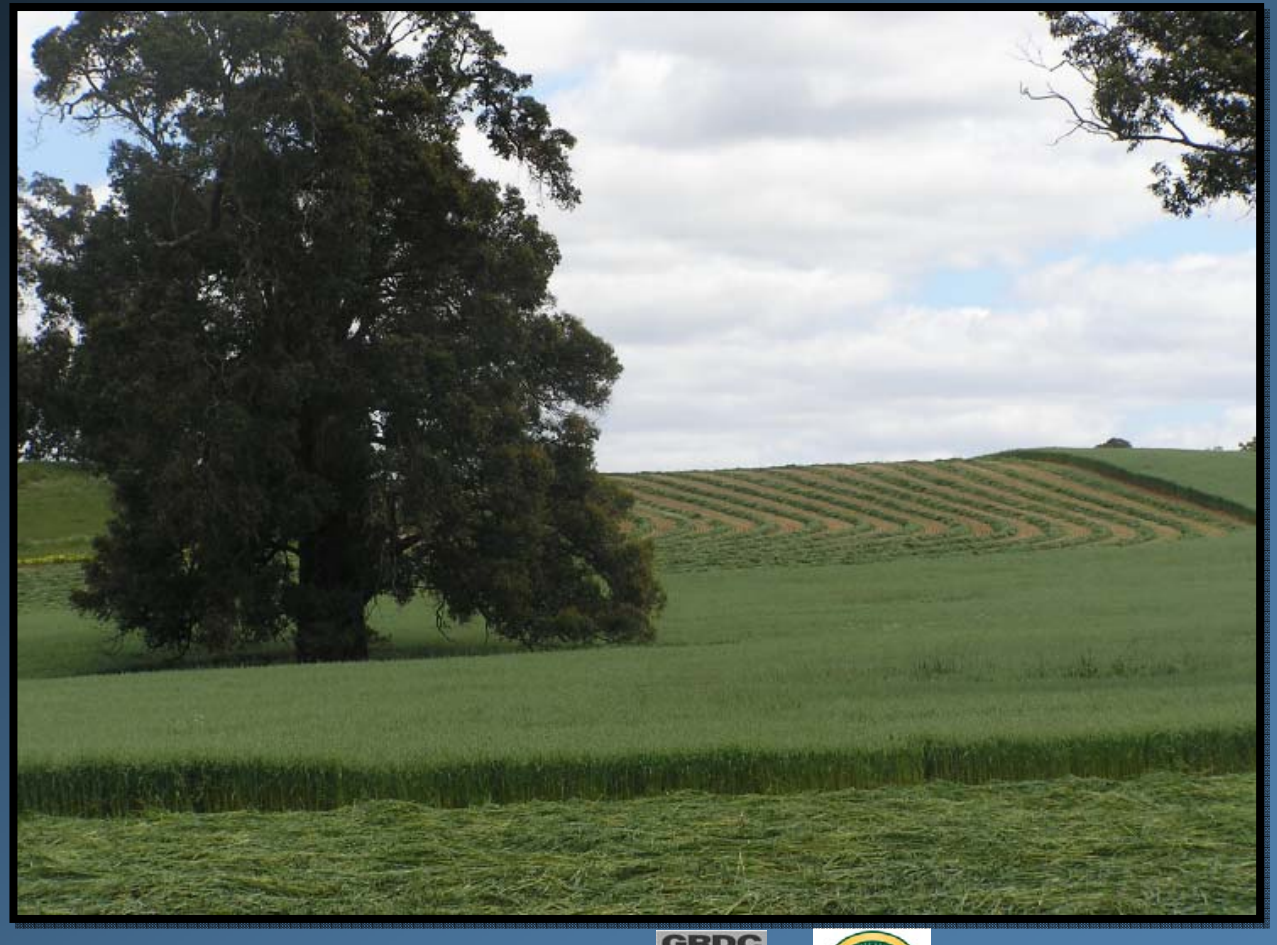
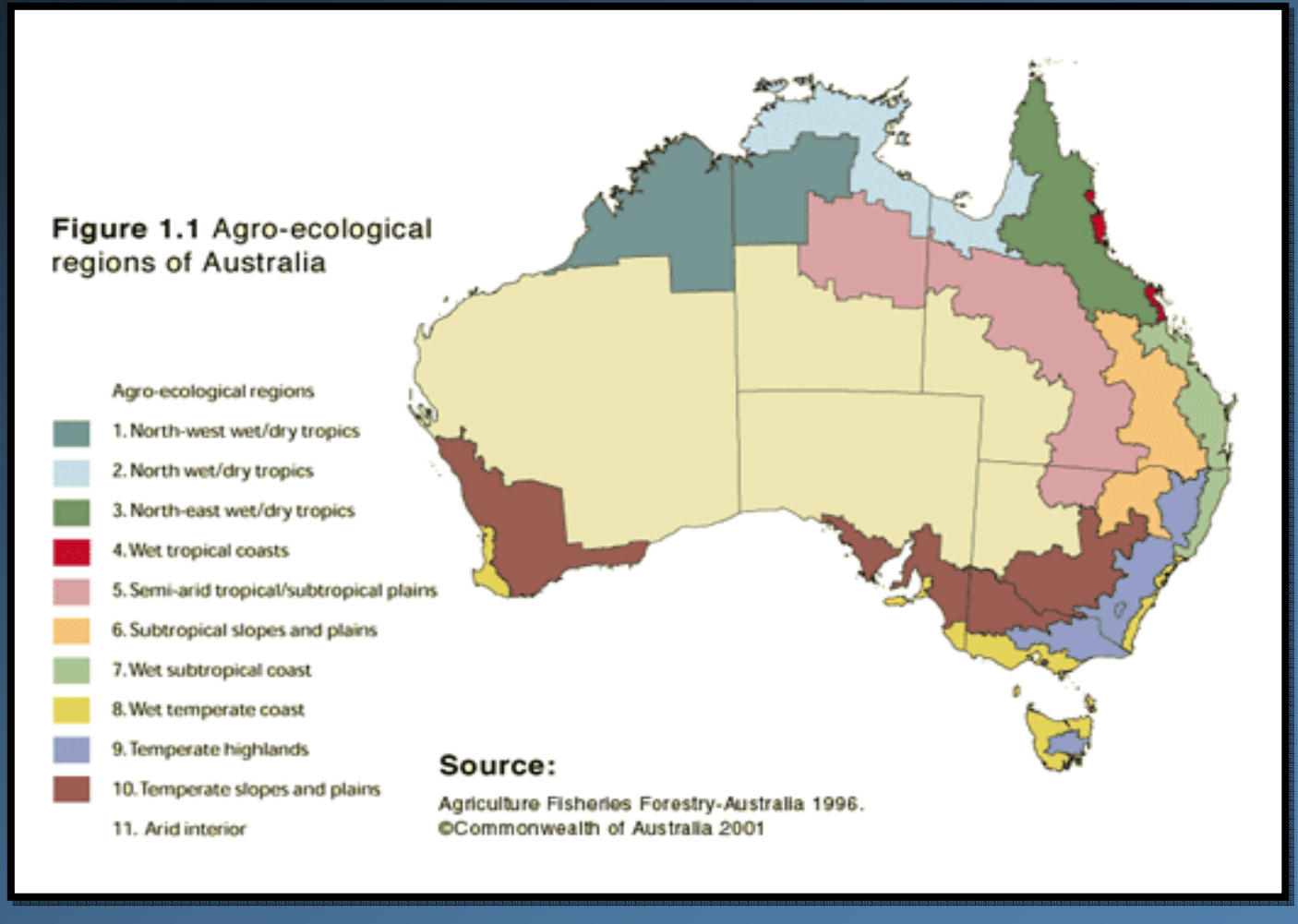
National Oat Breeding Program-Australia



