Can agribusiness utilise better information on climate variability?

Dr Lisa Brennan
Dr Peter Carberry
Dr Zvi Hochman

Agricultural Production Systems Research Unit (APSRU)

- CSIRO, Qld DPI & DNR (est. 1990)
- Mandate is RD&E on the management of cropping systems
- Core technology is simulation modelling
- Established skill in seasonal climat forecasting
- Northern Aust. systems: grain, cotton, sugar + national/international projects
- Mandate to work with agribusiness

CVAP Project:
Better management of climate variabilit within the agribusiness service sector

- **Funding:** supported by the Agriculture, Forestr and Fisheries Australia and Australia's rural R&D Corporations under the Climate Variability in Agriculture Program (LWRRDC)
- **Aim**: explore the role for seasonal climate forecasts and simulation models in the development and implementation of marketing, financial lending and insurance policies
- **Beneficiaries:** agribusiness, farmers

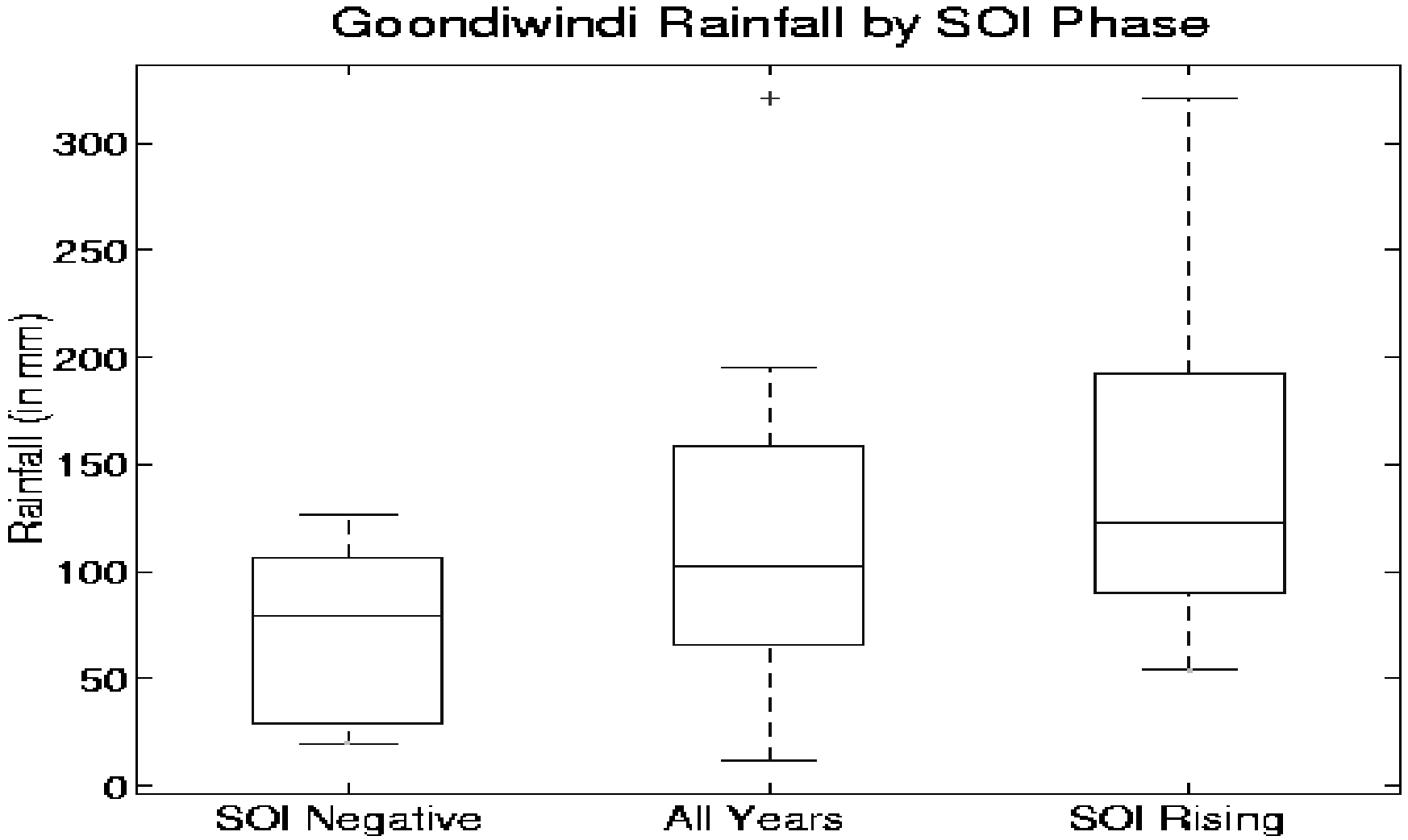
CVAP

Climate Variability in Agriculture R&D Program

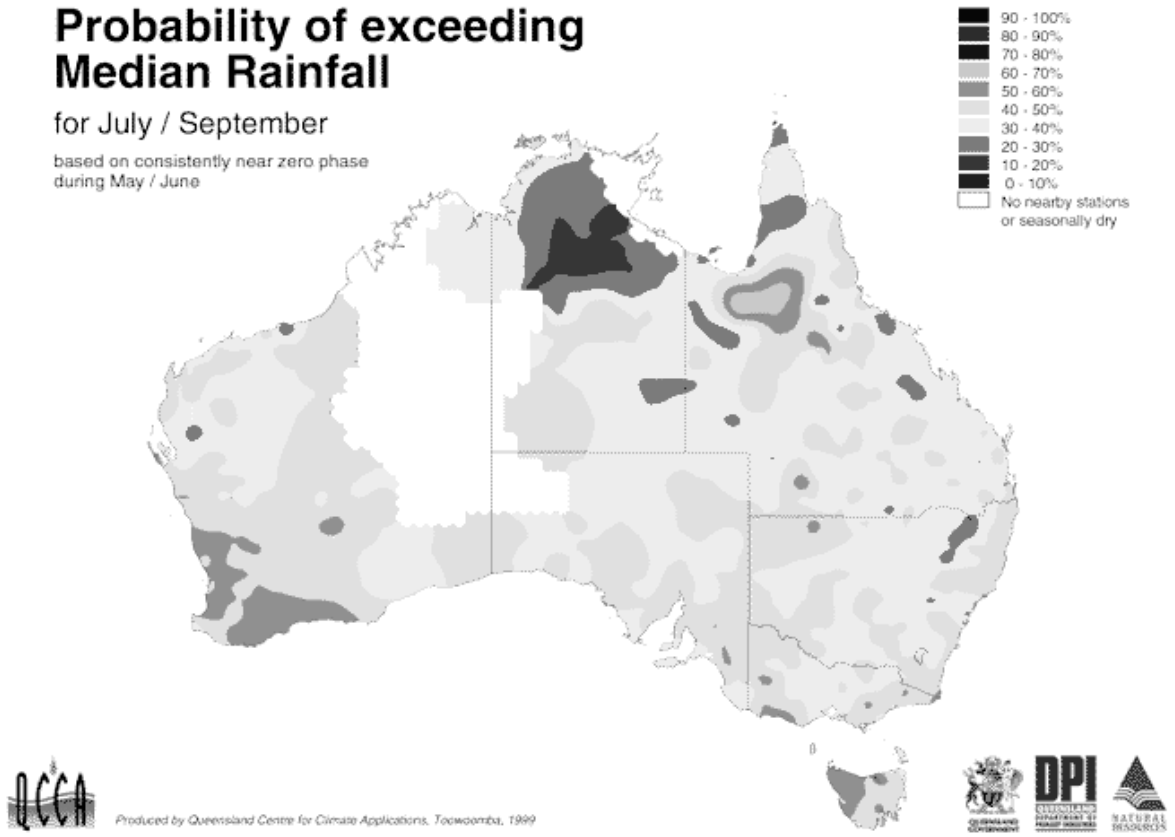
APSRU tools

- Soil resource database - defines the resource potential & availability of major soil types
- Seasonal climate forecasts - the Southern Oscillation Index (SOI) provides a forecast of seasonal rainfall
- APSIM model - predicts the performance of alternative cropping systems

