Genetics of Bere barley – A valuable genetic resource for the future?

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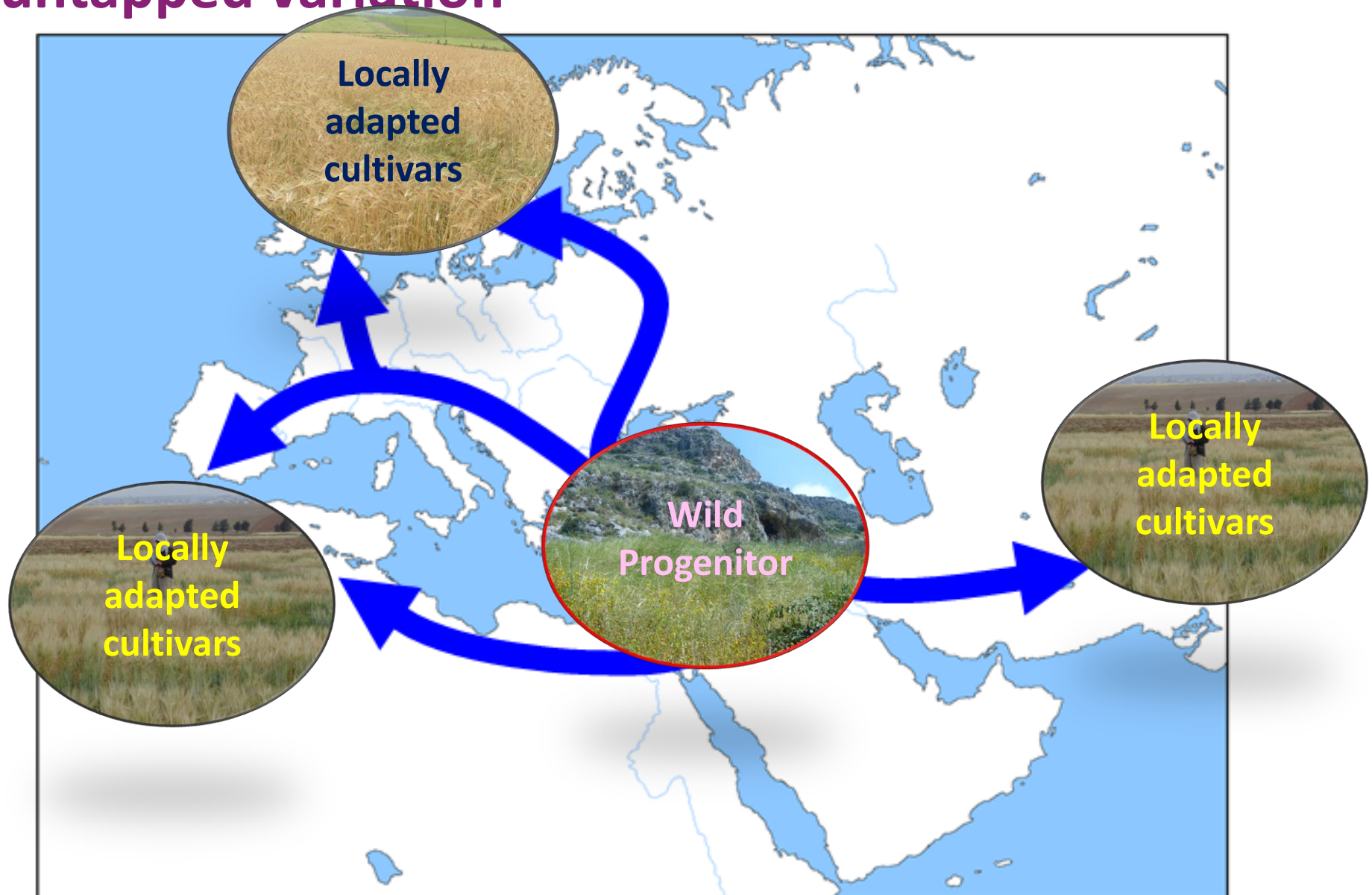
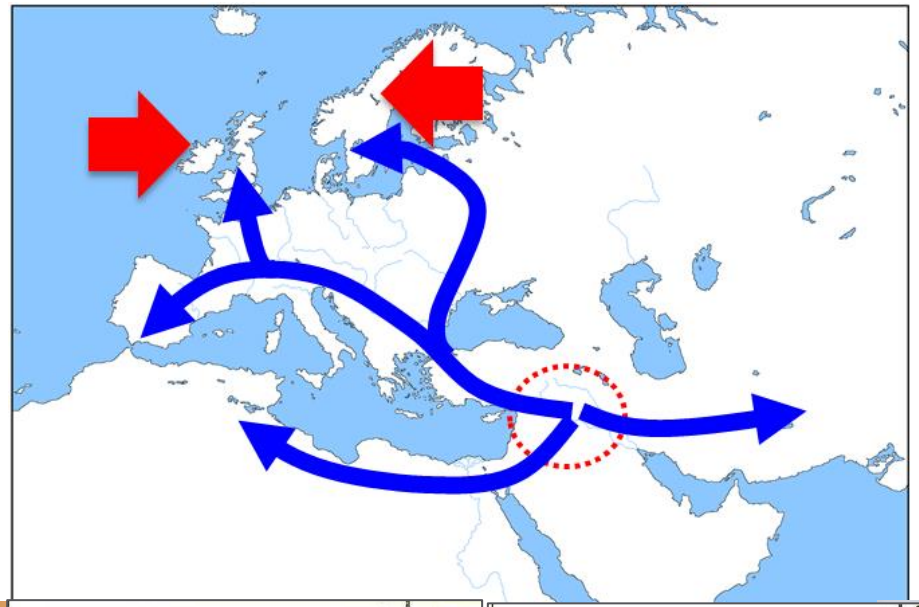
Large collections of barley landraces – novel sources of untapped variation

