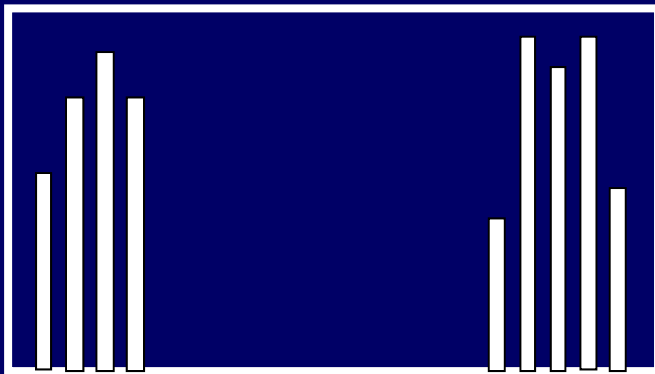
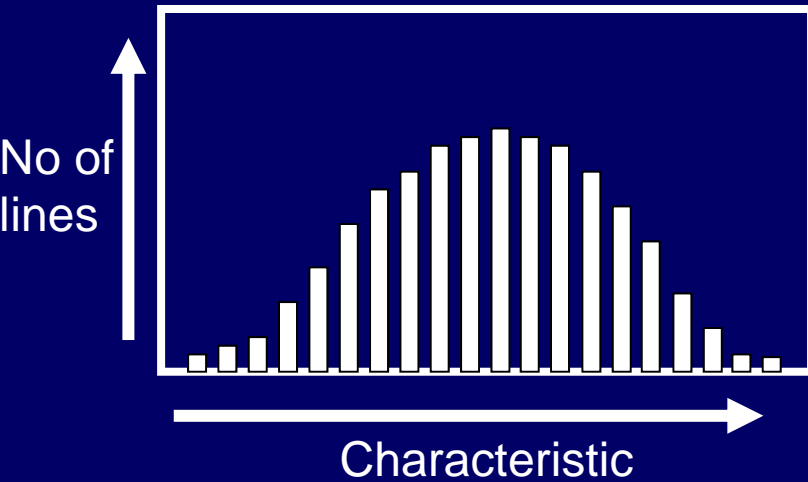


Avalon x Cadenza

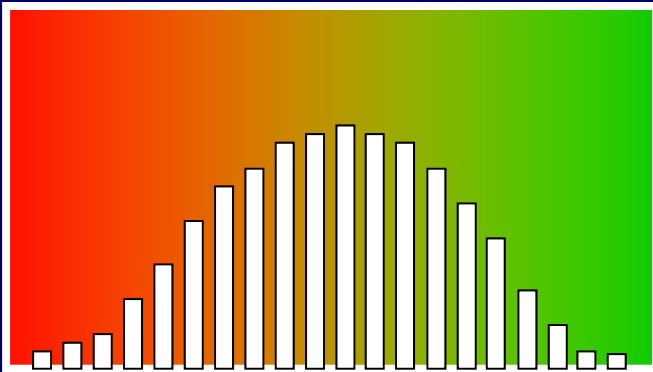
Simon Griffiths

WGIN Stakeholders November
2009

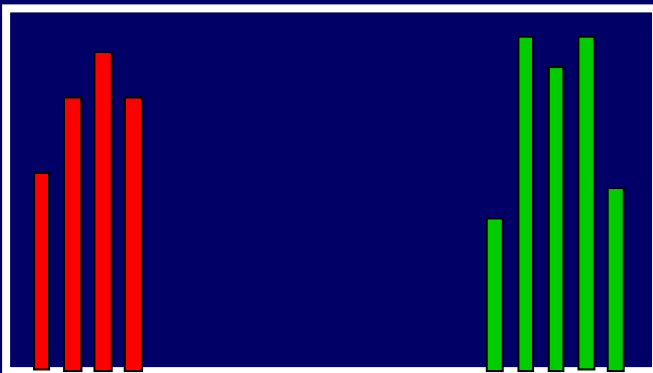
Wheat Genetic Improvement is Quantitative (mostly)



Wheat Genetic Improvement is Quantitative (mostly)



- The genes influencing quantitative traits like grain yield can be identified as Quantitative Trait Loci (QTL).
- The identification of QTL requires precise segregating populations and associated molecular markers, ideally assembled into genetic maps representing the 21 pairs of wheat chromosomes.



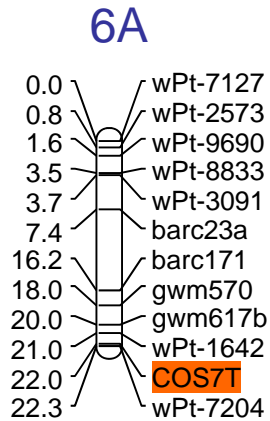
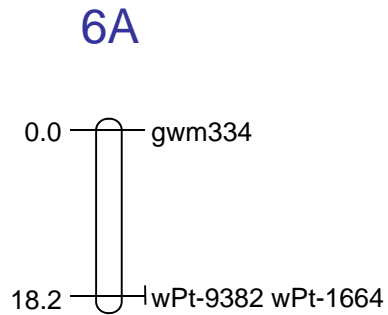
- WGIN has developed this set of resources for the Avalon x Cadenza doubled haploid population.

