

A novel allele for Sucrose Synthase type 2 in wheat

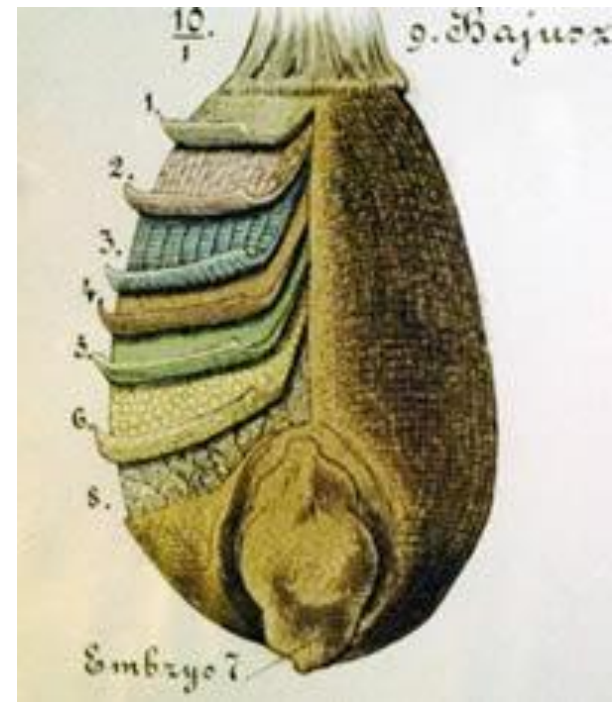
Anne Sturbaum

USDA-ARS Soft Wheat Quality



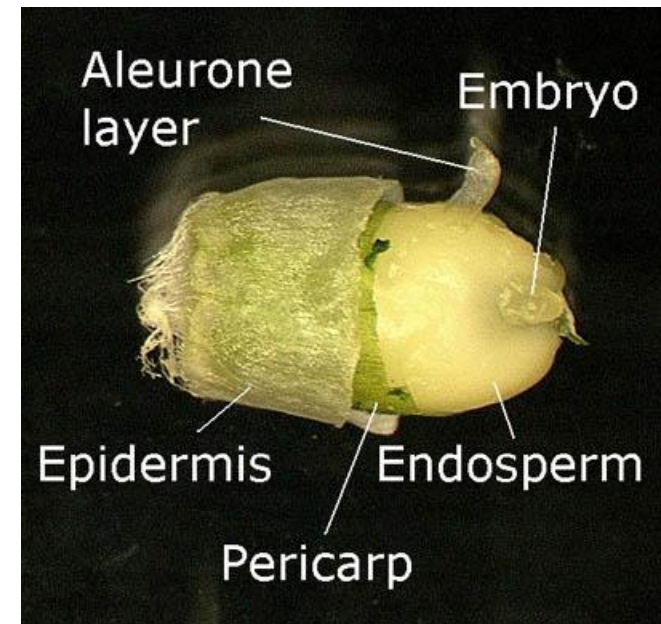
Goals of Genetics work at the SWQL

- DNA marker discovery
- Breeding material resource development
- Targets:
 - **FLOUR YIELD**
 - **SOFTNESS EQUIVALENCE**



Starch

- Holds just enough water to keep the embryo viable until germination.
- Stores glucose, provides energy and carbon source for germination.
- Structure and water holding capacity determine milling and baking quality.



Chromosome 2B

- **Finer Mapping of the 2B QTL for Milling Quality in Wheat**

Souza , et al, Poster PAG 2009

- **Identification and Validation of QTL for Grain Quality Traits in a Cross of Soft Wheat Cultivars Pioneer Brand 25R26 and Foster**

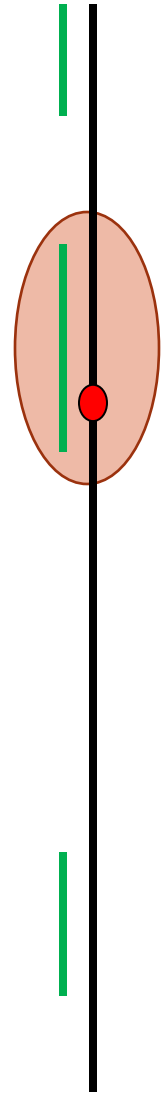
Smith, et al., Crop science, vol. 51, 2011

- **Association and multi-population studies**

Clay Sneller, Antonio Cabrera (in preparation)

