals.
- Consumers are very interested in the health aspects of quinoa
- Farmers are ready to start the cultivation

Conclusions (2)

- There are still challenges to be solved in the production technology and therefore more research and information are needed:
 - 1) New or improved varieties
 - Early flowering
 - Evenness on maturity
 - Resistant to lodging
 - 2) Information on optimal seed rates and plant densities
 - 3) Optimization of plant nutritional requirements and fertilization
 - 4) Postharvest technology
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GRACIAS