Avalon x Cadenza Map Summary

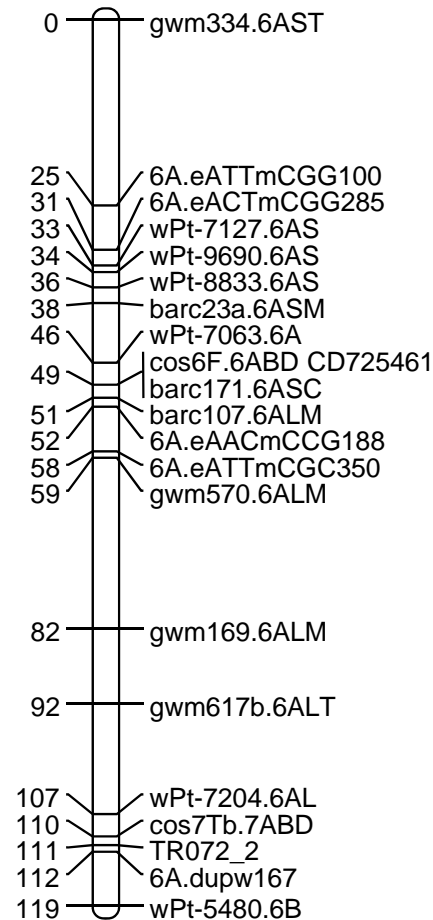
- 28 linkage groups
- 2000cMs
- 355 markers in total
 - 178 SSRs, 97 DaRT, 36 COS markers
 - 23 NIAB AFLP, 13 Perfect markers, 8 STMP
- Use other maps for reference
 - Somers consensus
 - Komugi map
 - ITMI

New and Improved...

6A before



6A after



AxC in Threadmapper

The screenshot displays the ThreadMapper Studio interface. The main window shows a 3D visualization of a protein structure with various markers (colored spheres) and connections (lines) between them. The interface includes a menu bar (File, Edit, View, History, Bookmarks, Tools, Help), a browser address bar, and a toolbar. On the left, there is a 'Marker Grouping' panel with a list of folders (0-24) and a 'Recycle Bin'. On the right, there is a 'Zoom Control' panel and a 'Connections' table. At the bottom, there is an 'Attribute Panel' and a status bar.

Browser address bar: <http://cbr.jic.ac.uk/t3mapper/default/embed/spectral>

Browser tabs: LEO Deutsch-Englis..., WebCalendar, Norwich BioScience..., SPIEGEL ONLINE - N..., Google, Outlook Web Acces..., W/Wikipedia, Latest Release Notes, WEB.DE - E-Mail - S..., Monogram web upd...

Browser tabs: SPIEGEL ONLINE - Nachrichten, Site Directory, Embedding: using spectral

ThreadMapper Studio toolbar: Update, Save, Load, 3D-On, BarChart, Prunning, cut, Join, John Innes Centre

Marker Grouping:

- Add
- Remove
- Order
- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21
- 22
- 23
- 24
- Recycle Bin

Zoom Control:

Connections:

markA	markB	dist
✓ wPt-3561.2BS	s17TCAC.2B	3.37
✓ gwm257.2BSM	wPt-3561.2BS	3.35
✓ s17TCAC.2B	wPt-0335.2BS	3.23
✓ gwm293b.5ASM	gwm156a.5ASM	2.8
✓ gwm156a.5ASM	VRNprom1A.5AL	2.79
✓ gwm174a.5DLM	gwm257.2BSM	2.75
✓ gwm293b.5ASM	wPt-4131.5AS/L	2.7
✓ wPt-4131.5AS/L	gwm219.6BLT	2.65
✓ gwm174a.5DLM	gwm159.5DSM	2.62
✓ barc49a.7ALM	VRNprom1A.5AL	2.54
✓ I-04-5W2.2B	wPt-0335.2BS	2.32
✓ wmc105.6BLC	gwm219.6BLT	2.15
✓ proGluB1.1BLM	wPt-1403.1BL	2.12
✓ gwm159.5DSM	gwm190.5DST	2.06
✓ barc127.7ASM	wPt-5153.7AS	1.98
✓ wmc44.1BLT	wPt-2526.1BL	1.98
✓ wmc44.1BLT	wPt-4721.1BLT	1.96
✓ wPt-2526.1BL	wPt-1403.1BL	1.95
✓ wPt-8657.4AL	wPt-4721.1BLT	1.85
✓ wPt-5153.7AS	wmc245b.2DLC	1.84
✓ wPt-0298.2DS/L	wmc245b.2DLC	1.8
✓ wmc105.6BLC	wPt-4856.6BS/L	1.77
✓ wPt-3451.1BS	proGluB1.1BLM	1.72
✓ wPt-4144.2D	wPt-0298.2DS/L	1.66
✓ wPt-4144.2D	wmc453b.2A/2D	1.64
✓ s528TCAC.2A	wmc453b.2A/2D	1.62
✓ barc49a.7ALM	wmc505a.3BS	1.61
✓ wPt-8657.4AL	barc78.4ALM	1.6

Controls: axes spin show label

Attribute Panel:

Color Groups MST Q RELOAD

Legend:

- 0: white
- 1: red
- 2: inwngreen
- 3: schmozzite

Jmol script terminated

Avalon x Cadenza workshop 3rd November 2009

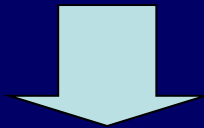
- Over 40 participants academic and industry
- Diseases- Yellow rust, Soil borne mosaic virus, Take All, Septoria
- Resource capture- Yield, Nitrogen use efficiency
- Adaptation- Heading date, height
- Others- Quality, disease.....

