



# Da Strampelli alla rivoluzione del gene

Peter Langridge

University of Adelaide

DAL GENIO AI GENI: L'EREDITÀ DI  
NAZARENO STRAMPELLI

Bologna, 2<sup>nd</sup> Dec 2016

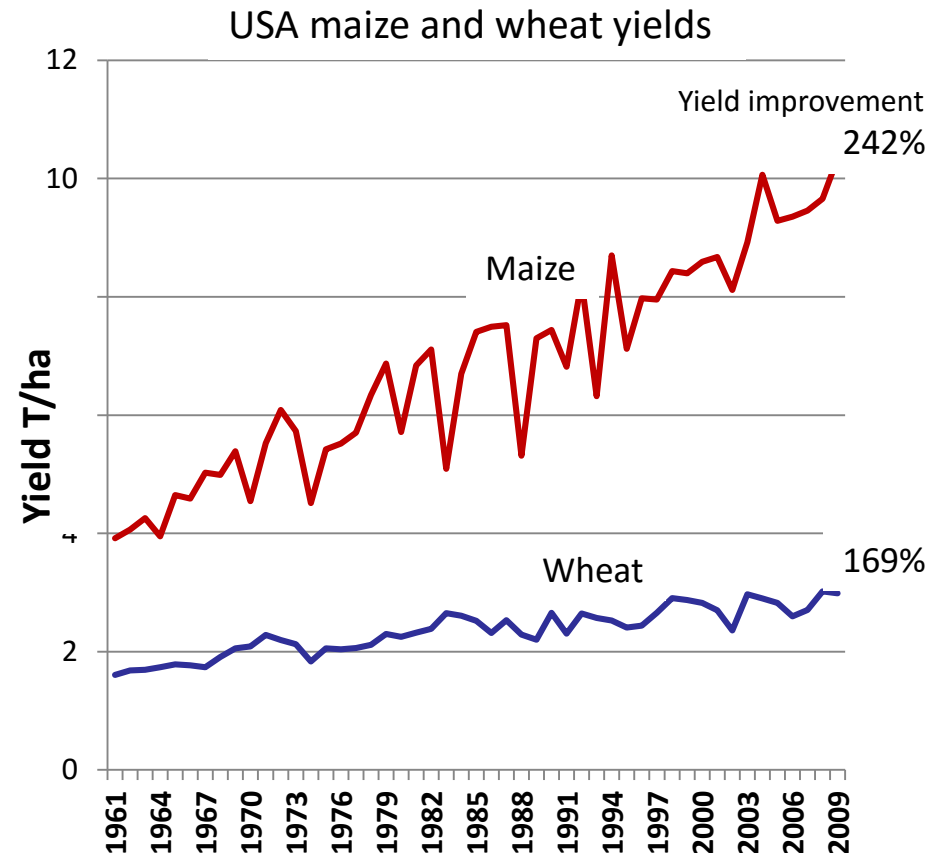
# Nazareno Strampelli, the 'Prophet' of the green revolution.

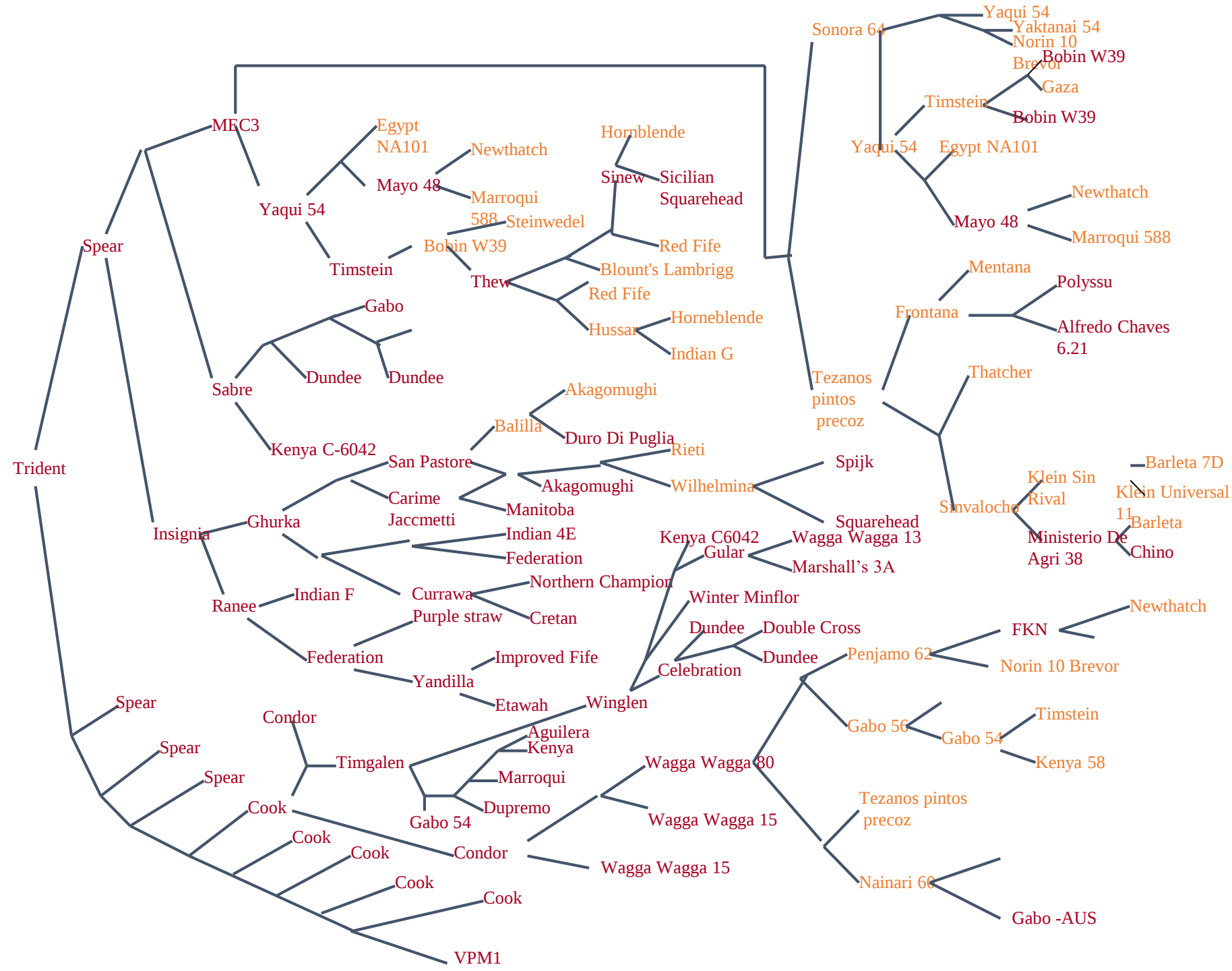
Salvi, Porfiri and Ceccarelli, J. Ag Sci. 2013