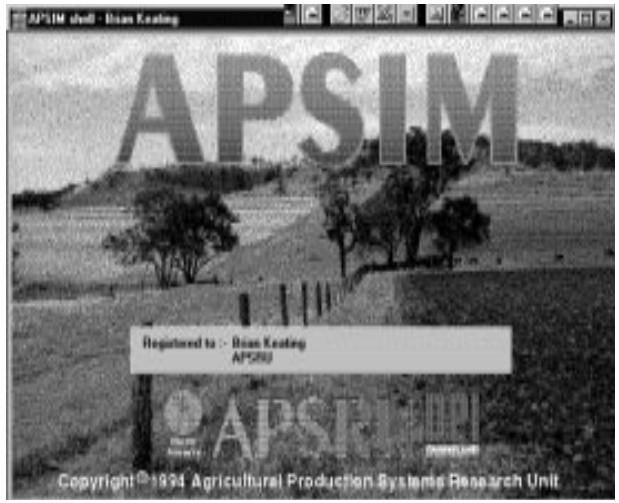
Seasonal rainfall v's Southern Oscillation Index (SOI)

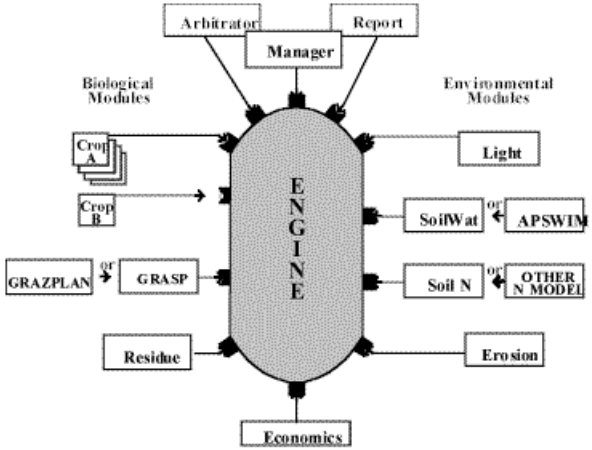


Rainfall outlook with a near zero SOI in May/June



Agricultural Production Systems Simulator (APSIM)





Simulates:

- yield of crops and pastures
- key soil processes (water, N, carbon)
- surface residue dynamics & erosion
- range of management options
- crop rotations + fallowing
- short or long term effects
- BUT, not pests nor diseases

APSIM crop modules

Now available

wheat
sorghum
sugarcane
chickpea
mungbean
soybean
barley
peanut
maize
sunflower
hemp
lucerne