Dissection of genetic gain in UK winter wheat

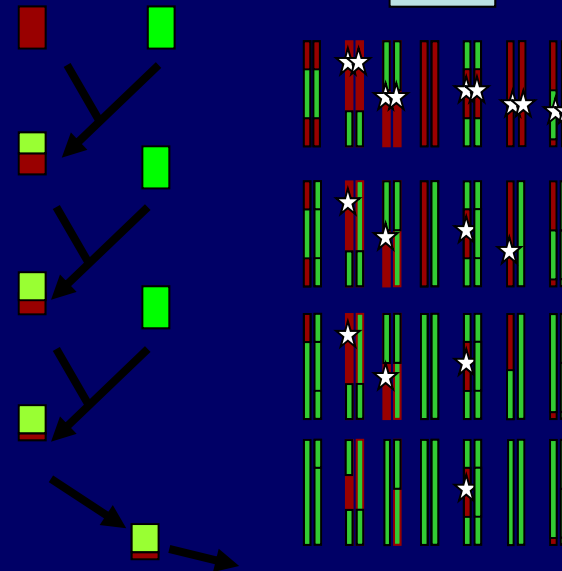
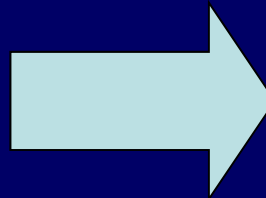
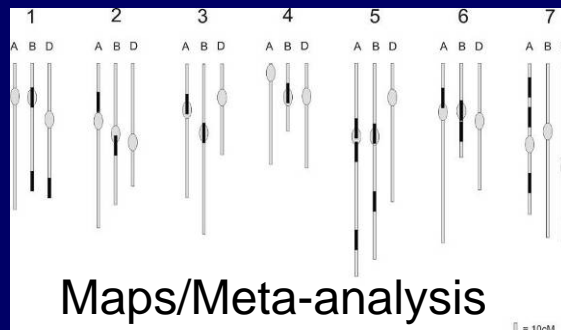
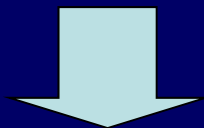
crosses

- Spark x Rialto
- Malacca x Charger
- Avalon x Cadenza
- Savannah x Renesansa
- Buster x Charger
- Lynx x Cadenza
- Charger x Badger
- Beaver x Soissons
- Savannah x Rialto
- Weebil x Bacanora
- Shango x Shamrock
- Milan x Catbird

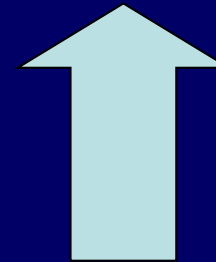
How do these alleles work in combination to make wheat better?



