

NordGen

Nordic Genetic Resource Center

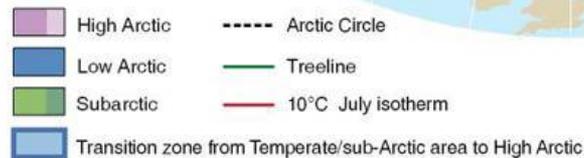
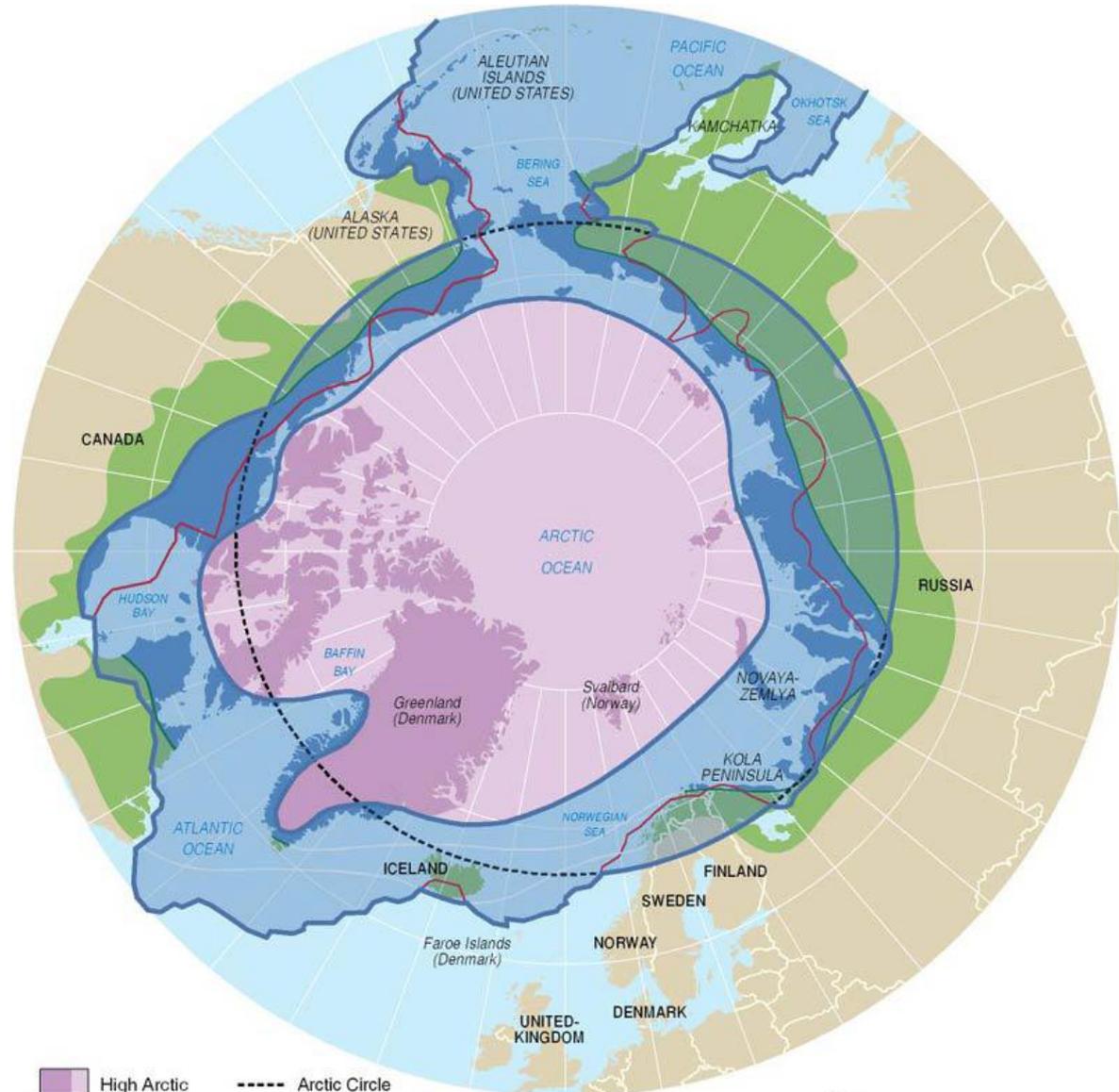


