



MAGIC wheat

Multi-parent populations for the
genetic dissection of agronomic traits

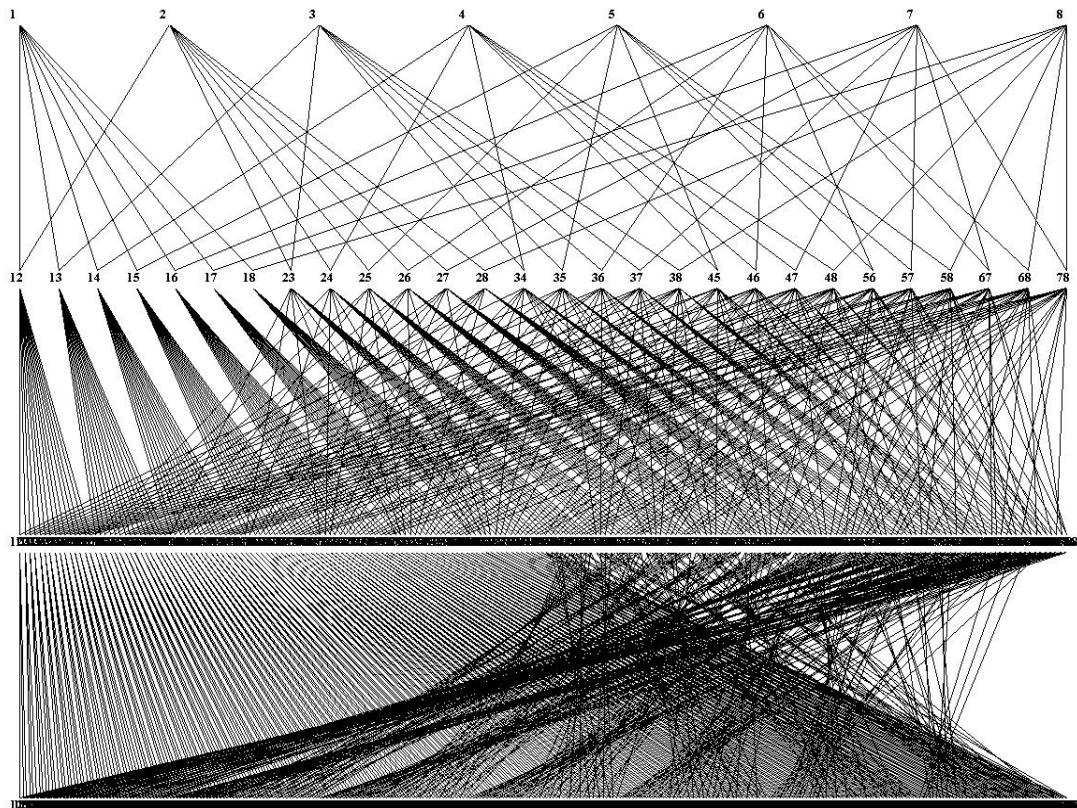
Alison Bentley, R Horsnell, P Howell, N Gosman, R Howells, G Rose,
T Barber, J Cockram, A Greenland and I Mackay