Department of Agriculture and Food
GOVERNMENT OF WESTERN AUSTRALIA
UNCLE TOBYS
AEXCO
RIRDC
GRDC Grains Research & Development Corporation
SAGIT
VITERRA
Government of South Australia

Plant Breeding in Australia
Agricultural Zones

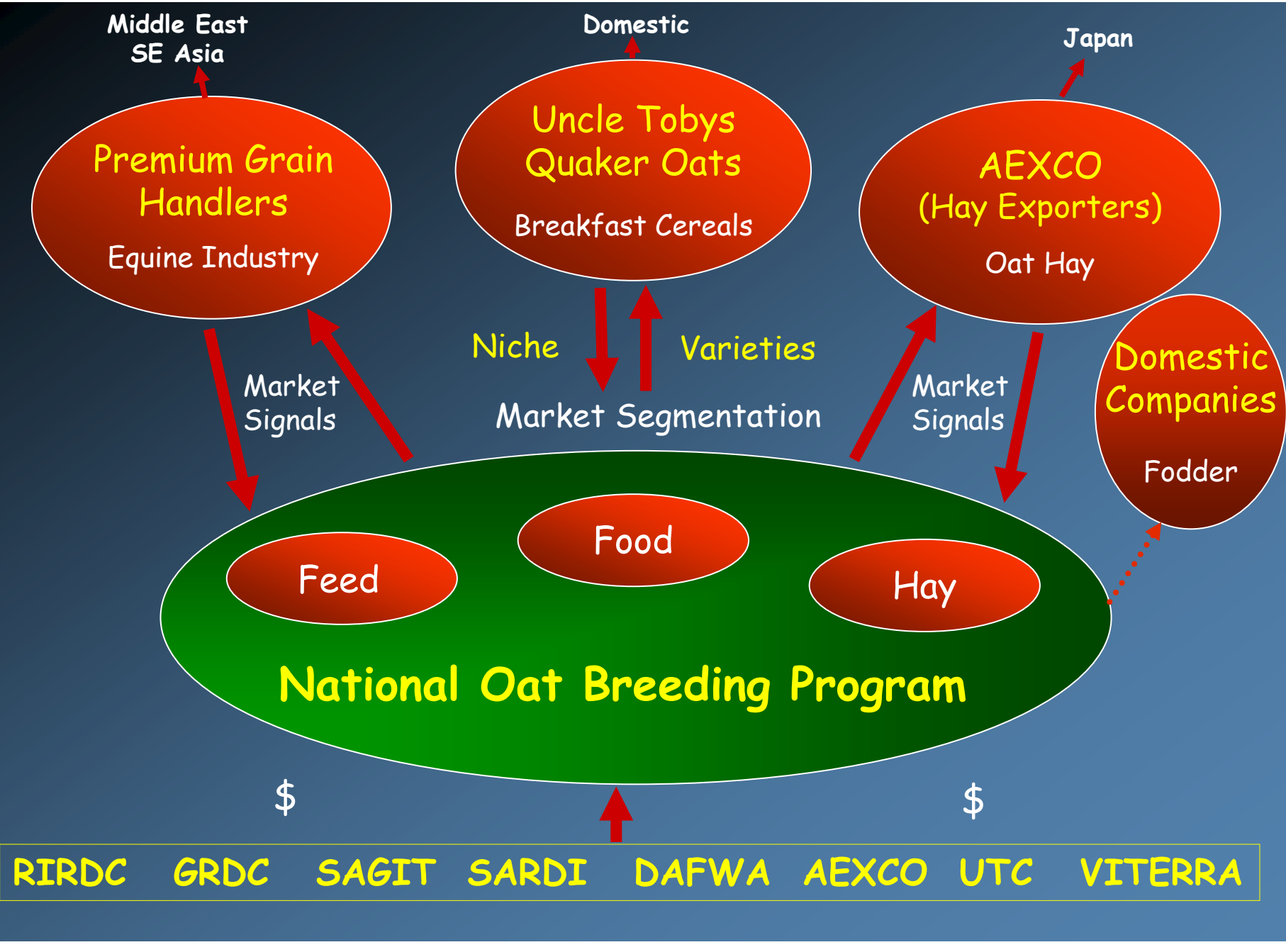


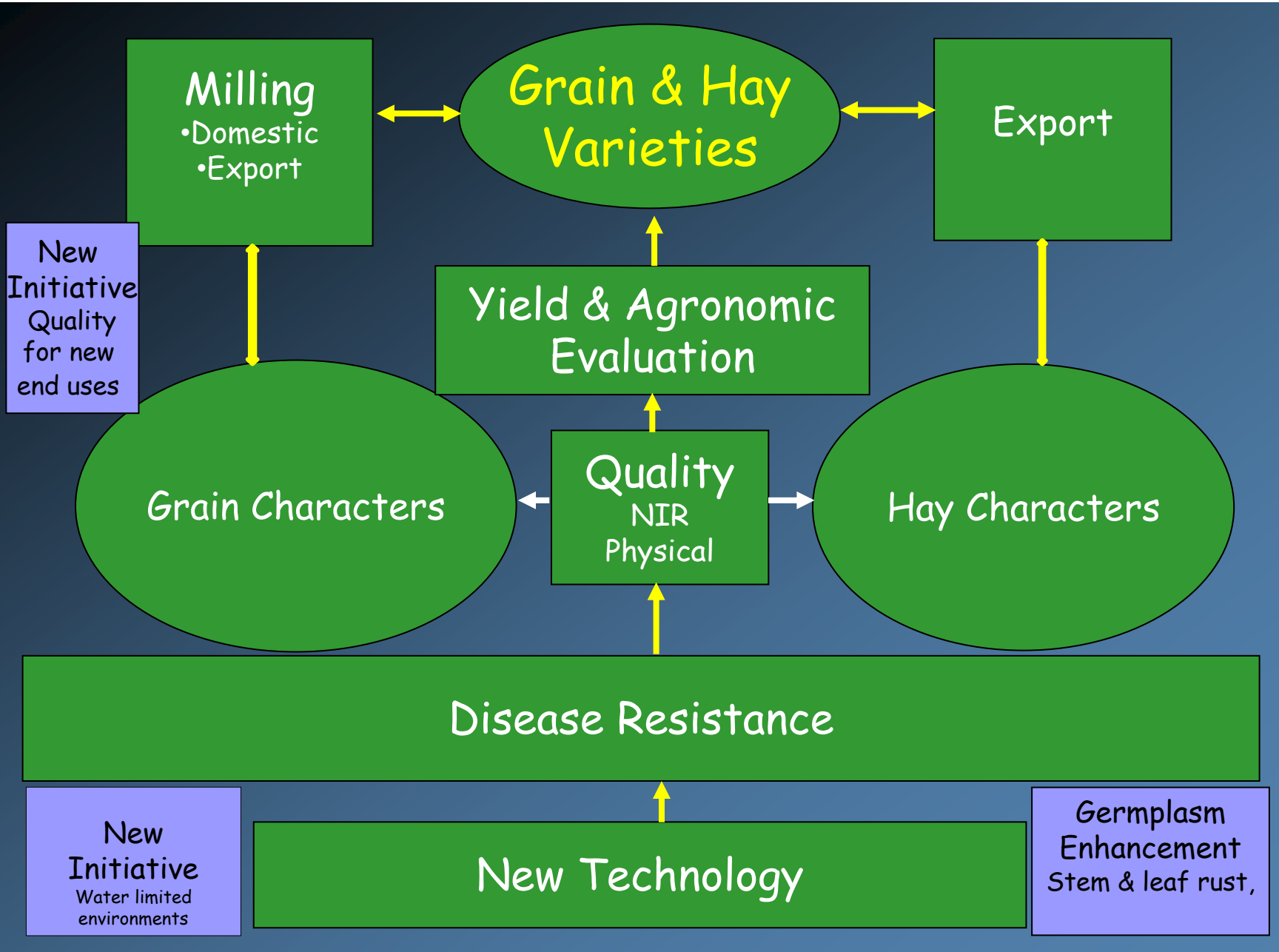
The National Oat Breeding Program

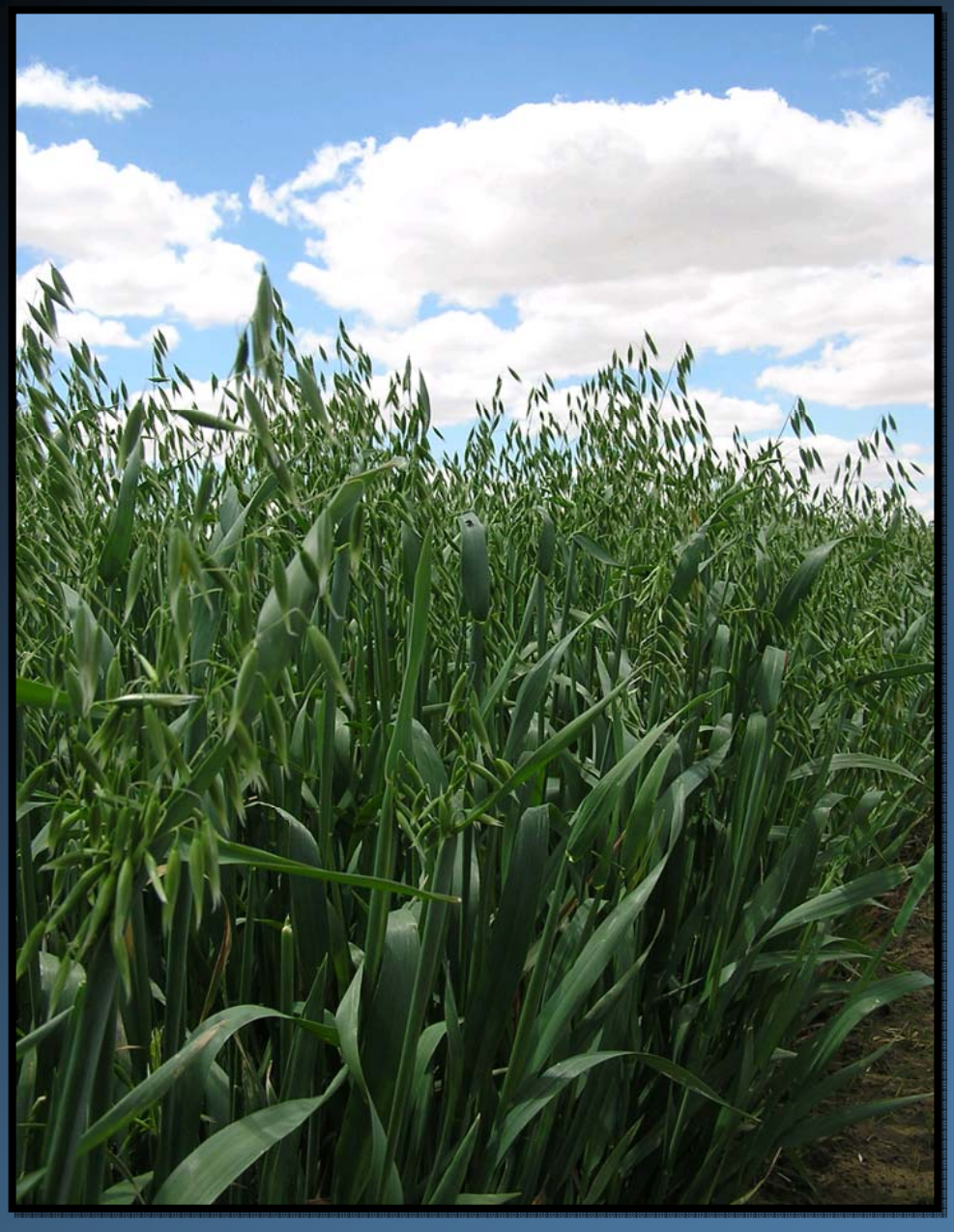
- National program began nine years ago
- A centralised breeding program for the southern region of Australia
- Two main regions or nodes for selection in southern Australia, SA and WA
- Technical staff located at SARDI and DAFWA
- Encompasses South Australia, Western Australia, New South Wales, and Victoria for late generation evaluation

Oat Breeding Group Located at SARDI

Oat Breeding Group Located at DAFWA


Middle East
SE Asia
Domestic
Japan
Premium Grain Handlers
Equine Industry
Uncle Tobys Quaker Oats
Breakfast Cereals
AEXCO (Hay Exporters)
Oat Hay
Domestic Companies
Fodder
Market Signals
Niche
Varieties
Market Segmentation
Market Signals
Feed
Food
Hay
National Oat Breeding Program
$
$
RIRDC GRDC SAGIT SARDI DAFWA AEXCO UTC VITERRA


Milling
•Domestic
•Export
Grain & Hay Varieties
Export
New Initiative Quality for new end uses
Yield & Agronomic Evaluation
Grain Characters
Quality
NIR
Physical
Hay Characters
Disease Resistance
New Initiative
Water limited environments
New Technology
Germplasm Enhancement
Stem & leaf rust,

