

Biological control of silverleaf nightshade

.... *trials and tribulations*

Photo: John Heap

WMSSA
SA Weeds Conference
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Photo: Greg Lefoe



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Talk outline

- SLN problem
- The SLN leaf beetle
- Importing the beetle
- Test list and DNA research
- Finding the test list plants
- Host specificity testing
- Future research



Biological control of SLN - Process

SLN declared as a “Target” in Aust. – 1985.

Suitable agent(s) identified – SLN leaf beetle.

Permits to import into quarantine – SLN leaf beetle imported 2016.

Identify potential off-target plants (host specificity list).

Find and propagate non-target plants.

DNA study of non-target plants (molecular biology).

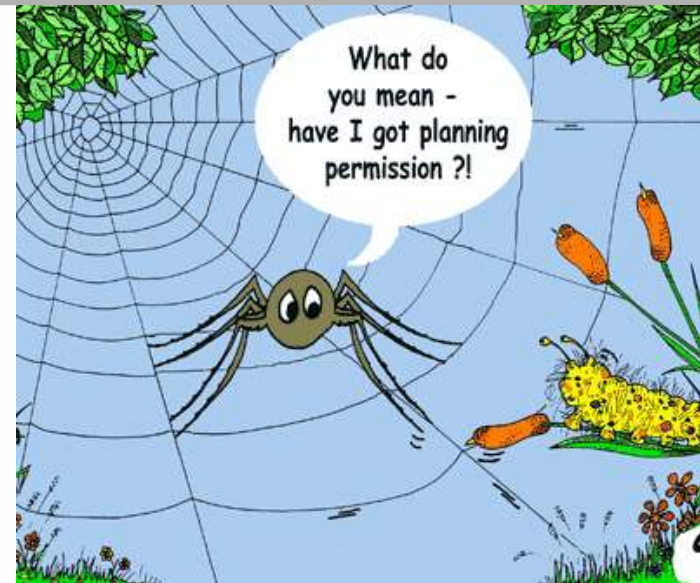
Test beetle damage to non-target plants (Aust. and Texas).

Consult stakeholders – horticulture, bush foods, aboriginal communities.

Prepare and submit “Permission to Release” application.

Stakeholder review.

Obtain “Permission to Release”.



New biocontrol research projects in Australia

“Biocontrol is the most cost-effective solution for landscape scale management of these weeds, with historical benefits outweighing R&D costs by over 23:1”

Project 1. MLA, AG and Australian partners 2016 to 2018:

1. Partnership model: NSW pilot - ‘beneficiary pays’.
2. **Silverleaf nightshade: assess SLN leaf beetle (*Leptinotarsa texana*).**
3. Blackberry: new fungus.
4. *Cylindropuntia* (cacti): mass rear/release of *Dactylopius tomentosus*.
5. Gorse: mass rear/redistribution of gorse soft shoot moth (GSSM).
6. **Biocontrol App on ALA.**
7. Parkinsonia: – mass rear/release for two new leaf feeding insects.
8. Parthenium – fine tune use of 4 existing agents.

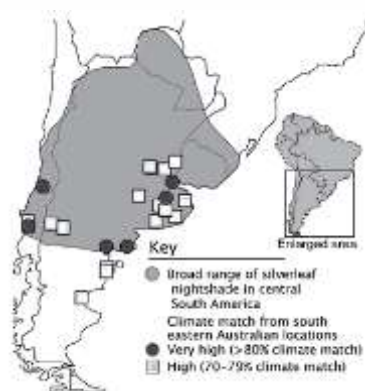


Image from Kwong et al 2008

Project 2. RIRDC, AG and Australian partners 2016 to 2020:

Focus on 10 highly invasive and damaging weeds:

Sth Aust: African boxthorn, silverleaf nightshade, fleabane.

Also: sowthistle, cabomba, prickly acacia, sagittaria, mother-of-millions, giant rat's tail grass, ox-eye daisy.