Public-Private Partnership for Pre-Breeding Status & Outlook

DanSeed Symposium, Denmark 10th March 2014
M Rasmussen



- PPP: Public – Private Partnership on Pre-breeding in Plants - status
- Ongoing processes
- Outlook



Sources :
 AMAP, 1998. AMAP Assessment Report:
 Arctic Pollution Issues.
 AMAP, 1997. Arctic Pollution Issues:
 A State of the Arctic Environment Report.
 CAFF, 2001. Arctic Flora and Fauna:
 Status and Conservation



- breeding



- research



- genebank

- breeding



- research

- genebank



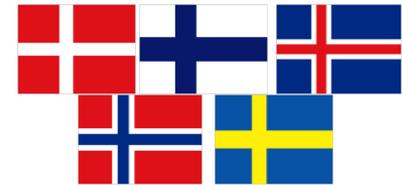
- breeding



- research

- genebank

Challenges:



- Adaptation to **climate change**
- Meeting **environment** goals
- Consumer & market **demand**
- Increasing gap between reserach, breeding & conservation – need public engagement
- Day length remains stable, everything else changes
- Location NORTH – market size & segmentation; - noone else will do the job
- Maintain competitiveness, maintain agricultural production & exploit opportunities, maintain rural livelihood
- Sustainable intensification – ”green agriculture”/ bioo-economy agendas

Prerequisites:

- Will! – Understand the challenge & impact if no action
- Funding! - Public resume responsibility & long term engagement
- Central contact point! – Secretariat & funding
- Variety production (plant breeding)! – understanding the seed chain & link to variety, if not = no impact
- Willing to change habits – adopt “seed-chain-view”, focus on the weak links of the chain





Pre-Breeding definition

- 1) base broadening of Nordic crops
- 2) introduction of specific traits in adapted germplasm
- 3) development of efficient tools & methods



PPP: Purpose



- Support development of Nordic plant breeding for long-sighted needs in agriculture & horticulture
 - Adaptation to climate change
 - Meeting environment goals
 - Consumer & market demand
 - Pre-competitive, strategic

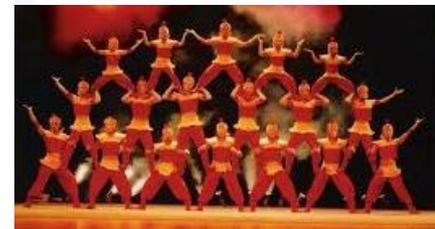


PPP: Stakeholders



- NCM – FJLS (Fish, Agriculture, Food & Forest)
 - *Funding secretariat & SC*
- NordGen (secretariat)

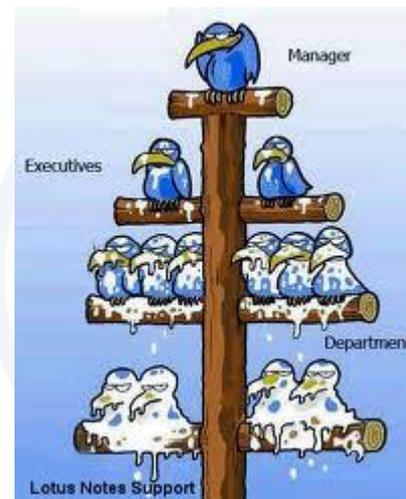
- Nordic Agricultural Ministries
 - *Funding 50% collaborative projects*
- Private plant breeding companies
- Public institutes and universities involved in plant breeding & plant breeding research
 - *Funding other 50% collaborative projects*