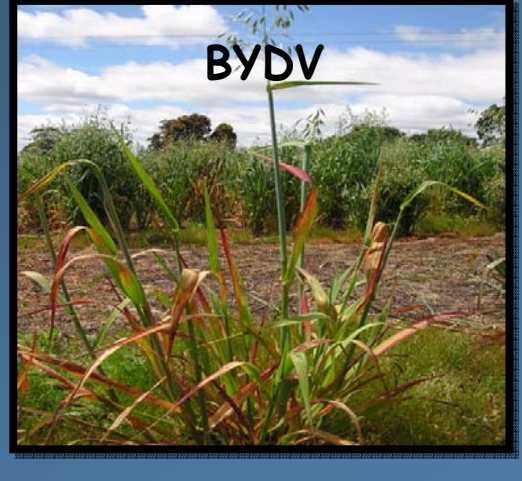


Breeding Priorities

Agronomic Characters

- Yield potential
- Shattering resistance
- Lodging resistance
- Height
- Maturity
- Early vigour

Improved Disease Resistance Foliar



Improved Disease Resistance Soil Borne

Stem nematode

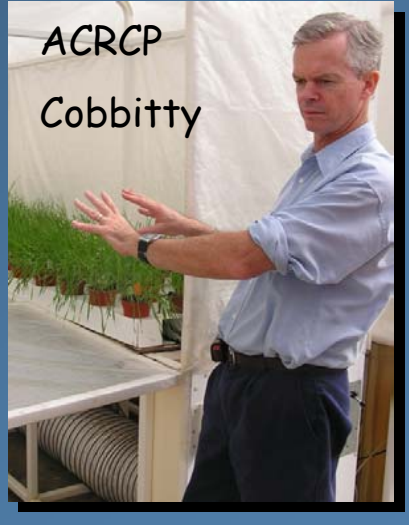
Tolerance reactions

Cereal cyst nematode

Tolerance reactions

Resistance reactions

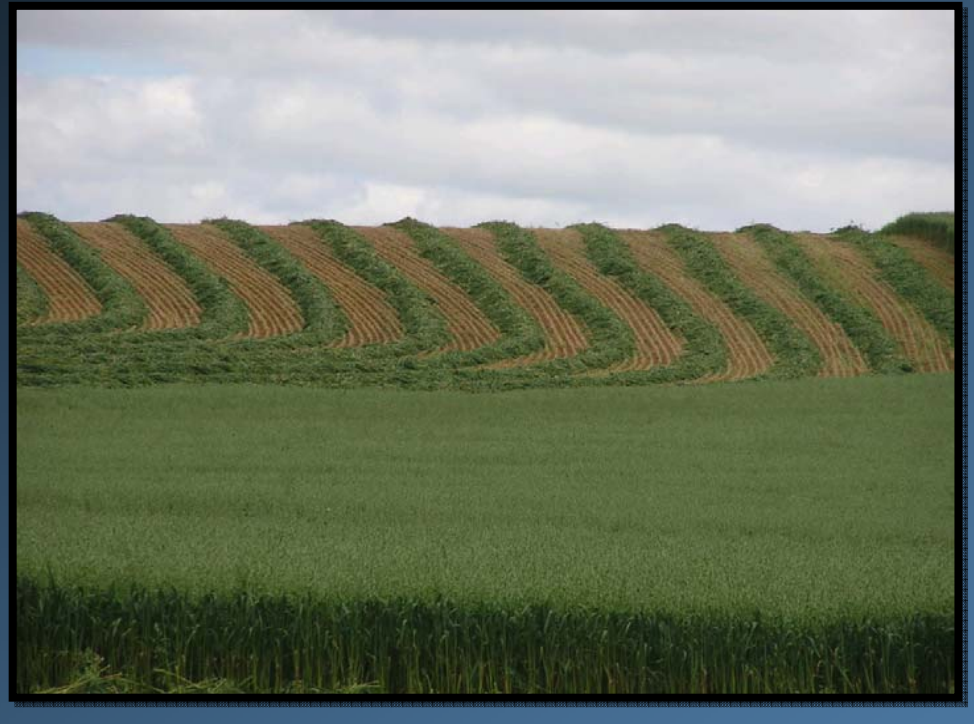
Disease Nurseries



Grain Quality

- Oil, protein, groat %
- Β -glucan
- Hull lignin
- Grain digestibility
- Hectolitre weight
- Screenings
- 1000 grain weight
- Hull Colour