The John Bingham Laboratory
NIAB, Cambridge

Mapping in multi-founder experimental populations

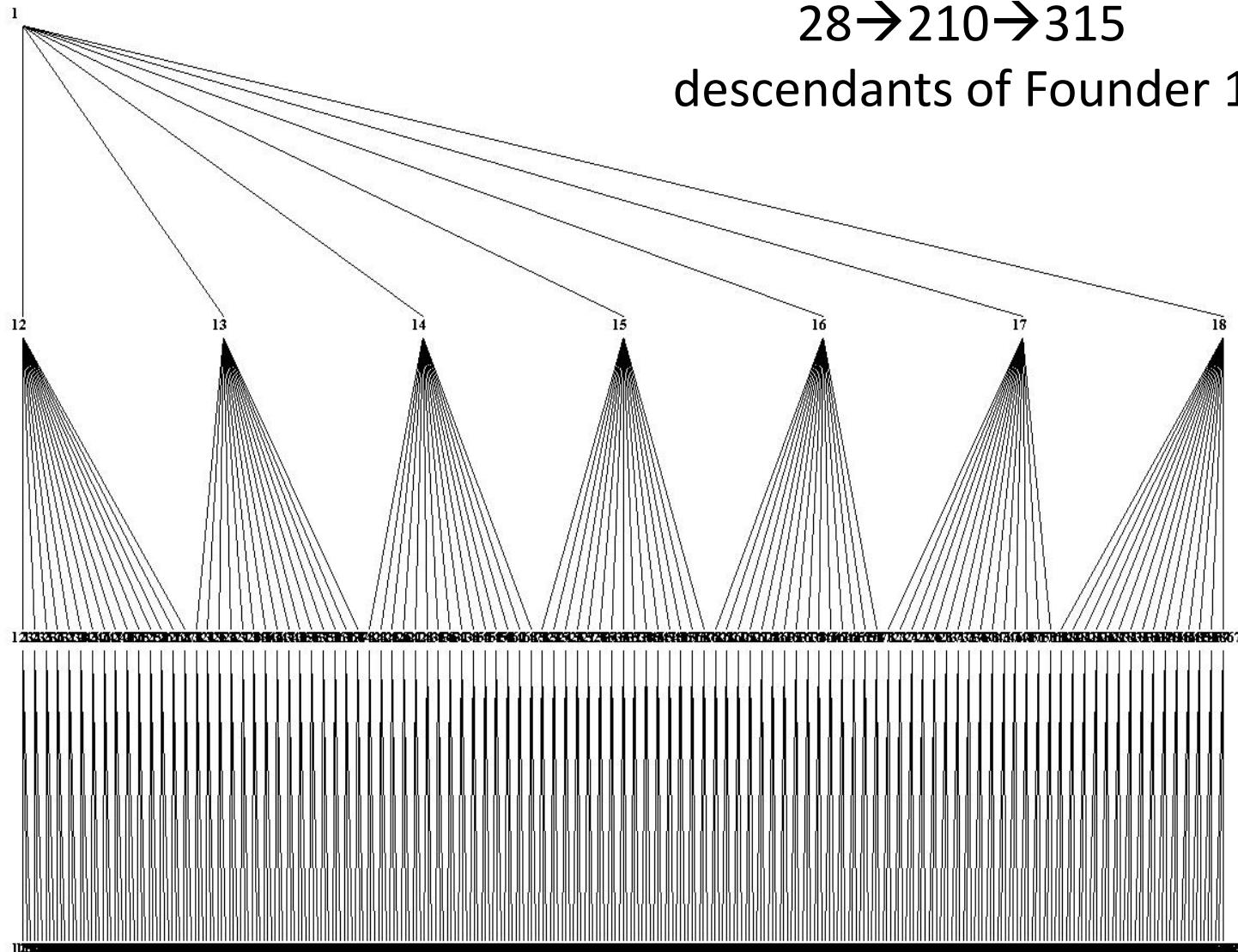
MAGIC

Multi-parent Advanced Generation InterCross



28→210→315

descendants of Founder 1

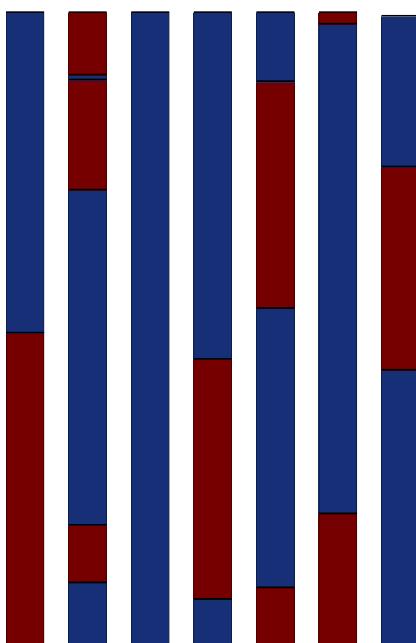


Customising MAGIC for mapping

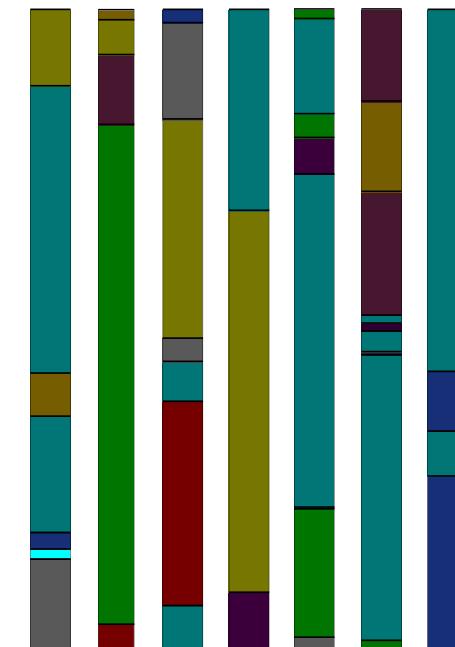
Variety	Reason for inclusion
Alchemy	Yield, disease resistance, soft feed type, breeding parent
Brompton	1BL/1RS, hard feed type, OWBM resistance
Claire	Slow apical development, soft biscuit/distilling type
Hereward	High quality benchmark Gp1 bread making type
Rialto	1BL/1RS, Gp2 moderate bread making type
Robigus	High yielding, soft biscuit/distilling type, OWBM resistance
Soissons	Early flowering French Gp2 bread making type
Xi19	Facultative, high quality Gp1 bread making type



F_2 derived

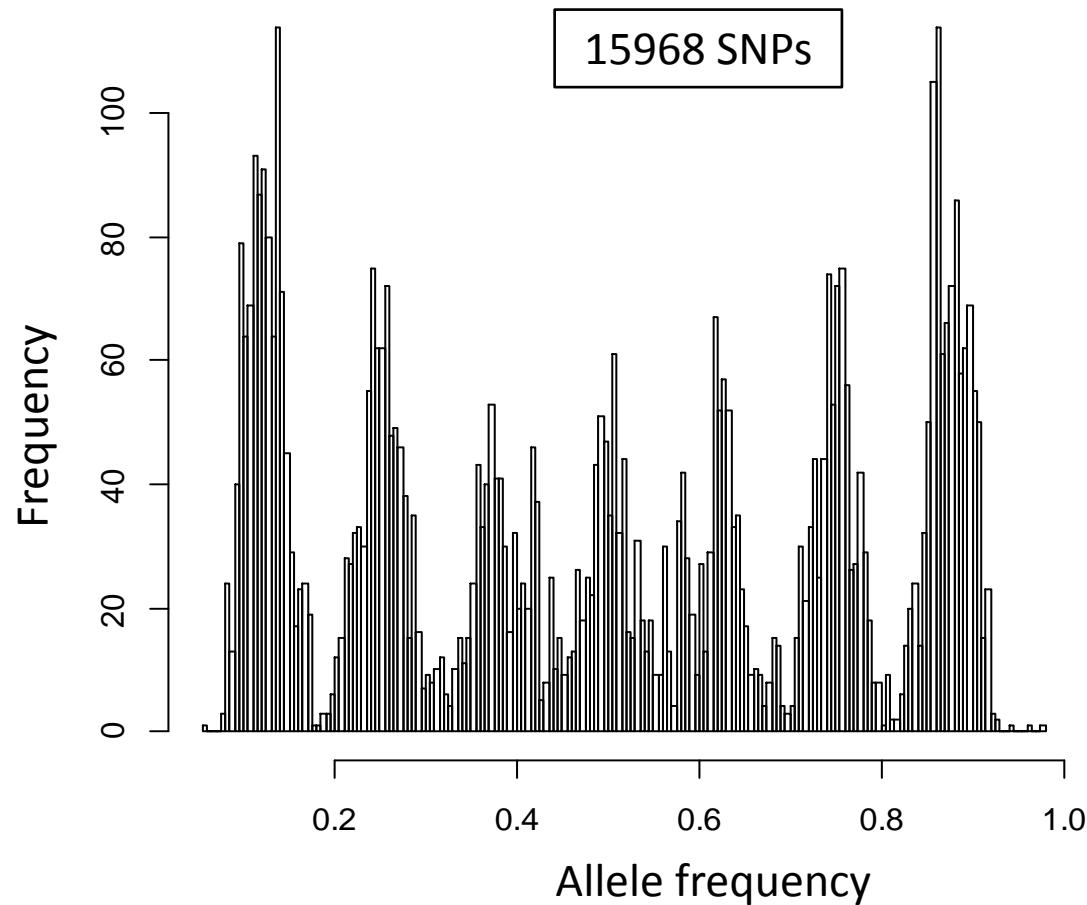


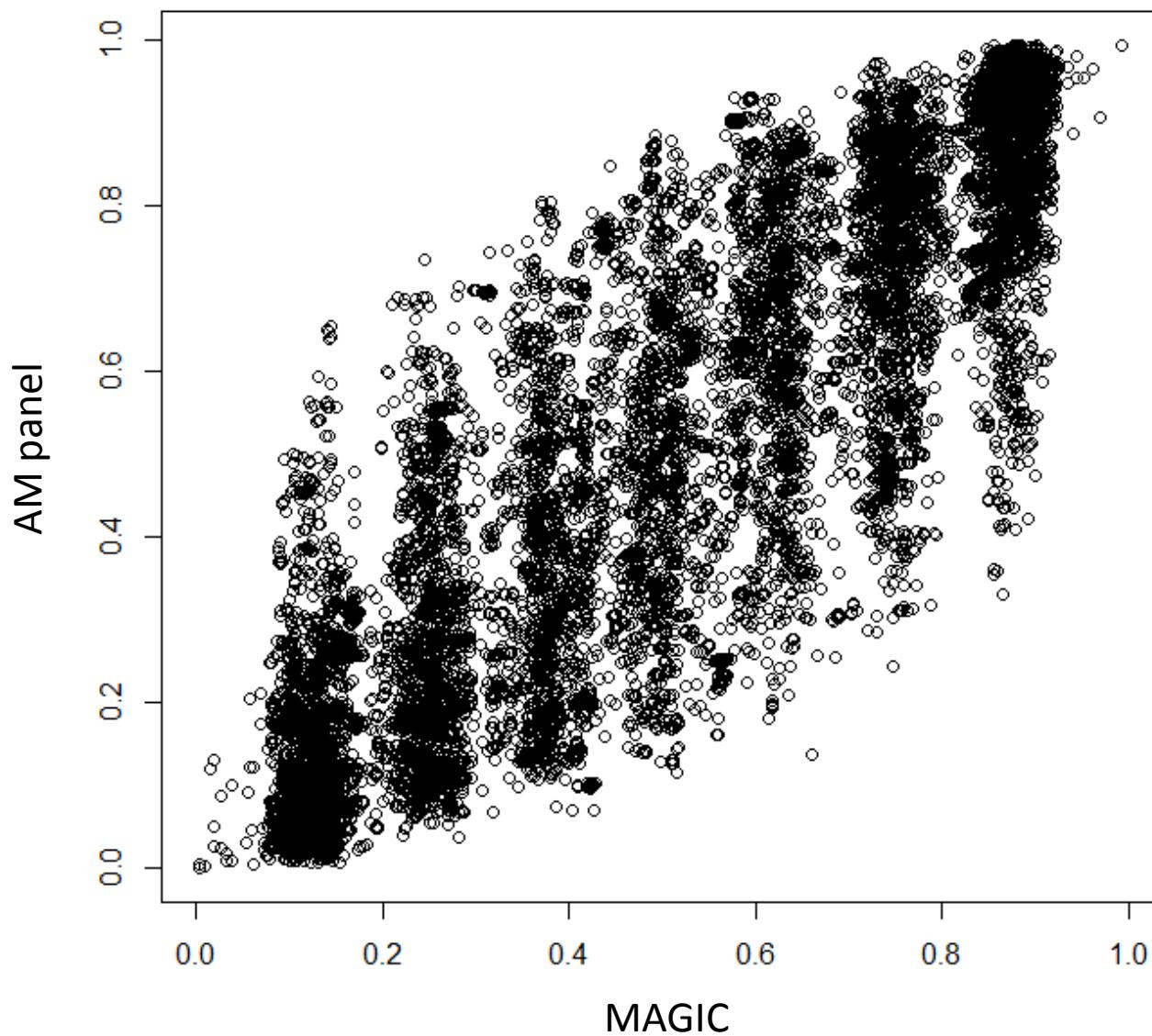
MAGIC



	F2 & self	Elite MAGIC & self
P (no recomb)	0.241	0.036
# tracts	2.6	4.7
# founders	2	3.5

