

Truffles and value-adding

Innovation in an emerging industry

Anne Mitchell





TRUFFLES

Underground mushrooms

- fruiting body of a fungus
- Fungus is in a symbiotic relationship with a host tree roots
 - *mycorrhizae*
- 1000+ truffle-like species found worldwide

EDIBLE TRUFFLE

Tuber spp. 70+ species

Tuber magnatum

T. melanosporum

T. lyoniae

T. aestivum/*T. uncinatum*

T. borchii

T. oregonense, *T. gibbosum*

Leucangium spp.

Terfezia spp, *Tirmania* spp



HISTORY OF THE INDUSTRY

World knowledge

- 1800s: field inoculation, re-afforestation in southern France
- 1960s: research into nursery inoculation
- 1977/1978: 1st truffles from nursery inoculated trees
- 1980s Spain and USA (California)
- 1987 New Zealand
- 1992/1993 Australia (Tasmania)
- Chile, Uruguay, Argentina, South Africa, Canada, Sweden



NZ & AUSTRALIA HISTORY

1985 – research in New Zealand

1987 – 1st planting in NZ

1992 – 1st planting in Australia - Tasmania

1997 – 1st planting in Western Australia

1999 – 1st truffle found in Australia - Tasmania

2003 – 1st truffle found in WA



CHARACTERISTICS OF THE INDUSTRY

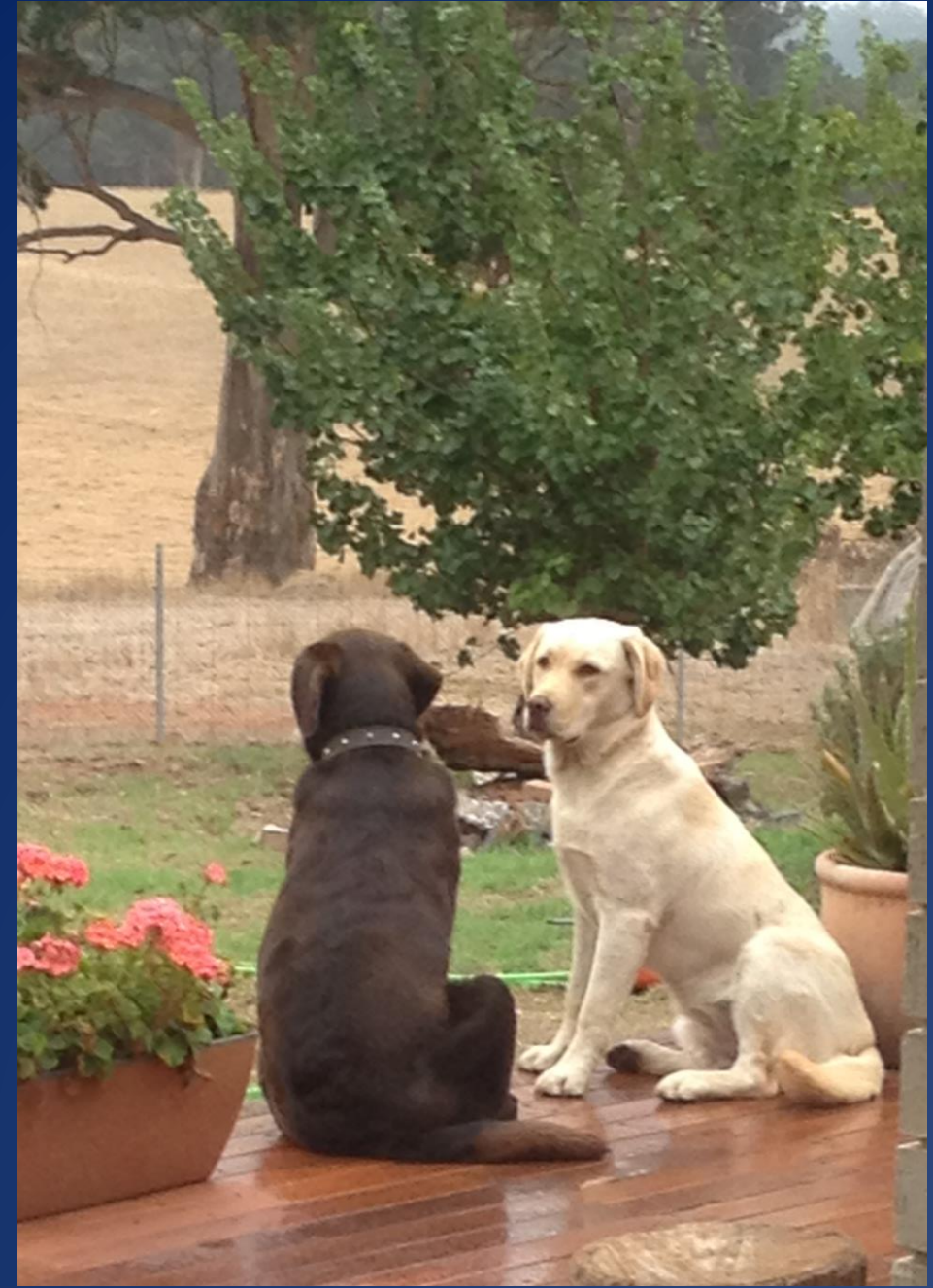
- Very long lead time from planting to commercial production
- Short harvesting season
- Short shelf life of fresh truffles
- Uncertainty of production in any given orchard
- Limited but increasing international knowledge on production systems
- Active international collaboration between scientists and producers
- no training program yet available (cf. viticulture/silviculture)