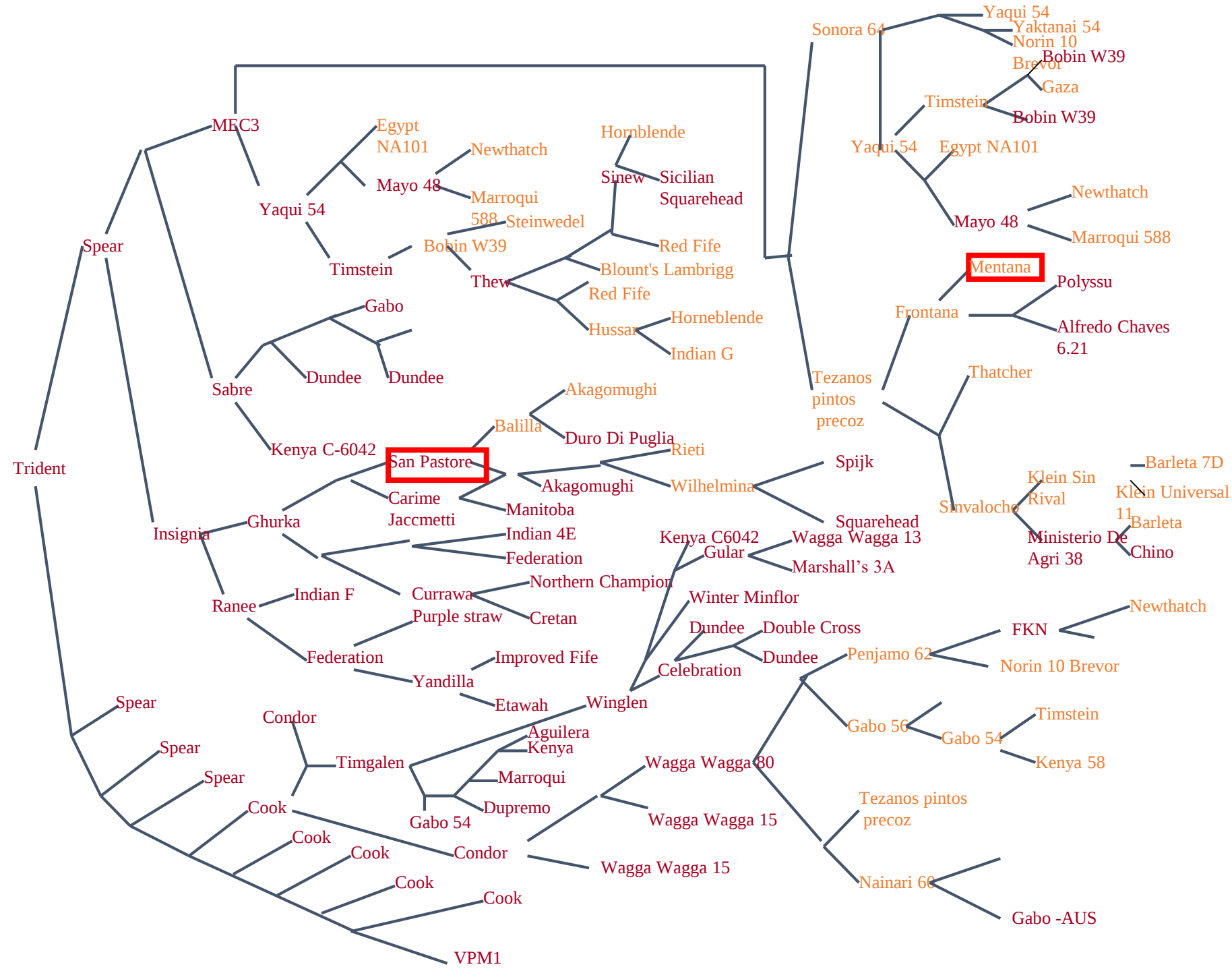


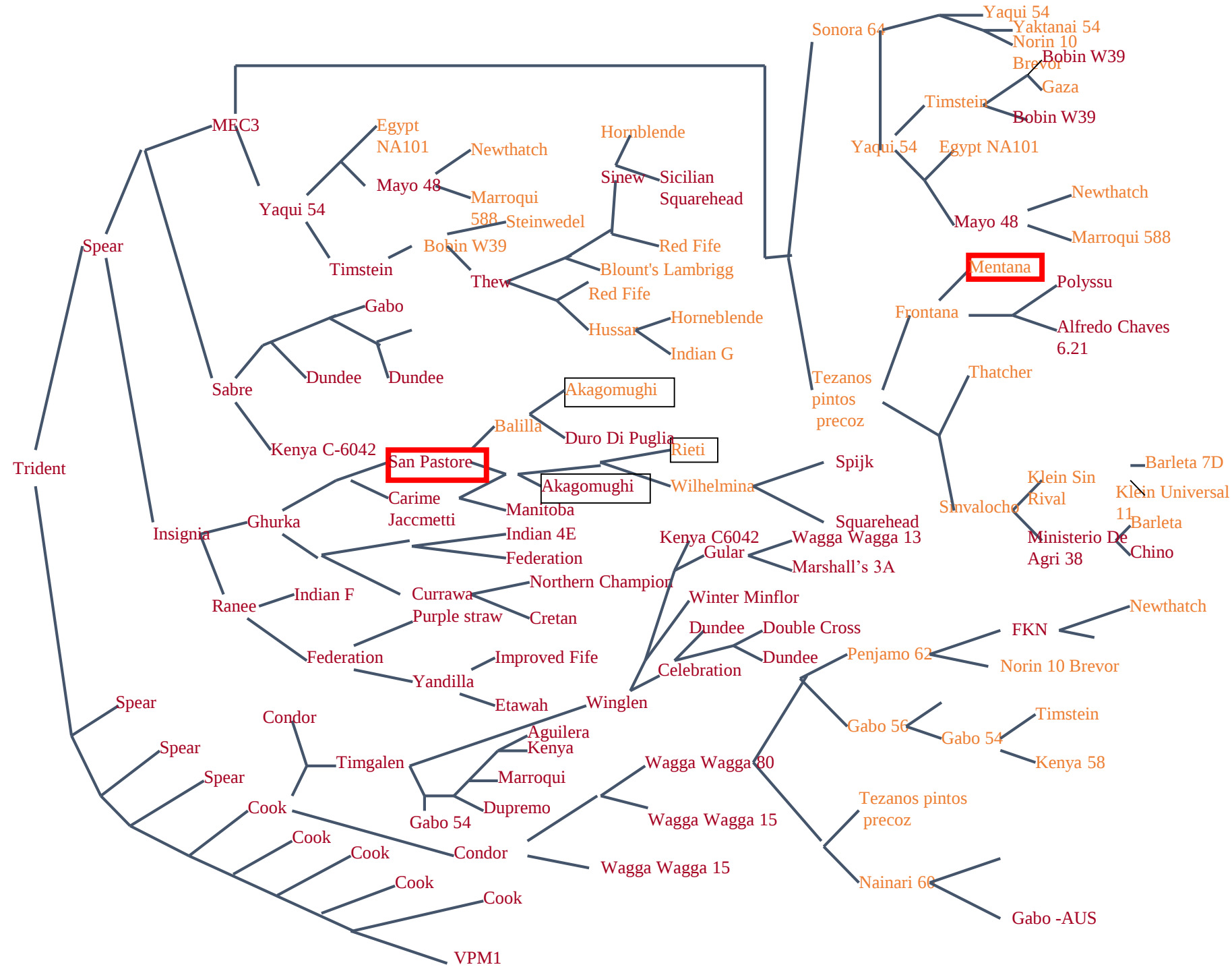
# Genetic improvement

- ❖ Based on utilising variation
- ❖ Conventional breeding natural or induced variation in “crossable” gene pool
- ❖ Breeders select for new genetic combinations
- ❖ New sources of variation
  - ❖ Wide crosses
  - ❖ Somatic hybrids
  - ❖ Mutagenesis
  - ❖ Genetic engineering
  - ❖ Gene editing









