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Decision support models for canola diseases

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Visit http://www.agric.wa.gov.au/cropdisease

National Meeting on Fungal Diseases of Canola

23 February 2010, The University of Melbourne

On-going & planned future activities

Blackleg: understanding, assessing & forecasting risks (2000 -)

Sclerotinia: understanding (assessing & forecasting) risks (2010 -)

BWYV: understanding, assessing & forecasting risks (2005 -)

Western Australia 2000 - 2010 → **Southern Australia 2010 -**

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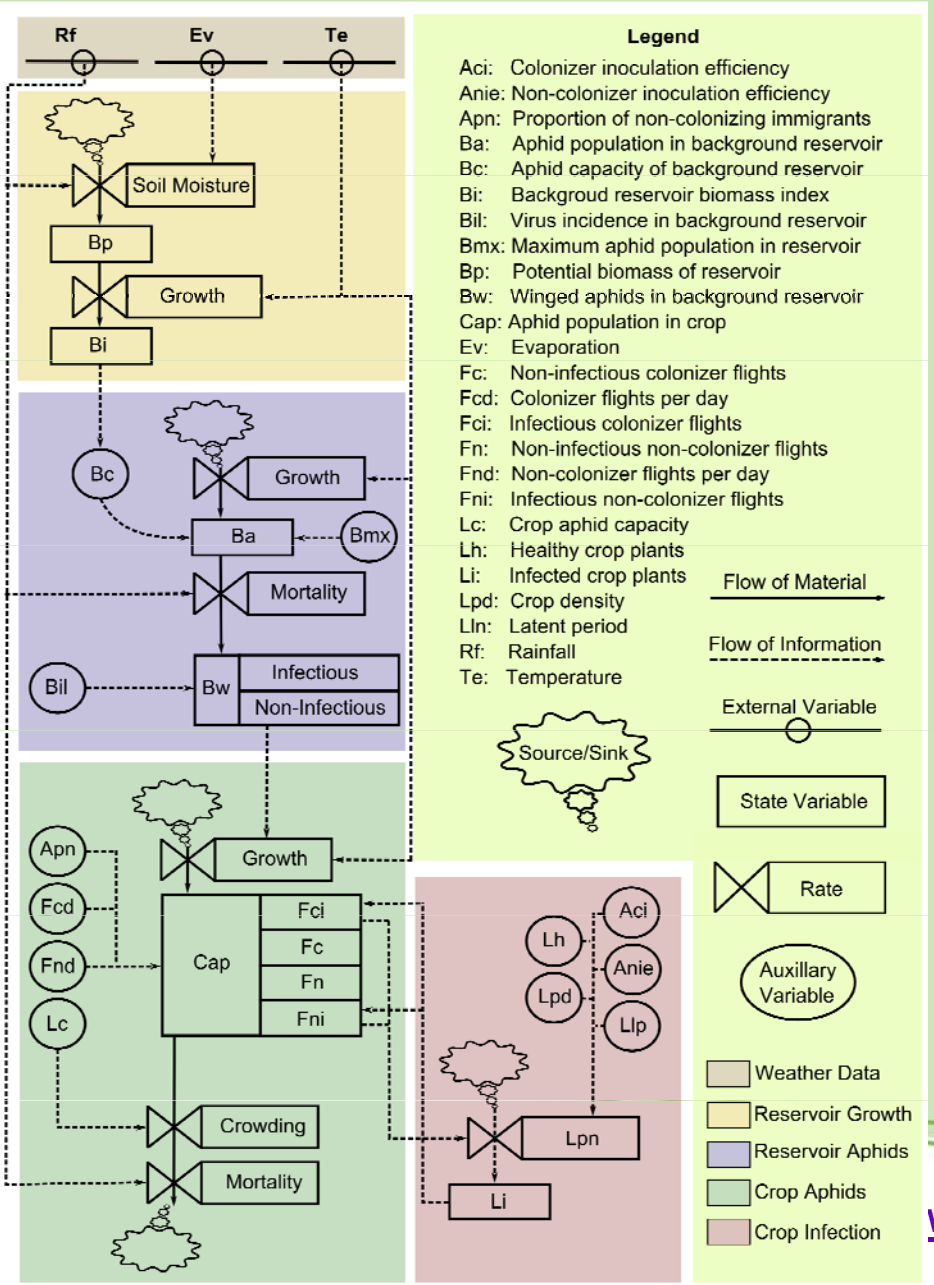
BWYV Canola

WA background reservoir: Wild radish (*Raphanus raphanistrum*)

Principal vector: Aphid, *Myzus persicae*

BWYV canola: how does it work?