CHARACTERISTICS OF THE INDUSTRY

- *One of the few agricultural pursuits where a product is not guaranteed*
- **the business happens underground**
 - failure?
 - ? tree quality
 - ? management
 - ? site-specific





TRUFFLES GROWN IN AUSTRALIA

BLACK

Tuber. melanosporum

T. aestivum/uncinatum

WHITE

T. borchii

ACCIDENTAL CONTAMINANT

T. brumale

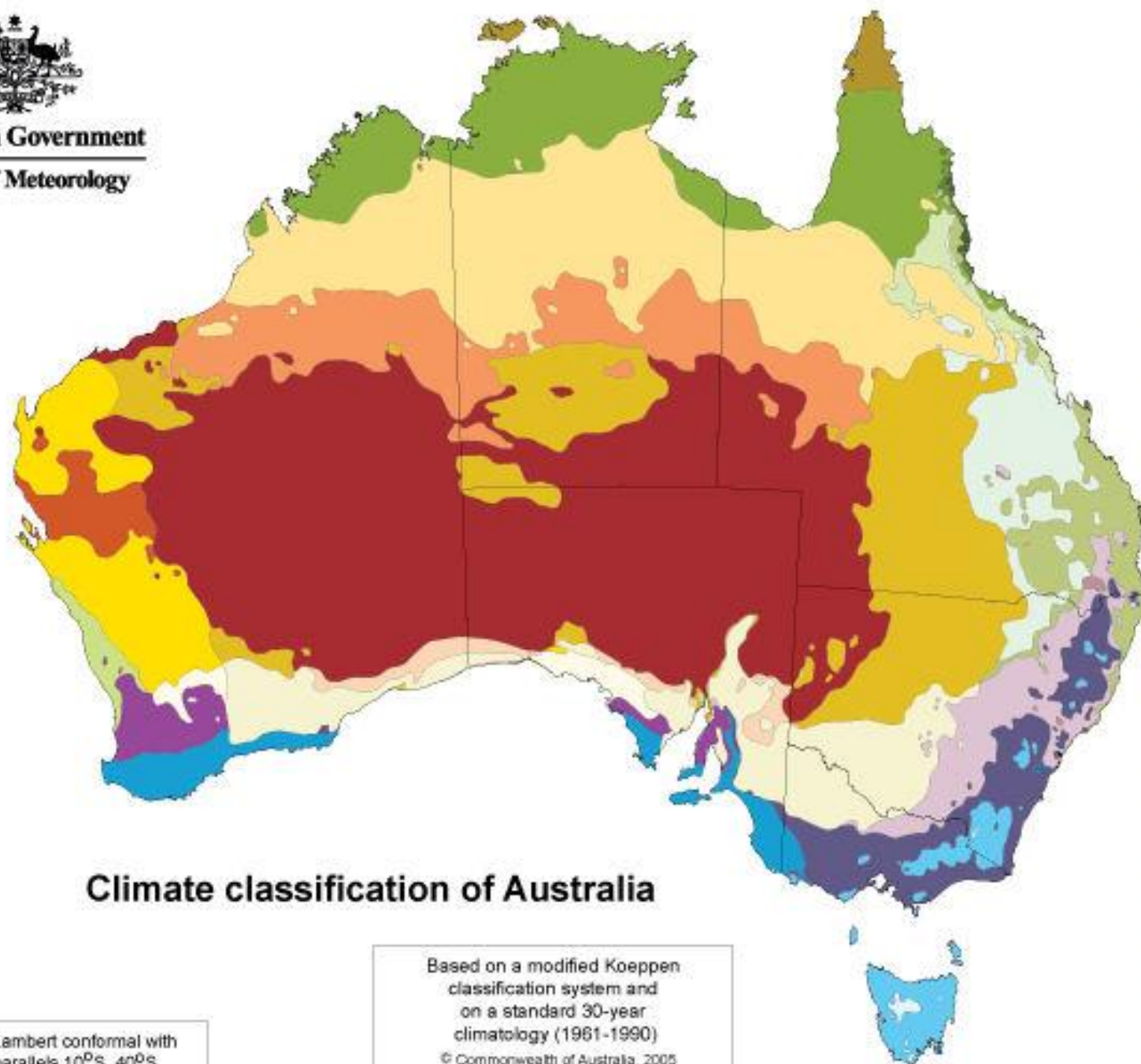
TRUFFLE GROWERS IN AUSTRALIA

- 200+ growers across Australia
- 600+ hectares
- Australian Truffle Growers Association ~120 members
- state-based organisations
 - Truffle Producers of Western Australia Inc.
 - Victorian Growers Group
 - Regional NSW co-operative



Australian Government

Bureau of Meteorology



Climate classes

Equatorial

- rainforest (monsoonal)
- savanna

Tropical

- rainforest (persistently wet)
- rainforest (monsoonal)
- savanna

Subtropical

- no dry season
- distinctly dry summer
- distinctly dry winter
- moderately dry winter

Desert

- hot (persistently dry)
- hot (summer drought)
- hot (winter drought)
- warm (persistently dry)

Grassland

- hot (persistently dry)
- hot (summer drought)
- hot (winter drought)
- warm (persistently dry)
- warm (summer drought)

Temperate

- no dry season (hot summer)
- moderately dry winter (hot summer)
- distinctly dry (and hot) summer
- no dry season (warm summer)
- moderately dry winter (warm summer)
- distinctly dry (and warm) summer
- no dry season (mild summer)
- distinctly dry (and mild) summer
- no dry season (cool summer)

Climate classification of Australia

Based on a modified Koeppen classification system and on a standard 30-year climatology (1961-1990)

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Projection: Lambert conformal with standard parallels 10°S, 40°S.