PPP: Organization

- Steering committee (SC)
- Secretariate – NordGen
- Collaborative projects (3)





PPP-SC construction

- 10 members:
 - 5 appointed by NCM, after proposal from national ministry
 - 1 appointed by Nordic universities (NOVA)
 - 4 appointed by plant breeding entities
- 1 observer from Baltic states (Est)
- NCM appoints chair person
- Members are appointed for 3 years
- Equal gender etc.
- Quorum at 50% of members present
- Decisions taken unanimously





PPP-SC tasks

- All details in decisions on development, rules, guidelines etc.
- Setting priorities
- Decide on calls, project proposal evaluation, funding decisions, reporting
- Follow up on projects & maintain overview
- Report to partners
- ToR for evaluation
- Secure Nordic synergy
- Work for long term funding





PPP: Administration

- NordGen administrative responsibility – secretary function
- SC chair, NCM & NordGen appoints a PPP coordinator
- PPP coordinator prepare SC meetings
- NordGen contract partner in projects
- NordGen responsible for reporting
 - NCM: Secretariat
 - National Ministries: Projects
- NordGen responsible for economy
 - Economy follows NCM rules for institutions
- NordGen organises Audits
- NordGen reports on PPP to partners



PPP: Which projects?



- Initiatives from plant breeding, - no open calls for research; scientific assessment
- 50/50 funding, contribution in-kind possible, - performance at universities/institutes preferred
- Pre-competitive, - i.e.. 2 of 3 possible companies as partners
- Nordic profile
- Start with pilot projects 2011-2013, + 2014
- Draft examples on barley and forages
- 1st call targeted: Barley, forage & fruit-berries





PPP: Evaluation

- **Scientific** evaluation
 - Novelty, quality, methods, competences, capacity, collaboration, access, planning, structure and sustainability
 - External evaluator
- Evaluation for **relevance**
 - Contributions to call, pre-competitiveness, co-funding, results, impact, dissemination, ownership, relevance for breeding, production and market, Nordic value, synergies
 - Steering committee





PPP: Economical frame

- Total frame: App. 8 mill. DKR per year, over 3+1 years
- 50% Public money
- 50% Private
- Company costs in project based agreements, as a part of the project budget

(Secretariat funded by NMR separately)





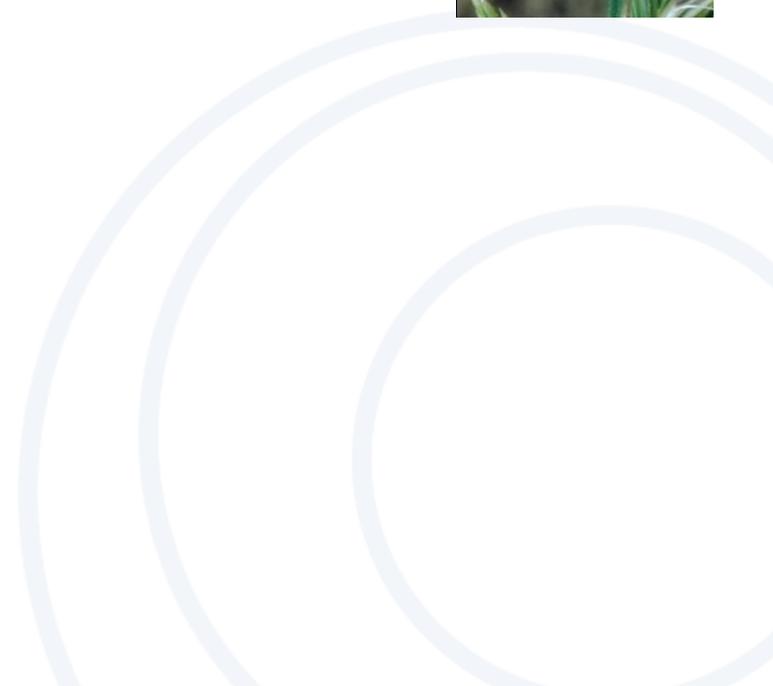
PPP: 1st Call autumn 2011

- Targeted Call on:
 - Barley
 - Forages
 - Fruit & Berries
- 2011-2013 + 2014
- Barley & forage in all 5 countries
- Main crop groups
- Preliminary project skiss applied in process