# Strampelli - Breeding targets and novel genetic sources

- Rust resistance – *Rieti* (land race)
- Early maturity– *Akakomugi* (Japanese land race)
- Lodging resistance – short straw – *Akakomugi* (Japanese land rice)



# Strampelli - Breeding targets and novel genetic sources

Defect  
elimination

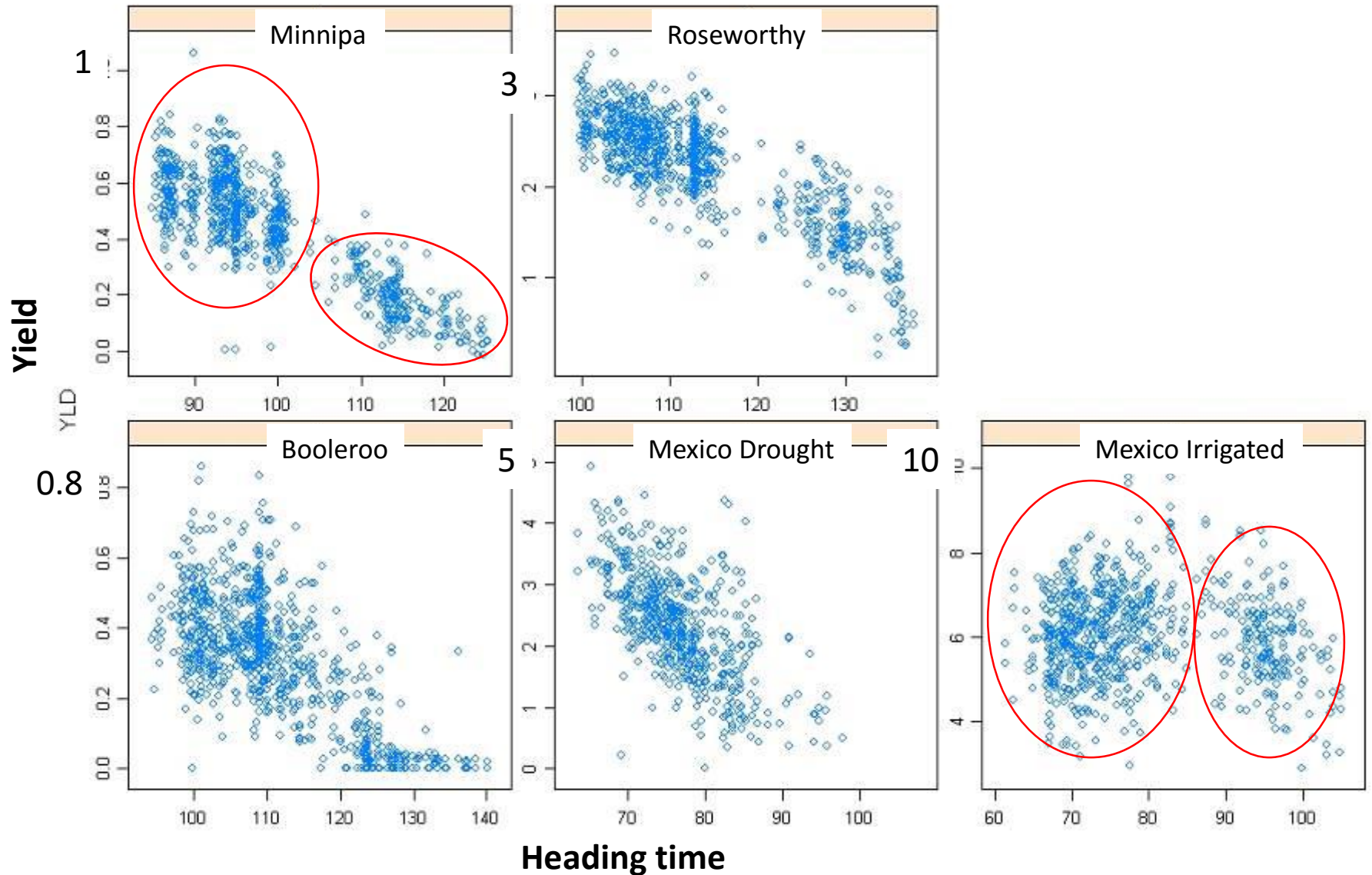
- Rust resistance – *Rieti* (land race)

