

High-quality crops for plant-based diets

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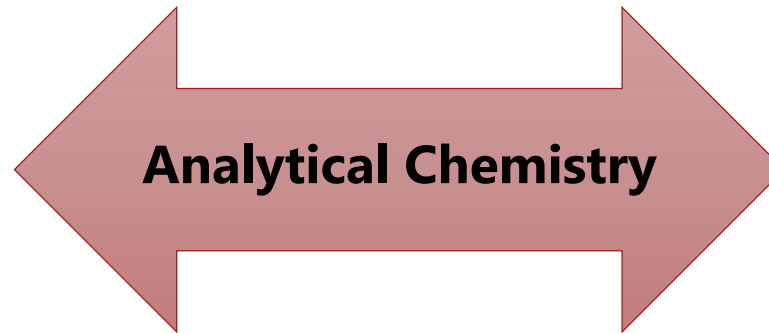
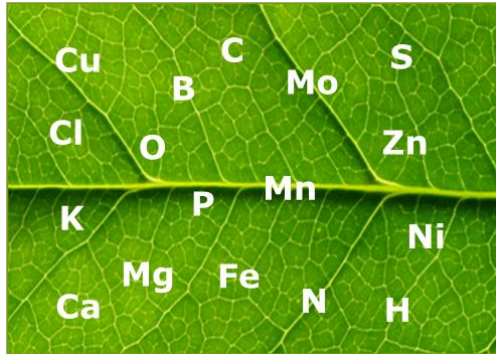
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5 October 2022

Plant Nutrients and Food Quality Research Group



- Biochemical functions
- Nutrient interactions
- Production systems
- Soil fertility
- Fertilization strategy
- Micro-climate
- Genetics



- Nutrient content
- Nutrient bioavailability
- Protein content
- Amino acid composition
- Heavy metals
- Food safety
- Food authenticity

Sustainable crops and production systems

- Improved utilization of light, carbon dioxide, water and nutrients
- Reduced use of non-renewable resources
- Circularity - use of wastes and industrial side streams
- Climate tolerance
- Disease and pathogen resistance
- Stable yields
- Crops for food instead of feed
- Targeted production using less resources