90K iSelect genotypes





22nd August 2011 'Warrior' Pst race

New wheat yellow rust race confirmed

Mike Abram

Monday 22 August 2011 16:00



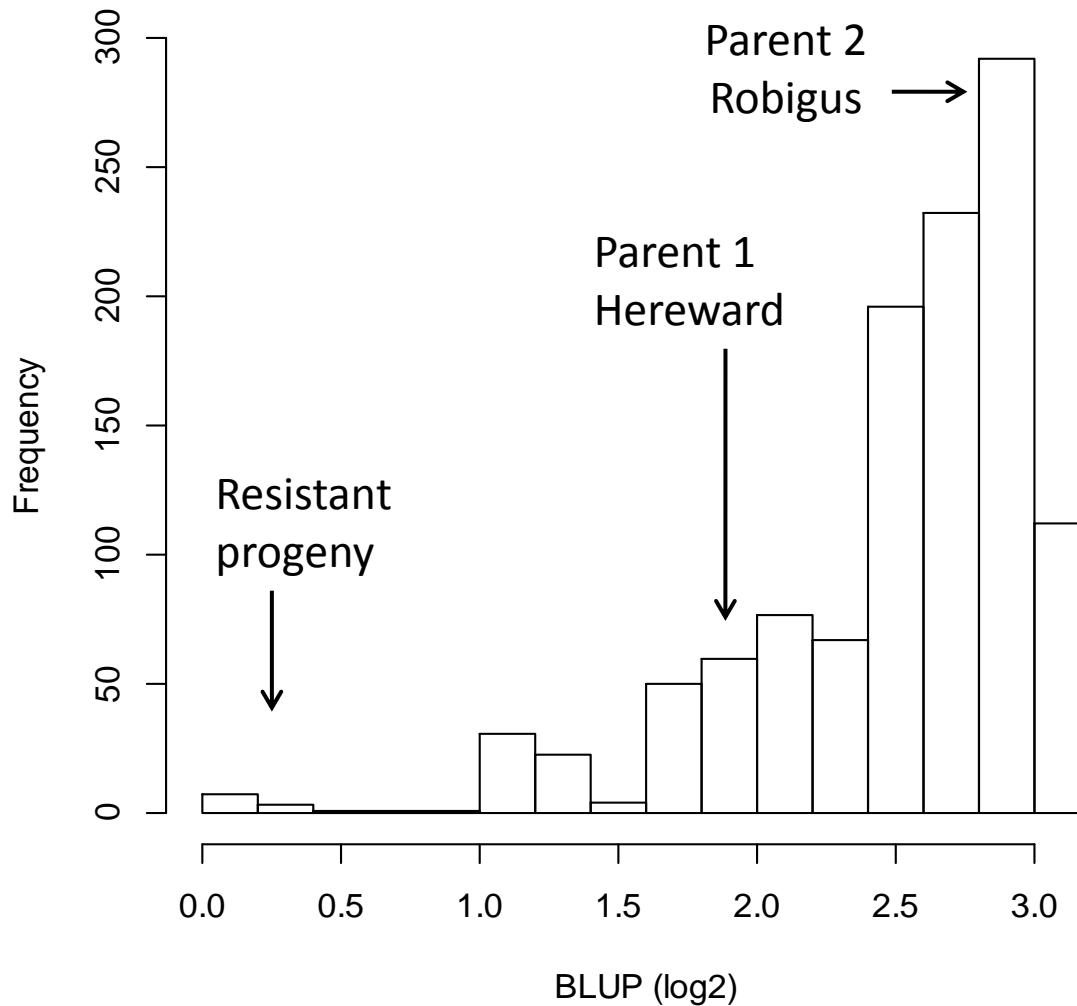
A new race of yellow rust in winter wheat has been confirmed by the UK Cereal Pathogen Virulence Survey (UKCPVS).

Yellow rust samples collected from three farm crops of Warrior winter wheat earlier this summer have re-infected the variety in the first round of testing by NIAB TAG.

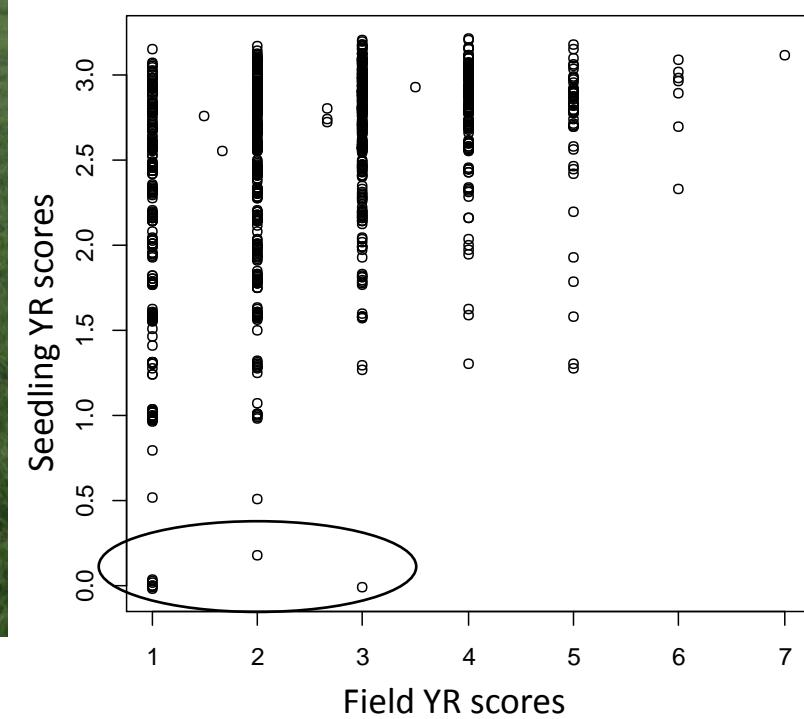
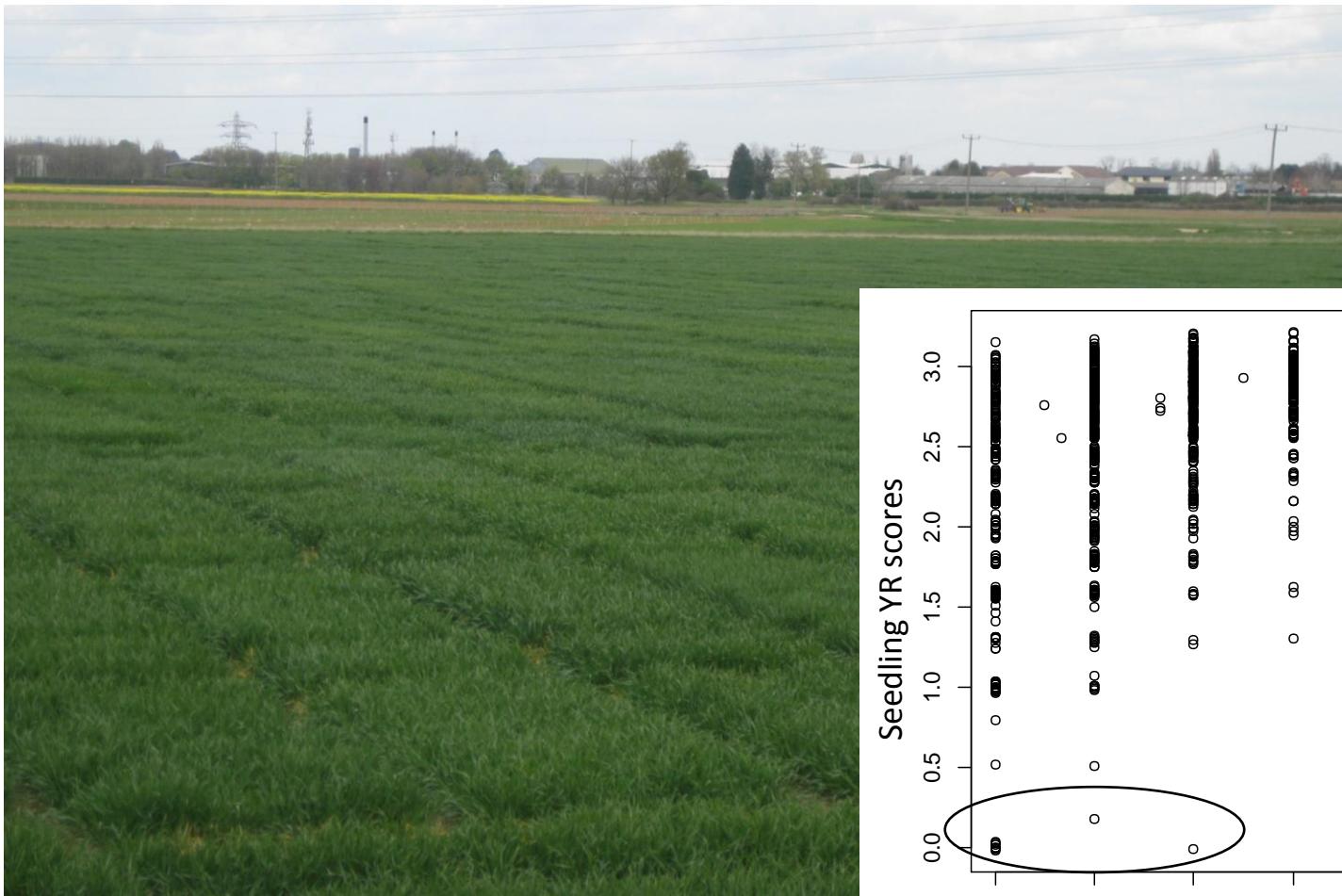