Modelling steps

- Model environmental (wild radish) biomass
- Model aphid population in wild radish and their migration into crop (canola)
- Model aphid population
- Virus spread in canola

Validation

aphid numbers
BWYV incidence
4 sites, 3 rainfall zones, &
3 years.

Model: implementation & application

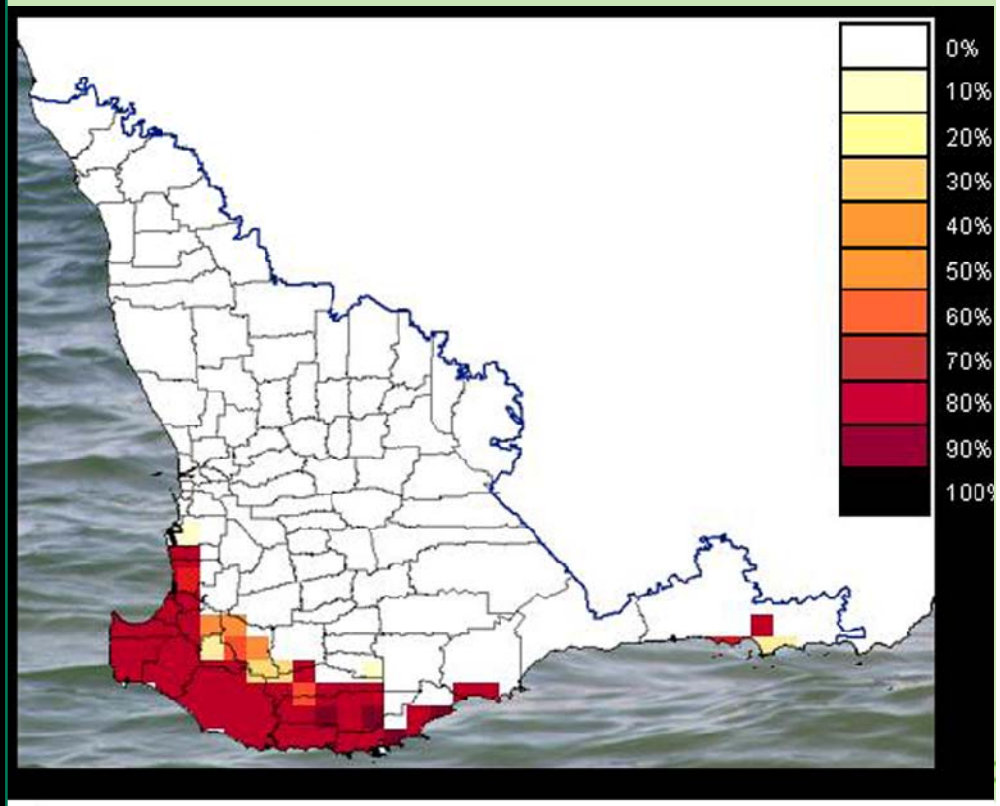
Beet western yellows virus

1. **Prediction sites:**
   WA cropping-belt, ~400 sites

2. **Predictive method:**
   run model up to forecast date, finish model run off with all 50 historical years in database (assuming 10th, 50th and 90th percentile incidence as low, normal, and high risk forecasts)

3. **Forecast timing:**
   greater current season data = greater accuracy; not recommended before late April (in WA)

- **South Australia**
- **Victoria**



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Sclerotinia

Work starting in 2010

- **WA**
- **NSW**

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Blackleg

Work started in 2000

Environmental effect of pseudothecial maturity (Khangura et al. 2007)