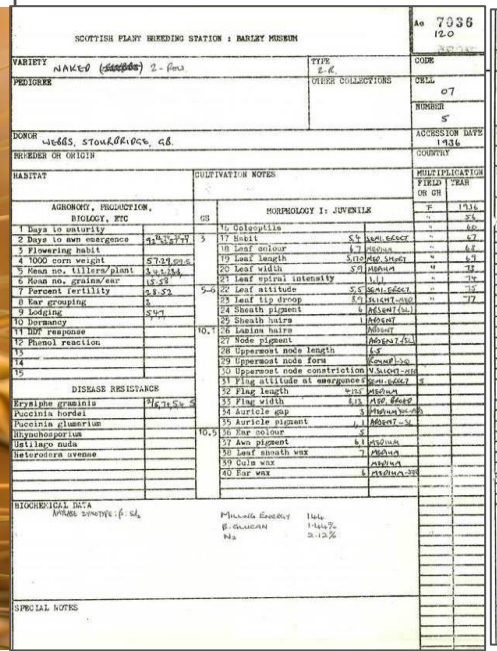


Assembled Heritage collection (150 accessions)

2 row landraces
From UK



6 row landraces
From Scotland & Scandinavia



SCOTTISH PLANT BREEDING STATION : BARLEY MUSEUM

Ac 7336
120

VARIETY NAKED (~~duplicate~~) 2-Row
TYPE 2-R.
PEDIGREE
OTHER COLLECTIONS
CODE
CELL 07
NUMBER 5
DONOR WEBBS, STOURBRIDGE, GB.
ACCESSION DATE 1936
BREEDER OR ORIGIN
COUNTRY
HABITAT
CULTIVATION NOTES
MULTIPLICATION FIELD OR GH / YEAR
F 1936

AGRONOMY, PRODUCTION, BIOLOGY, ETC

		GS
1 Days to maturity		
2 Days to awn emergence		3
3 Flowering habit		
4 1000 corn weight	57.2/59.0/5	
5 Mean no. tillers/plant	3.2/3.3/3.4	
6 Mean no. grains/ear	15.5/8	
7 Percent fertility	98.5/2	5-6
8 Ear grouping	2	
9 Lodging	3.4/7	
10 Dormancy		
11 DDT response		10.1
12 Phenol reaction		
13		
14		
15		