QTLs

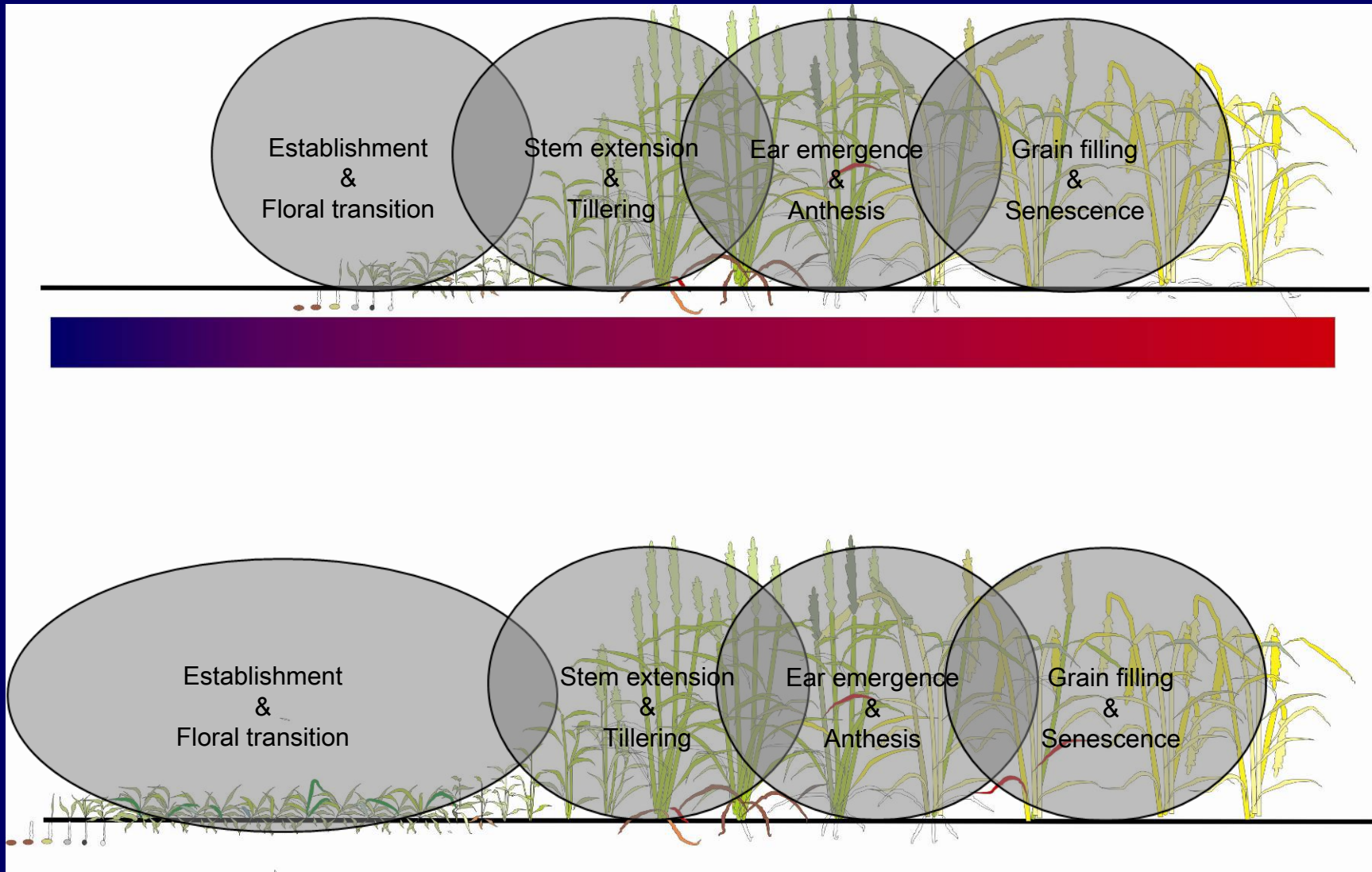


Isogenics

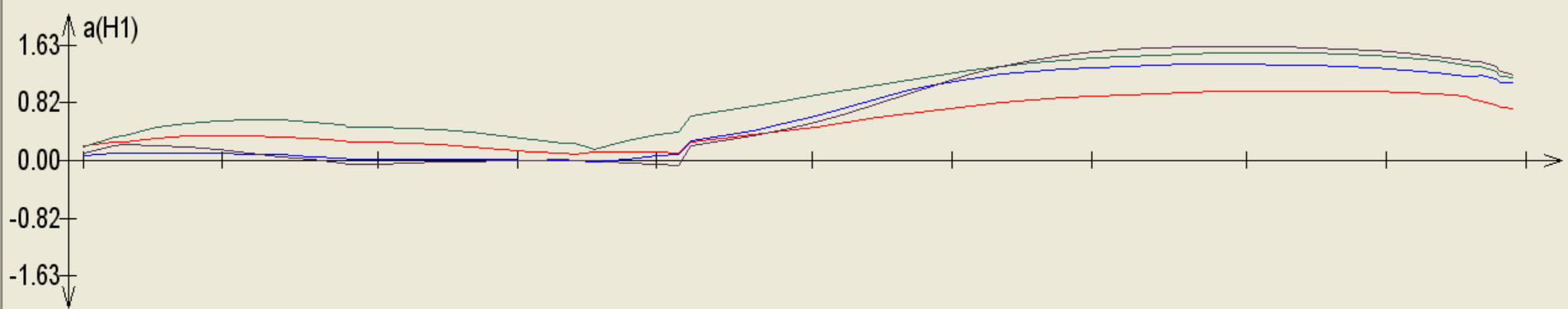
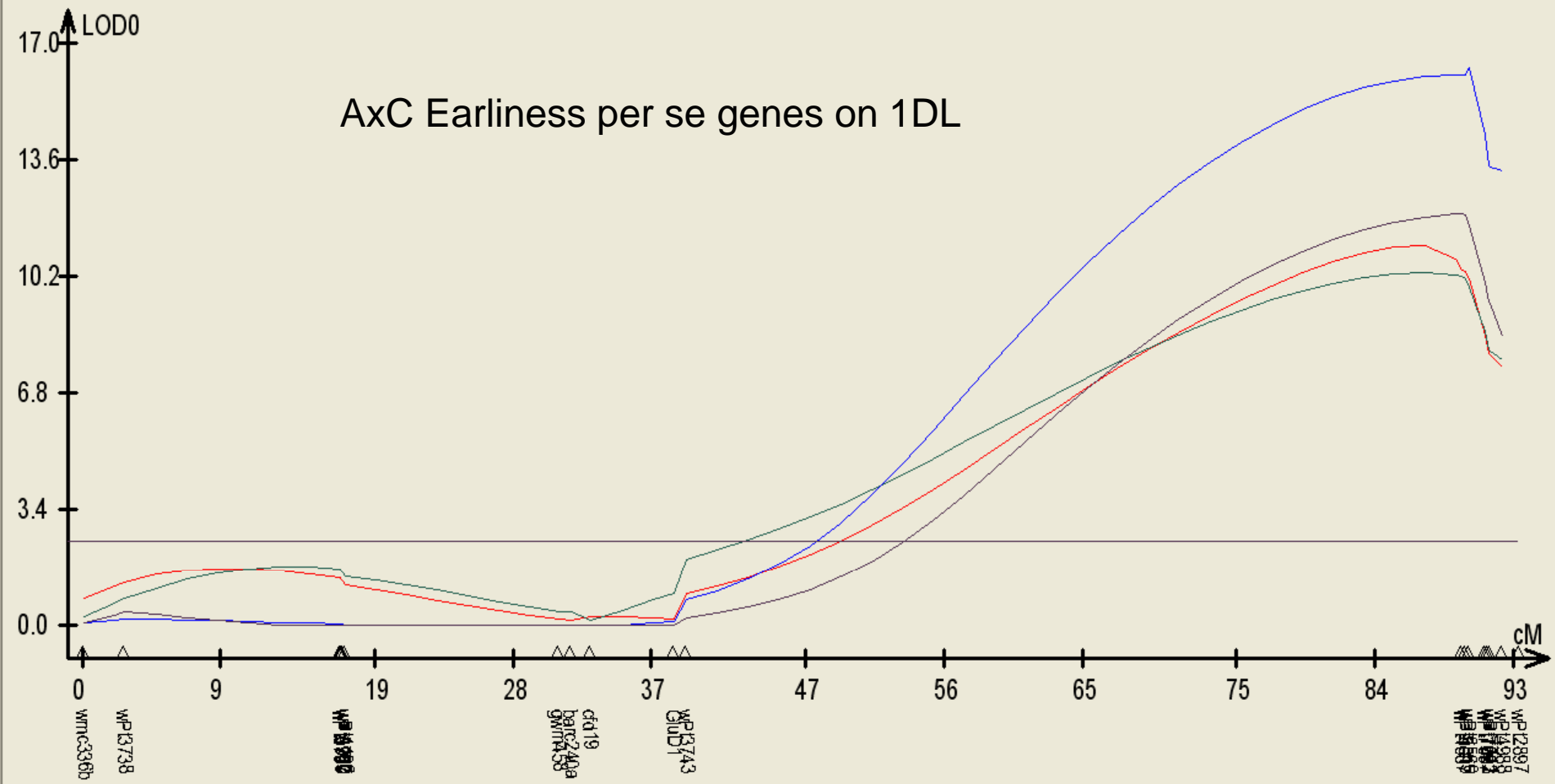


