
Experience in Portugal of securing authorisation to release *Trichilogaster acaciaelongifoliae* (against *Acacia longifolia*)

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MINISTÉRIO DA EDUCAÇÃO E CIÊNCIA



The problem (1)

Invasion by *Acacia longifolia* in Portugal

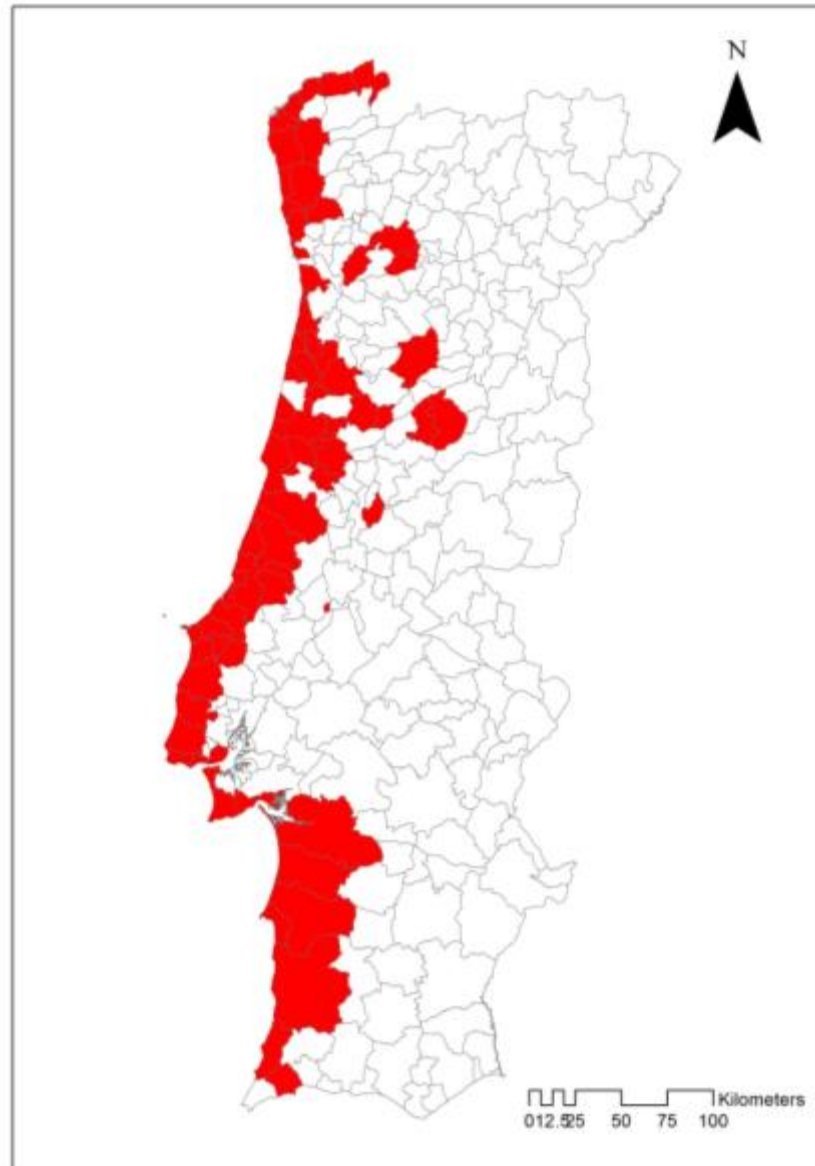
- Exotic tree, from Australia



The problem (1)

Invasion by *Acacia longifolia* in Portugal

- Exotic tree, from Australia
- Introduced in the early 20th century for sand stabilization
- At present: invades extensive areas of coastal dunes and other habitats in Portugal (and Spain, France, Italy, South Africa...)
- **Key point: massive seed production – large long-lived seed bank**
→ **fast re-invasion potential**





The problem (2)

Invasion by *Acacia longifolia*

- Major Impacts:
 - **Decreases biodiversity**; threatens protected species & habitats, e.g., **Natura 2000 sites** and **Nature Reserves**
 - Changes soil biology and biochemistry;
 - Decreases **forest productivity**
 - Increases fire hazard
- ➔ Economic impacts: >> 1M€ (last 10y)+ **non-available data**

The problem (2)

Invasion by *Acacia longifolia*

- Major Impacts:

Invasion of the Portuguese dune ecosystems by the exotic species *Acacia longifolia* (Andrews) Willd.: effects at the community level.