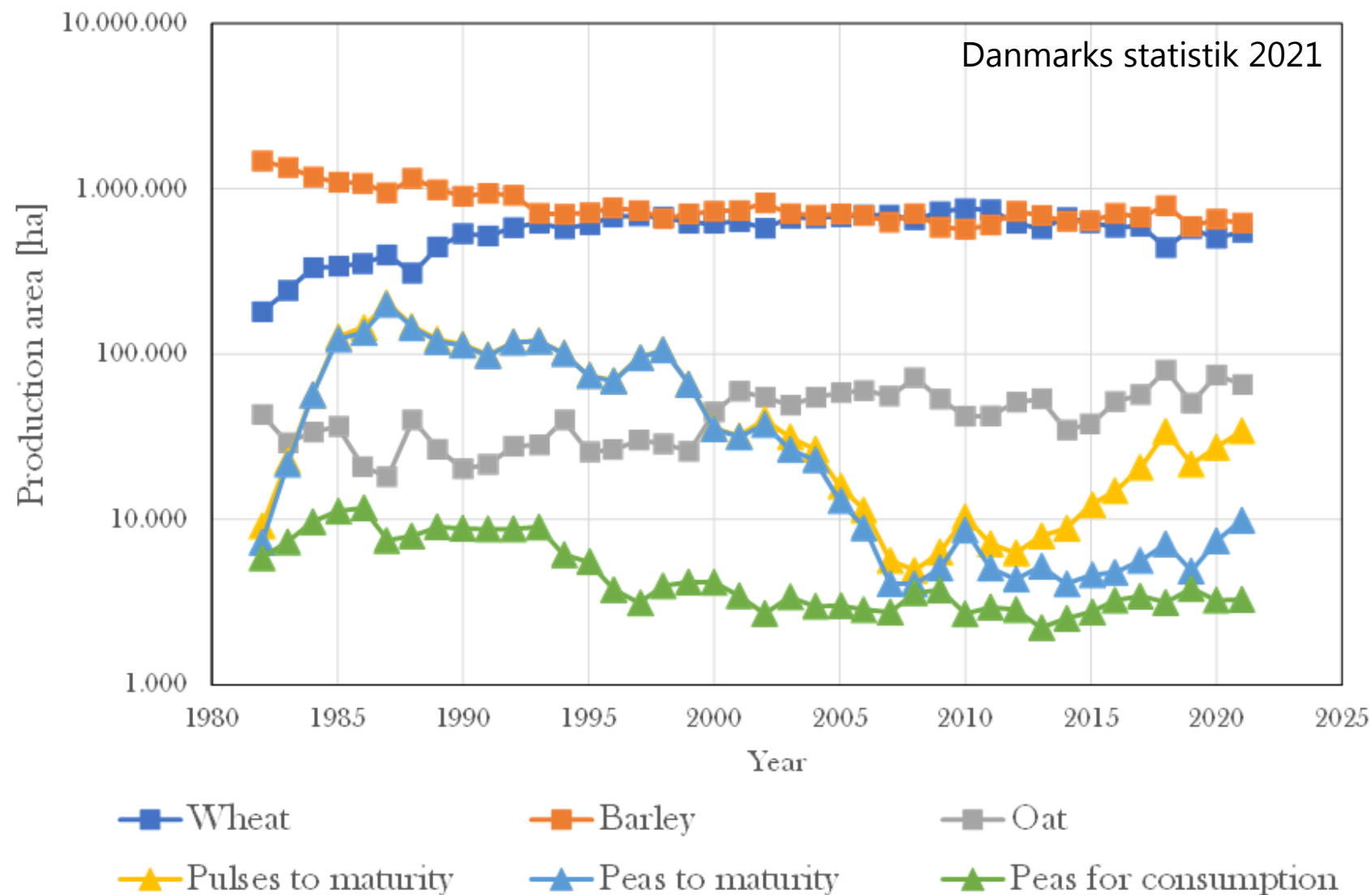


Which crops for a plant-based diet?

- More than 300.000 different plant species
- 150-250 plant species are agriculturally relevant
- ~10 plant species deliver 95% of Worlds food and feed
- Wheat, rice and maize dominate globally (2/3 of the total yield)
- Barley, wheat, maize, grass and rape seed dominate in Denmark
- Urgent need for more protein crops



Danish crops in a historical perspective



I 2023 kan landmænd få et ekstra tilskud for at dyrke bl.a. høstebønner, hvis de opfylder betingelserne. Tilskuddet kommer oveni den almindelige landbrugsstøtte og økologitilskuddet. Foto: Marie-Louise Simonsen

Nyt tilskud til protein- og konsumafgrøder: Se listen med afgrøder her

Landmænd kan fra næste år få et ekstra tilskud, hvis de dyrker visse afgrøder til protein og konsum. Landbrugsstyrelsen har lavet en foreløbig liste med tilskudsberettigede afgrøder.

<https://okonu.dk/>

"Novel" crops for plant-based diets in a Danish perspective

Faba beans

Peas

Lupin

Lentils

Soybean

Oat

Quinoa

Amaranth

Buckwheat

Large differences in:

- Fertilization requirements
- Tolerance to drought, weeds, diseases, pathogens
- Harvest yield
- Functionality
- Taste
- Nutritional value
- Protein content
- Protein quality
- Anti-nutrient content



Yield or quality?