DISEASE RESISTANCE

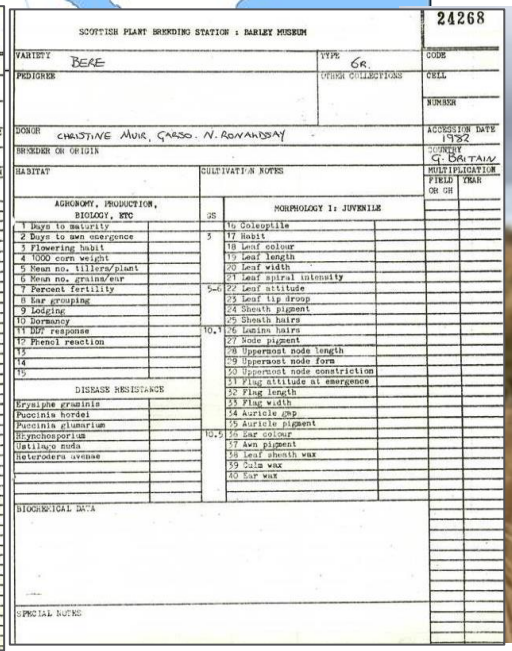
Erysiphe graminis	3/6.7.5.4 S
Puccinia hordei	
Puccinia glumarum	
Rhynchosporium	
Ustilago nuda	
Heterodera avenae	

MORPHOLOGY I: JUVENILE

16 Coleoptile		
17 Habit	5.4	Mod. erect
18 Leaf colour	4.7	Medium
19 Leaf length	5.1/Mod. short	
20 Leaf width	5.9	Medium
21 Leaf spiral intensity	1.1	"
22 Leaf attitude	5.5	Mod. erect
23 Leaf tip drop	5.5	Slight-mod.
24 Sheath pigment	6	Absent (Sl.)
25 Sheath hairs	1	Absent
26 Lamina hairs		Absent
27 Node pigment		Absent/Sl.
28 Uppermost node length	6.8	
29 Uppermost node form		Round-ish
30 Uppermost node constriction	9	Absent-slight
31 Flag attitude at emergence	5	Mod. erect
32 Flag length	9.2	Medium
33 Flag width	6.1	Mod. broad
34 Auricle gap	3	Medium
35 Auricle pigment	1.1	Absent-Sl.
36 Ear colour	2	
37 Awn pigment	6.1	Medium
38 Leaf sheath wax	3	Medium
39 Culm wax		Medium
40 Ear wax	6	Medium-dense

BIOCHEMICAL DATA
Amylase activity: β-Sd.
Milling Energy 144
β-Glucan 1.44%
Nx 2.12%

SPECIAL NOTES



SCOTTISH PLANT BREEDING STATION : BARLEY MUSEUM

24268

VARIETY BERE
TYPE 6R.
PEDIGREE
OTHER COLLECTIONS
CODE
CELL
NUMBER
DONOR CHRISTINE MUIR, GARSO. N. RONALDSAY
ACCESSION DATE 1932
BREEDER OR ORIGIN
COUNTRY G. BRITAIN
HABITAT
CULTIVATION NOTES
MULTIPLICATION FIELD OR GH / YEAR