"Warrior had been previously resistant to all yellow rust disease isolates at seedling and adult plant stages. The new isolates have been shown to infect the seedlings of the variety, which is evidence that we are dealing with a new race," explains Rosemary Bayles, principal cereal pathologist at NIAB

Glasshouse YR resistance

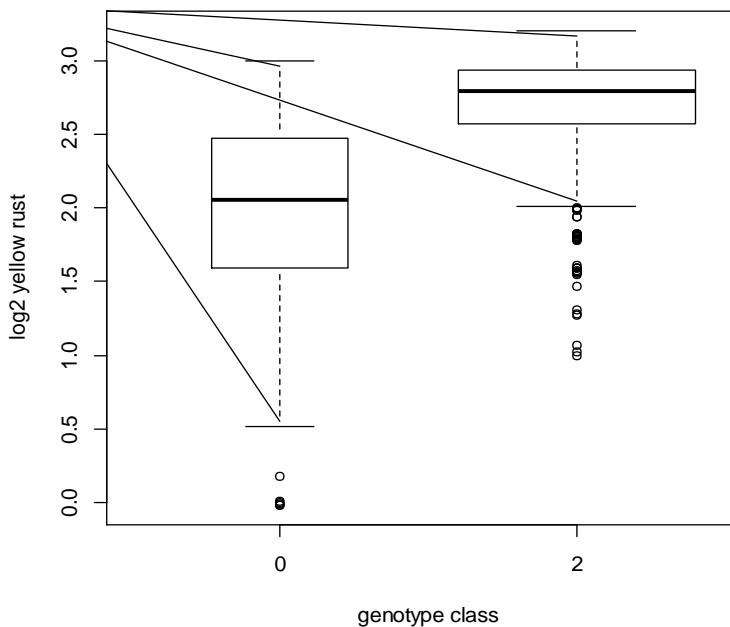


Field YR resistance



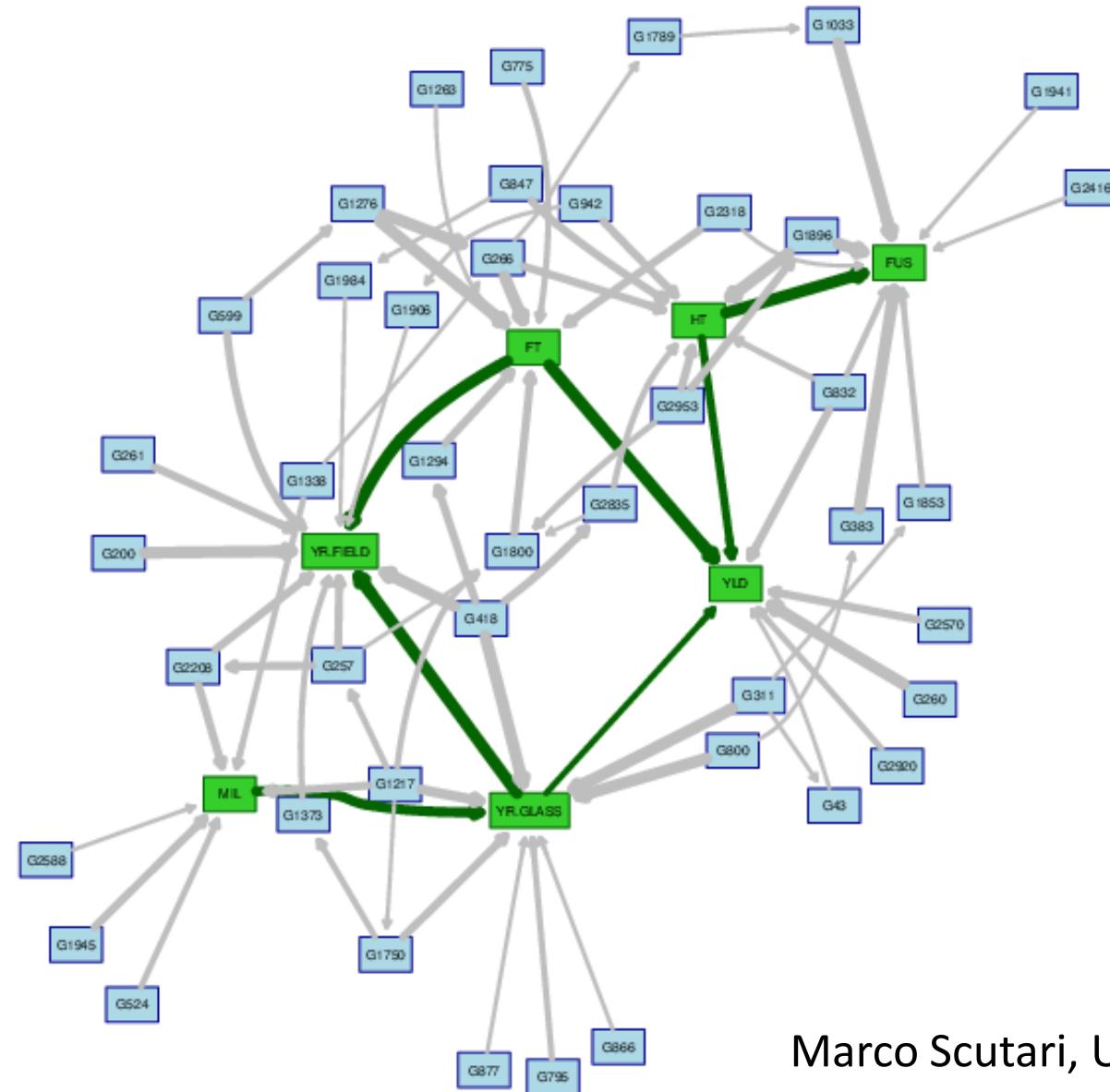
YR resistance - NIAB Elite MAGIC population