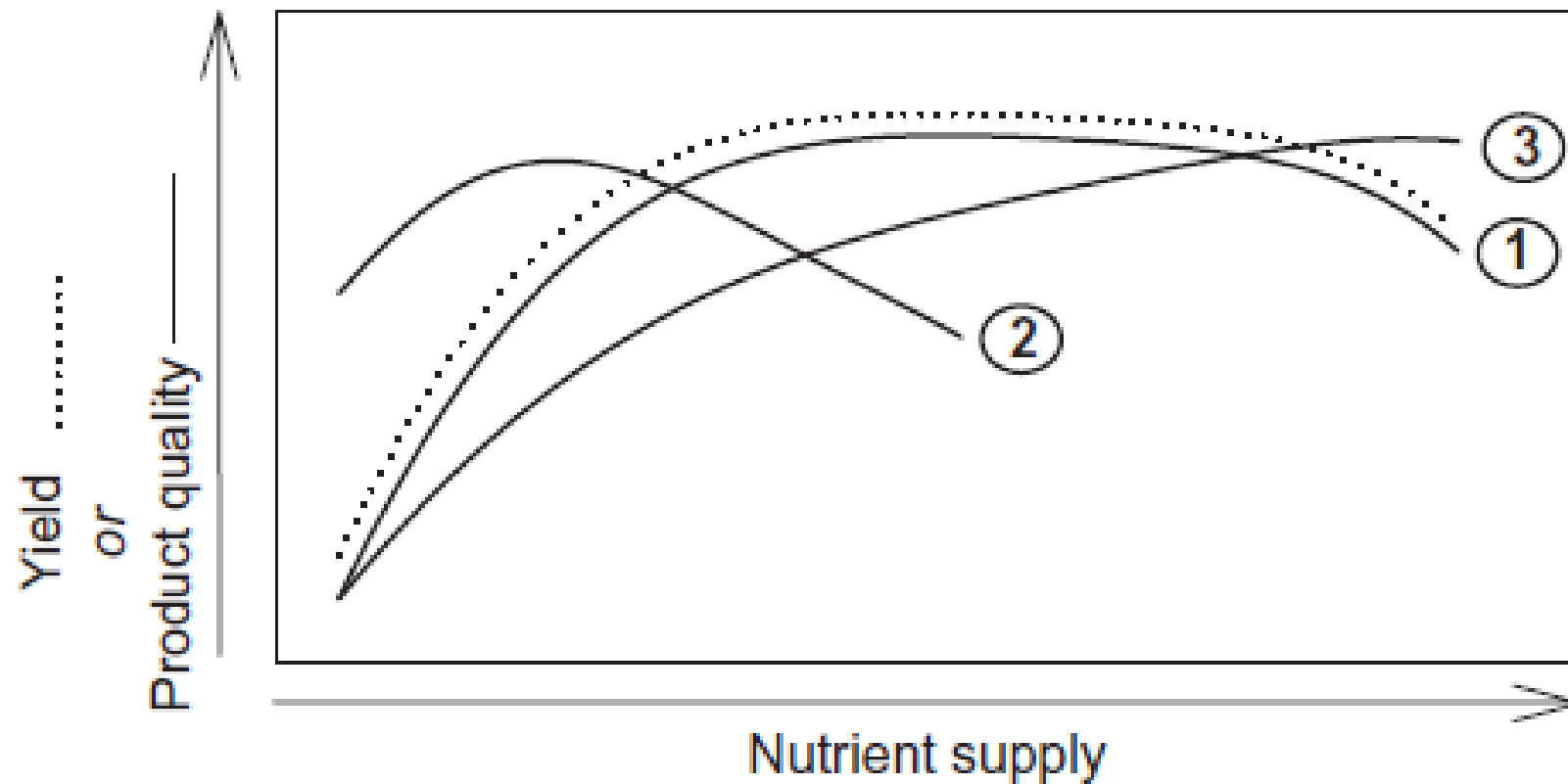



FIGURE 9.1 Nutrient supply and yield (dotted curve) and product quality (curves 1, 2 and 3). For explanation and examples see text. *Based on Marschner (1995).*

AQRIFood (2022-2024)

- Advancing the Quality of plant-based Raw materials and Ingredients for Food applications
- **Project coordinator:** Christian Bugge Henriksen
- **Participants:** See all 19 here www.aqrifood.dk
- **Funding:**  nnovation Fund Denmark



Linda K. Nielsen

Individual WPs of AQRIFood Phase I

WP1) Selection and cultivation of relevant cultivars

WP2) **Analysis of nutritional quality of raw materials and ingredients**

WP3) Analysis of functional quality of ingredients

WP4) Analysis of sensory quality of ingredients

WP5) Determination of most important quality parameters

WP6) Extension and preparation of mutant library of faba bean

WP7) LCA pilot study

WP8) Project management and dissemination

17. juni 2022

First AQRIFood leaf samples are ready for nutrient analysis

PLANT-BASED FOOD: Once analyzed, the samples collected from our Sejet breeding plots will hopefully reveal the best quality crops for plant-based foods.