AGRONOMY, PRODUCTION, BIOLOGY, ETC

		GS
1 Days to maturity		
2 Days to awn emergence		3
3 Flowering habit		
4 1000 corn weight		
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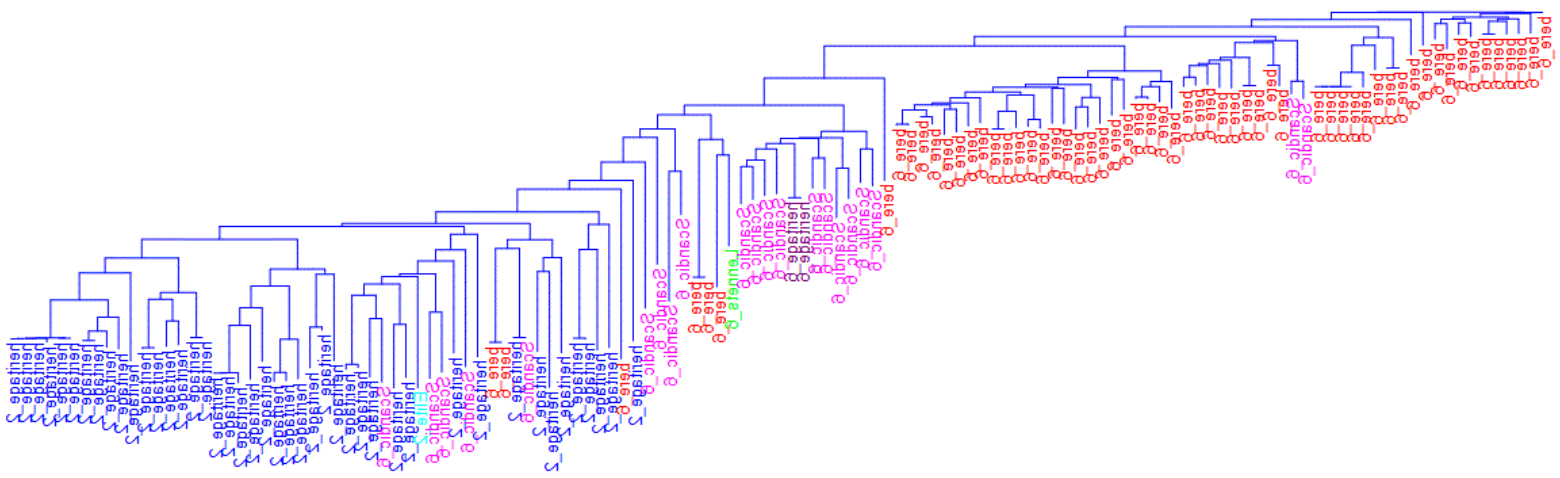
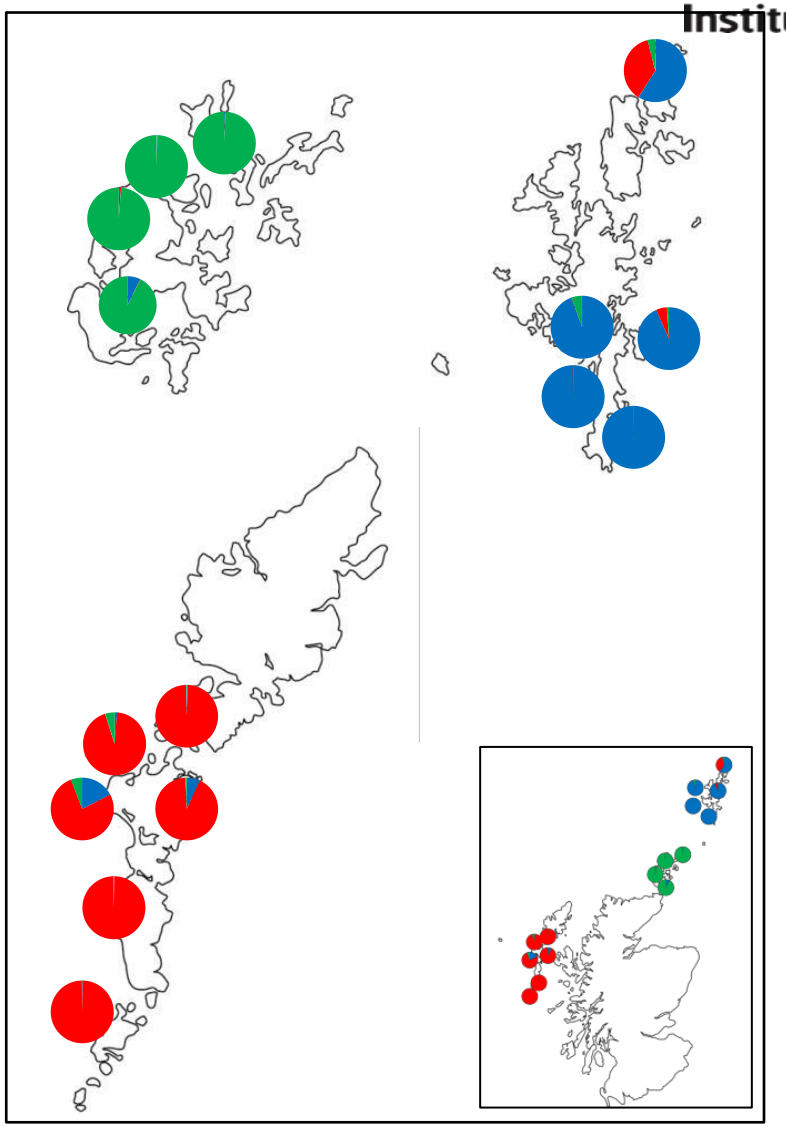
36 Ear colour		
37 Awn pigment		
38 Leaf sheath wax		
39 Culm wax		
40 Ear wax		