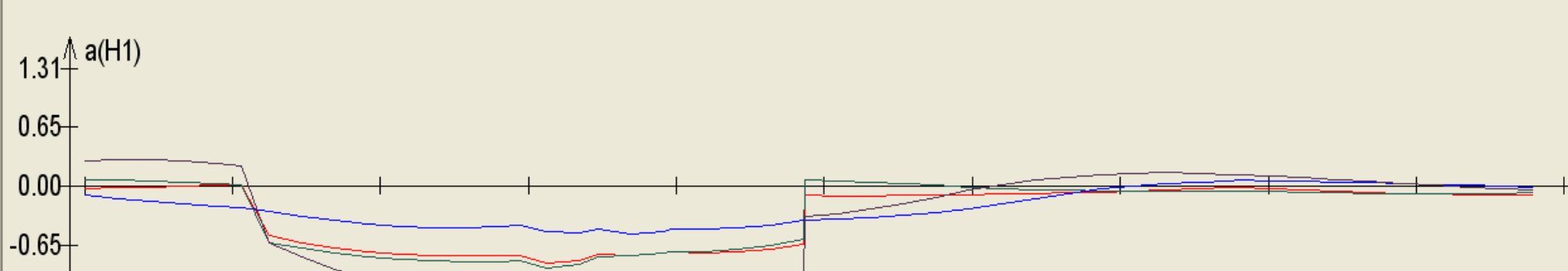
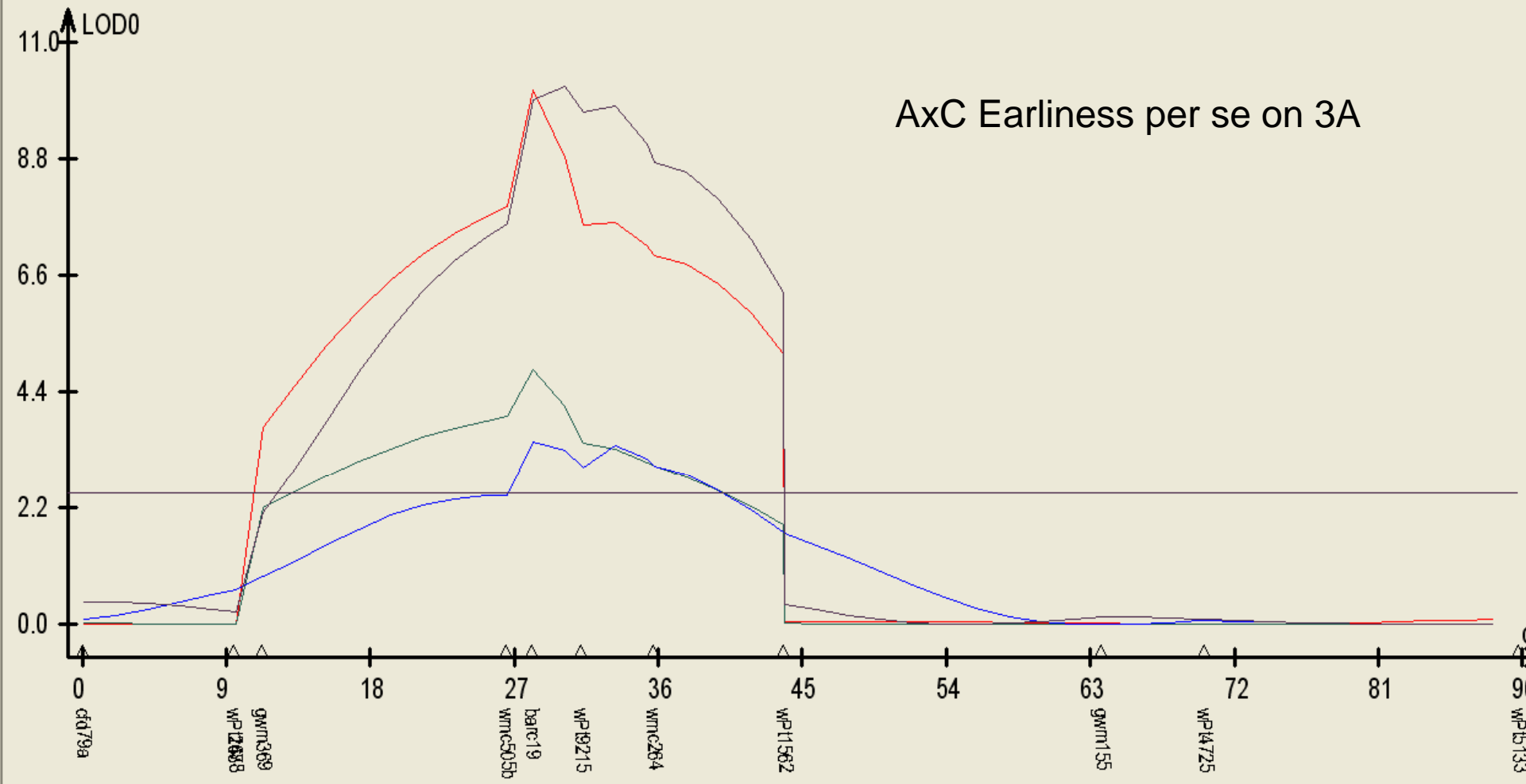
Fitting wheat to it's environment

