

**University of the Sunshine Coast
School of Science, Technology and Engineering
Forest Research Institute**

Bark beetle bites: a review of the *Ips grandicollis* biological control program in Australia – current status of introduced agents and opportunities



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Background

- *Pinus radiata* – common exotic species globally
- Softwood plantations – 1.01/1.74 million ha (ABARES 2023)
- Exports (2022-2023) – AUD 2.8 billion (ABARES 2023)



Ips grandicollis (Coleoptera: Curculionidae: Scolytinae) in Australia

Detections

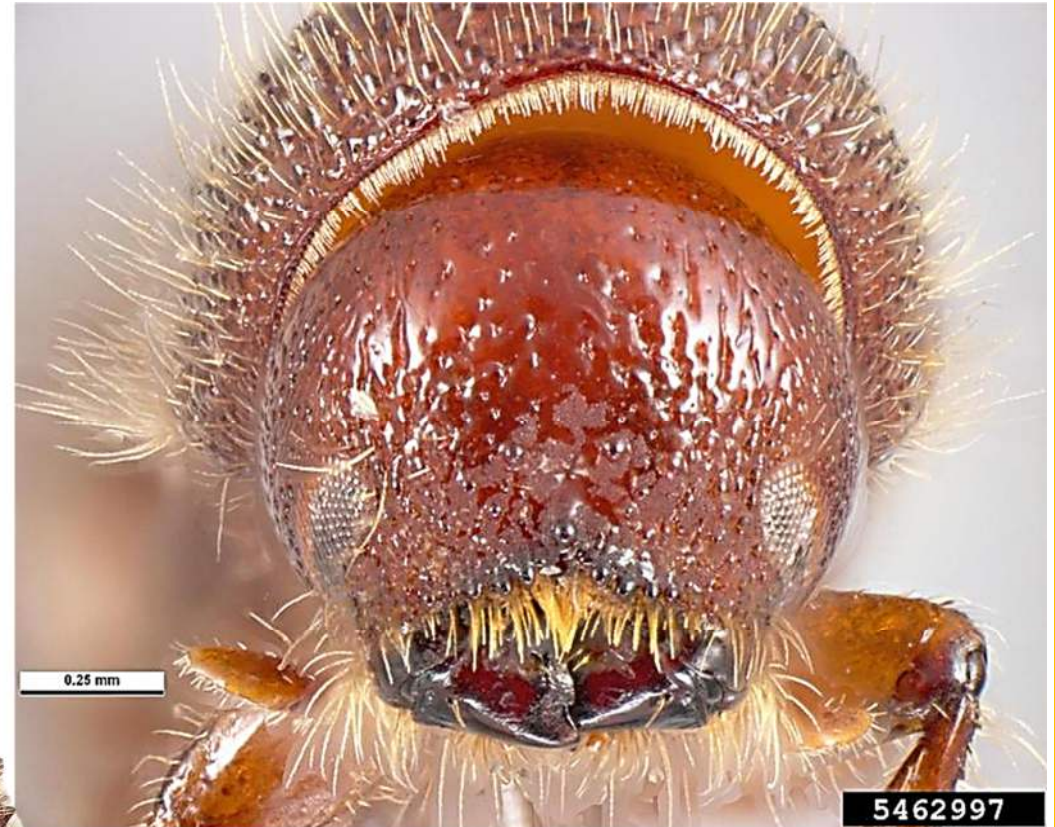
1943 SA

1952 WA

1981 VIC

1982 QLD

1983 NSW



Images: Joseph Benzel, Screening Aids, USDA APHIS PPQ; Pest and Diseases Image Library, Bugwood.org



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Ips grandicollis in Australia

Stress inducing factors

- drought
- fire



Image: HQ Plantations 2024

Impacts

- Logistical pressure



Image: HQ Plantations 2024

- Blue stain

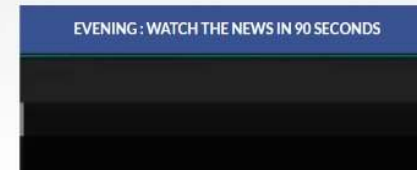


- Biosecurity and trade implications

NEWS • WORLD •

12:53pm, Nov 12, 2020 Updated: 4:20pm, Nov 12

Victorian timber log exports blocked from entering China due to bark beetle



Source: ABC News 2020



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Biological control program in Australia

- 1981 *Ips* management project SA
- no natural enemies
- rapid expansion
- high damage potential
- Predators (Coleoptera)

– *Thanasimus dubius* (Cleridae)



– *Temnoscheila virescens* (Trogossitidae)



Images: Natasha Wright, Braman Termite & Pest Elimination; Gerald J. Lenhard, Louisiana State University, Bugwood.org