Marker	Estimated effect
2D	0.6476
3A	0.4223
1A	0.4069



Favourable alleles are dispersed

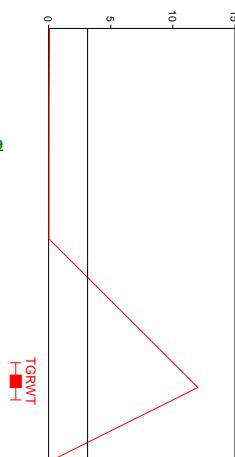
Line/SNP	2A_SNP	3A_SNP	1A_SNP
Alchemy	R	S	S
Brompton	S	S	S
Claire	R	S	S
Hereward	S	S	R
Rialto	S	R	S
Robigus	S	S	S
Soissons	S	S	R
Xi19	S	R	S
MEL_1	R	R	R
MEL_2	R	R	R
MEL_3	R	R	S
MEL_4	R	R	S
MEL_5	R	R	S
MEL_6	R	S	R
MEL_7	R	S	S



Marco Scutari, UCL

Mapping TGW QTL

Kukri_c22361_2477 Kukri_c3075_391
 Kukri_c7794_1247 Kukri_c9595_242
 RAC875_c767_4007 RFL_Conig2605_672
 RFL_Conig2605_693 RFL_Conig441_505
 RFL_Conig441_627 wsnp_Ex_rep_c67878_66584488
 Excalibur_c37240_609
 BS00003881_51 BS00004377_51
 Kukri_c50910_866
BS00065309_51 BS00072945_51
 Excalibur_c47557_418 wsnp_Ex_c19454_28409258
 IACX8469 **BS00011122_51**
 BS00023089_51 BS00041481_51
BS00064632_51 BS00078715_51
BS00086046_51 BS00087178_51
 BS00089169_51 Ex_c50864_326
Excalibur_c1492_1282 Excalibur_c61509_69
 Excalibur_rep_c66355_301 Excalibur_s105534_234
 (AAV1263 IAAV1346
 IAAV1385 IAAV5967
 IAAV6535 IAAV894
 JD_c6195_347 Ku_c13637_545
 Ku_c71238_1537 **Kukri_c1281_515**
 Kukri_c16868_1062 Kukri_c25562_1826
Kukri_c30819_246 RAC875_c49166_240
 RAC875_c5819_1450 RAC875_c58848_60
 TA003858-0637 TA004097-0977
 tpb0047k12_1370 wsnp_Ex_c12288_19625413
 wsnp_Ex_c35545_43677576 wsnp_Ex_c43887_50077773
 wsnp_Ex_c591_1176609 wsnp_Ex_rep_c102173_87395725
 wsnp_Ex_rep_c105612_89983181 wsnp_Ex_rep_c67218_65729639
 wsnp_Ex_rep_c67692_66357763 wsnp_Ku_rep_c68351_67302372
 (AAV6992 IACX422
BS00013851_51 BS00099290_51
Excalibur_c49239_97 TA004032-0298
 BS00022412_51 BS00024191_51
BS00033799_51 BS00036211_51
BS00065079_51 BS00072146_51
BS00088373_51 Ex_c8482_488
Excalibur_c16840_3454 Excalibur_c37358_676
 Excalibur_c60816_99 **IAAV245**
 (AAV3994 IACX8190
 Ku_c104762_377 Kukri_c33967_97
Kukri_c38882_391 Kukri_rep_c70185_854
 Ra_c4452_3073 RAC875_c13778_650
RAC875_c29487_369 RAC875_rep_c76107_118
 TA0011414-0867 TA002574-0900
 Tdurum_contig78006_158 wsnp_BE403421A_Ta_2_1
 wsnp_Ex_c1104_2118684 wsnp_Ex_c11446_18469102
 wsnp_Ex_c18965_27868480 wsnp_Ex_c19476_28434084
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 wsnp_Ex_rep_c67605_66248628 wsnp_Ex_rep_c69901_68864080
 wsnp_JD_c5028_6151168 wsnp_Ku_rep_c71238_70957970
 wsnp_Ra_rep_c100410_86374467 BobWhite_c20706_135
 BobWhite_c7156_64 **BS00064203_51**
BS00068469_51 Ex_c66635_500
 wsnp_Ku_c27273_37219950 BS00064873_51
 BS00009985_51 BS00043716_51
 Kukri_c14901_114 BS00011034_51
BS00022120_51 Excalibur_c34574_452
wsnp_Ku_c2329_4474766 wsnp_Ku_c8394_14267750
 wsnp_Ra_c44015_50539749 BS00022605_51
 wsnp_Ku_c3354_6228393 wsnp_Ku_c3354_6228863
 wsnp_Ku_c9388_15743434 wsnp_Ra_c310264_40243185
 BS00038646_51 Ku_c9262_902
 BS00084250_51 Kukri_c2704_1137
 Kukri_c44260_577 TA004297-0876
 wsnp_Ex_c2350_4403690 wsnp_Ex_c341_667884
 wsnp_Ku_c2700_5121331 wsnp_Ku_c2700_5121383
 Kukri_c18260_345 Kukri_c9262_401
 BS00072903_51 BS00082211_51
 Excalibur_rep_c69275_346 GENE-3945_245
 RAC875_c62614_191 TA012395-0819
 Tdurum_contig42125_5692 wsnp_Ex_c30264_39202224
 wsnp_Ku_c3450_6387847 **Ku_c69999_111**