Physiological  
breeding

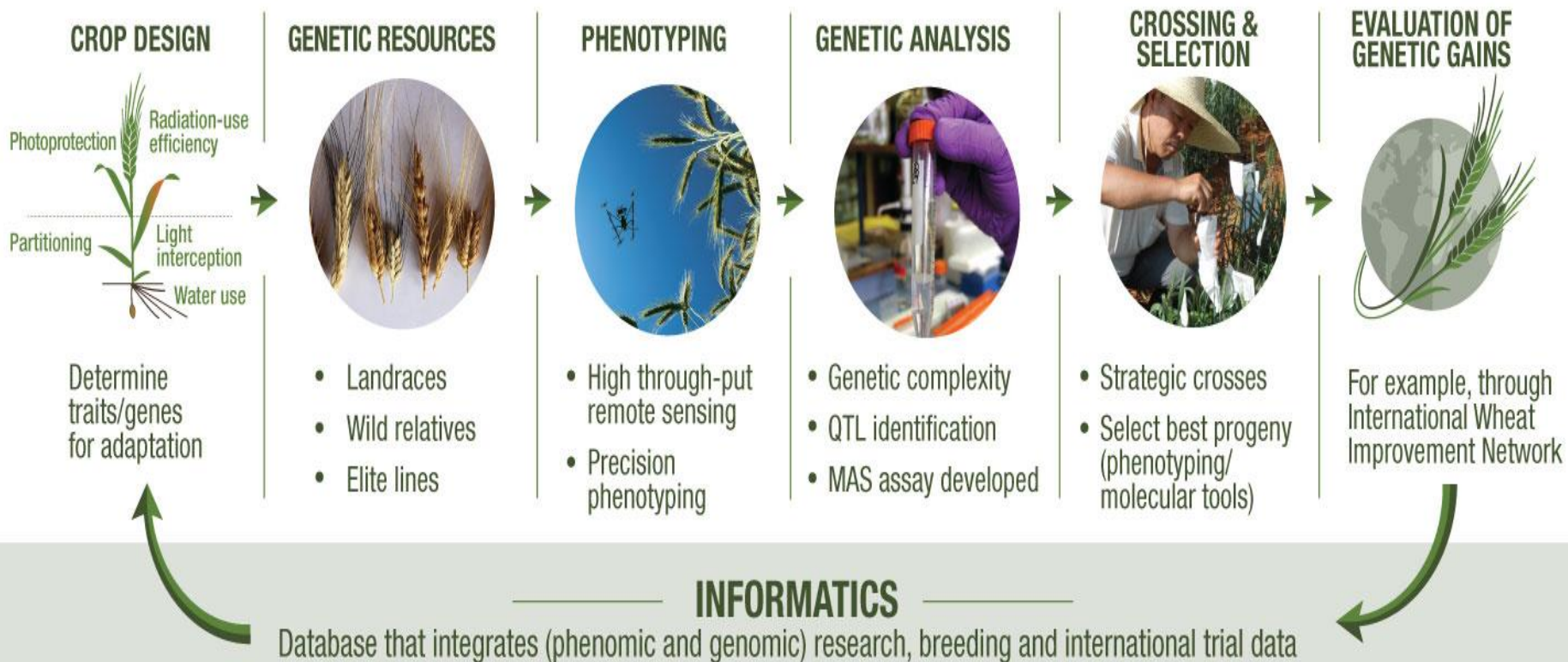
- Early maturity – *Akakomugi* (Japanese land race) – **escape summer drought**
- Lodging resistance – short straw – *Akakomugi* (Japanese land race) – **increased harvest index**

