Institut for Jordbrug og Økologi

Forædlingsmetoder til Fremtidens Landbrug

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Sektion for Plante- og Jordvidenskab
Molekylærforædling

DanSeed Symposium 2009
Kobæk Strand
24. Februar

UDVALGTE sider fra præsentationen
Og links til hjemsider med mere information

Forædlingsmetoder og mål

1. **TILLING**

   http://www.agri.life.ku.dk/faggr/plantandsoil/Research/Plant_breeding/plant_quality.aspx

   1. Mutationer
   2. Ernæring – Miljø – Resourcer
   3. Lav-fytinsyre mutanter
2. iKORN
3. Diversitet (EXBARDIV)
   1. Vilde – landracer - sorter
4. Biotek erstatter kemikalier
   1. Kompakte potteplanter
5. Internationalt netværk COST Tritigen

iKORN

SEJET PLANTBREEDING

Nordic Seed

FACULTY OF LIFE SCIENCES
UNIVERSITY OF COPENHAGEN

Demands:
Healty
Environment
Reduced Input
High-Quality
food and feed
Retention of
Agro-Industry
Strength

High Throughput
WP5, Rasmussen, 3.2 mill DKK

Improved Quality
WP1
Brinch-Pedersen
5.2 mill DKK

N

P

Reduced Fertilizer
WP2
Schjørring
2.3 mill DKK

Toxins

Genetic Resources and Disease
WP4, Backes, 4.4 mill DKK

Output:
Usefull
Properties
in Cereals
Junior Scientists
Competitive
Plant Breeding
&
Plant Protection

WP1: Føde og Foder: a) hvedekernens indhold af fytinsyre-P; b) hvedekernens protein
WP2: N use efficienty, bedre udnyttelse af kvælstofgødning
WP4: Fusarium resistens (mindre toxin i hvedekernen)
WP5: Genom værktøjskasse

Improved Quality and Disease Resistance in Cereal Crops

Genomic - assisted Analysis and Exploitation of Barley Diversity:

EXBARDIV

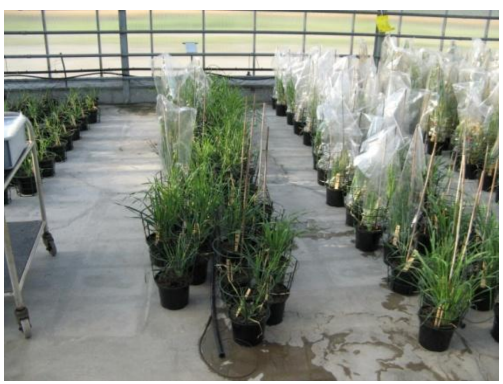
HVCC – *Hordeum vulgare* core collection of 400 EU varieties

LCC – landrace core collection

HSC – *Hordeum spontaneum* collection 440

MÅL

- At udvikle en strategi for associations kortlægning, hvor forskellige populationer udnyttes til at opdage nye gen-alleler i en vild byg og byglandracer som kan udnyttes i forædling.



ERA-NET PLANT GENOMICS

SHI Patent – Bioteknologi erstatter kemikalier i drivhuset

Novel Plants' PCT/EP2006/005862, priority 17 June 2005

Patent ejes 100% af Københavns Universitet

Opfindelsen dækker kontrolleret overudtryk af SHI genet i prydplanter, og formålet er producere nye sorter med større værdi for producenterne

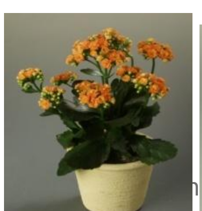
DFFE Innovation 'Etablering af platform for prydplanter'

Knud Jepsen A/S

Proof-of-concept 2008-09 fra F&I Styrelsen til bl.a. KU

Nyt DFFE non-food projekt: Kuldetolerance 2009-2011 Årslev, SDU, KU-Life

Wt 35S:*SHI*



Er der et marked for GMO planter

JA! I Danmark, EU, USA og andre steder

Teknologirådets grundige borgerundersøgelse

Nye GM-planter – ny debat: Borgerjuryens slutdokument. Maj 2005, http://www.tekno.dk/)

Borgerne er positive overfor GMO prydplanter, især når de erstatter kemiske hjælpestoffer i drivhuset

Åbent hus 2008 i drivhusene på Rolighedsvej med 4000+ Frederiksbergborgerer bekræfter os i dette

MEN den officielle godkendelsesprocedure for GMO planter er kostbar, også i USA, omend billigere for prydplanter (ingen foder- eller fødeafprøvning). Markedet for en mange prydplanter er ikke stort nok til at bære sådanne omkostninger, derfor bliver det en begrænsende faktor.