Silverleaf nightshade – the problem

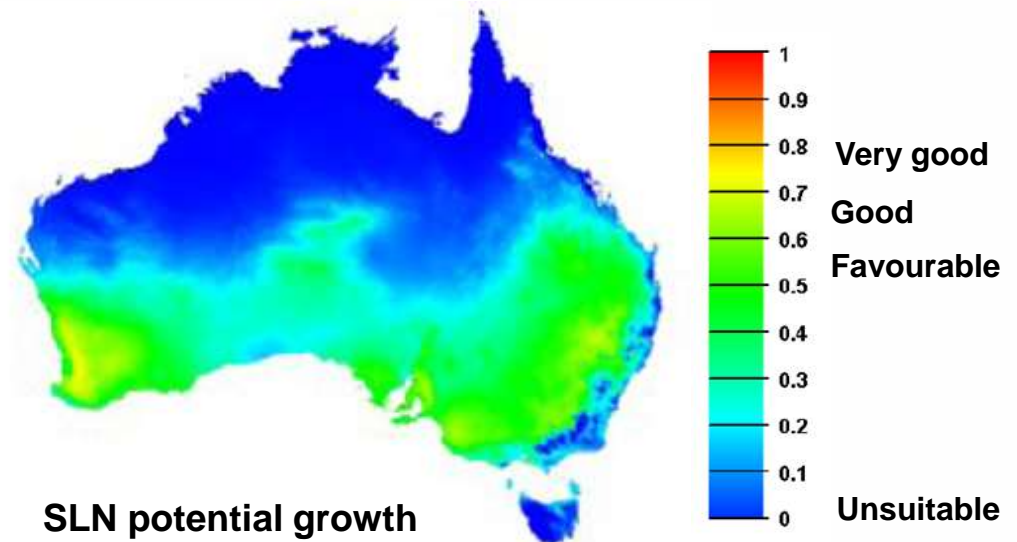
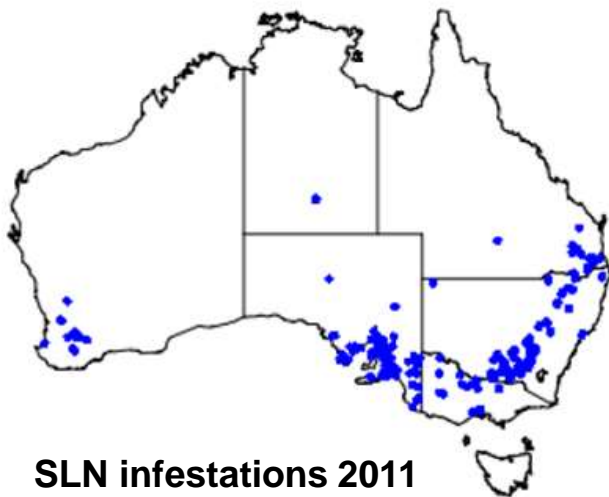


SLN in Australia

- SA + NSW + Vic Major widespread problem
- WA Developing problem
- Qld, Tas, NT Not an issue
- Australia: > 1.1 million ha infested



SLN continues to spread – new regions and new paddocks!



From: Wilson, P.D., Downey, P.O., Gallagher, R.V., O'Donnell, J., Leishman, M.R. and Hughes, L. (2011)

SLN research team

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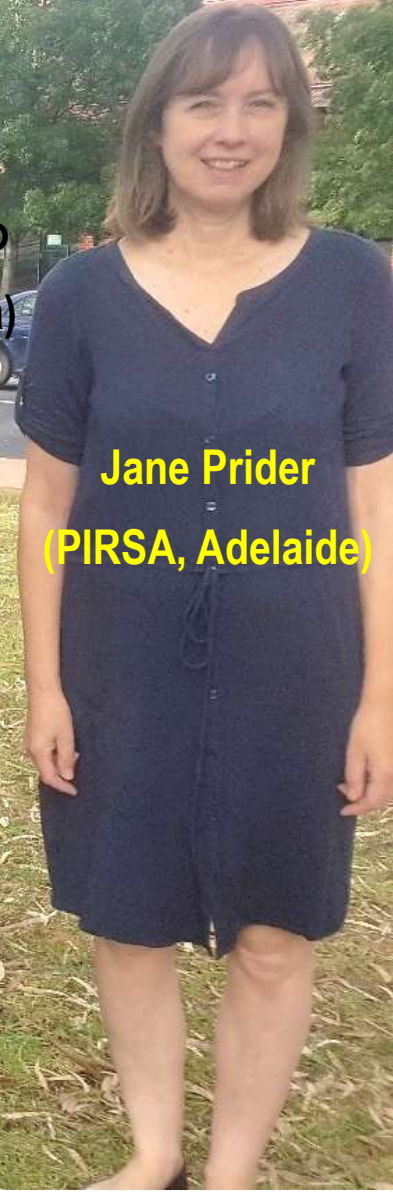
Laurie Haegi
DEWNR, Adelaide