<https://plen.ku.dk/forskning/afgroedevidevidenskab/climate-and-food-security/aqrifood/news/tracking-samples-from-farm-to-lab-table/>



Søndagsmagasinet

Her er plads til både nyheder og længere historier og tid til at gå i dybden med fortællingerne. Vi beskriver det der optager og skaber debat i lokalområdet. Holder du til i Lorryland omkring f.eks. Lejre, Helsingør, Hundested, Frederikssund eller Solrød og har kendskab til en historie, som du synes skal fortælles i Søndagsmagasinet, så send en mail til: sondagsmagasinet@tv2lorry.dk



Spis grønt for fremtiden (1:2)

Andrea Donau og hendes kolleger arbejder benhårdt på at lave en vegetarisk ost, som rent faktisk smager godt, og Christian Christensen har succes med produktion af plantebaseret drik. Vi har besøgt nogle af de iværksættere, som har sat sig for at producere de fødevarer, vi skal indtage i en fremtid med mindre kød.

< Del videoen

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Spis grønt for fremtiden (2:2)

Produktionen af kød koster dyrt i klimaregnskabet. Men hvis vi skal spise mere plantebaseret mad, skal vi kunne lide det vi putter i munden. Christian Bugge Henriksen står i spidsen for et stort forskningsprojekt, der skal være med til at forbedre kvaliteten af de råvarer, vi bruger til at producere de plantebaserede fødevarer.

< Del videoen

<https://www.tv2lorry.dk/sondagsmagasinet/sondagsmagasinet-2116>

Peas & Love (2022-2026)

- Pea yield stability, taste and quality – potential of old cultivars for increased organic pea production
- **Project coordinator:** Dorte Bodin Dresbøll

- **Participants:**  UNIVERSITY OF COPENHAGEN  Innovation Centre for Organic Farming  Pure Dansk  LOOP FOOD LAB