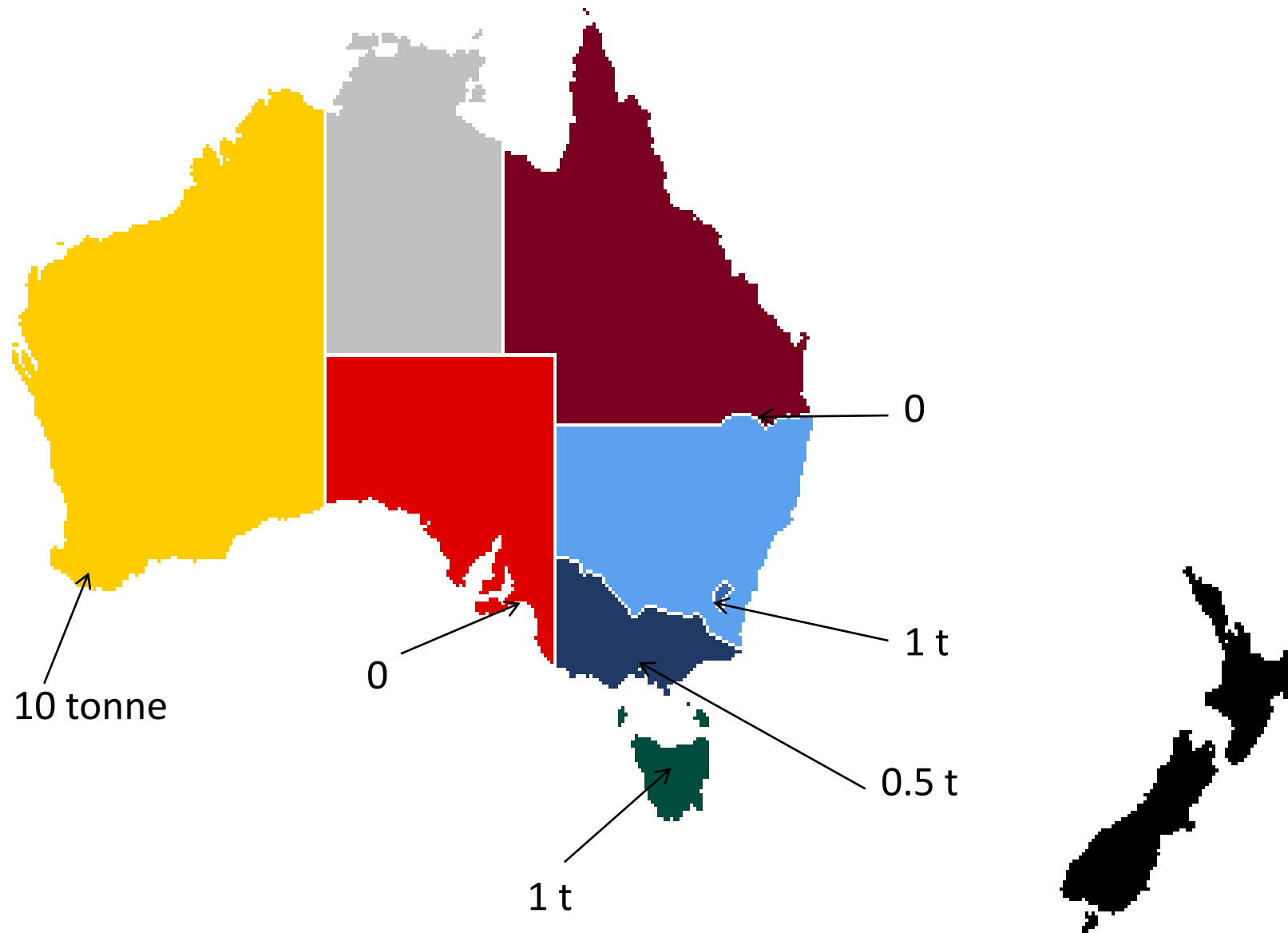
AUSTRALIAN PRODUCTION

STATE	2011	2012	2013	2015
NSW/ACT	300	400	500	1000
Tasmania	650	1000	1500	750
Victoria	15	50	75	300
Western Australia	2400	3300	6000	6500
TOTAL	3365	4750	8075	8550

Estimates in kilograms

PRODUCTION 2016

- 50% increase on 2015 → 12.5 t
- unseasonal Autumn rain, waterlogged soils in poorly draining areas
- hypoxia and resultant >50% rot on the east coast
- production levels up to 500 kg/ha in Manjimup region
- 5 kg *T. borchii* in Victoria