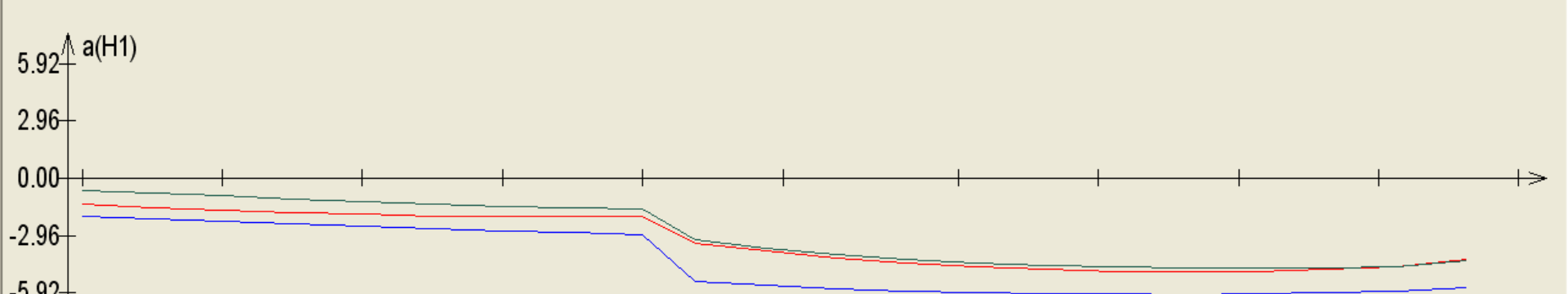
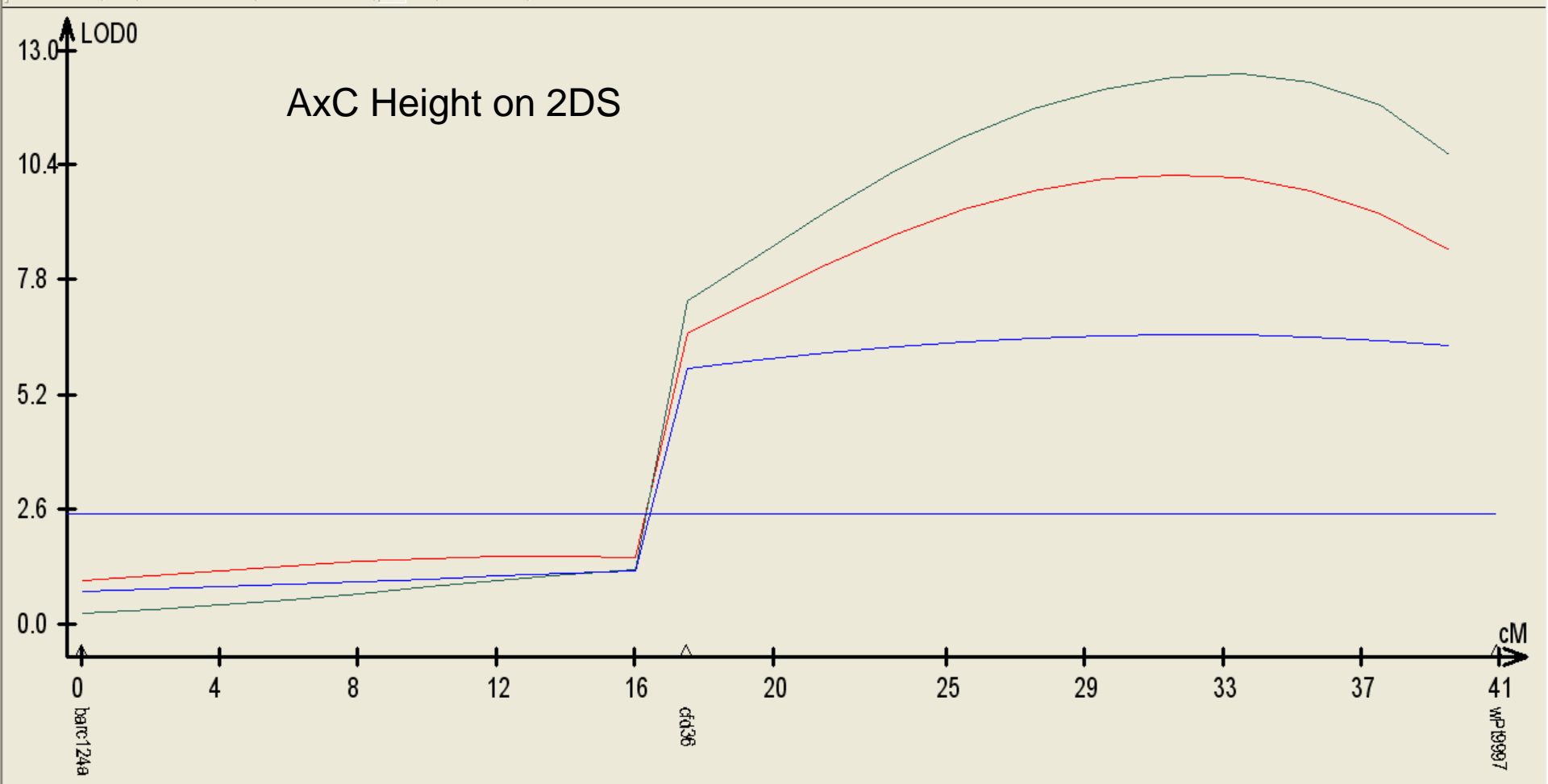
The genetic fine tuning of adaptation