BIOCHEMICAL DATA

SPECIAL NOTES

Unique diversity: Geographically distinct



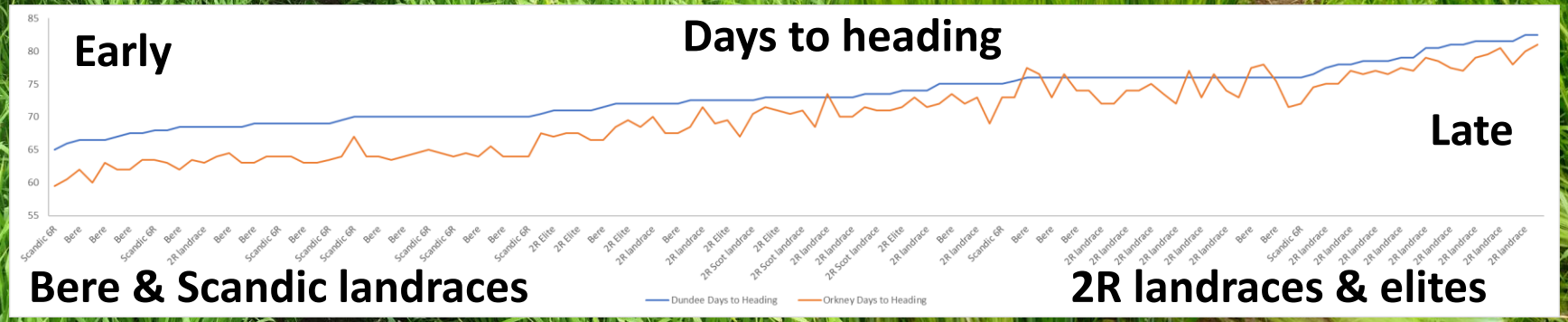


Multi-site Field trials- 2 reps at Dundee and Orkney College field- height, earliness & yield