Estimated *T. melanosporum* production 2016

INDUSTRY R&D FUNDING:

Australian National University (ANU) Canberra

Australian Truffle Growers Association (ATGA)

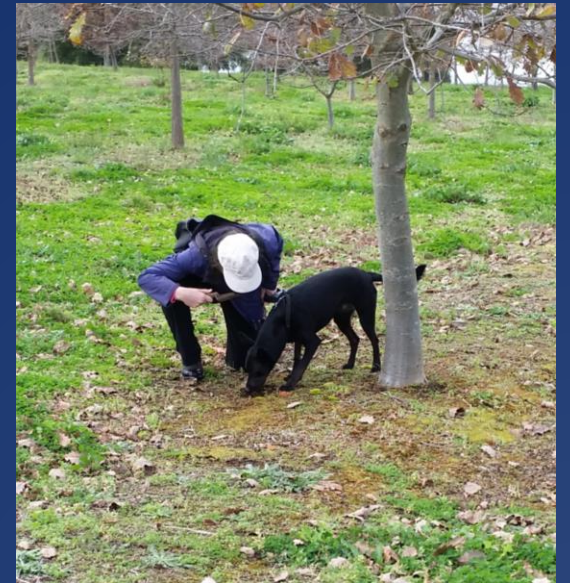
Department of Agriculture and Food, WA (DAFWA)

Department of Primary Industries, New South Wales (DPI NSW)

Plant Health Australia (PHA)

Rural Industries Research & Development Corporation (RIRDC)

Truffle Producers of Western Australia (TPWA)



RESEARCH AND DEVELOPMENT

Grading Standard - training workshops in each stage

Tree certification

Research and Development

E-nose: **Garry Lee** UWA

Proteomics: **Mark Baker** Maquarie

Reducing truffle rot: **Harry Eslick** Truffle & Wine Company, Murdoch

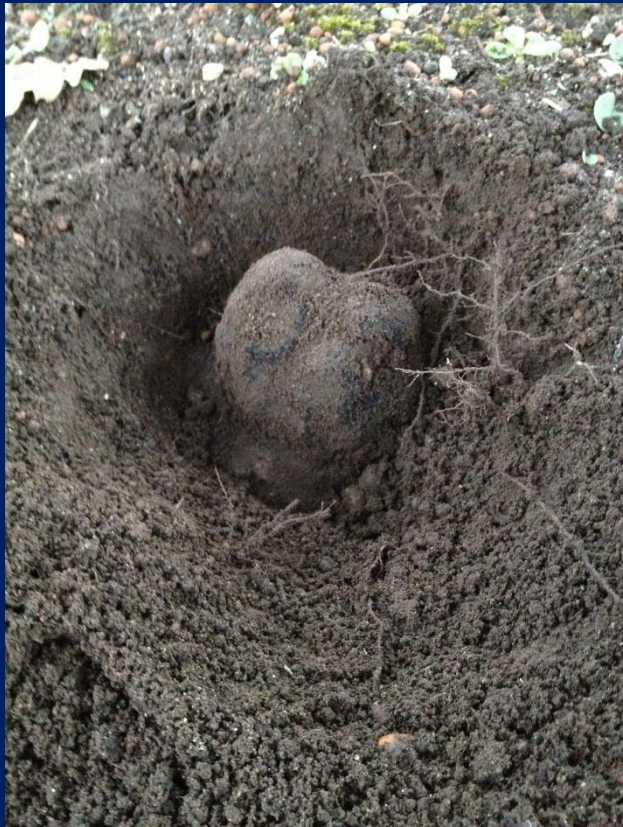
Pests and Diseases of Truffles and Their Host Trees - national project