- Projects initiated





PPP Project 1: NordApp

- **Pre-breeding for Future Challenges in Nordic Apples**

- SLU + Graminor + MTT
- Coordinator: Prof. Hilde Nybom
- Total budget: 3.384.302 DKR
- Link to EU project Fruitbreedomics (www.fruitbreedomics.com),





PPP Project 1: NordApp

WP 1. Nordic platform for fruit and berry breeding

WP 2. Information retrieval and networking

WP 3. Phenotyping of apple canker susceptibility in apple cultivars

WP 4. Phenotyping of storage rot susceptibility in apple cultivars

WP 5. DNA-based analyses

WP 6. Information dissemination





PPP Project 1: NordApp

Status:

- Network in place, well integrated
- Reorganized some of the work (better use of staff resources)
- Partly delayed
- Very good disease tests
- Optimistic





PPP Project 2: Barley

- **Combining Knowledge from Field and from Laboratory for Pre-breeding in Barley**



- Validation, testing, developing of molecular markers for disease resistance
- Nordic Seed, Sejet, Graminor, Lantmännen, Boreal, LBHI, UMB, KU
- Coordinator: Dr.Prof. Ahmed Jahoor
- Total budget : 9.302.331 DKR





PPP Project 2: Barley

- WP M: Database development and association mapping - published markers associated to a panel of Nordic breeding lines
- WP T: Agronomic traits – field test for disease resistance
- WP F: Preparing for the future – work plan next phase, select resistance traits & dev. populations





PPP Project 2: Barley

Status:

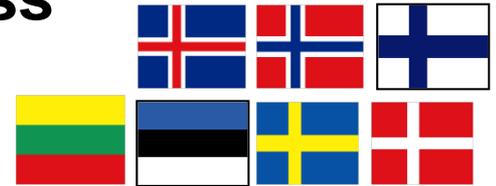
- Joint panel of candidate lines in trials – very close collaboration
- Good field evaluations, all disease scores, good analysis
- Association studies successful
- Following project plan
- Already concrete results: Markers for daylength & Nematode resistance!!!





PPP Project 3: Ryegrass

- **PPP for pre-breeding in perennial ryegrass (*Lolium perenne* L.)**



- UMB, Graminor + Lantmännen + DLF, UÅ + LBHI+ Boreal + Jõgeva + Lithuanian Inst. Agr.
- Coordinator: Prof. Odd Arne Rognli
- Total budget : 3.143.700 DKR
- Linked to NOFOCGRAN, VARCLIM





PPP Project 3: Ryegrass

WP 1. Locating and requesting *Lolium perenne* L. accessions and cultivars

WP 2. Multiplication of gene bank accessions for further testing

WP 3. Testing the potential winter hardiness of existing perennial ryegrass cultivars

WP 4. Phenotyping of gene bank accessions

WP 5. Establishing a broad breeding population (Base broadening)

WP 6. Genetic diversity analyses and trait/marker associations

WP 7. Testing of plant materials from WP1 and WP2

WP 8. Establish the broad breeding population in different growing conditions

WP 9. Test the accessions from WP1 and WP2 for winter survival (frost) and diseases resistance in lab tests