# Drought and heading time

## Impact on yield



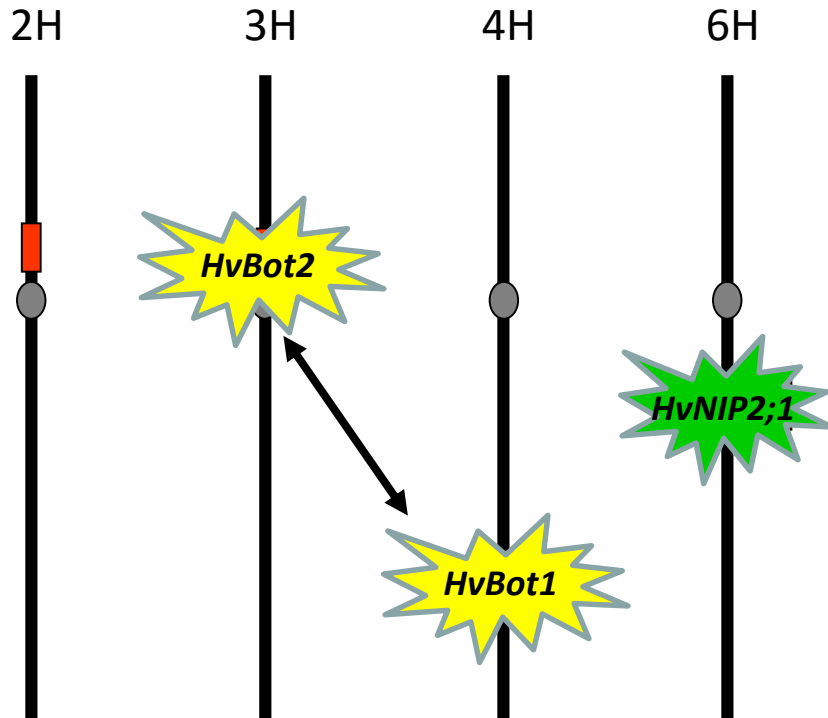
# PHYSIOLOGICAL BREEDING PIPELINE



# B-tolerance QTL cloning

## Barley

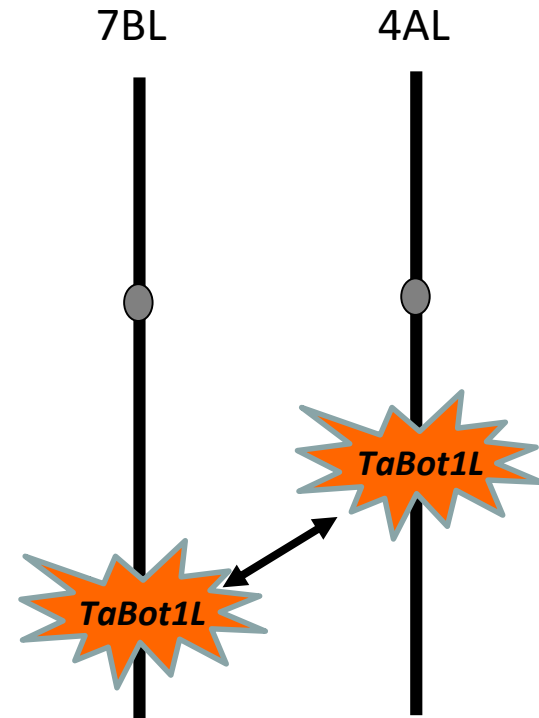
Tolerance source:  
Sahara 3771, CM72



*Jefferies et al., 1999, TAG*  
*Sutton et al. 2007, Science*  
*Schnurbusch et al. 2010, Plant Physiol.*

## Wheat

Tolerance source:  
Halberd, G61450  
and others

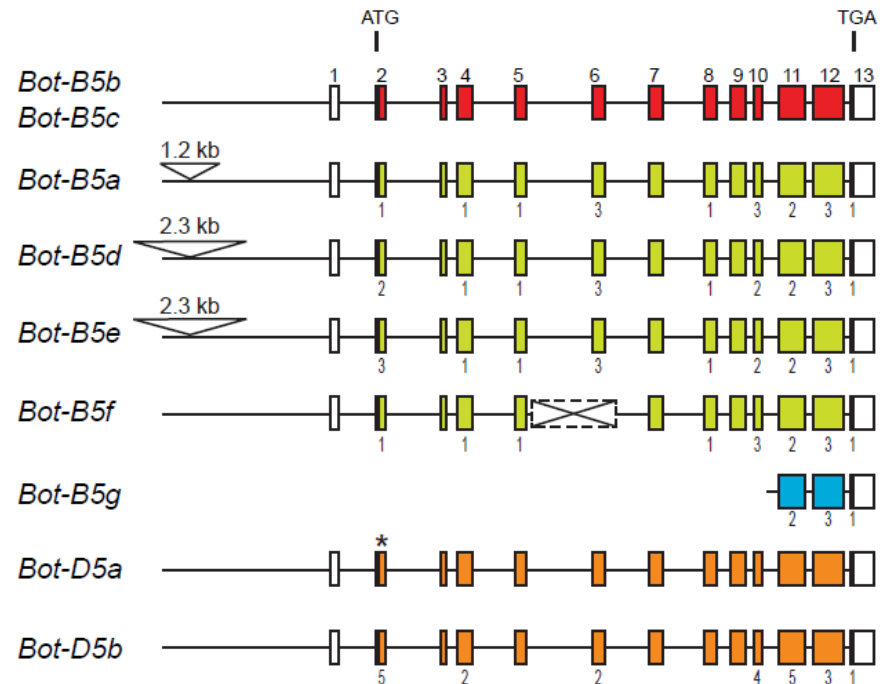


*Jefferies et al., 2000, TAG*  
*Schnurbusch et al. 2007. TAG*  
*Schnurbusch et al. 2008. Genome*