Truffles and value-adding – DAFWA, TPWA, Fresh Produce Alliance

GRADING

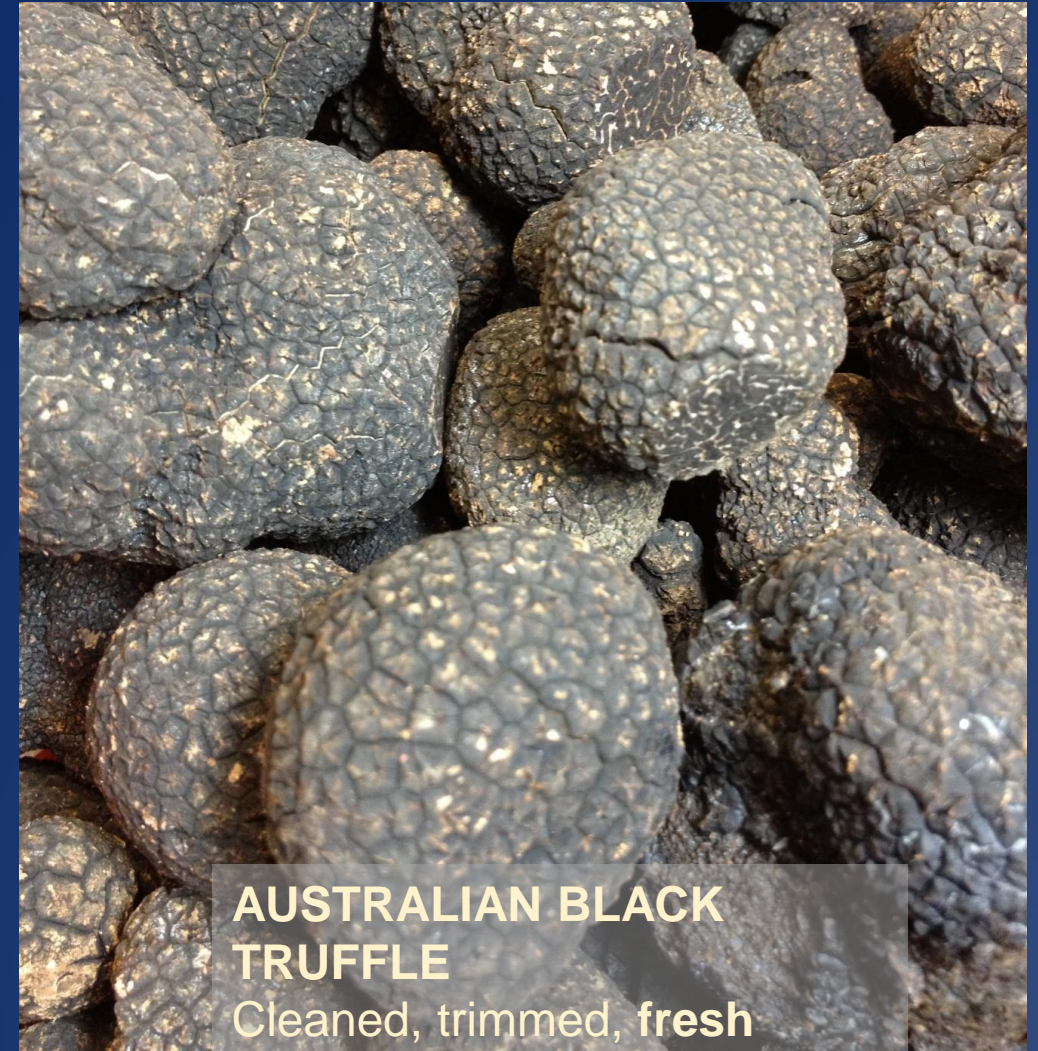
Quality and consumer requirements

Presentation to market



PRESENTATION TO MARKET

Grading standard adapted from UN standard
Grading workshops conducted every year



**AUSTRALIAN BLACK
TRUFFLE**

Cleaned, trimmed, **fresh**
free from dirt, species specific

TREE CERTIFICATION

Tree health - trunk and branches

Root system - healthy (no. feeder roots; J-rooting)
- inoculation success/percentage

DNA - *T. melanosporum* present
- contaminants, esp. other *Tuber* spp.