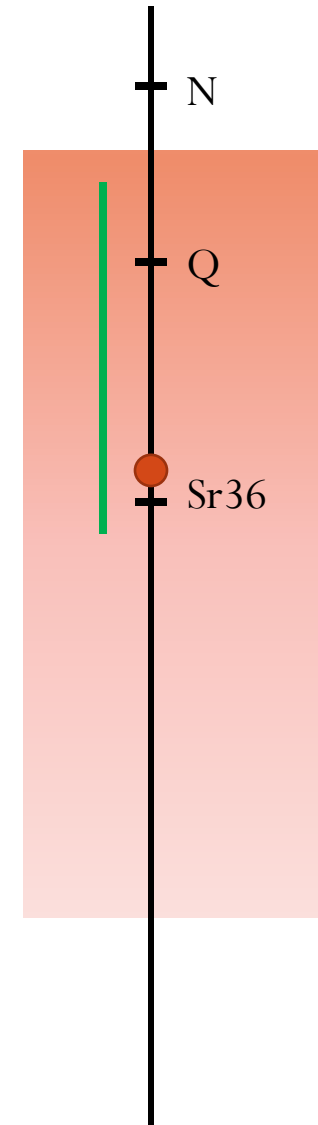
- **Flour yield QTLs in three Australian doubled haploid wheat populations**

Lehmensiek, et al, DaggardA Australian Journal of Agricultural Research, 2006, 57, 1115–1122



Resources

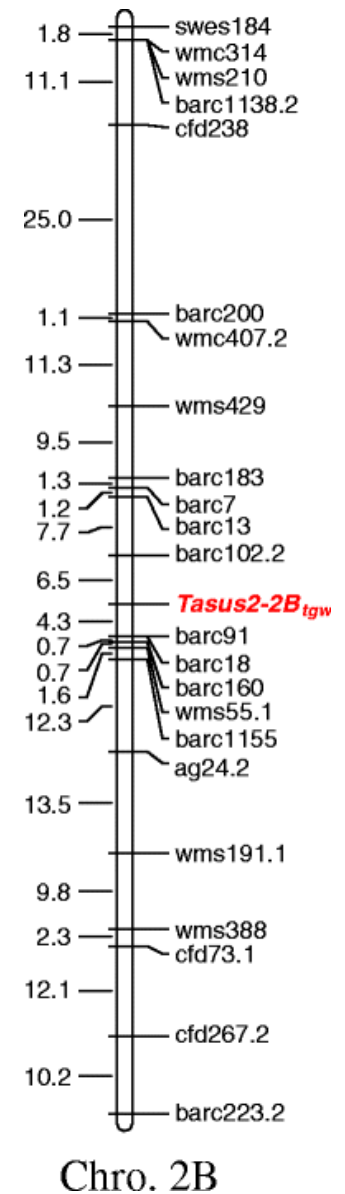
- Association Mapping Population
 - 187 soft wheat cultivars-
 - Eastern US, 1808-2005
 - 20% 2B translocation, stem rust, powdery mildew
 - QTL mapped to 2B
 - Multiple traits, FY and SE
- Foster by Kanqueen Recombinants
 - Foster
 - high FLOURYIELD
 - large 2B translocation
 - Kanqueen
 - Poor flour yield



Sucrose Synthase type 2

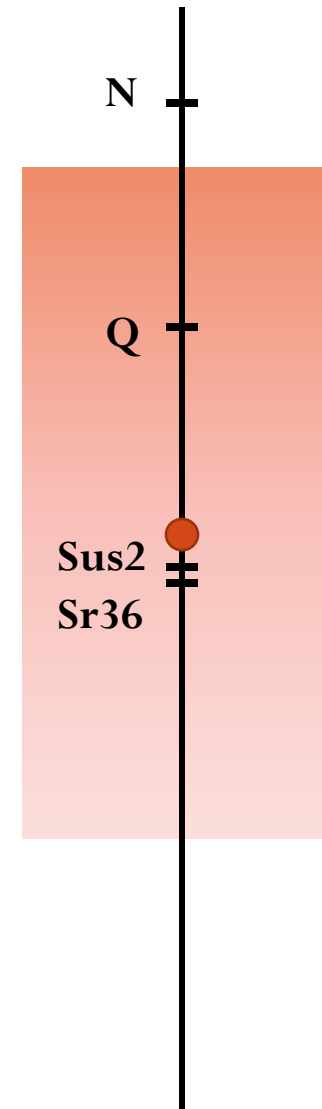
- Provides precursor for starch synthesis
- Expressed in endosperm
- Sequenced
- 2 types for the *TaSus2* on 2B
- 1000 GW (High and Low)
- Maps to 2B

The wheat (*T. aestivum*) sucrose synthase 2 gene (*TaSus2*) active in endosperm development is associated with yield traits (Jiang, 2011, Funct Integr Genomics)