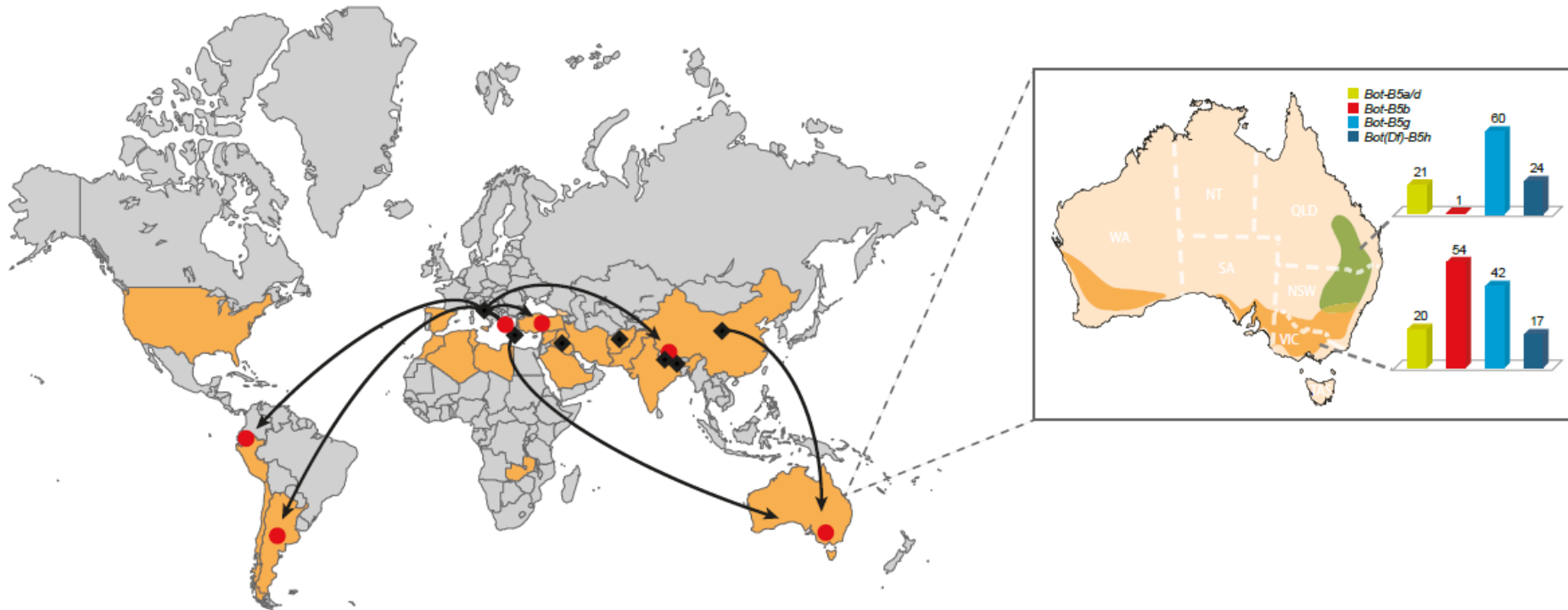
# Reduced tissue B combination of transport processes