Hay Quality

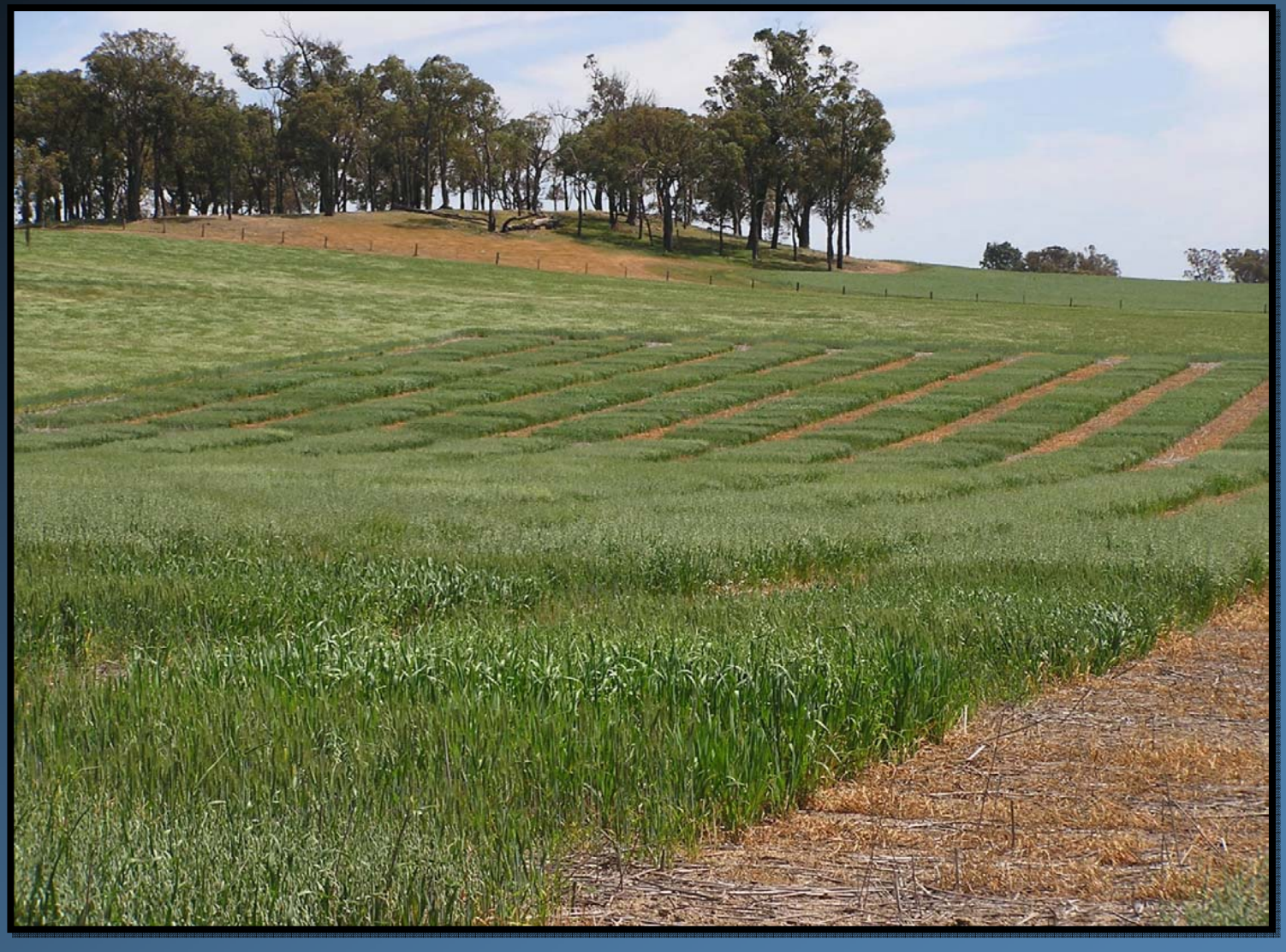


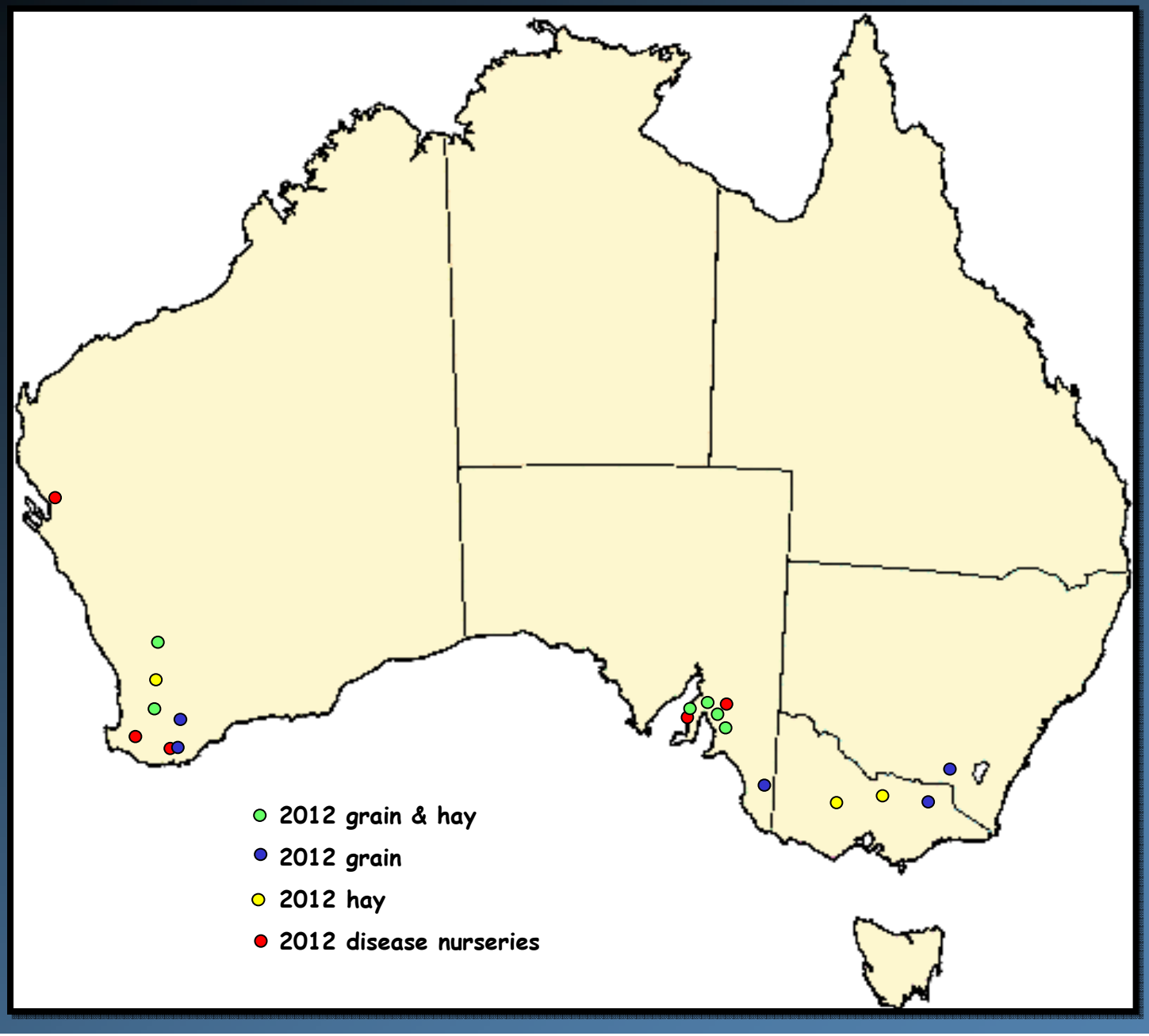
- Digestibility
- WSC
- NDF
- ADF
- Protein
- Colour
- Stem diameter

Crosses

- 200-250 crosses each year –grain and hay for WA and SA
- WA germplasm used in crosses since 2003, 1st year of Nat'l Program
- Parental germplasm maintained in cold store room, 4° C

