DEPARTMENT OF
PRIMARY INDUSTRIES

Biological management of willows

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Victoria
The Place To Be

Development of biological control options for invasive willows in Australia

Leaf galling eriophyiid - Japan

Leaf galling Tenthredinidae - Japan

Nematus oligospilus - Australia

- under development since 2001
- concepts developed
- prospects for success are high
- issues of conflict of interest

Why biological control?

- protect past and future investment in control
- addresses the key cause of invasion – willow health
- operates on a landscape-scale
- self sustaining - post release
- high probability of success
- reduce future investment in willow suppression
- 5 year return on investment (based on 5% reduction in management costs and $72 million investment in non-biological control over 12 years. A biological control would run for 12 years at an average of $250,000/year)

Feasibility study

Sagliocco & Bruzzese (2001). Biological control of willows in Australia – A feasibility study. Department of Primary Industries, Frankston.

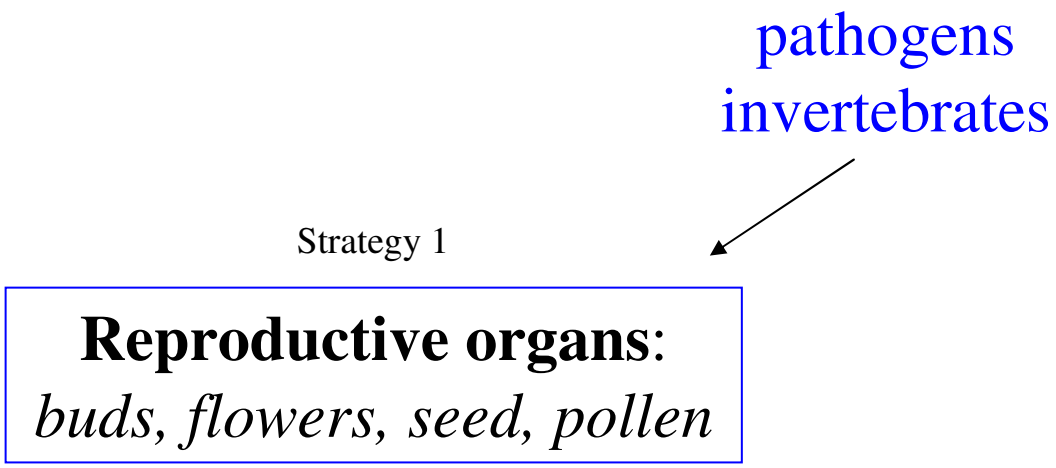
- Rich assemblage of phyotphagus organisms on willows
- broad range of feeding guilds and taxonomic richness
- Few phytophages occur in Australia
- Many organisms are highly damaging with indications of acute specificity

Biological control strategies

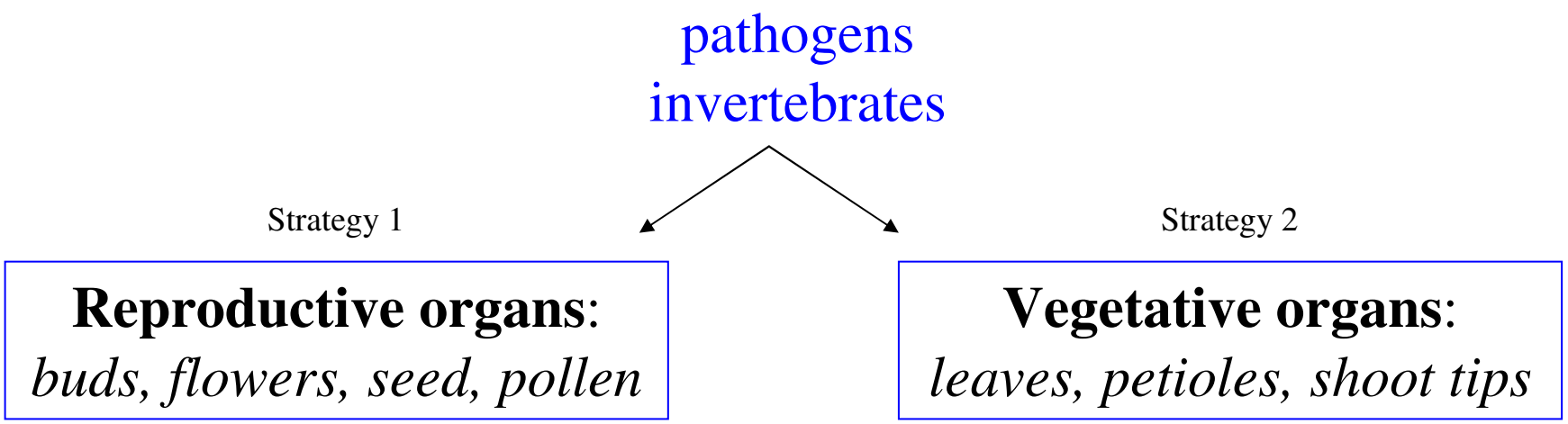
Adair, RJ, Sagliocco, J-L and Bruzzese, E. (2006). Strategies for the biological control of invasive willows in Australia. Australian Journal of Entomology, 45, 259-267

- Three basic approaches
- Potential key organisms identified
- Basis for justification