Avalon x Cadenza

5 chromosomes

7 QTL

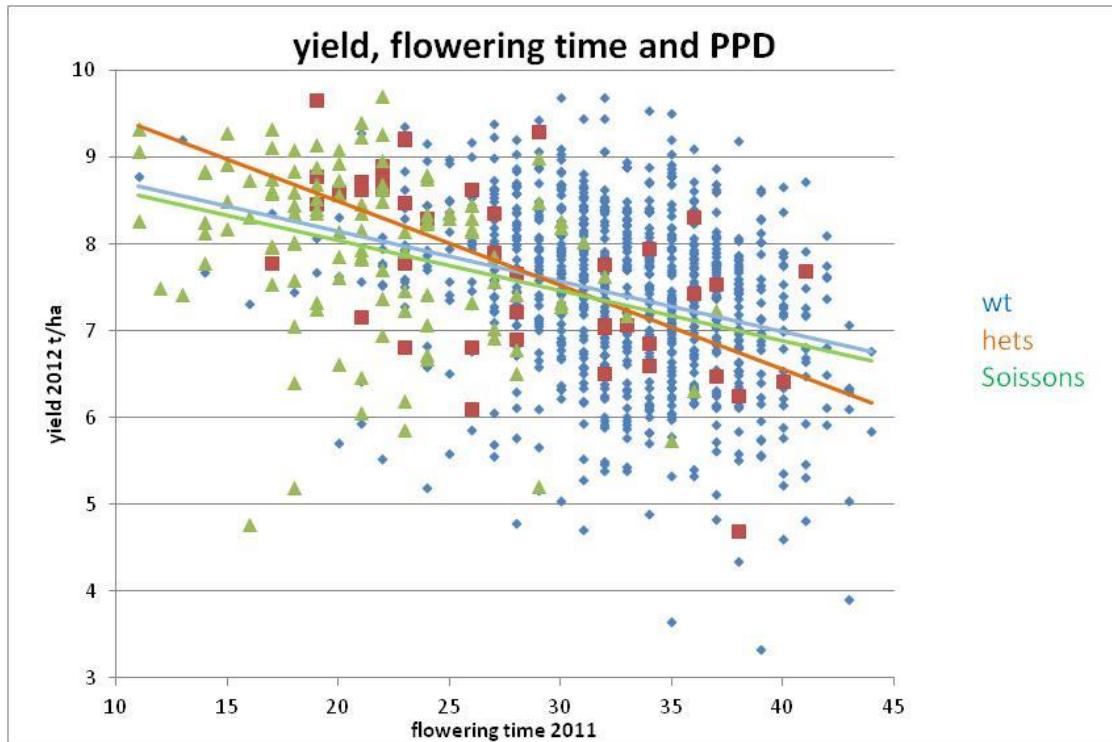
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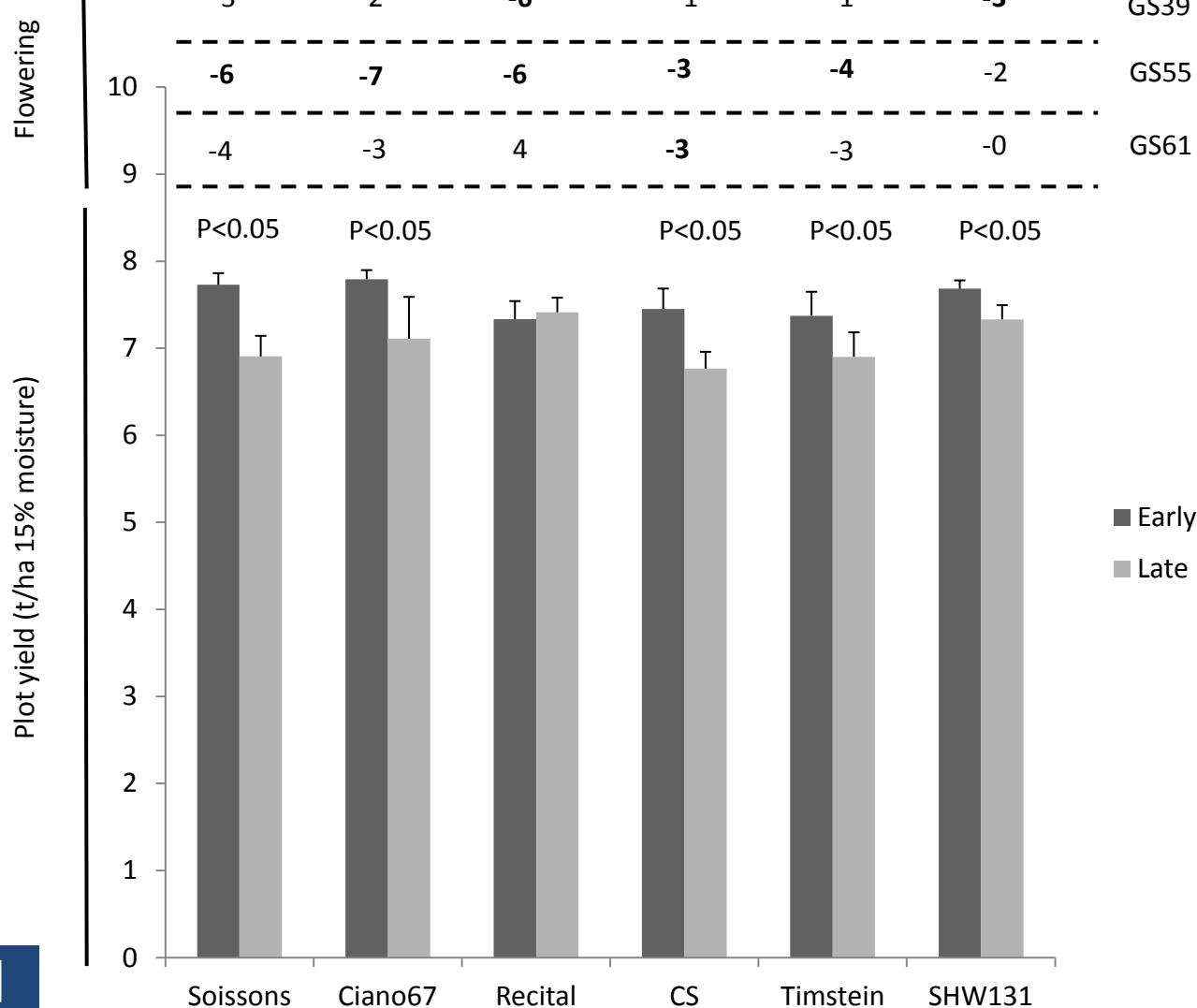
24 linkage groups