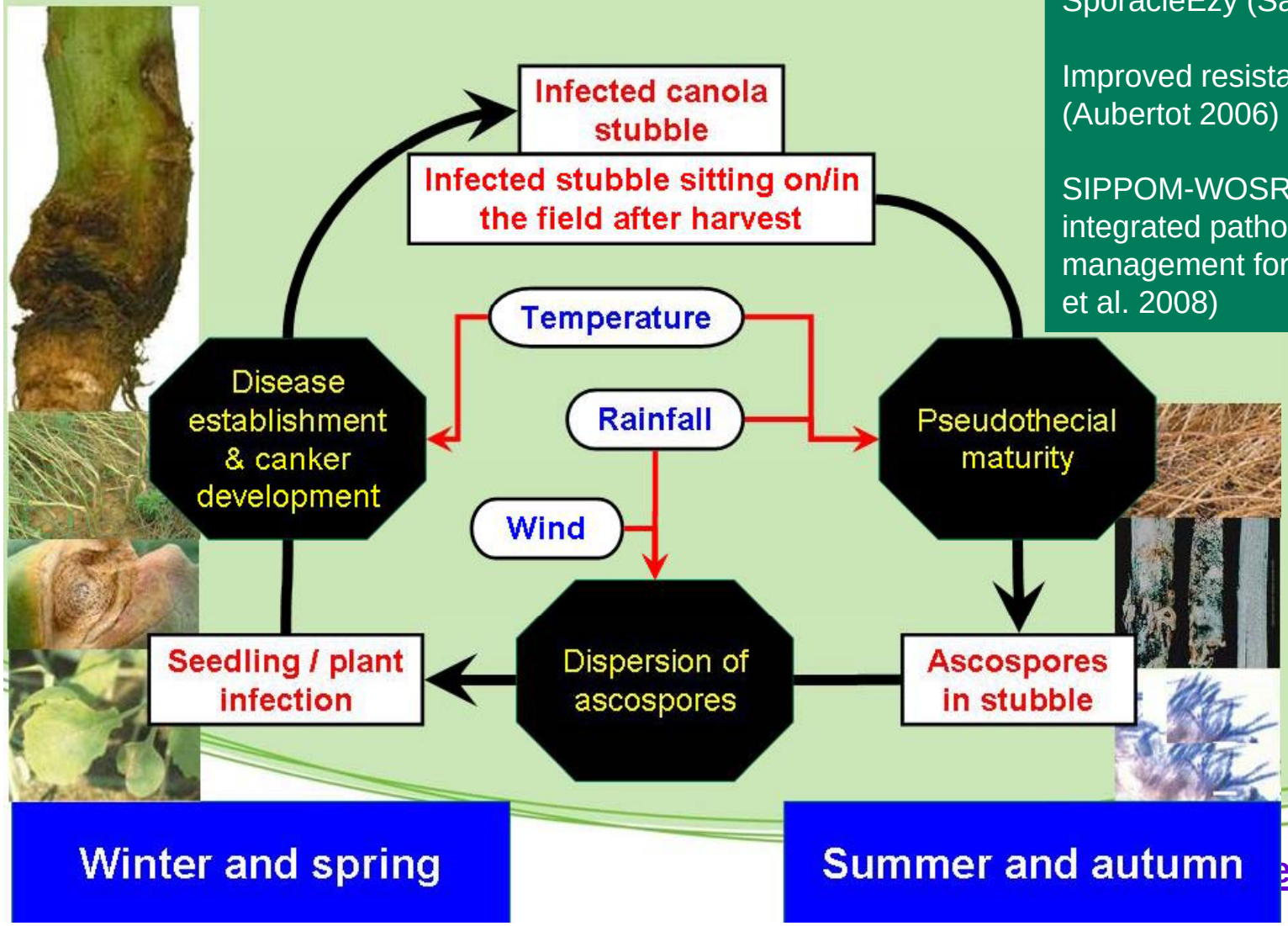
Blackleg Sporacle (Salam et al. 2003)

SimMat (Aubertot et al. 2006)

Improved Blackleg Sporacle and SporacleEzy (Salam et al. 2007)

Improved resistance management (Aubertot 2006)

SIPPOM-WOSR: simulator for integrated pathogen population management for blackleg (Lô-Pelzer et al. 2008)