The James Hutton Institute

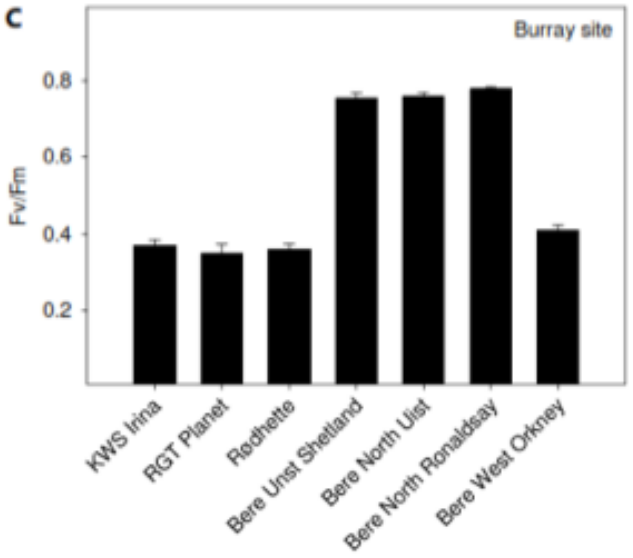
Orkney

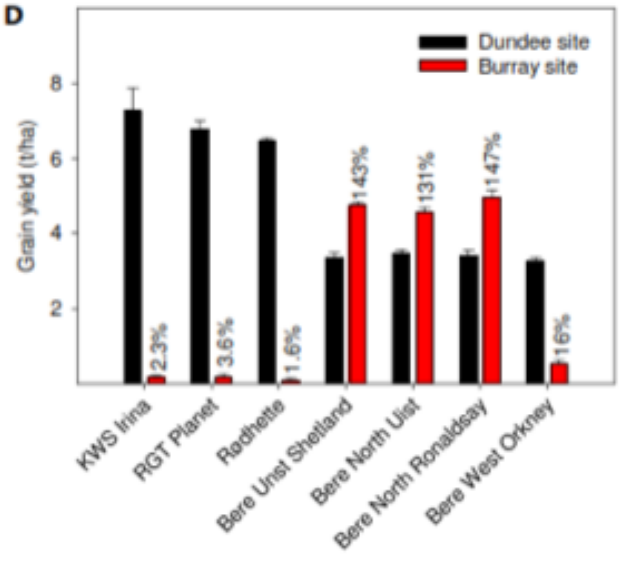
Dundee



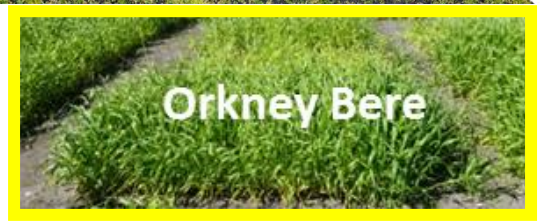
Burray Field location low pH soils

Using the variation nutrient efficiency traits





Using the variation of tolerance to develop new breeding material



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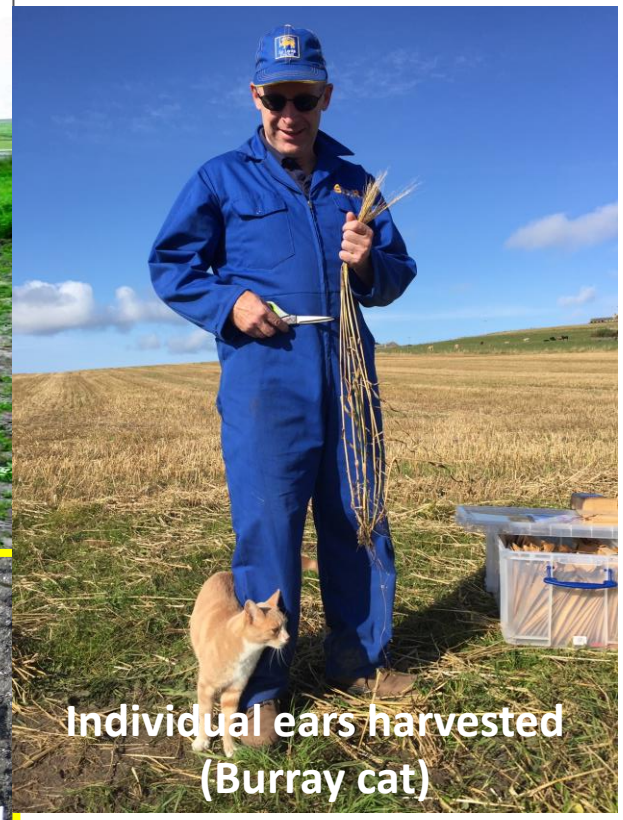
- Tolerant to nutrient deficient soils
- Early flowering and harvest
- Novel malting quality