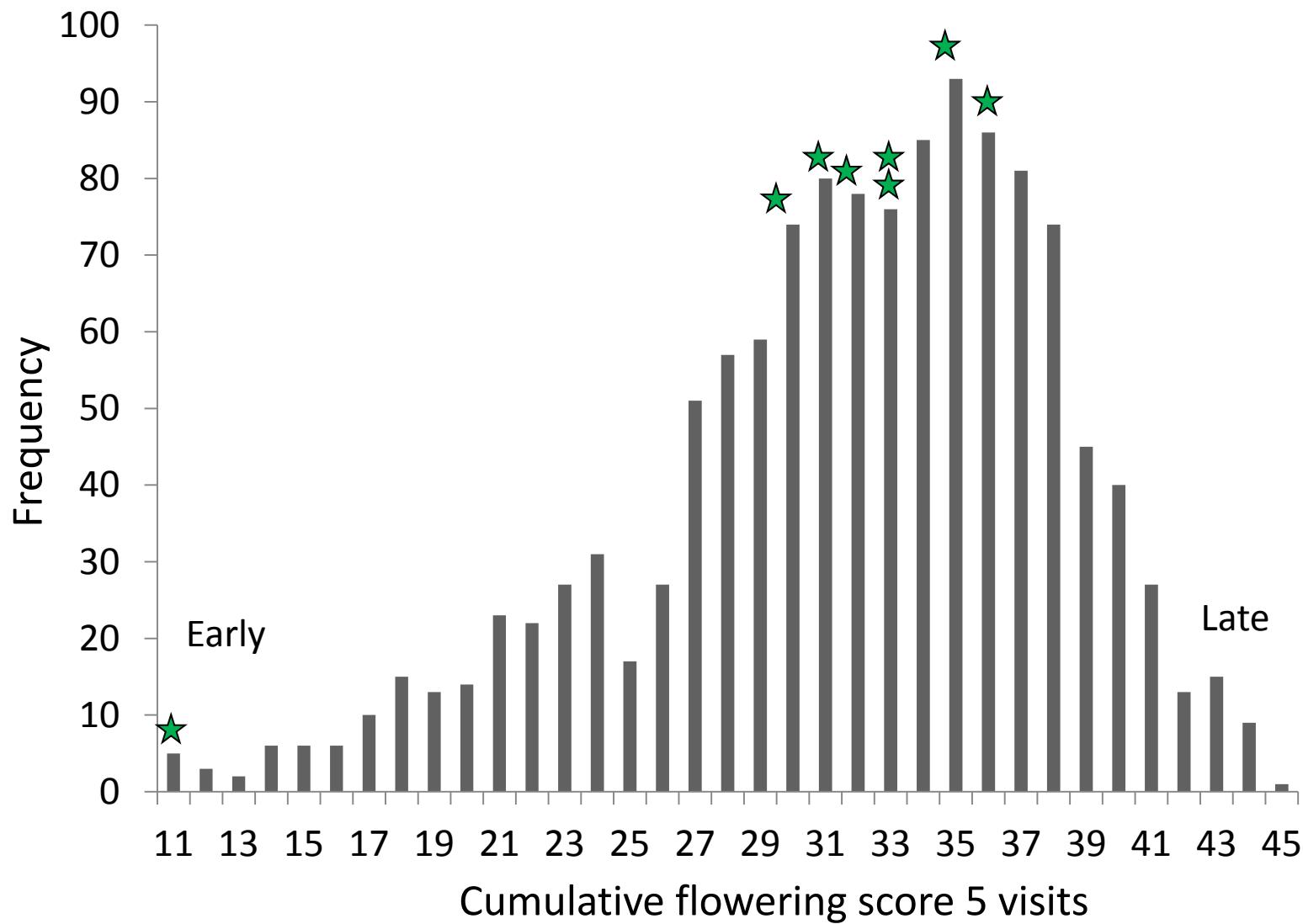
124 SNPs

Harriet Benbow University of Bristol

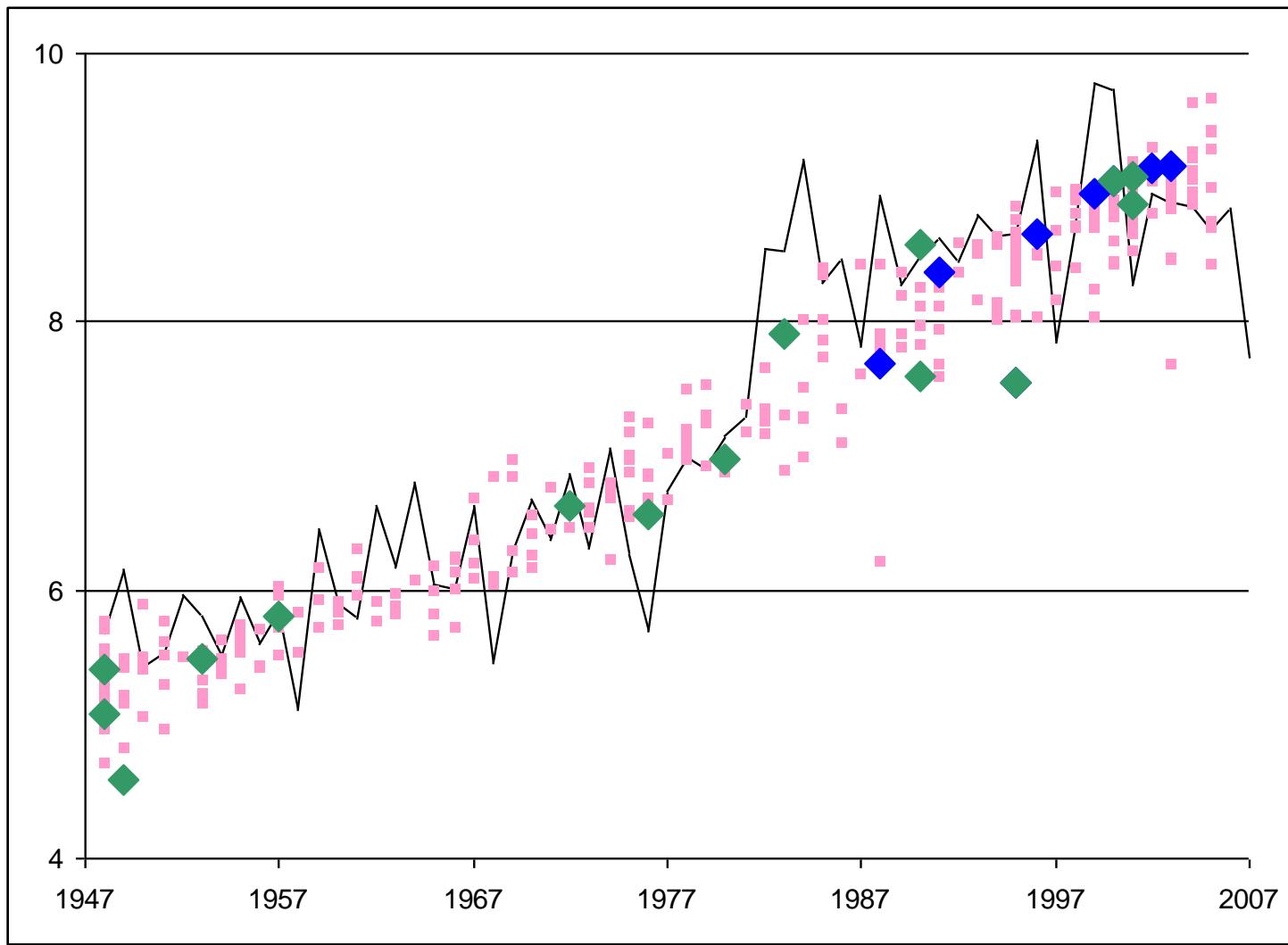
Adaptive traits e.g. flowering time

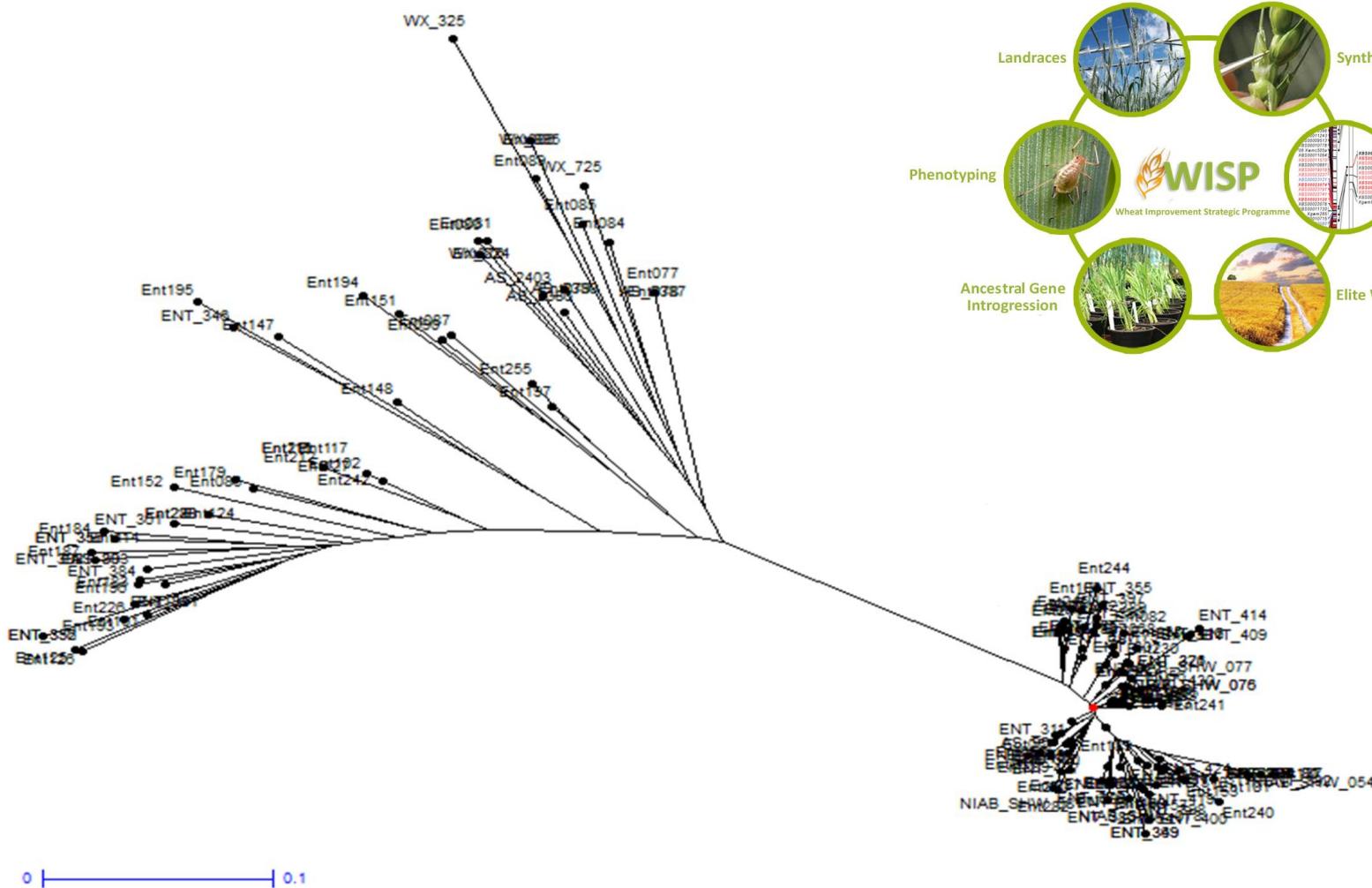




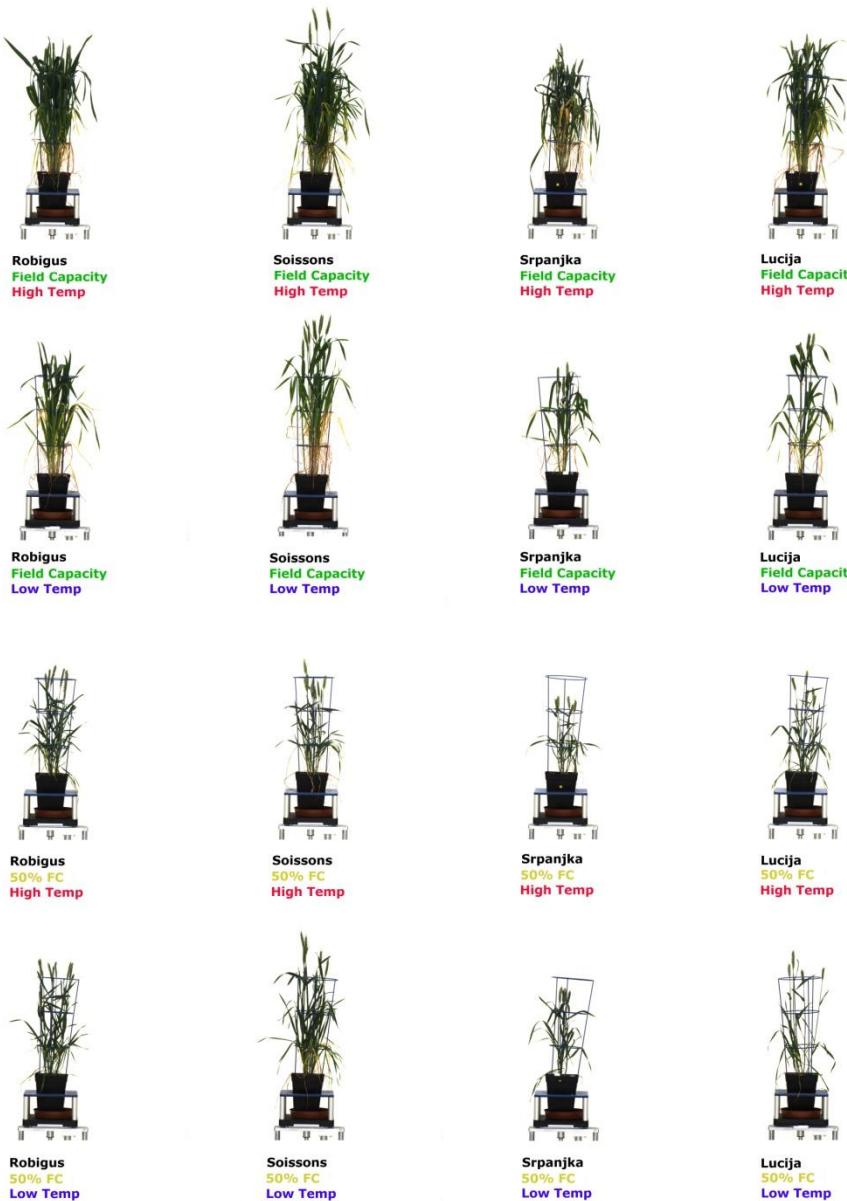


NIAB Diverse MAGIC population

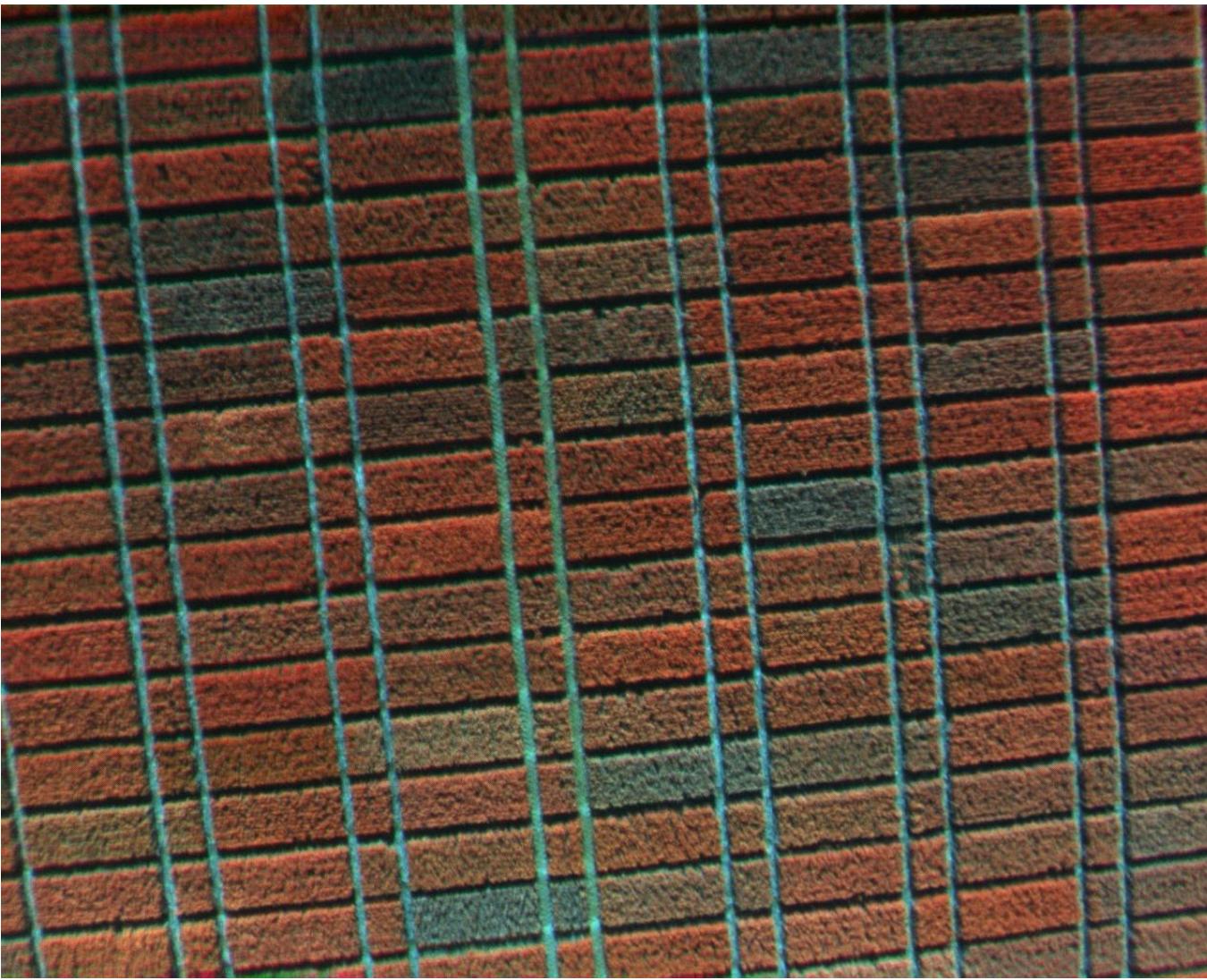




The National Plant Phenomics Centre, IBERS



Multi-spectral field imaging of MAGIC, Ursula Ag



Acknowledgements

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NIAB pre-breeding team

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Dave Laurie, Adrian Turner (*Ppd-1*)

WISP partners