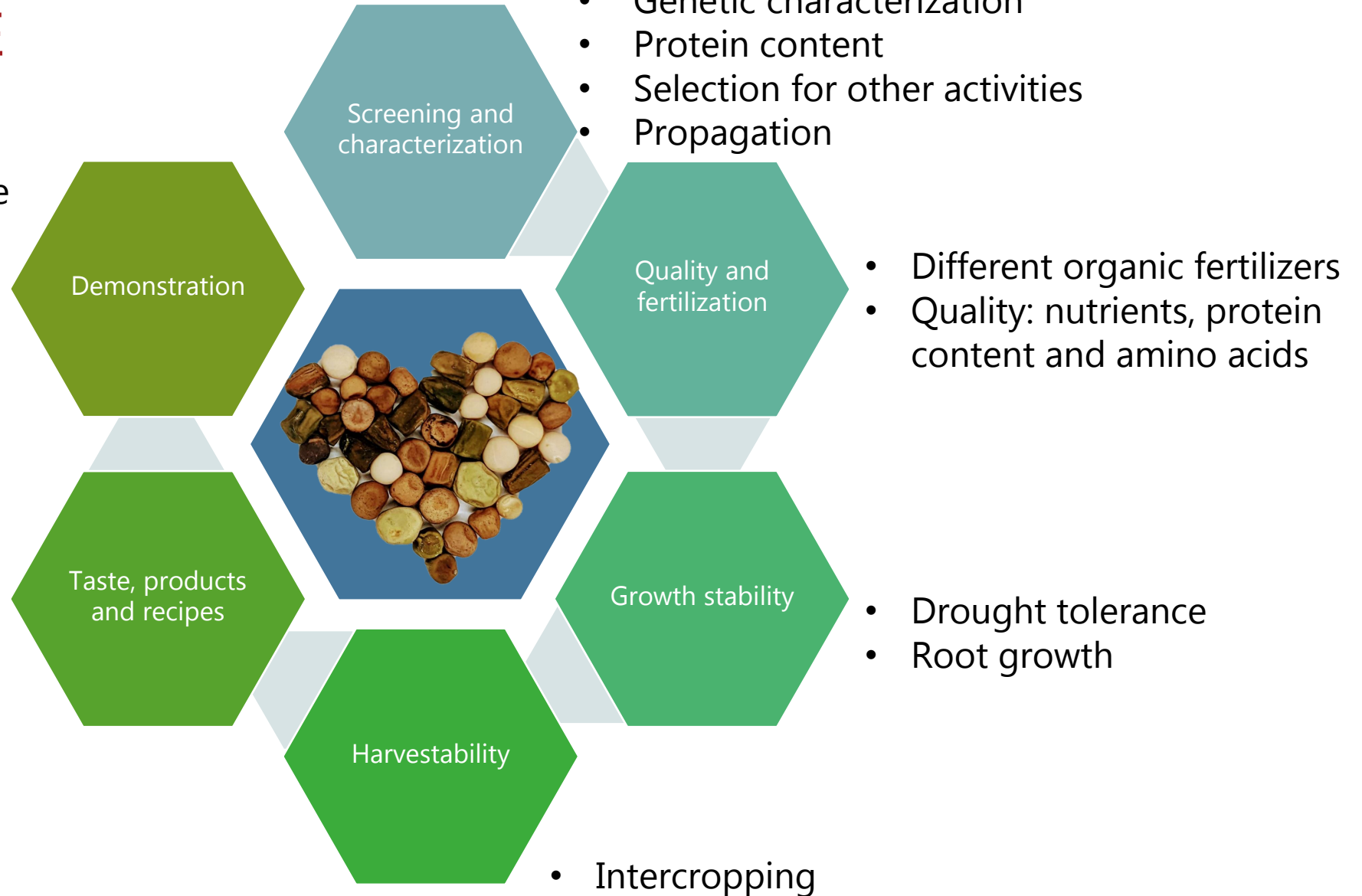
- **Funding:**  ICROFS Internationalt Center for Forskning i Økologisk Jordbrug og Fødevarer  gudp Ministeriet for Fødevarer, Landbrug og Fiskeri



PEAS & LOVE

- Growth at field scale
- Events

- ~300 old accessions
- Genetic characterization
- Protein content
- Selection for other activities
- Propagation



Pea propagation



Field propagation: 133 accessions



Large: 15m x 1.5m
30 accessions



Small: 1m x 1m
43 accessions



Small: 1m (fenced)
82 accessions

Large variation! But it is also what's inside that matters 😊



<https://icrofs.dk/forskning/dansk-forskning/organic-rdd-7/peas-love>

Healthy and high-quality crops = nutritious and safe food?

- Healthy crops are not always nutritious foods
- Yield versus food quality parameters?
- Quality scoring depends on application – direct consumption, isolate, concentrate, extrudate etc.
- Post-harvest processing is often required (food safety, bioavailability, functionality, taste, smell...)
- Optimization begins in the field – improve quality during plant growth
- Growth method and fertilization strategy is important
- Interdisciplinary collaboration!

Collaboration possibilities

- Novel crops and raw materials for plant-based foods
- Agricultural production methods and systems for novel crops
- Analytical methods for evaluating the quality of crops and raw materials
- New technologies – data driven crop and food production

Two available positions in the PNFQ research group

**PhD fellowship in protein crops for
plant based food**

<https://jobportal.ku.dk/phd/?show=157560>

**Postdoc of Plant nutrition and
analytical chemistry**

<https://employment.ku.dk/all-vacancies/?show=157559>

Thank you for your attention

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https://plen.ku.dk/english/research/plant_soil/plant-nutrients-and-food-quality/