Trial Sites




2012 grain & hay
2012 grain
2012 hay
2012 disease nurseries

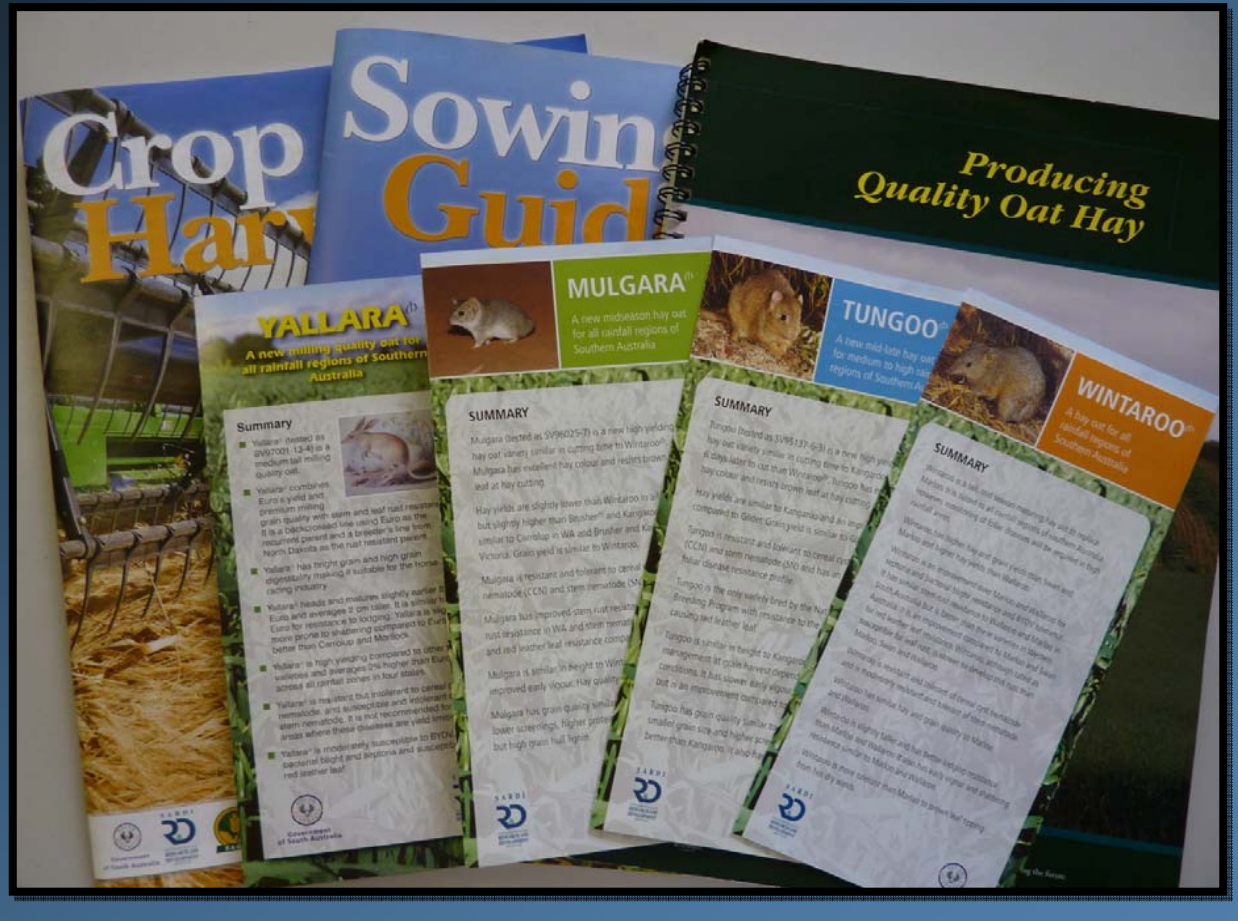
Data Collection

- Hay & grain yield
- 11 grain quality traits for milling and feed
- 6 hay quality traits
- 10 disease traits, including 7 nurseries
- 8 agronomic traits

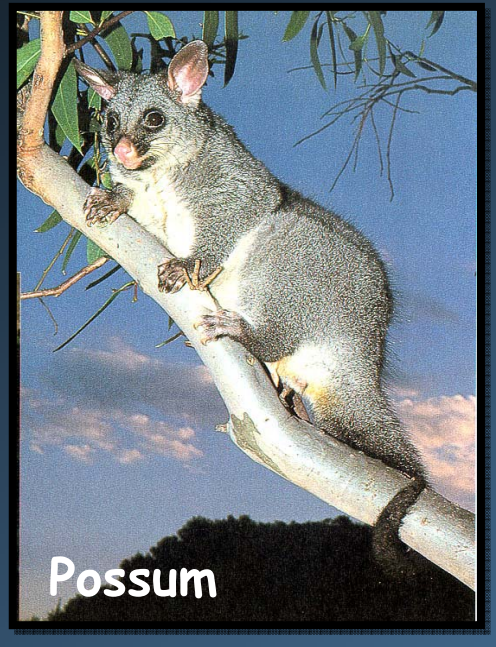
Consultation

- Field days
- Visits to grower properties to talk and view crops of new varieties with millers and agronomists
- Meetings with end users at least annually

Extension of New Varieties



Milling Varieties



Hay Varieties

New Hay Variety Releases

Pre-breeding Collaboration

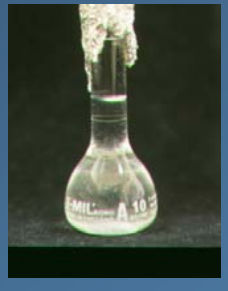
- Current Programs-funded
  - ✓ Leaf and stem rust sources from wild species- P. Davies, SARDI, (GRDC)