Biological control program in Australia

- Parasitoids (Hymenoptera)
 - *Coeloides sympitis* (Braconidae)
 - ***Dendrosoter sulcatus* (Braconidae)**
 - *Dinotiscus dendroctoni* (Pteromalidae)
 - *Rhopalicus pulchripennis* (Pteromalidae)
 - ***Roptrocercus xylophagorum* (Pteromalidae)**
- 1990
- 118, 873 predators and parasitoids
- AUD 578, 000

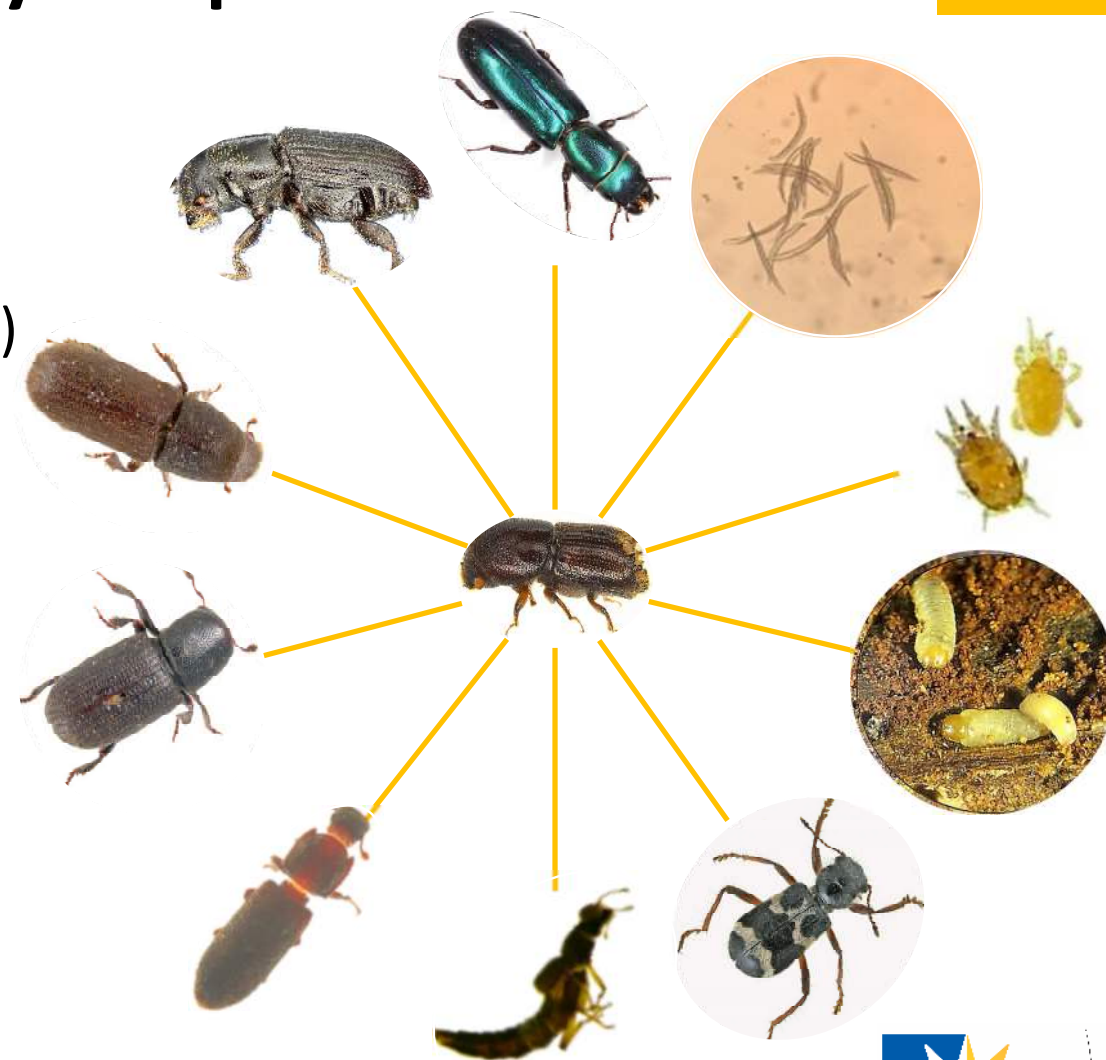


Roptrocercus xylophagorum *Dendrosoter sulcatus*

(Ips Project Management Committee 1990)

Bark beetle natural enemy complex

- USA: 30.8% *Ips* spp. brood reduction – predators (32 species) and parasitoids/parasites (14 species) (Kulhavy et al. 1989)



Images: Natasha Wright, Braman Termite & Pest Elimination; Gerald J. Lenhard, Louisiana State University, Bugwood.org



Opportunities – potential predatory beetles



Corticeus sp. (Coleoptera:
Tenebrionidae)



Platysoma sp. (Coleoptera:
Histeridae)