ease

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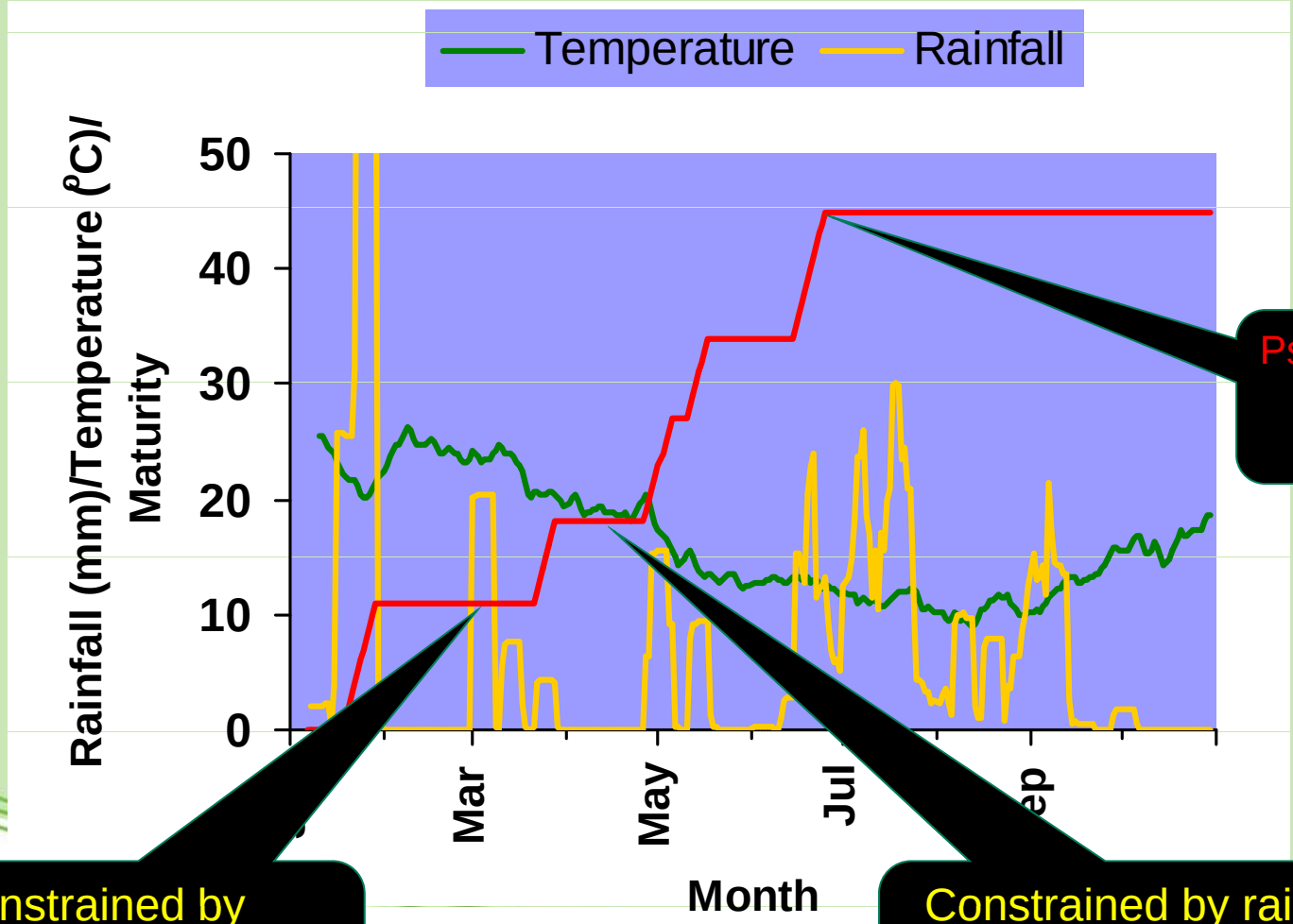
Model(s) to track down ascpospore maturity