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Silverleaf nightshade leaf beetle

- released in South Africa in 1992



Photos: Helmut Zimmermann and Greg Lefoe

Silverleaf nightshade leaf beetle (SLNLB) (*Leptinotarsa texana*)



prepupa



larva



adult

Ladies and Gentlemen ... The Beetles!



hhhmmmm ...
but what should we feed them?



Non-target testing – Host Specificity List

Australian native *Solanum* species – lots!!!!

Horticultural plants:

potato, tomato, eggplant, bush food plants, garden plants.

Solanum weeds.

List:

33 High priority species

61 Medium priority species

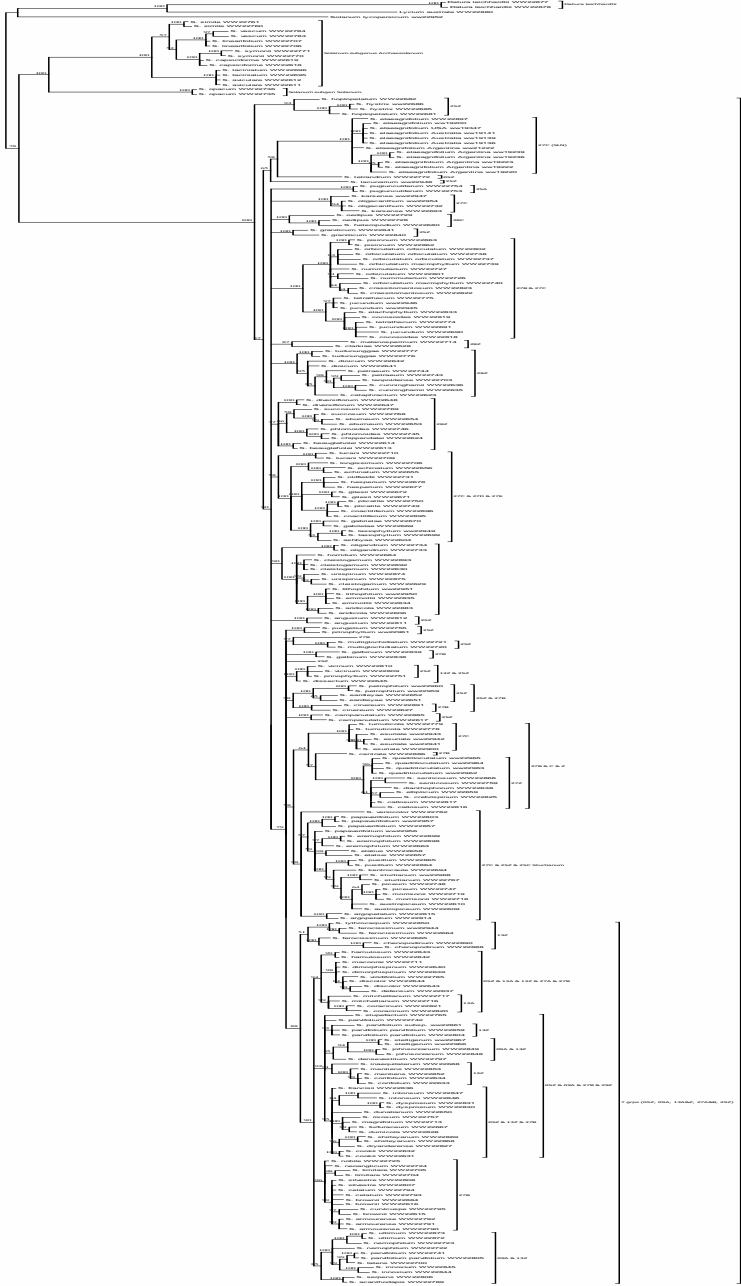
122 Low priority species



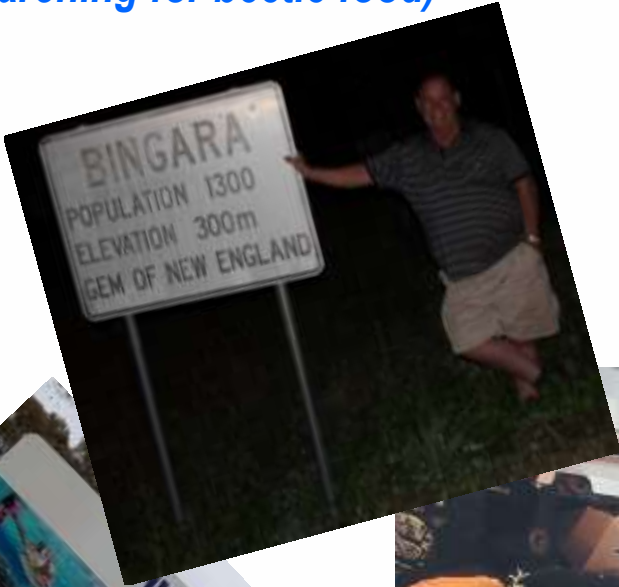
Host specificity test list - consultation



Who is related to whom? DNA research



All Aussie Adventures time to hit the road!
(or searching for beetle food)



Five stars all the way!!



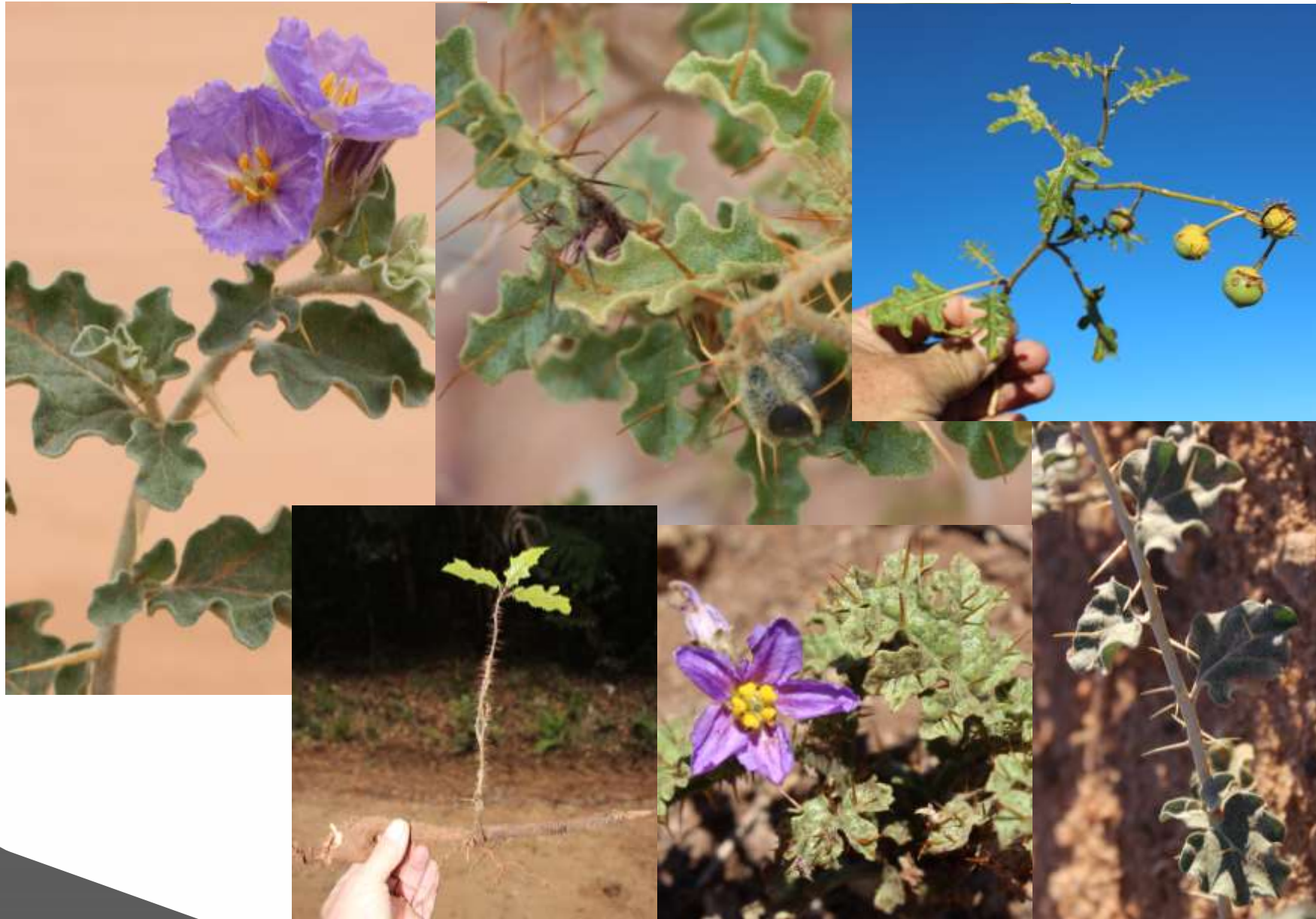
What an office!!