WP 10. Identify marker-trait associations





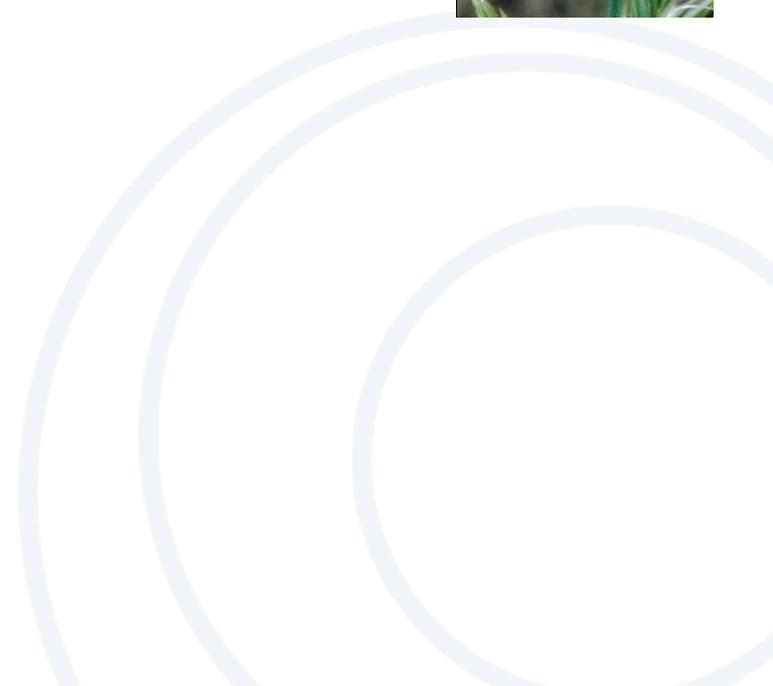
PPP Project 3: Ryegrass

Status:

- Material selected
- Trials successfully established
- Good data on winter hardiness
- Seed multiplication ongoing
- Following project plan



Horizontal activities

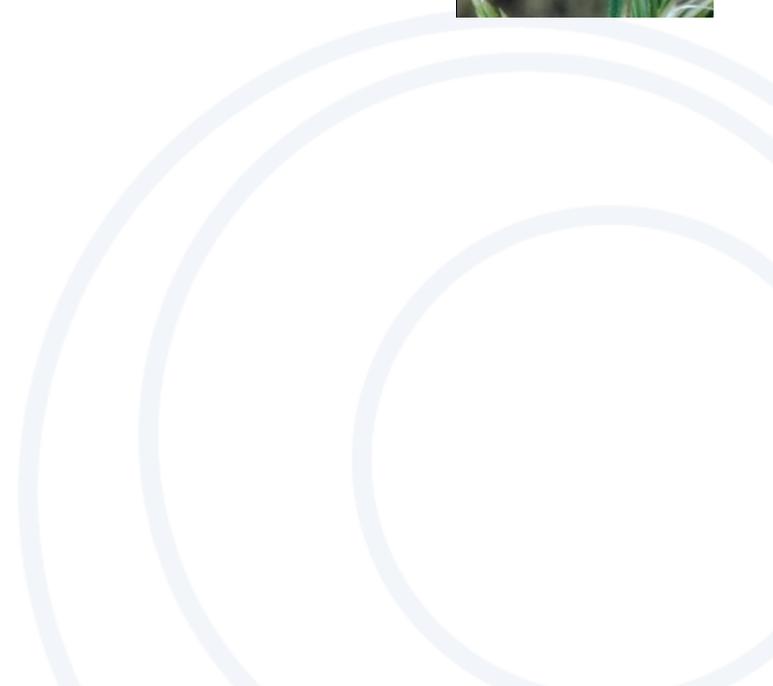




- Concept Note , EU, April 2013
- FAO Expert consultation May-June 2013: Public-Private Partnerships for pre-breeding – how can we develop the model in an international level
- EU workshop September 2013: PPP's and plant breeding vs. Horizon 2020
- GTDT & IPK expert consultation: CWR –how to stimulate utilization?
- International symposium, FAO, NO, FR, ?: Pre-breeding; global model
- Nordic & national meetings; NP's SE, NO, DK; EK-FJLS Nov 2013; SUF; “Varieties for the future”, Horizon 2020, [Danseed](#)



Partnership



Partnership



- 12 Nordic plant breeding entities
- 2 associated Baltic partners
- All Nordic agricultural universities & research centers





Proposed agenda:

- 1) Very short welcome and introduction to the meeting.