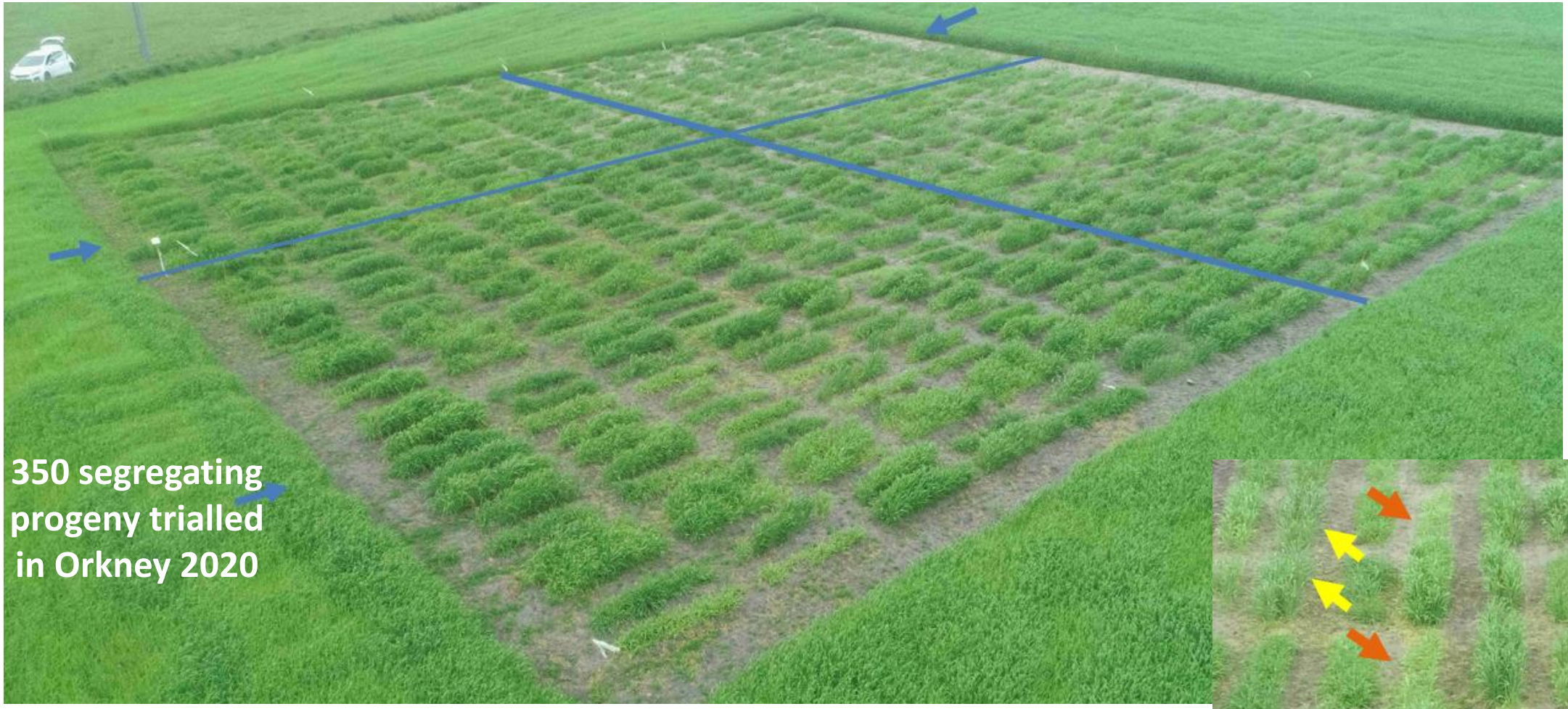
- High yield
- Good quality
- Uniform

Genetic dissection of Mn efficiency: Selection in the field (Burray, Orkney)-2018

Each plant scored and leaves harvested for DNA



Using the variation of tolerance to develop new breeding material-Multiplied from single seeds 6 generations (2020)



Bere parent, early, tolerant and unique quality and flavour

Elite parent, KWS Irina, good quality, high yielding

Heritage collections

- **Unique combinations of diversity locally adapted**
- **Ability to identify variation at almost all genes in barley**
- **Via breeding methods and genotyping novel germplasm tailored to different and a changing environment**
- **Efficient use of micronutrient providing useful variation for marginal soils and sustainability**
- **Conservation via utilisation as well as stored in genebanks**
- **Makes great whisky, beer and bannocks!**

Thank you

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