Blackspot Sporacle; Improved Sporacle; SporacleEzy



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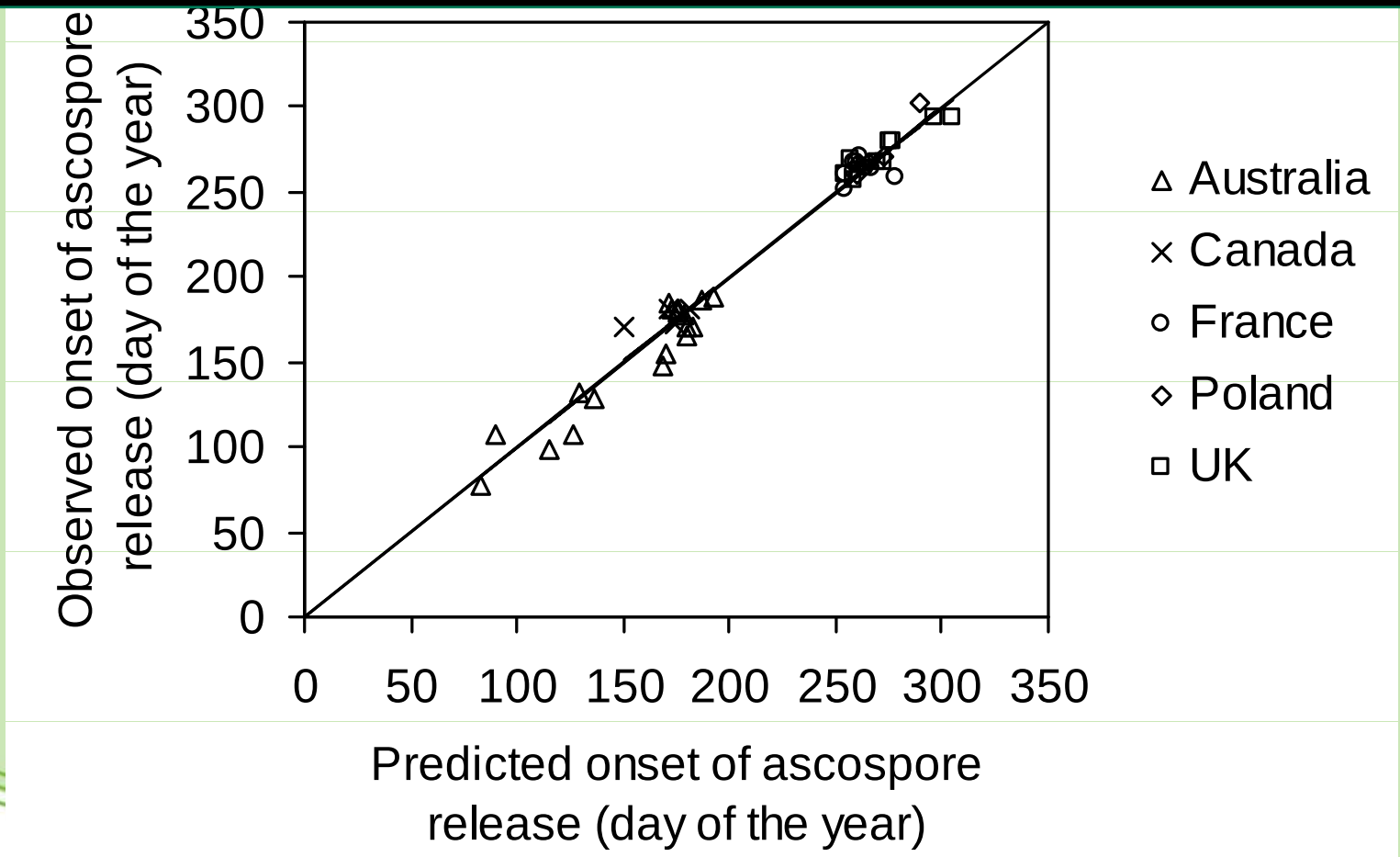
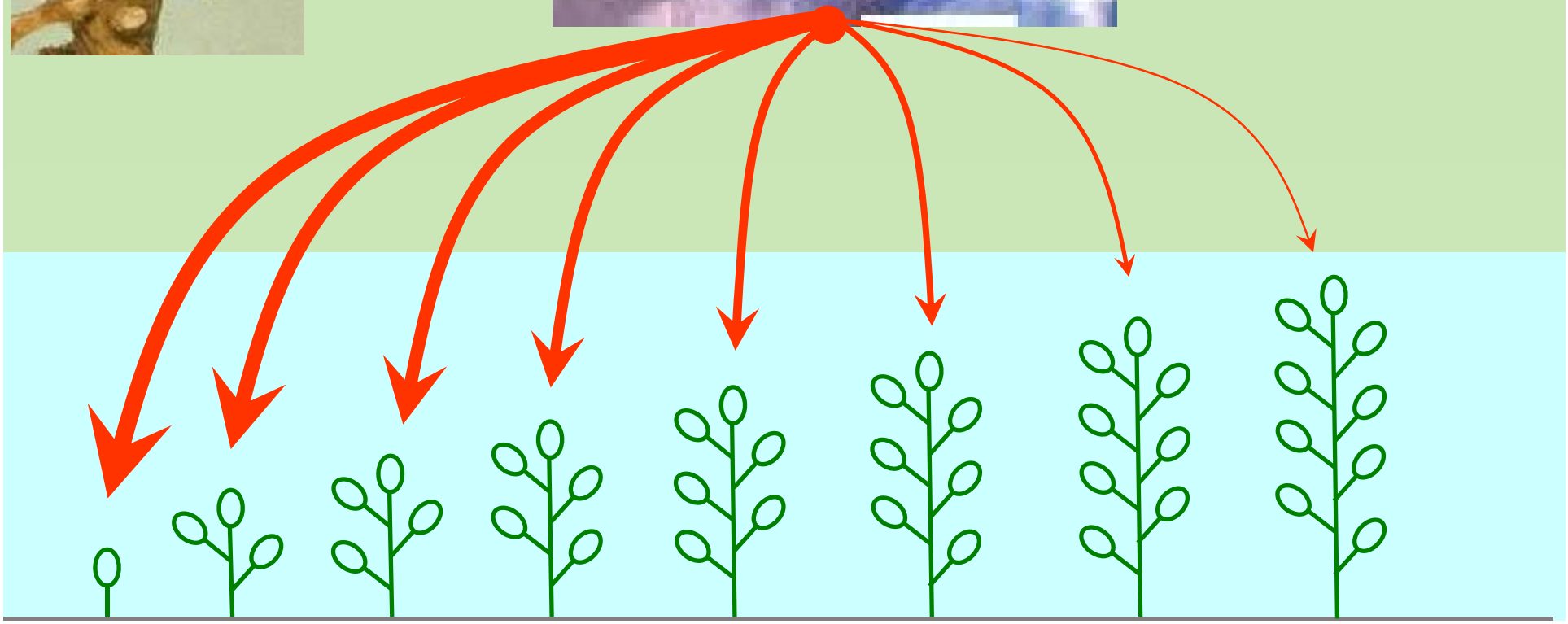