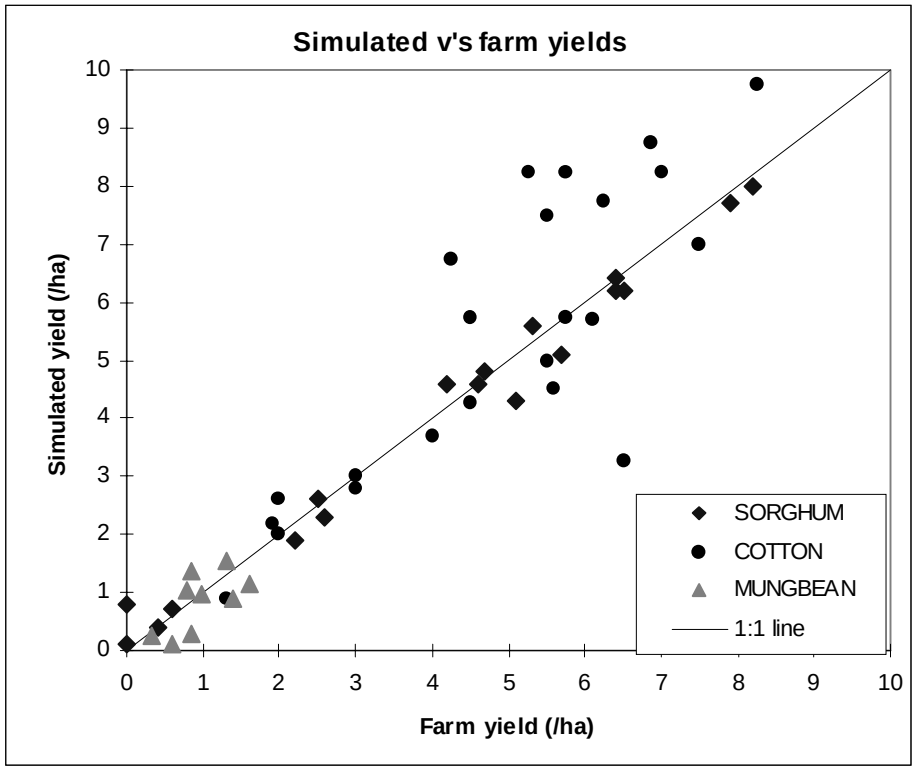
Under development

fababean
canola
lupin
pigeonpea
annual medic
trees

Via negotiation

cotton - CSIRO PI
millet - ICRISA

The credibility of APSIM is being established



- APSIM teste against data fro commercial farms
- Crops includ cotton, sorghum, mungbean, wheat, chickpea

Where is APSIM currently used?

Australia

- All States & territories
- CSIRO, State Ag Depts., Unis
- IAMA, private consultants, farmers

International

- New Zealand
- India
- Africa (Kenya, Zimbabwe, Niger …)
- Philippines

Who uses APSIM?

- Research and commercial activities.
- Credible management tool for farmers and advisers.
- Demand for commercial deliver service.

How is APSIM used?