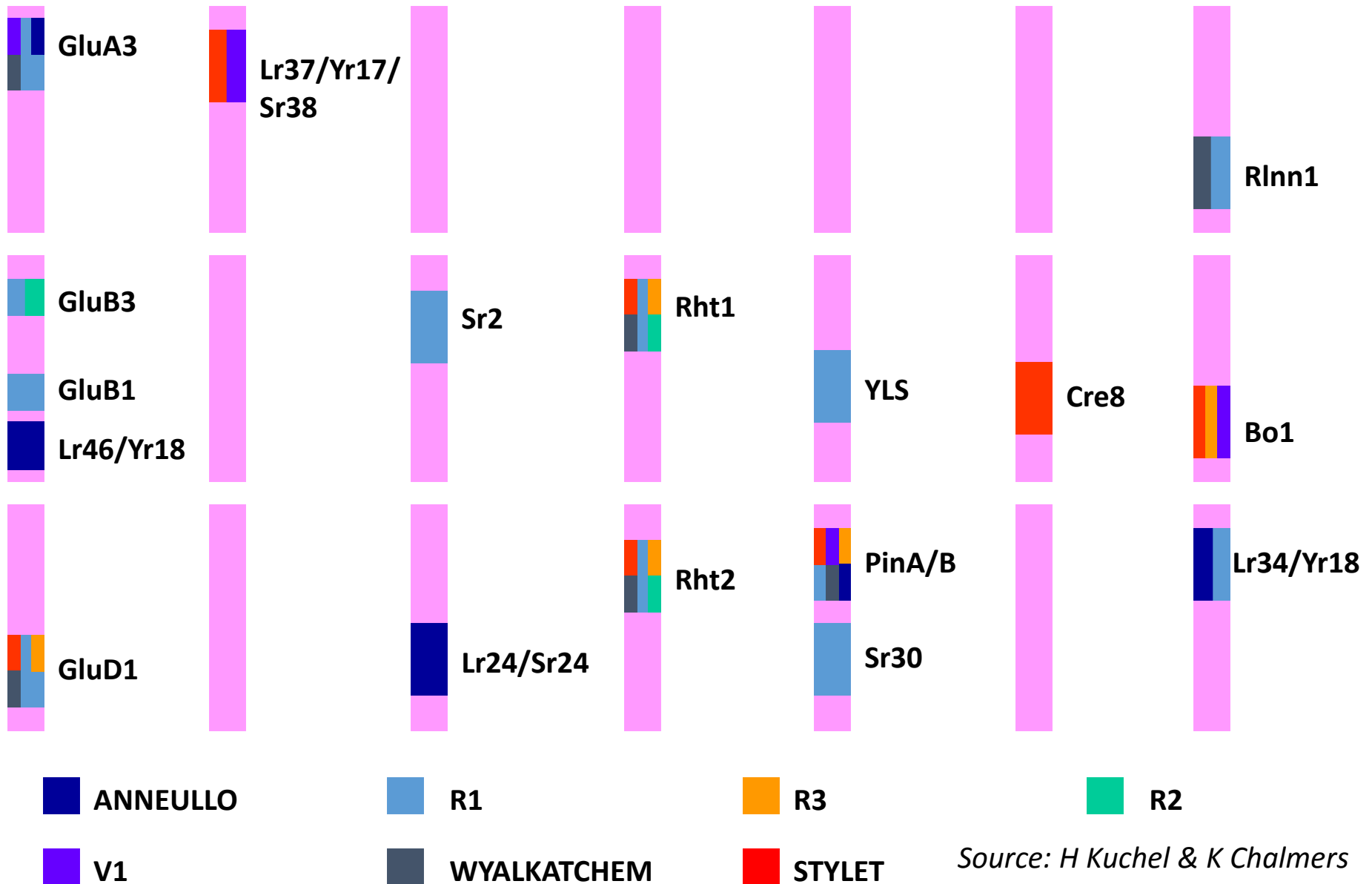
# Allelic variation in wheat



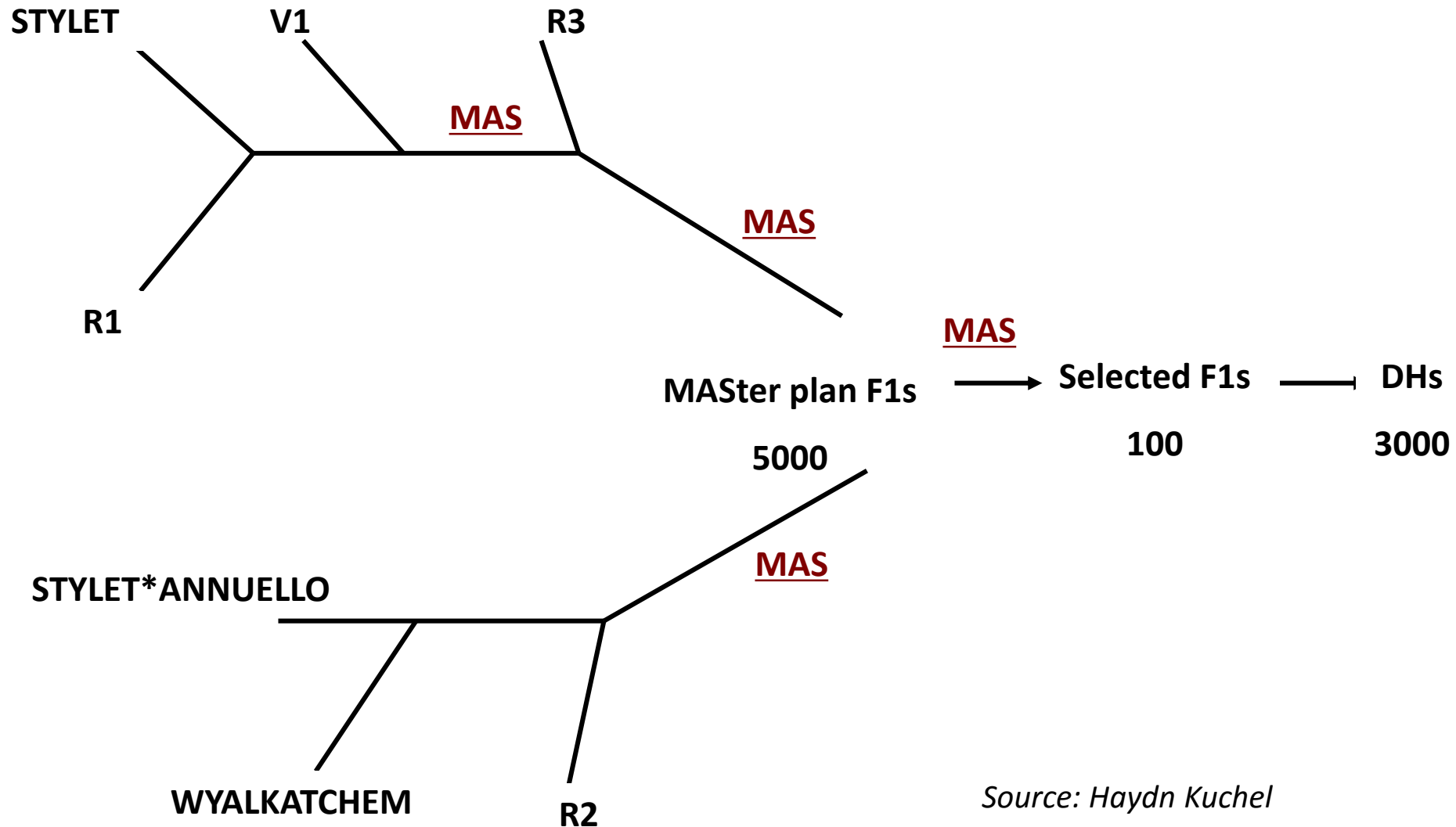
# Origins of Boron tolerance in wheat



# Breeding ideotypes



# The strategy



# Nazareno Strampelli, the 'Prophet' of the green revolution.



- ❖ Application of Mendel's genetics to wheat breeding
- ❖ Use of diverse genetic resources
- ❖ Defect elimination
- ❖ Physiological breeding

