Breeding dual purpose wheats at CSIRO

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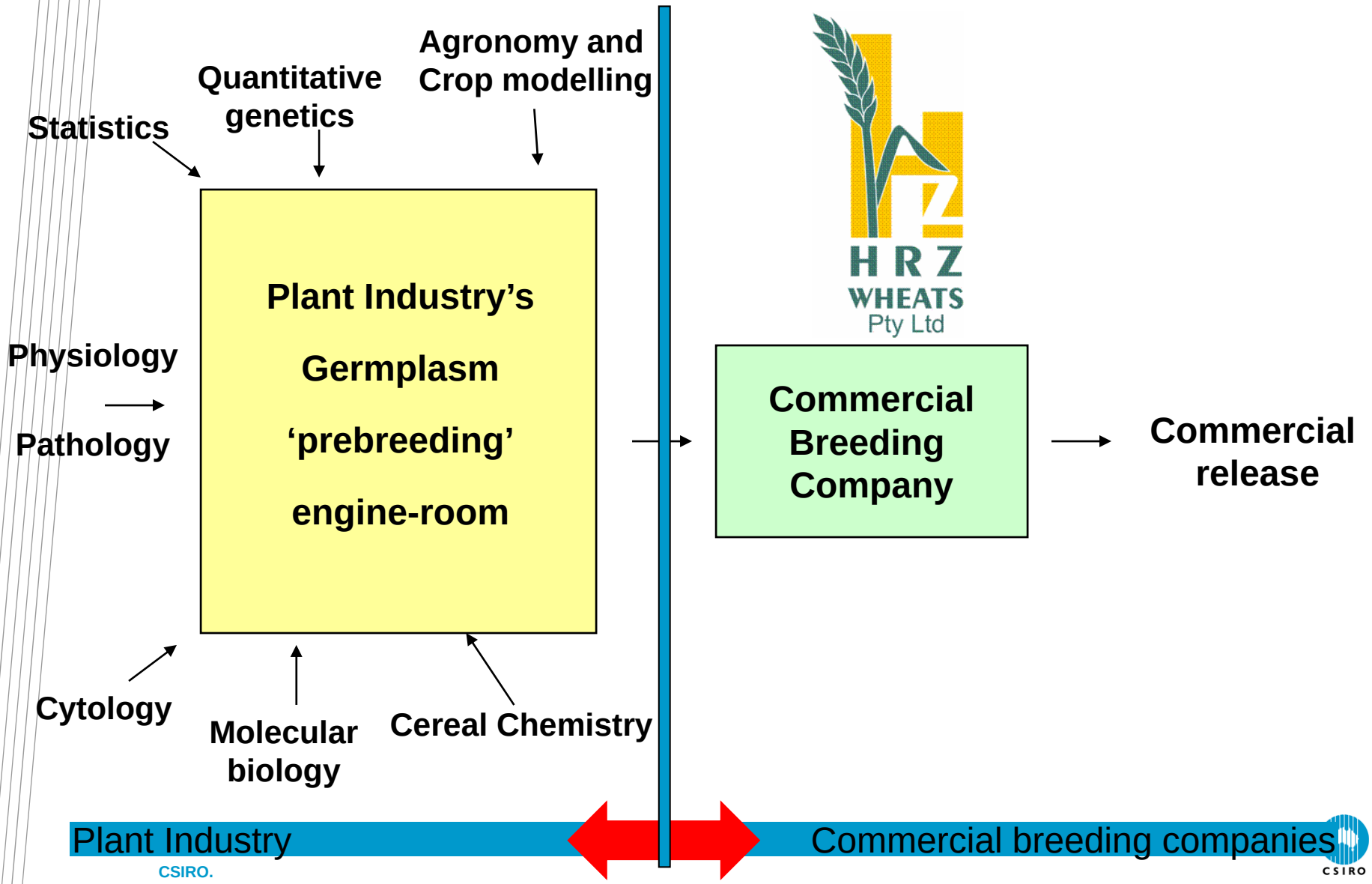
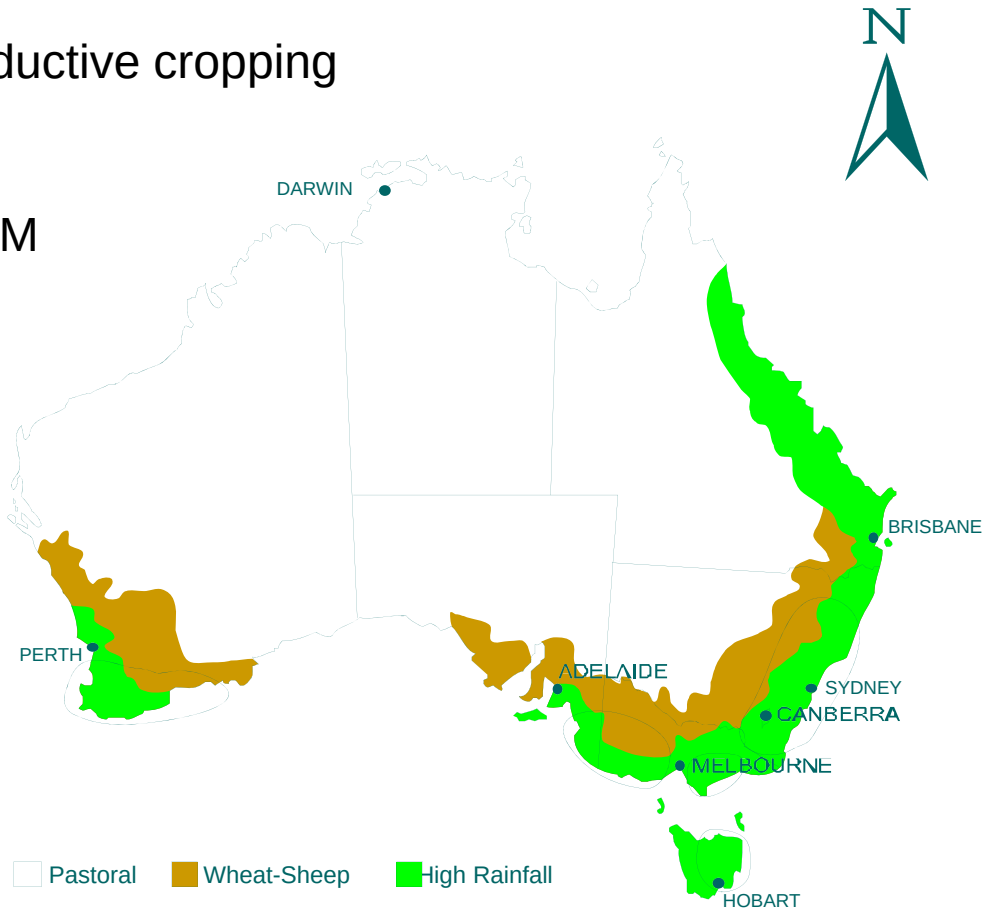
CSIRO