Tested internationally with 46 datasets, respectively, 19, 4, 10, 4 and 9 from Australia, Canada, France, Poland and UK

Phytopathology (2003); Plant Pathology (2007)

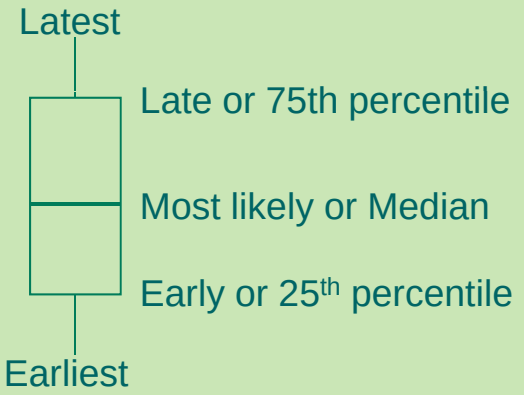
Why do we bother to know?

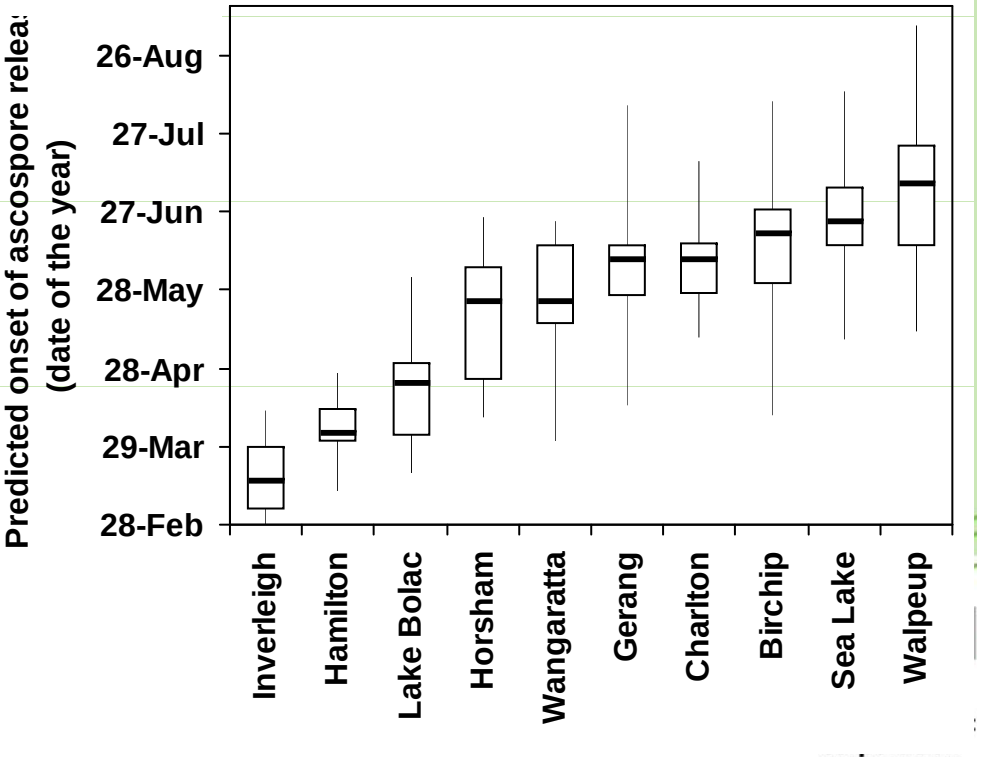


Strategic & tactical decisions

Gerang

15 years (1991-2005) prediction





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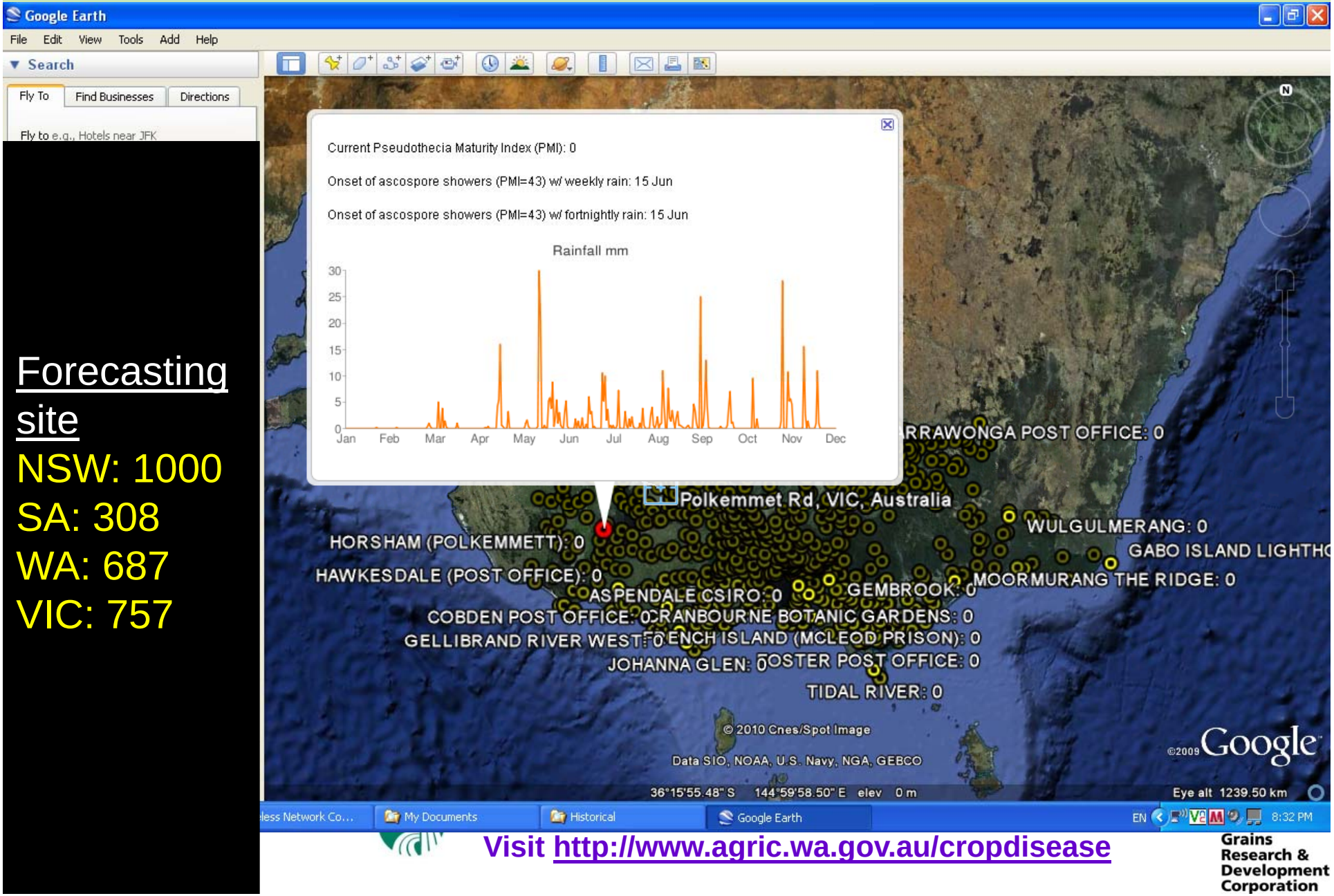
Blackleg: onset of ascospore shower



Forecasting site

NSW: 1000

SA: 308

WA: 687

VIC: 757

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Blackleg risk and management through times

ERA	RISK	ISSUE	MANAGEMENT OPTION
Era-4 2005-	Moderate/ high	Too many genetic material (APR/TR) & Resistance erosion	Paddock separation Variety selection (through gene reco) Rotation (Tightening) Chemical provision Avoidance of "risky" ascospore showers Gene rotation
Era-3 2000-04	Extremely low!!!	"Excellent" genetic material (TR)	
Era-2 1990s	High	Limited genetic material (APR)	Paddock separation Variety selection Rotation (Lengthening) Chemical application Avoidance of "risky" ascospore showers
Era-1 1970s	Extremely high	Lack of genetic material	Paddock separation

Blackleg risk management in Era 4

Moderate/ high

Too many genetic material (APR/TR) & Resistance erosion

Paddock separation
Variety selection (through gene reco)
Rotation (Tightening)
Chemical provision
Avoidance of "risky" ascospore showers
Gene rotation

Huge progress in:
Epidemiology (laboratory)
Epidemiology (field)
Molecular study

Winter and spring

Summer and autumn

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Blackleg risk management in Era 4