Sucrose Synthase

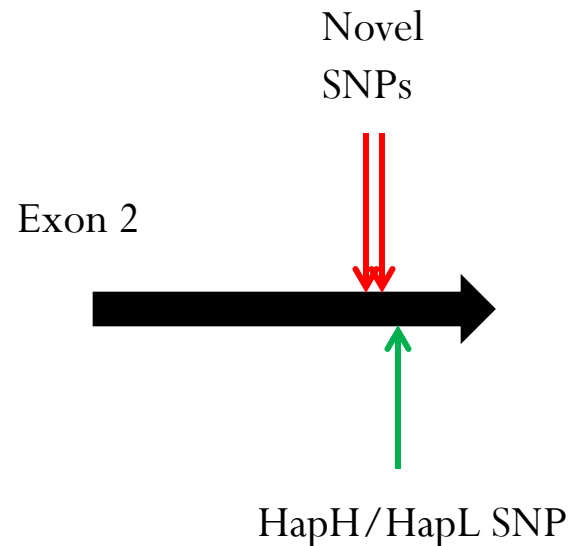
- **AM population**
 - linked to 2B translocation
 - No TL in European and Asian cultivars
- **Foster and Kanqueen**
 - Polymorphic
 - Foster - high TGW type (H)



Sucrose Synthase - 2B

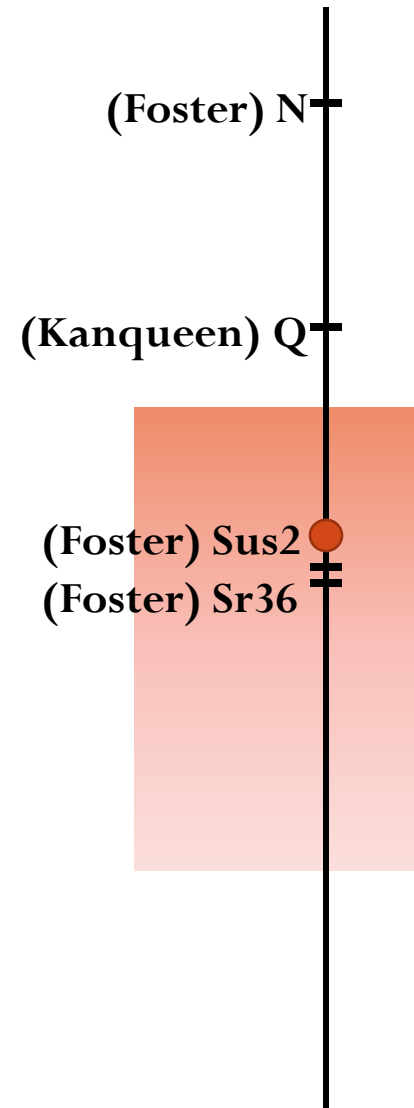
Foster and Kanqueen

- **At least 2 novel SNPs**
- **Synonymous changes – a.a. sequence not altered**
- **2B translocation unique sequence**
- **HapH is not present in US Eastern cultivars**



Foster by Kanqueen Recombinant

Line	SE	FY
FxK-RIL 13	59.04	70.34
Foster	56.26	69.66
Kanqueen	55.17	65.67



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- DNA marker discovery

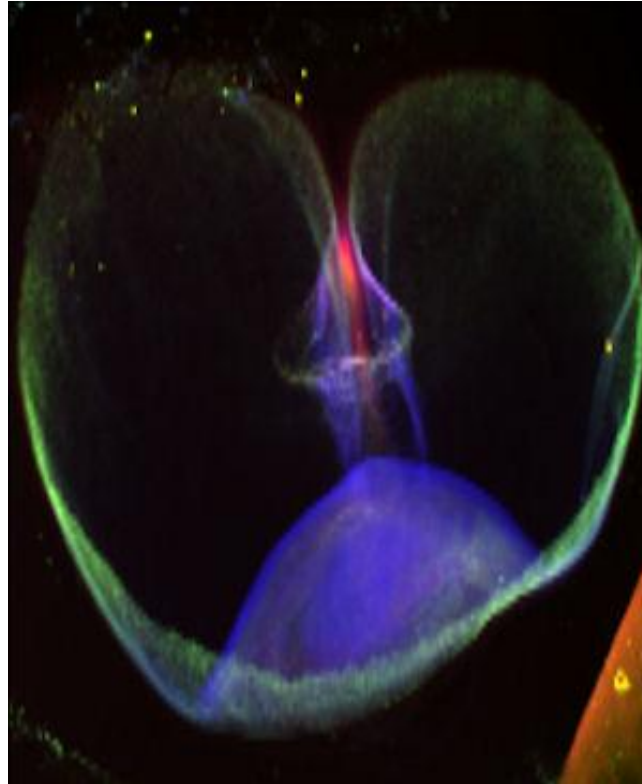
Sus2 – FLOUR YIELD

and improved SOFTNESS EQUIVALENCE

- Breeding material resource development
 - **Breeding lines to improve flour yield and SE**

Future

- **Sequence**
- **Expression**
- **Markers**
- **Breeding**
- **Quality**



THANKS:

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