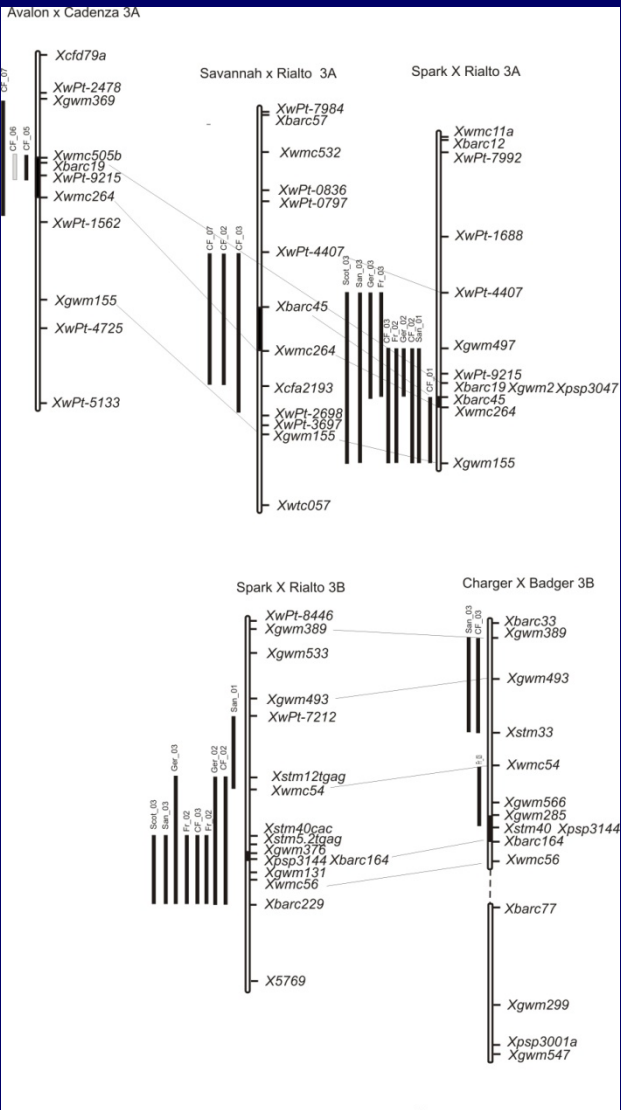
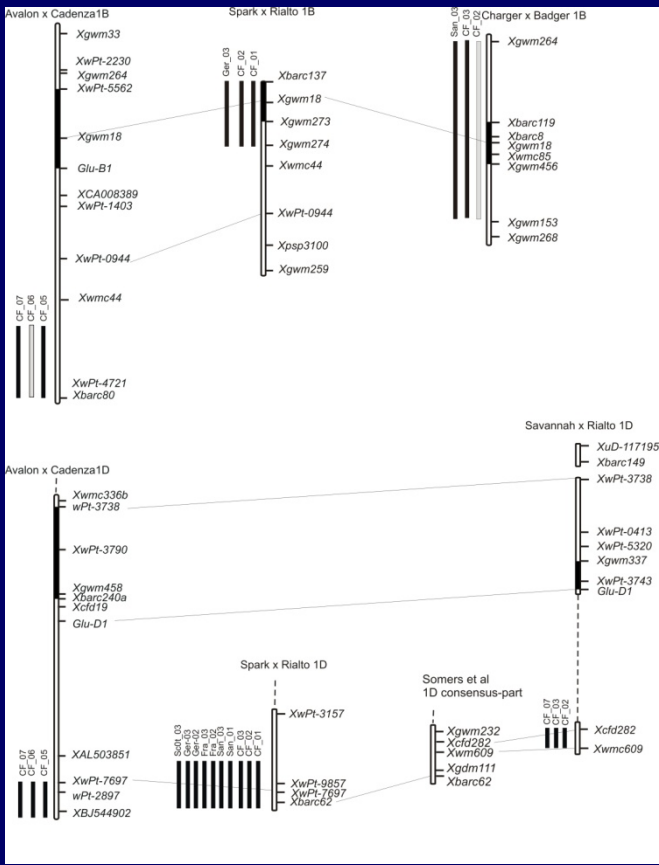
AxC Earliness per se genes on 1DL







Allelic variation is very common for many of these QTL



Are 1DL and 3AS combinations related to performance?