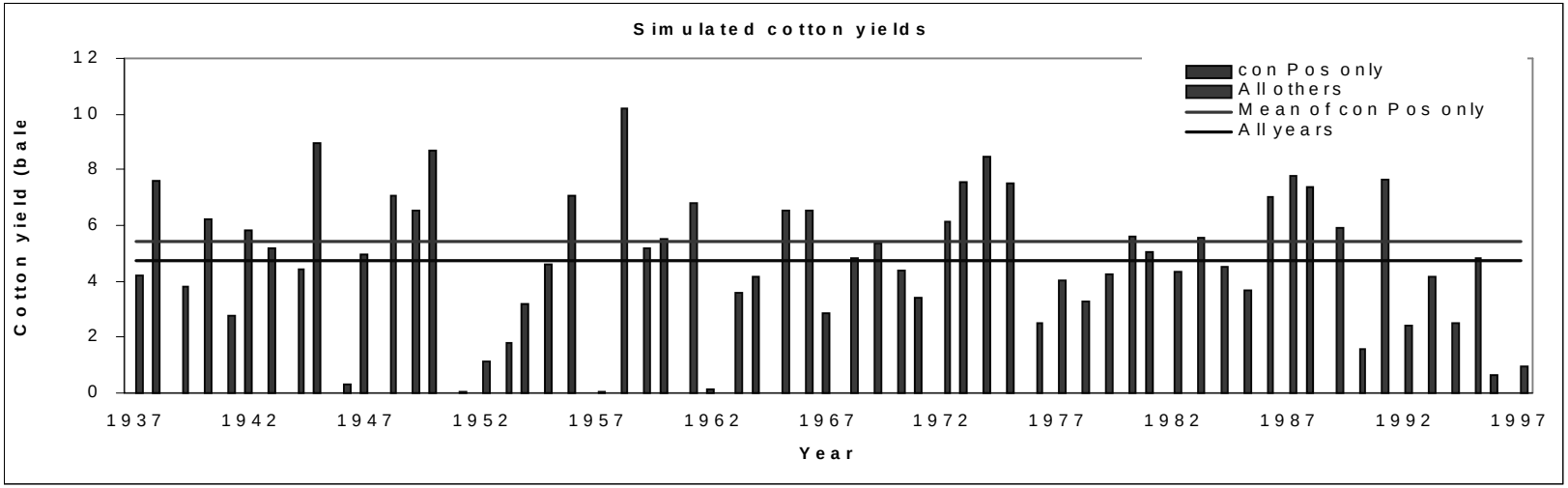
- Pre-plant forecast

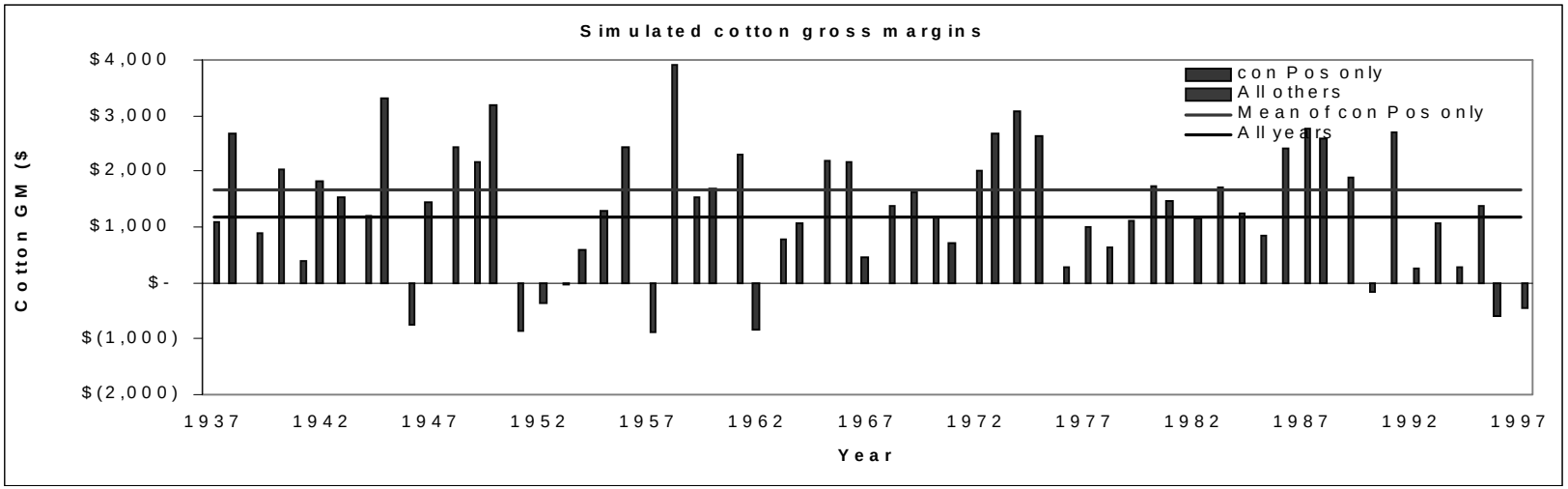
  “what are the yield prospects for a crop in a region?”