Moderate/ high

Too many genetic material (APR/TR) & Resistance erosion

Paddock separation
Variety selection (through gene reco)
Rotation (Tightening)
Chemical provision
Avoidance of "risky" ascospore showers
Gene rotation

Challenge

Developing a system, considering all available options, for our clients (growers/consultants) enabling them to review their individual circumstances in finding

Right variety for a paddock (+/- chemicals)

Right paddock for a variety (+/- chemicals)

Huge progress in:
Epidemiology (laboratory)
Epidemiology (field)
Molecular study

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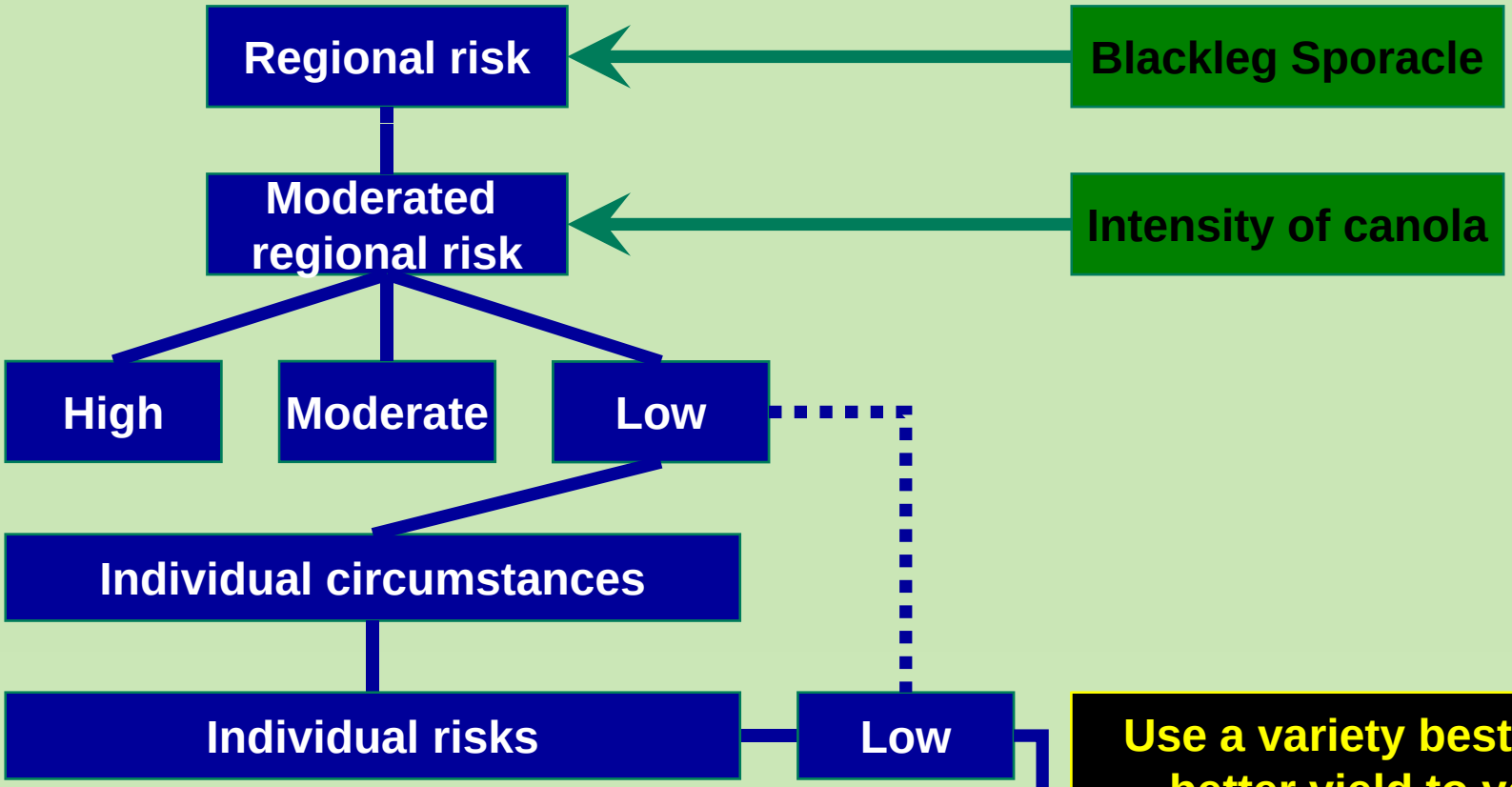
WA Blackleg Risk Management System



Use a variety best suited and better yield to your agro-environmental circumstances
Watch any change in current season's ascospore maturity

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