Crossing

Marker Assisted Backcrossing

50% DH1 P1 and P2

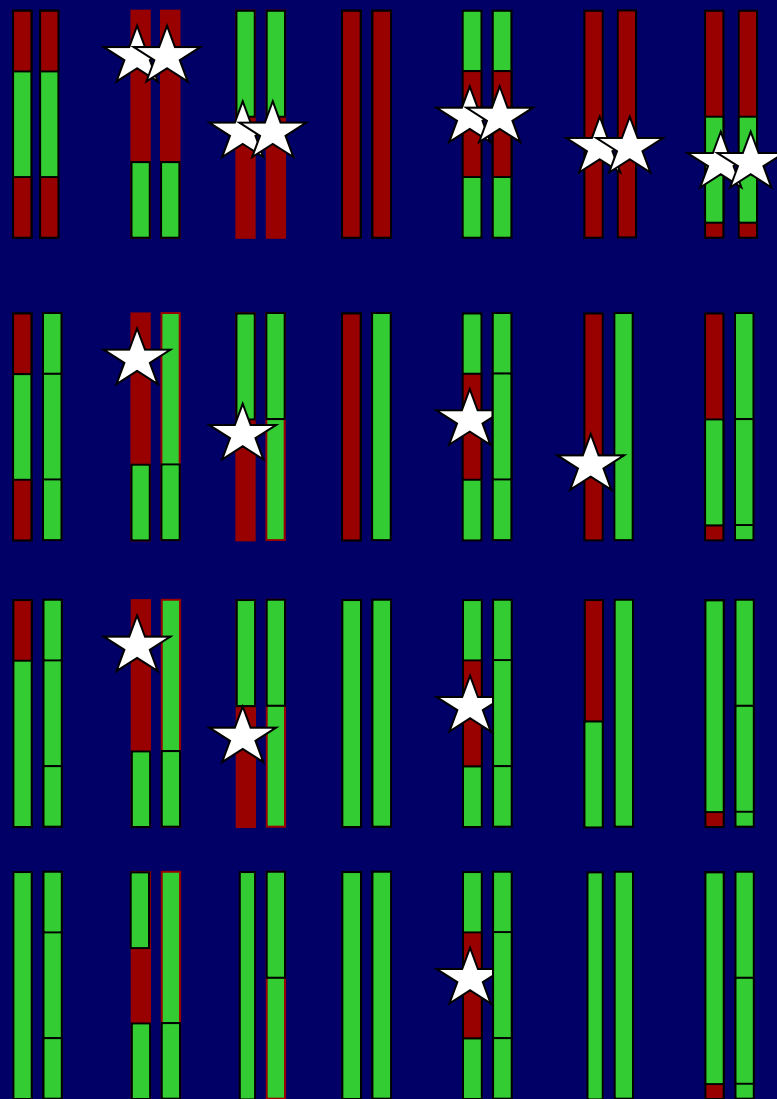
F₁ P1

75% BC₁ P1

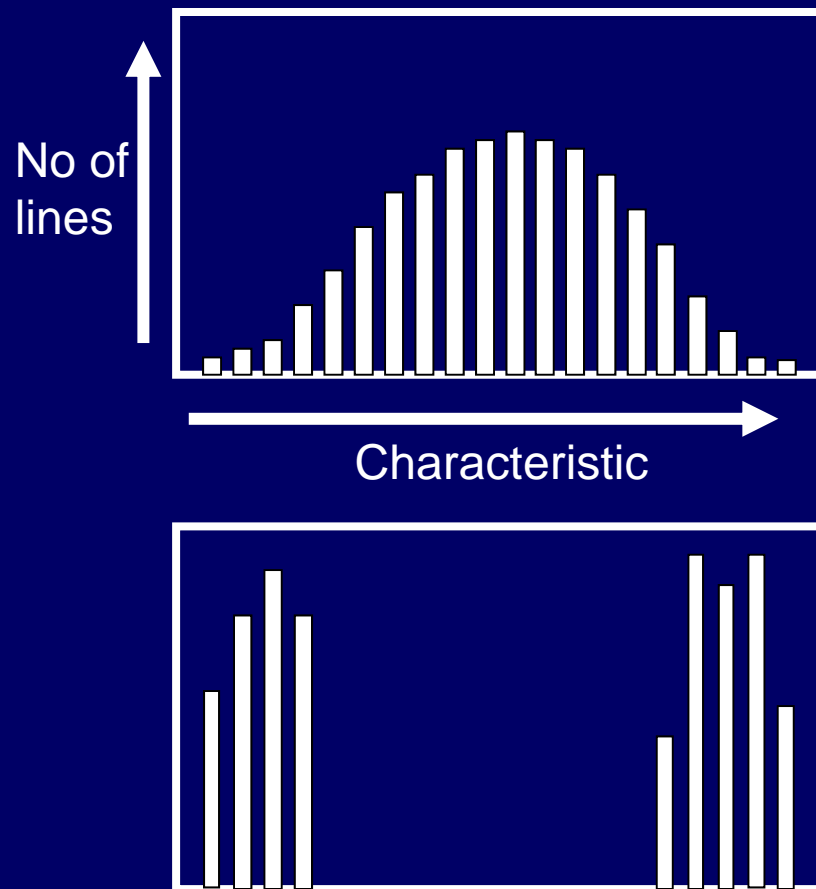
87.5% BC₂

BC₂F₂

Population representing both homozygous classes



WGIN2 aim: From QTL to major gene



Acknowledgements



Lorelei
Bilham



Catherine
Baker

Neil
McKenzie

James
Simmonds

Luzie
Wingen

Simon
Orford



Liz
Sayers



Richard
Goram



Michelle
Leverington

John
Snape

Lesley
Fish

Debora
Gasperini