- *C. fraxini* and *C. pini* biocontrol UK and South Africa (BIOCAT2023.1)

- *P. elongatum* – biocontrol UK *l. sexdentatus* (Meshkova et al. 2022)

- Associated with *Ips* in Australia (Stone 1993; D. Smith pers. com)

Entomopathogenic fungi



Beauveria bassiana

Field

84% mortality *I. avulsus* (Olatinwo et al. 2018)

Laboratory

50-90% *I. typographus* (Kreutz et al. 2004) and *I. sexdentatus* (Steinwender et al. 2010)

- Non-target impacts
- Viability under field conditions (Mann and Davis 2021)

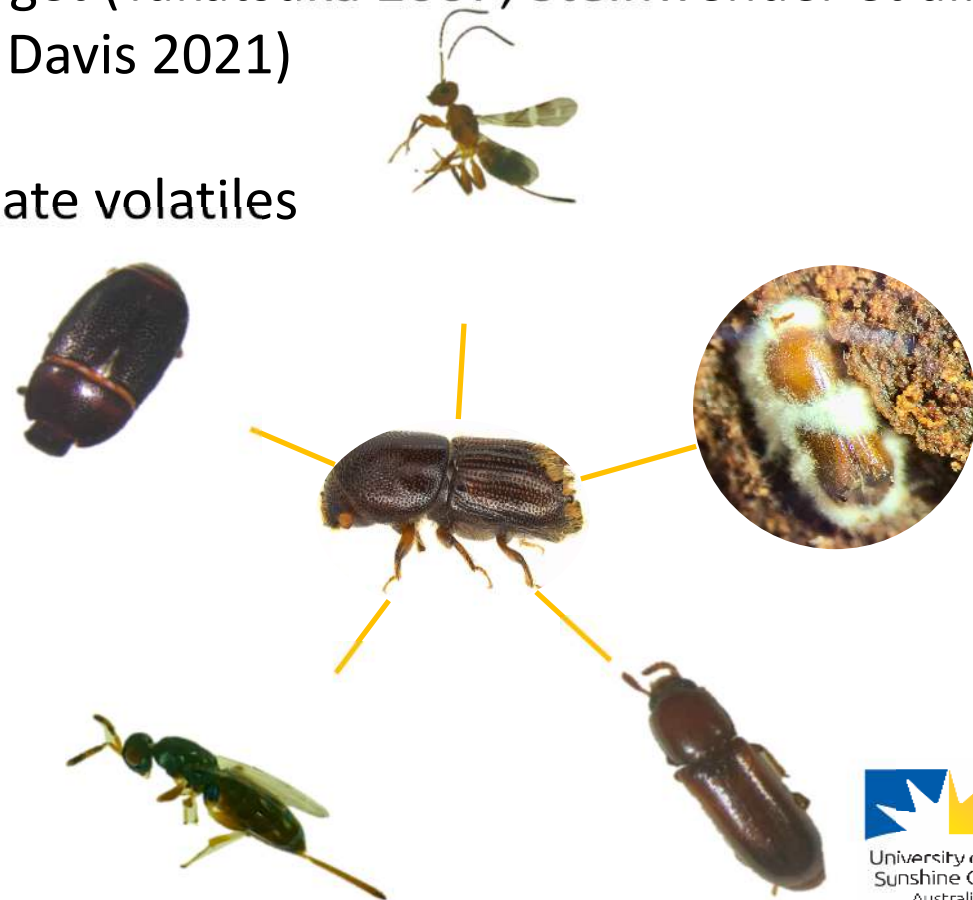
Semiochemicals for parasitoid performance

- Improved utilisation (Aldrich 1995) and effectiveness (Ali et al. 2023)
- Host-associated volatile organic compounds (VOCs) – oxygenated monoterpenoids (Sullivan et al. 1997; Sullivan et al. 2000)
- Host-associated fungal volatiles (Boone et al. 2008; Kandasamy et al. 2016)



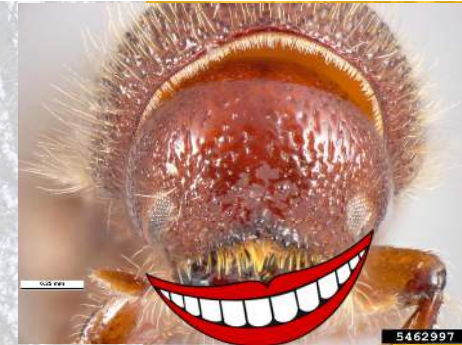
Way forward

- *Corticeus* and *Platysoma* – feeding assays, gut content analysis
- Entomopathogenic fungi from target (Takatsuka 2007; Steinwender et al. 2010)
- Delivery mechanisms (Mann and Davis 2021)
- Parasitoids – role of fungal associate volatiles



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