Wheat Germplasm Development and breeding at CSIRO



The high rainfall zone (HRZ) of Australia - Australia's future food bowl

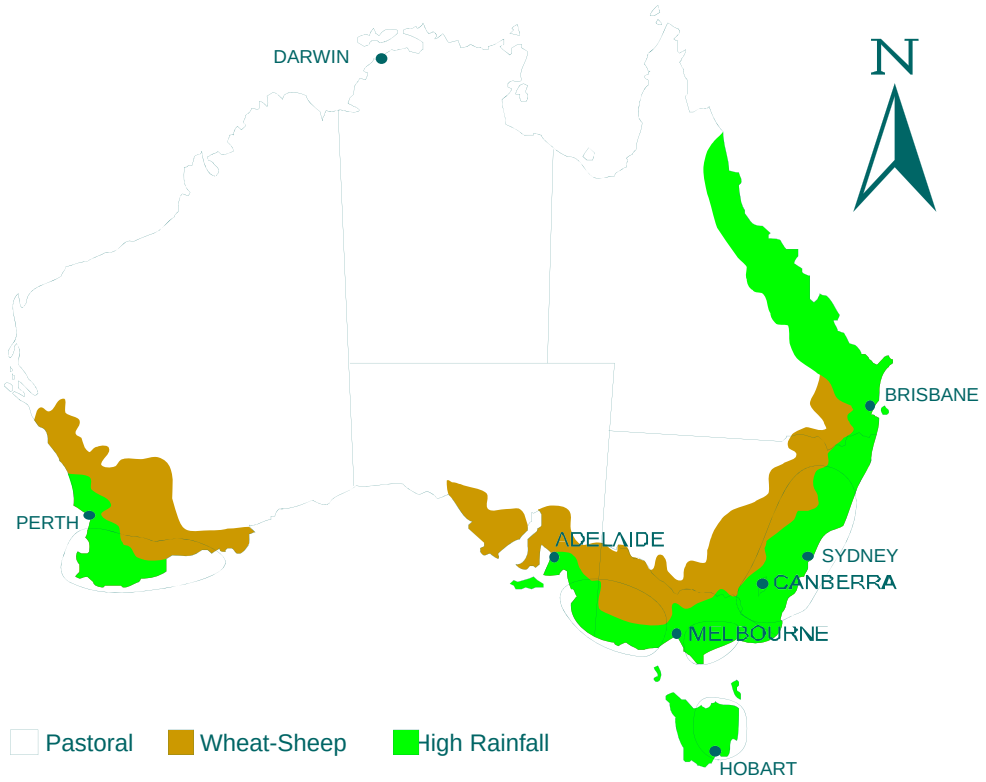
- CSIRO has pioneered breeding in this zone.
- The most reliable and productive cropping region in Australia.
- The region of choice for GM and high value crops.