  - ✓ Develop molecular markers for CCN R & T (GRDC/SAGIT), boron toxicity, salt tolerance K. Oldach, SARDI, (RIRDC)
  - ✓ Improved productivity in water limited environments (SAGIT)
  - ✓ Determine if effectors identify resistant genotypes to oat septoria –Richard Oliver, Curtin University (RIRDC)
  - ✓ Australian Cereal Rust Control Program, Robert Park, University of Sydney, (GRDC)

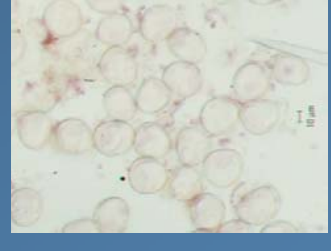
Isolated Microspore Culture method in Barley

Donor plants

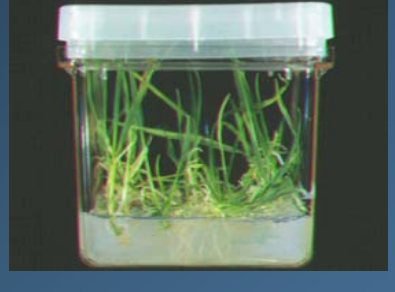
Pre-treatment

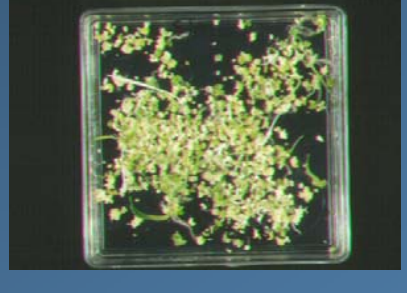
Microspore preparation

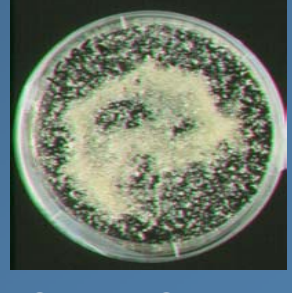


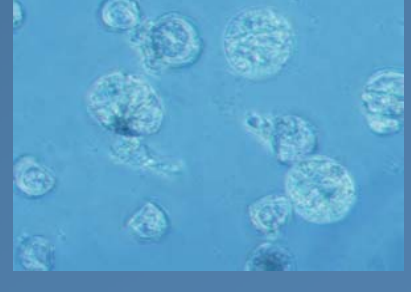


Microspore culture and regeneration









Source: PA Davies & PK Sidhu (SARDI)

Thank You