The thrill of the chase!!



Finding the hidden treasures



Finding the hidden treasures



Finding the hidden treasures



Four expeditions - 54 species found and propagated.





Host specificity testing in Melbourne and Texas





erbox

..... but the search continues with Greg Lefoe !!
South African agent list and South America

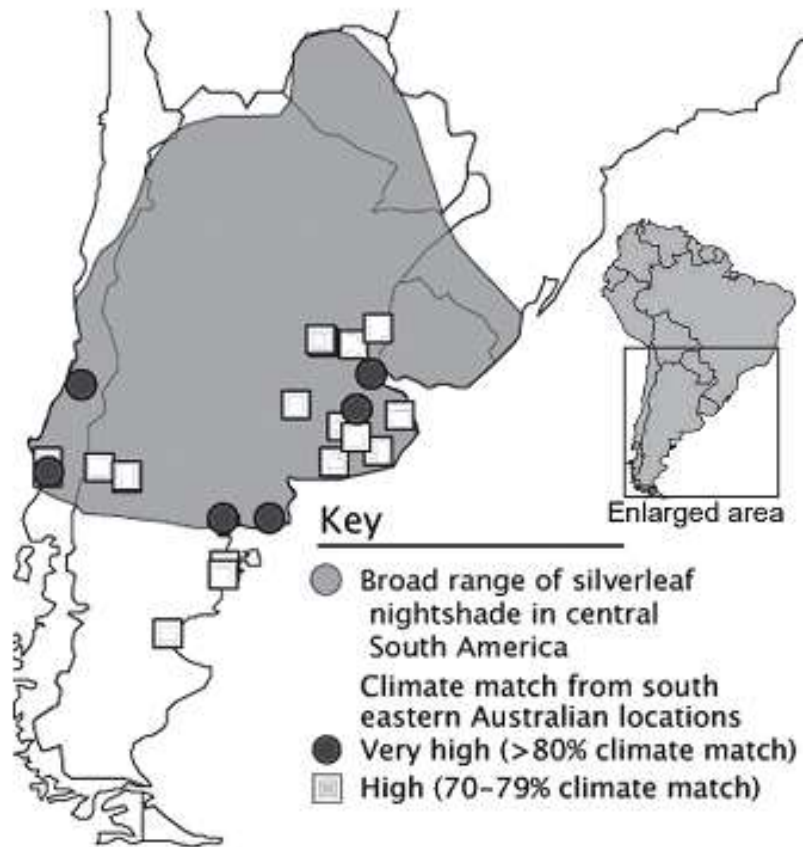


Image from Kwong et al 2008