TREE CERTIFICATION

Voluntary

Random sample collected from nursery

Independent collection process

Independent testing agencies

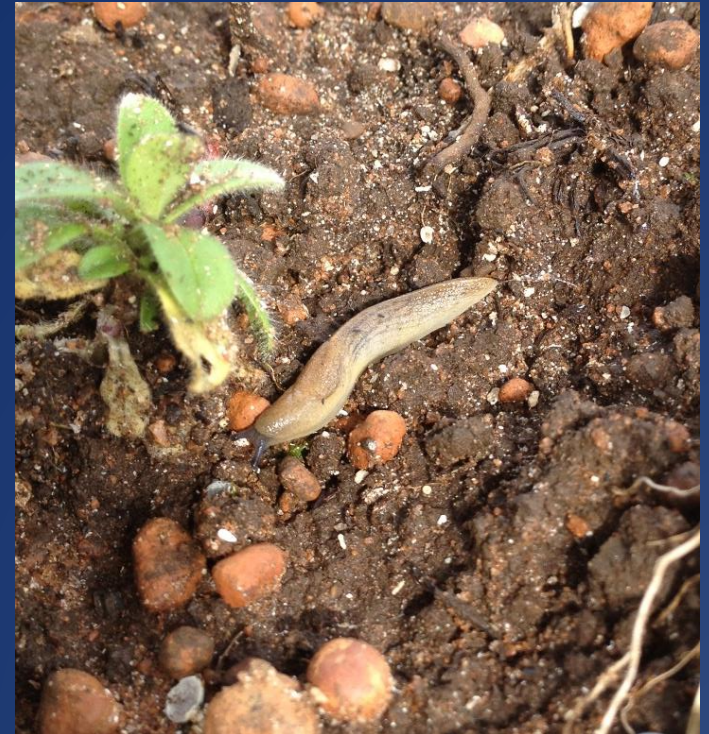


PESTS AND DISEASES OF TRUFFLES AND THEIR HOST TREES

National project based in Manjimup, Western Australia

Funded by:

- Federal and state governments
- Truffle Producers of Western Australia
- Australian Truffle Growers Association
- Australian National University
- Private industry members



P & D PROJECT

Objectives

- Identify pests and diseases
- Information package
- Management options - IPM principles
- Industry best practice
- International phytosanitary/quarantine requirements
- Database: development of the Australian truffle industry biosecurity manual



PROJECT DESIGN

- Survey of growers
 - Mapping grower locations
- Regular monitoring at selected sites
- National enquiry line
- Detailed study of key pests identified
- Review management practices

PROGRESS TO DATE

- Mapping: WA >60 growers; ES >85
- Survey conducted
- Pests and disease webpage
- National enquiry line
- Newsletters
- Biosecurity webpage
- Monitoring sites across Australia
- Detailed study of slugs, millipedes, slaters
- Establishment of Reducing Truffle Rot Working Group



Pitfall traps and tile traps



Pest reporting & identification

- App based reporting - MyPestGuide Reporter
- Facility for growers to send images of pests or problems
- Feedback and recommendations
- Adds to database for project
- Ongoing surveillance for Biosecurity Plan



Truffles and value adding

- WA based project to utilise all product, including 'waste'
- Collaboration with Fresh Produce Alliance
- Determine parameters for new products
- Consumer and market acceptance

COLLEAGUES

DAFWA

Stewart Learmonth
Helen Collie
Alan Jacob
Diana Fisher

Fresh Produce Alliance

Jennie Franchesci
Debbie Xu

NATIONAL

Celeste Linde - Australian National University
Ainsley Seago - Department of Primary Industries NSW
Alan Davey - private consultant to rural industries
Janet Paterson - Truffle and Wine Company
Harry Eslick - formerly of Truffle and Wine Company
Gavin Booth - Australian Truffle Traders

Numerous growers across Australia







Thank you