AUSGRAINZ

A vital partnership between CSIRO and Plant and Food Research, New Zealand for HRZ Breeding activities

CSIRO



New varieties released by CSIRO in the HRZ in the last 5 years:

Dual-purpose:

[A]Mackellar

[B]Revenue

[B]Mansfield

Grain only:

[A]Preston

[A]Gascoigne

[A]Commercial partner AWB Seeds

[B]Commercial partner Grainsearch

Wheat growing in Australia

Normal wheat cultivation

Jan June Dec

Dual purpose wheat

Jan June Dec

Dual purpose wheats have a flexible sowing window and can be planted from February (graze and grain) to June (grain only).

Advantages of dual-purpose wheats

- Grazing value plus grain
- High grain yield (Australian record)
- Soil conservation
- Deeper root system
- Can be managed so that grazing increases yield
- Flexibility in cropping system
- Internationally marketable grain

Mixed farming enterprises – value of dual purpose wheat

Conservative estimates in NSW - $700 to $1000 per ha

$250 - $350 per ha animal production (forage)

$450 - $650 per ha grain production

Monaro **Fat lambs: $1150 per ha gross margin (forage)**
Steers: $1400 per ha gross margin (forage)

Weaner bulls: $600 per ha plus 14 t/ha silage

Dual-purpose breeding programs at CSIRO

1. Feed wheat - GRDC, CSIRO, NZ Plant and Food Research, SFS

2. Milling wheat – HRZ Wheats P/L (CSIRO, PFR, GRDC, Landmark)

Note HRZ Wheats also breeds grain only wheats

Yield results of dual-purpose wheats in eastern Australia

	% Site means across 23 sites and 4 years
CS95102.1	**120**
CS123.1	114
Mackellar	109
Dennis	108
Chara	107
H150.2	106
Declic	102
Marombi	101
Brennan	100
Rudd	98
Tennant	97
Kellalac	97
Currawong	96
EGA_Wedgetail	92
Rosella	92

Plant Type for HRZ winter wheats

Primary requirement:

High yield, rust resistant, grazing tolerant, internationally recognised grain quality (if milling wheat)

- NZ and CSIRO Source Material
  - Novel and more robust rust disease package
  - Plant architecture to physically hold up high yields (can exceed 10 t/ha)
  - Breeding for high yield potential
- Two dual-purpose maturity types
  - Mid-season (Wedgetail)
  - Late-season (Revenue)
  - Regional (Vernalisation or photoperiod)

- High Yield potential
- AH quality (>11.5% protein)
- BYDV resistance
- WSMV resistance
- Awnless (sprouting tolerance)
- Other diseases
  - Yellow leaf spot
  - Septoria
  - Root diseases

CSIRO

New dwarfing genes for improved establishment - to sow on receding soil moisture

Molecular markers used in breeding

Yellow rust, leaf rust and stripe rust

BYDV

Vernalisation and photoperiod response

GA responsive dwarfing genes (long coleoptile)

High molecular weight glutenins