- 2) Short update from ongoing projects:
 - 2 a) NordApp, Pre-breeding for Future Challenges in Nordic Apples: Hilde Nybom
 - 2 b) Combining Knowledge from Field and from Laboratory for Pre-breeding in Barley: Ahmed Jahoor
 - 2 c) PPP for pre-breeding in perennial ryegrass (*Lolium perenne* L.): Odd Arne Rognli

- 3) Short information from Secretariat (2nd call, horizontal activities and memberships)

- 4) Questions and very short discussion.



Nordic Crop and Plant Breeding landscape 2014

- Who are the breeders?





Nordic plant breeding landscape 2007-08

- 13 plant breeding entities in the Nordic countries
 - 10 Nordic plant breeding companies
 - 3 universities/research institutes conducting plant breeding
- 1 multinational; breeding activities for non-Nordic markets
- Testing of non-Nordic material mainly through representation





Crops bred in Nordic countries 2007-08

Crops	Programs	Countries
spring barley	8	DK FI IC NO SE
<i>forage grasses</i>	5	DK FI IC NO SE
potato	5	DK FI NO SE
<i>clover</i>	4	DK FI NO SE
apple	3	NO SE FI
oats	3	FI NO SE
spring wheat	3	FI NO SE
<i>berries</i>	3	FI NO SE
winter wheat	3	DK SE
peas	2	FI SE
triticale	2	DK SE
field beans	1	FI
forage beets	1	DK
rye	1	FI
spring oil seed rape	1	SE
spring turnip rape	1	FI
sugar beets	1	SE
turf grass	1	DK
winter barley	1	DK
winter oil seed rape	1	SE
lucerne	1	SE



Who?



Number of breeders

- 9 Nordic plant breeding companies
 - hereof 3 conducting public funded breeding



- 3 Nordic institutes/universities conducting plant breeding
- 1 non partner, Nordic company
- 1 non Nordic, breeding activities for non-Nordic markets
- 8 Baltic plant breeding institutes, hereof 2 PPP associated partners



In total: 22 plant breeding entities in Nordic-Baltic region
14 PPP partners/associated partners

- 6 non partner, International plant breeding companies, present in the Nordic countries, but not breeding specifically for the Nordic region. 5 hereof select for main Nordic markets
- 20 "micro-breeders", 19 food crops, 1 technical crops



Nordic plant breeders +Associated Baltic partners;15



Who?



Ownership:

- Public: 5 (100%), 2 partly
- Private: 5 (100%), 4 partly
- Trust: 1 (100%), 3 partly

Origin:

- Nordic-Baltic: 11 (100%), 2 partly
- Non- Nordic-Baltic 2 (100%), 2 partly



Who?



What kind of enterprise:

- SME & *SME-like*: 2 SME, **11 SME-like**
- Medium: 1
- Large: 2

Part of a larger organisation / structure:

- Yes: **13**
- No: 2



LKF Vandel



syngenta.



Graminor





Crops bred in Nordic countries 2014 (+associated) Total: 112

cereal crops	36
forage crops	45
root crops	9
protein crops	4
oil crops	3
fruits	5
berries	7
vegetables	2
energy crops	1

Crops bred in Nordic countries 2014



No of programs	Crop	Countries
9	spring barley	DK, FI, IS, NO, SE, ES, LI
3	winter barley	DK
5	spring wheat	DK, FI, NO, SE, ES, LI
6	winter wheat	DK, FI, SE, ES, LI
5	oat	FI, NO, SE, ES, LI
3	rye	FI, ES, LI
3	triticale	DK, SE, ES
3	pea	FI, SE, ES
1	field beans	FI
1	soybean	ES
1	spring turnip rape	FI
1	spring oil seed rape	SE
1	winter oil seed rape	SE (DE)
1	fodder beet	DK
1	sugar beet	SE
6	potato	DK, FI, NO, SE, ES
6	red clover	DK, FI, NO, SE, ES, LI
4	white clover	DK, NO, SE, LI
2	alfalfa	SE, ES