- Post-crop yield assessment

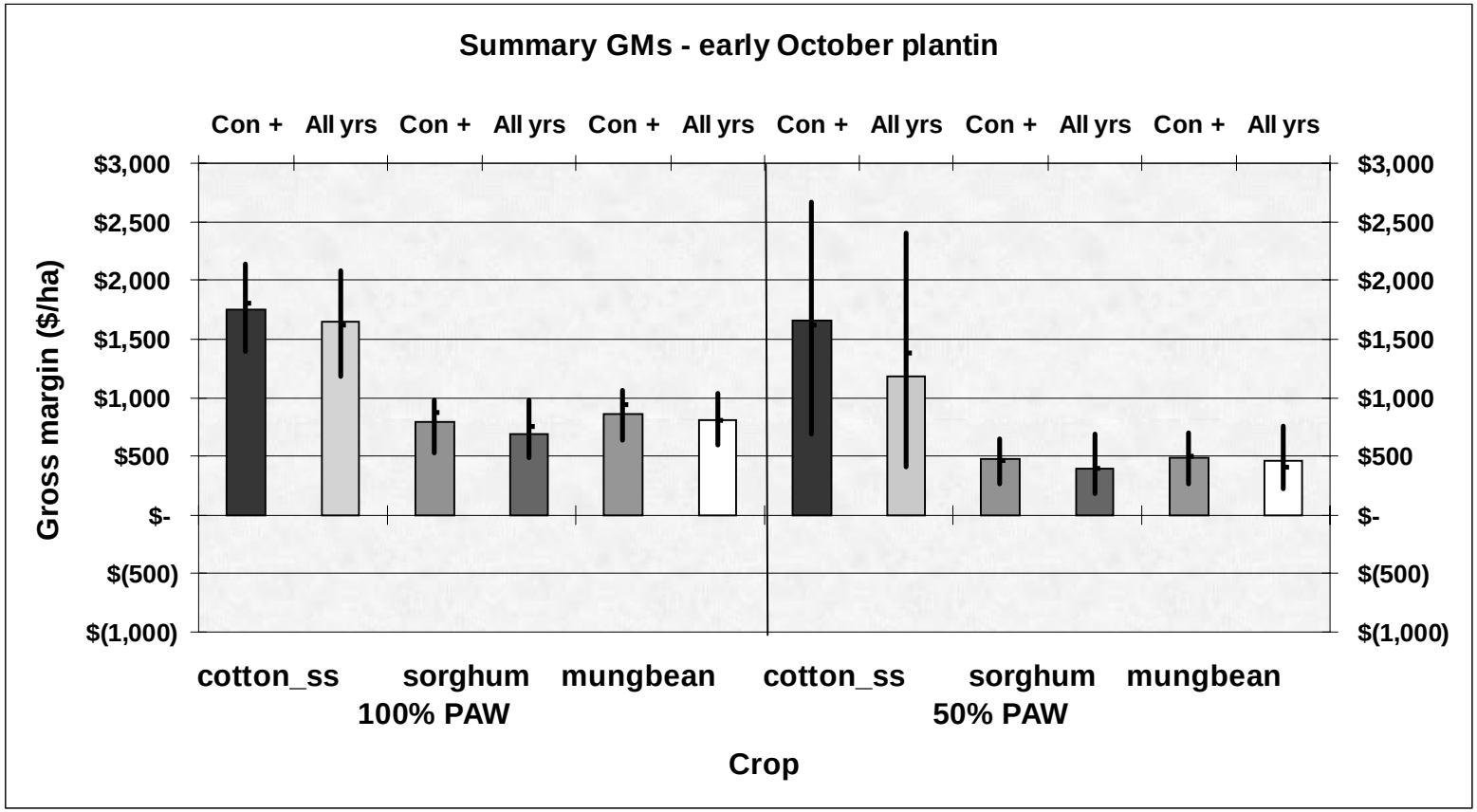
  “what should a crop have yielded given good agronomic management?”

Dalby, cotton - single skip, clay soil (230mm), 50% full, +ve SOI in Aug, $550/bale