Three strategies for biological control of invasive willows



Three strategies for biological control of invasive willows



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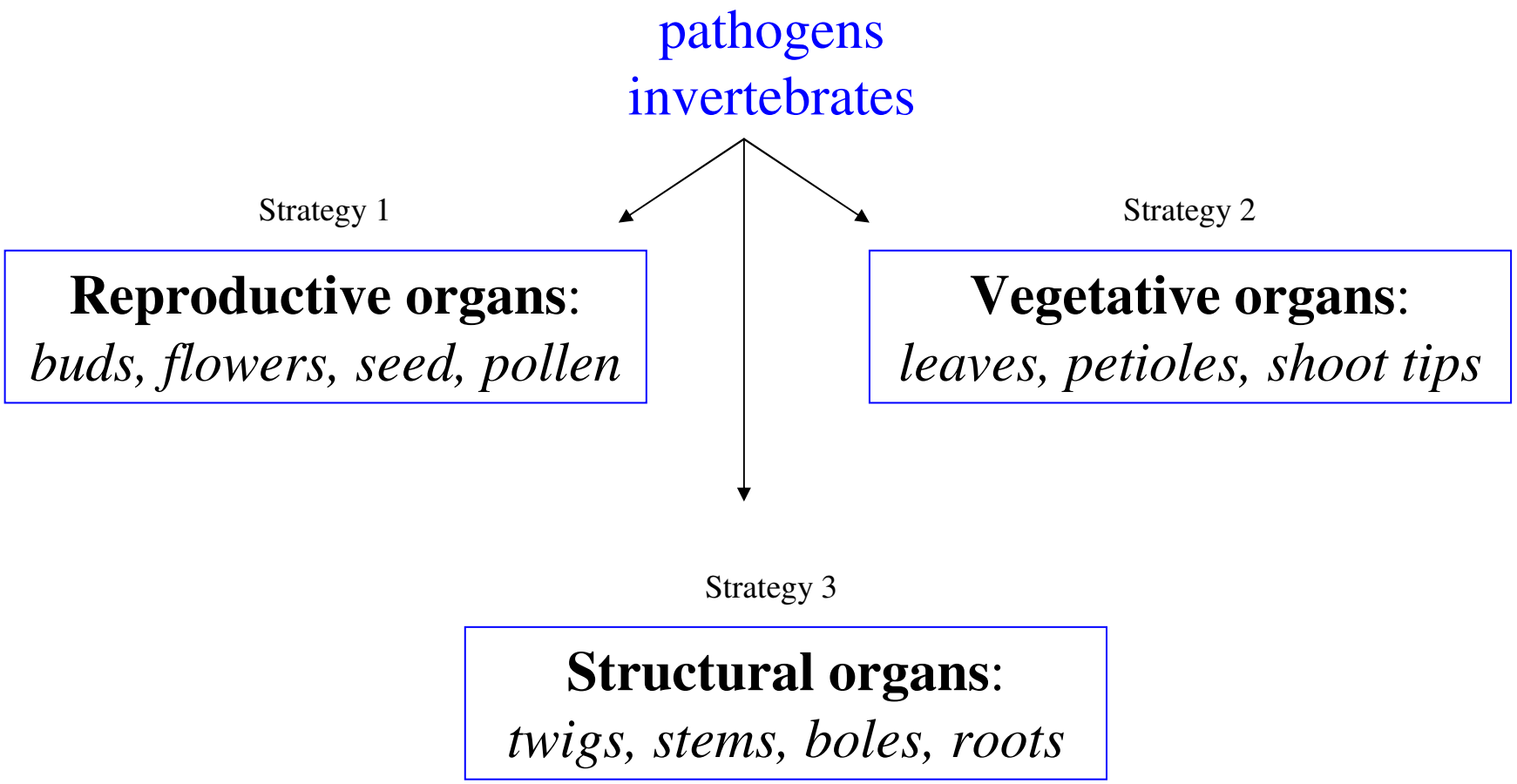

Which options do we choose?

- influences cost
- influences time frame
- influences complexity
- influences potential for conflict of interest

Influencing factors

- Target selection – all willows or a subset?
- Which organs on which willow species? seed-feeders vs defoliators
- Efficacy evaluation is **critical -** can seed-feeders limit populations of willows?
- What level of defoliation is required to suppress willow health?
- What level and type of gall development will suppress normal growth functions?
- Agent selection and sequence of introduction governed by host-agent interactions and agent-agent interactions

Preferred approach

- Develop case for complete targeting of *Salix cinerea – seed, foliage, stems*
- Develop a case for targeting seeds and floral organs of all main invasive *Salix*
- Develop a deferred case for targeting defoliation of key invasive willows

Constraints	Solutions
• Willows accepted as targets for biocontrol	→ Prepare a case to AWC
• Efficacy of attack strategies	→ Define herbivory targets to guide agent selection
• Prioritise agent selection	→ Workshop key candidate selection
	↘ ?Pre-host testing efficacy evaluation

Progress

- Partial funding commitments - $100,000 (in principle)
- Costs estimated - $150-300K for each of 10 years, depending on development phase and strategy adopted

Stepwise development of biocontrol

Phase 1	- nomination of willows as targets - determine herbivory impacts - workshop candidate selection - identify host source populations
Phase 2	- biology and life history studies -host specificity evaluation
Phase 3	- application for release
Phase 4	- mass-rearing and redistribution