Crops bred in Nordic countries 2014



No of programs	Crop	Countries
6	timothy	DK, FI, NO, SE, ES, LI
5	meadow fescue	DK, FI, NO, SE, ES
4	tall fescue	DK, FI, SE, LI
5	perennial ryegrass	DK, NO, SE, ES, LI
3	italian ryegrass	DK, SE, LI
3	cocksfoot	DK, SE, LI
2	red fescue	DK, LI
1	kentucky bluegrass	DK
1	hard fescue	DK
1	blue fescue	DK
1	bromegrass	DK
1	festulolium	DK
1	creeping bentgrass	DK
1	tomato	ES
3	apple	FI, NO, SE
1	pear	FI
1	plum	NO
2	strawberry	FI, NO
2	black currant	FI, SE
1	red currant	FI
1	raspberry	NO
1	seabuckthorn	SE
1	salix	SE



What?



Breeding process:	15: yes, all processes
Maintenance:	15: yes
Official listing/similar:	15: yes
Seed multiplication/ or propagation:	4: yes, 3: yes + partner, 5: 1 generation then partner, 3: partner
Seed/plant production:	4: yes, 1: yes + partner, 10: partner
Marketing:	3: yes, 1: yes + partner, 11: partner

Where?



Predominant target area:

- National: 8
- Regional: 4
- European: 3
- Global/global programs: 5



NORDIC SEED



LKF Vandel



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Lantmännen Boreal Graminor



Traits?



Yield & yield stability:	1:10	2:2	3:2	4:1	
Disease resistance:	1:1	2:8	3:6		
Stress tolerance:	1:2	2:4	3:4	4:5	
Quality:	0:1	1:4	2:4	3:5	4:1 (crop specific)
Winter hardiness:	4				
Drought:	3				
Earliness:	2				
Salinity:	1				
NUE:	1				
Climate adaptation traits:	1:13	2:-	3:2		
Sustainability traits:	1:11	2:4	3:-		
Market adaptation traits:	1:11	2:-	3:2		

Scale?



Lines in official trials (estimated):	530
Varieties listed (estimated):	1117
Varieties listed in the last 5 years (estimated):	508
Varieties marketed (estimated):	499

Scale?



No of plant breeders : 107
 - FTE's: 101,85

No of FTE's in breeding (estimated) 552,6

2 "types":
 1) small: 1-5 plant breeders 6 entities
 2) medium: 10-15 plant breeders 5 entities

Estimated input (tot of 10 partners): ~ 31,5 mill €





- Next steps:
 - Securing funding 2nd phase 2015-2017
 - 2nd Call summer-autumn 2014
 - Expansion, continuation...



PPP Funding situation

- Funding pilot phase = 3 x 4+4 mill DKK
- Funding 2014 = 4+4 mill DKK
- Scale for future PPP program 2015 – 2017
 - Need to expand to more crops
 - Need to continue ongoing collaboration
 - Need long term engagement from funding ministries
 - Proposed 25 + 25 mill...
 - Realistic? Stepwise increase? Double in 2015?
- Collaboration to EU?



PPP next steps in preparation

- Workshop Reykjavik 27th-28th February 2014
- Crops specific questions – fast answer! March 2014
- Input to EK-FJLS meeting 9th April 2014
 - Outcome of the workshop – position paper?
 - Update of Nordic breeding
- Minister meeting June 2014
 - Decision on budget from ministries
- PPP 2nd. (open) Call: Aug-Sep 2014?
- Processes; evaluation, funding decision, contracts, etc: autumn 2014
- Project start 2nd phase: 1. January 2015
- Prolong pilot phase 2014, contracts in process





NordGen

Thank you for your attention!

Thank you to all breeders for sharing information!!!