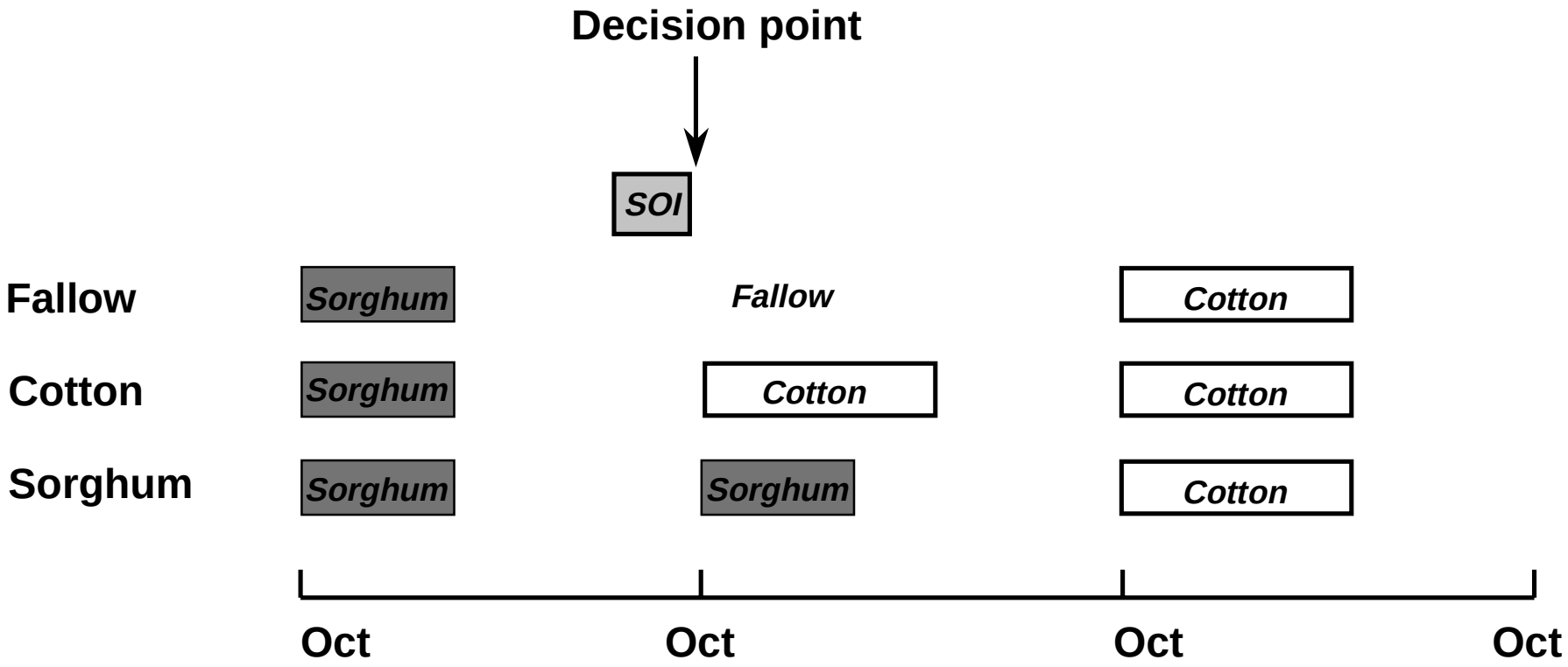




Dalby - crop choice, Oct. plant



Three system options



Simulated system performance - average of 108 years

Comparison of fallow-cotton, cotton-cotton & sorghum-cotton rotations at Dalby

	fallow	cotton	sorghum
Yields			
year 1 (bale or t / ha)	**0.0**	**4.2**	**3.2**
year 2 (bale / ha)	**6.0**	**4.3**	**5.2**
Gross margin ($/ha/2 yr)	**1482**	**1691**	**1605**
Risk (% yrs GM < $500)	**5**	**19**	**15**
Cash flow (year 1)	**-56**	**820**	**380**
Soil loss (t/ha/2 yr)	**80**	**57**	**39**

Engaging with agribusiness

Rabobank Australia contracted to:

- identify potential applications for APSRU tools with the agricultural value chain
- identify companies that may benefit from access to these tools
- initiate contact with these agribusiness companies

Value chain v's APSRU capabilities

	Genetics	Inputs	Farm	Early Stage Processing	Later Stage Processing	Retailing	Chain Services
		IAMA					
1. Forecastin supply/yield **2. New opportunities** **3. Post Morte** **4. Environment Impacts**	Eg canola	**Incitec** Complaint handling fertilizer use	**Twynam** Northern Australia	Canola Feed Grains		Suppliers	Transport and Logistics Insurance
5. Water **6. Banking / insurance**				Reduced water supply Finance investment			**NAB** **ALM** **IAMA**

Engaging with agribusiness

- Genuine interest in APSRU tools among agribusiness.
- APSRU's value to agribusiness is in playing the competitive game better - an issue of managing risk, especially suppl and biological risk of the agricultural production base.
- This is APSRU's core capability.