COST Action

Action FA0604: Triticeae genomics for the advancement of essential European crops

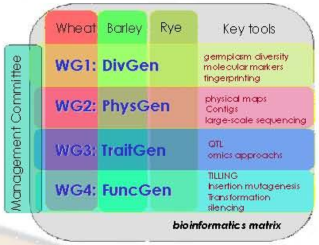
TritiGen http//tritigen.ari.gov.cy/

Europe faces the challenge of delivering safe, high-quality, and health-promoting food and feed as well as bio-products in an economical, environmentally sensitive, and sustainable manner across environments that face climatic change and increasing abiotic and biotic stresses. Triticeae cereals (wheat, barley and rye) are essential in human and domestic animal nutrition and are arguably the most important crops for European agriculture. Existing germplasm resources and current breeding methods alone are insufficient for understanding the mechanisms underlying important traits and for catalysing a quantum leap in yield, sustainability and quality improvement. Major advances in crops will require a broad suite of direct genomics approaches, built on relevant data from model plants (rice, *Brachypodium*). Such a strategy is massively complex and can only be carried out efficiently at the international level. The COST Action will coordinate, focus and strengthen national and pan-European Triticeae genomics to improve sustainability and value of the crops.

For more information on this COST Action programme see http//tritigen.ari.gov.cy/

Organization

The TritiGen COST Action, is organised into four interactive Working Groups (WGs). They will serve to coordinate research by the COST Action participants on the topics included under the WG. Their pattern of interaction and synergy is shown below, where they are also labelled by their acronyms.



Working Group 1. Tools for assessing, harvesting and applying genetic diversity (DivGen). Karl Schmid (Chair) and Hikmet Budak (Vice-Chair) .

Development and deployment of more rapid and robust, less expensive, and denser molecular markers in order to assess germplasm diversity, phylogeographic patterns of diversity and haplotype, marker-assisted selection, association genetics and genome evolution studies.

Working Group 2. Accessing the physical genome for sustainability and quality (PhysGen). Pierre Sourdille (Chair) and Nils Stein (Vice-Chair).

Development of contig-based physical maps for barley and hexaploid wheat genomes that will serve as the basic resources for high-throughput gene isolation and large-scale sequencing. The overall synteny and colinearity of the Triticeae genomes and the sequenced genomes of rice and *Brachypodium* will be exploited.

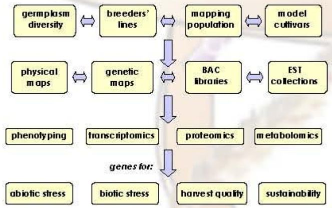
Working Group 3. Implementation of genomics approaches for understanding cereal traits (TraitGen). Nils Rostoks (Chair) and Hilde-Gunn Opsahl-Sorteberg (Vice-Chair).

Technologies to identify differentially expressed genes and to analyse gene expression levels on a genomic scale and proteomics tools will be used to better understand traits of interest in the Triticeae that control the sustainability and value of the crop.

Objectives

The main objective of this Action is to develop the technology platforms and projects that will provide efficient tools to identify and exploit qualitative and QTL alleles for improving wheat, barley and rye.

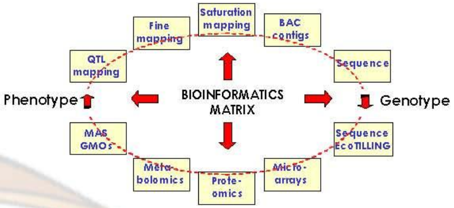
Research tools



Working Group 4. Functional genomics for testing and validation of candidate genes (FuncGen). Soren Rasmussen (Chair) and Patrizia Galeffi (Vice-Chair).

In order to assess gene function, RNAi and VIG strategies, transient and stable transformation, TILLING populations for reverse genetics, and SNP association mapping will be used. Advances in Triticeae transformation by partners in TritiGen is also making possible insertional mutagenesis strategies applying T-DNA and transposons.

Dissemination. Roberto Tuberosa (Chair) and Alain Murigneux (Vice-Chair) .



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Forskere i molekylær forædling

Anna Maria Torp, Lektor, TILLING and molecular markers in wheat. Special attention to phytic acid in the grain (iKORN)

Christina Rønn Ingvardsen; post doc, Molecular Markers in barley varieties, landraces and wild-type. ERA-PG EXBARDIV

Henrik Lütken; post doc; molecular biology of Kalanchoë. Proof-of-concept for the short internode gene Shi.

Sine Hovbye Topp; post doc on growth related control in Kalanchoë. Now cold-tolerance in ornamentals

Pia Haugaard Nord-Larsen; post doc; Breeding for improved bioenergy conversion (*Brachypodium distachyon*)