Benefits for agribusiness

- Ability to forecast supply – quality and yield – for a given area
- Ability to conduct crop assessment
- Ability to reconstruct the past and determine what went wrong and wh
- Ability to forecast environmental impacts
- Ability to assess water utilisation
- Ability to contribute towards the development of new risk management (insurance) and financial products.

Exploring case studies within agribusiness

- In-house case studies with several companies to explore APSRU tools in business operations.
- Case studies_____
  1. Agronomic consulting *
  2. Crop insurance/agri-liability (ALM, IAMA)
  3. Financial assessment (IAMA, NAB)
  4. Stock inventory assessment (INCITEC, IAMA)
  5. Portfolio management (INCITEC, TWYNAM)

Exploring case studies within agribusiness

- Action learning approach.
- APSRU researchers work alongside agribusiness staff to explore possible benefits if the company had in-house capability.
- Potential applications within industry emerge via interactions with agribusiness staff.
- Evaluation and learning documented

Crop Insurance/ agri-liability: ALM , IAMA

- ALM Crop loss assessment (“agri-liability”)
  - over 10 completed case studies
  - APSIM recently tested in court
- IAMA
  - retailer of insurance products
  - “weathering” insurance

Financial assessment: National Australia Bank

- Climate influences bank lending polic
  - eg El Nino had a definite impact
- Rural Finance Managers & their farmers
  - yields & risk for individual crops
- Testing credibility with good clients
- Learn about lending process

Financial assessment: IAMA

- IAMA offers crop terms to clients
- Obtain inputs on credit (eg seed, fertiliser)
- IAMA and farmers can benefit from better info about climate risk
- IAMA evaluating APSIM in this role

Portfolio management: Twynam, INCITEC

- Twynam - Australia's largest cotton producer
- Incitec - one of Australia's largest fertiliser suppliers
- Portfolio management opportunities
- Informed allocation of inputs, or choice of enterprise, across a portfolio of geographically spread farms

Learnings - Opportunities for engaging agribusiness

- Opportunities abound
  - high level of interest, willingness to contribut funding
- Insurance industry most receptive
- Some organisations already have wel developed ways of dealing with climat variability
  - hard to see how simulation could do better than them

Learnings - The engagement process

- CVAP contributed to research costs
  - significantly less interest would have been generated if we had asked participating companies for funding contribution
  - agribusiness need to see what's possible before giving $
- APSRU interaction with agribusiness benefited from credibility already achieved with farmers
- Dealing with agribusiness requires different ways o engagement
  - bureaucratic vs commercial culture
  - bridging the differences was learnt on the run
  - researchers need to be proactive when clients are operating in learning mode in a commercial culture

Learnings - Participatory action research framework

- Participatory Action Research (PAR) framework used by the project has been an appropriate methodology in which to pilot interactions
- PAR mode is time-consuming, stressful, an confronting - not the easiest research
- Meeting collaborator expectations is challenging
- Lack of incentive for researchers to engage with clients
  - as evidenced by the number of researchers undertaking policy analysis rather than direct engagement

Learnings - Commercialisation issues

- Need to address
  - legal issues
  - client confidentialit
  - ownership of intellectual propert

developed throughout the case study process.

- Clarification of the internal and intra-organisational management procedures for developing long-term arrangements.

Concluding remarks

- Bank lending policies, crop insurance policies, product inventories and marketing advice could all be positively influenced through better dealing with climate variability.
- More time and investment is required to capture and respond to the major opportunities.
- Success = the adoption of climate forecasts an simulation within the agricultural service sector beyond the life of this project.

Find more @…..

1. Climate Variability in Agriculture R&D Program

www.cvap.gov.au

2. Agricultural Production Systems Research Unit

www.apsru.gov.au

3. FARMSCAPE - more applications of APSRU tools

www.farmscape.tag.csiro.au

….or see me today for a fact sheet.