Hélia Marchante^{1*}; Elizabete Marchante² and Helena Freitas²

Plant Invasions: Ecological Threats and Management Solutions, pp. 75-85
Edited by L.E.Child, J.H. Brock, G.Brundu, K. Prach, P.Pysek, P.M. Wade, M. Williamson
© Backhuys Publishers, Leiden, The Netherlands

Soil Biology & Biochemistry 40 (2008) 2563–2568

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Soil Biology & Biochemistry

journal homepage: www.elsevier.com/locate/soilbio



ELSEVIER



Invasive *Acacia longifolia* induce changes in the microbial catabolic diversity of sand dunes

Elizabete Marchante^{a,b,*}, Annelise Kjøller^b, Sten Struwe^b, Helena Freitas^a

Biol Invasions
DOI 10.1007/s10530-008-9280-8

ORIGINAL PAPER

Belowground mutualists and the invasive ability of *Acacia longifolia* in coastal dunes of Portugal

Susana Rodríguez-Echeverría ·
João A. Crisóstomo · Cristina Nabais ·
Helena Freitas

Plant Ecol
DOI 10.1007/s11258-015-0530-4



Temporal changes in the impacts on plant communities of an invasive alien tree, *Acacia longifolia*

Hélia Marchante · Elizabete Marchante ·
Helena Freitas · John H. Hoffmann

APPLIED SOIL ECOLOGY 40 (2008) 210–217

available at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/apsol



ELSEVIER



Short- and long-term impacts of *Acacia longifolia* invasion on the belowground processes of a Mediterranean coastal dune ecosystem

Elizabete Marchante^{a,b,*}, Annelise Kjøller^b, Sten Struwe^b, Helena Freitas^a

The solution?

mechanical and chemical control available

- prohibitively **expensive**
- fails to succeed due to copious seed banks

Sustainable alternatives needed!

Biological control?

Trichilogaster acaciaelongifoliae

- Australian bud-galling wasp (*Hymenoptera: Pteromalidae*), **3mm**



Trichilogaster acaciaelongifoliae

- Australian bud-galling wasp (*Hymenoptera: Pteromalidae*), **3mm**
- **> 30 years in South Africa** (after more than 40 non-target *Acacia* species tested - most from SA, 12 from Australia)
- Mono-specific – affects *A. longifolia* (sporadic, underdeveloped galls in *A. melanoxylon* and *Paraserianthes lophantha*)
- Annual life cycle:
 - 362 days inside galls;
 - Emergence of ♀, search for flower (vegetative) buds;
 - oviposition and death after 2-3 days
 - galls develop instead of flowers – **NO SEEDS produced**

Trichilogaster acaciaelongifoliae

Short term effects:

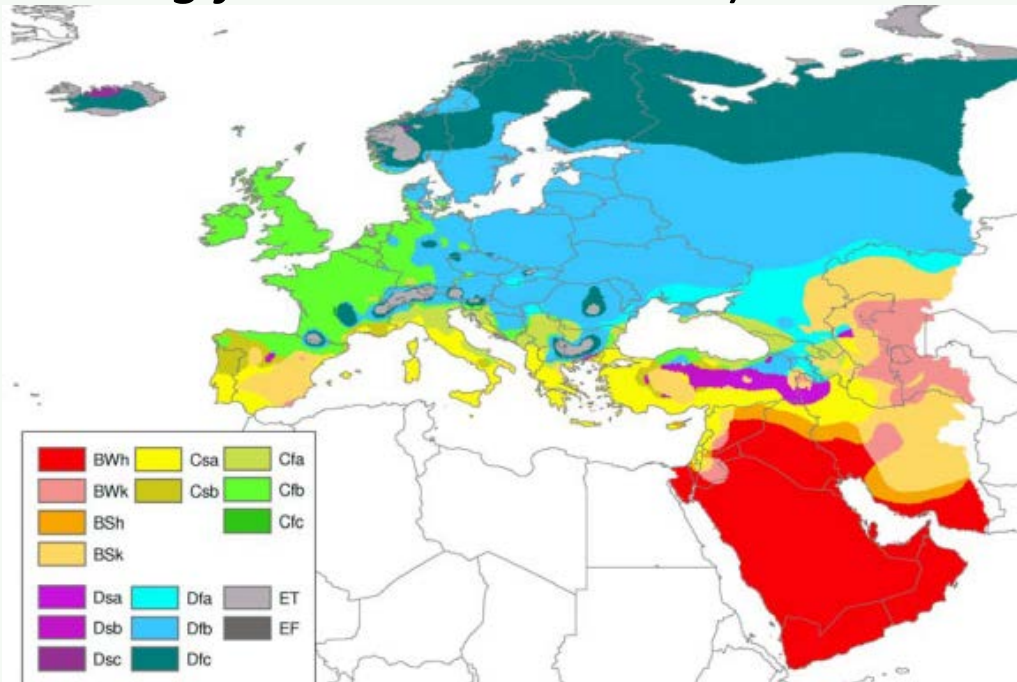
- Decline of seed production & dispersal;
- no addition to the seed bank

Long term effects:

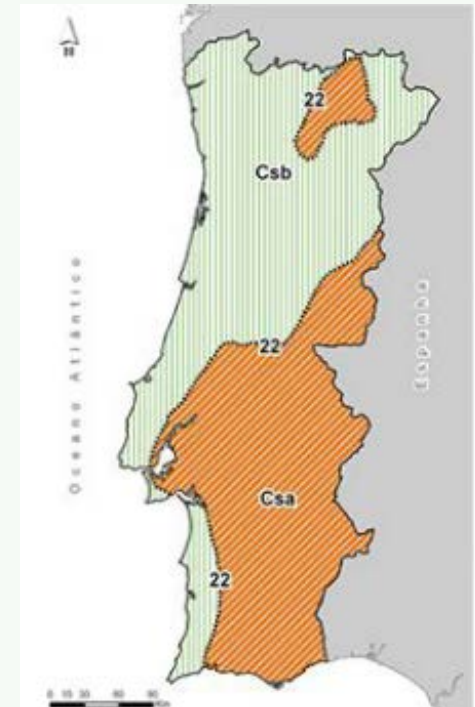
- reduction of germination post-control, fire or other disturbances
- physiological stress - plants die as cannot cope with heavy gall loads

Trichilogaster acaciaelongifoliae

- **Potential distribution after release:**
 - Preferred: Csb & Cfb climates (native range and South Africa)
 - Most probable distribution - Portugal and NW Spain (where *A. longifolia* is also invasive)



<http://www.hydrol-earth-syst-sci.net/11/1633/2007/hess-11-1633-2007.pdf>



2003. Application for
introduction into
quarantine (**ICN**)



ICN – Portuguese national authorities for nature conservation – *A. longifolia* is mainly an environmental weed

Portuguese Law – Decree-Law no 565/99

MINISTÉRIO DO AMBIENTE

Decreto-Lei n.º 565/99

de 21 de Dezembro

A introdução de espécies não indígenas na Natureza pode originar situações de predação ou competição com espécies nativas, a transmissão de agentes patogénicos ou de parasitas e afectar seriamente a diversidade biológica, as actividades económicas ou a saúde pública, com prejuízos irreversíveis e de difícil contabilização. Acresce que, quando necessário, o controlo ou a erradicação de uma espécie introduzida, que se tornou invasora, são especialmente complexos e onerosos.



- Intentional introduction of **alien species** in the wild
- Some “economic” exceptions - agriculture, horticulture, etc.

Not specific for biocontrol!

Dossier with BCA information (biology, host-specificity tests, etc)

Proposal of the list of species for the host-specificity testing - 40 species

Family		Non-target species	criteria
Anacardiaceae	1 n	<i>Pistacia lentiscus</i> L.	
Caprifoliaceae	2 n	<i>Viburnum tinnus</i> L.	
Cistaceae	3 n	<i>Cistus psilosepalus</i> Sweet	
Empetraceae	4 n	<i>Corema album</i> (L.) D.Don	
Ericaceae	5 n	<i>Arbutus unedo</i> L.	
	6 n	<i>Erica scoparia</i> L.	
Fabaceae (=Leguminosae)	7 e	subfam. <i>Caesalpinioideae</i> - <i>Ceratonia siliqua</i> L.	
	8 n	subfam. <i>Faboideae</i> - <i>Cytisus striatus</i> (Hill.) Rothm.	
	9 n	subfam. <i>Faboideae</i> - <i>Genista falcata</i> Brot.	
	10 n	subfam. <i>Faboideae</i> - <i>Medicago marina</i> L.	
	11 e	subfam. <i>Faboideae</i> - <i>Phaseolus vulgaris</i> L.	
	12 e	subfam. <i>Faboideae</i> - <i>Pisum sativum</i> L.	
	13 n	subfam. <i>Faboideae</i> - <i>Stauracanthus genistoides</i> (Brot.) Samp. subsp. <i>genistoides</i>	
	14 n	subfam. <i>Faboideae</i> - <i>Ulex parviflorus</i> L.	
	15 e	subfam. <i>Faboideae</i> - <i>Vicia faba</i> L.	
	16 e	subfam. <i>Mimosoideae</i> - <i>Acacia melanoxylon</i> R. Br.	
Fagaceae	17 n	<i>Quercus faginea</i> Lam.	
	18 n	<i>Quercus lusitanica</i> Lam.	
	19 n	<i>Quercus pyrenaica</i> Willd.	
	20 n	<i>Quercus robur</i> L.	
	21 n	<i>Quercus rotundifolia</i> Lam.	
	22 n	<i>Quercus suber</i> L.	
	23 n	<i>Quercus x coutinhoi</i> Samp.	
Lamiaceae	24 n	<i>Lavandula luisieri</i> (Rozeira) Rivas-Martinez	
Lauraceae	25 n	<i>Laurus nobilis</i> L.	
Myricaceae	26 n	<i>Myrica faya</i> Aiton	
Myrtaceae	27 e	<i>Eucalyptus globulus</i> Labill.	
Oleaceae	28 n	<i>Phillyrea angustifolia</i> L.	
Pinaceae	29 n	<i>Pinus pinaster</i> Aiton	
	30 e	<i>Pseudotsuga menziesii</i> (Mirbel) Franco	
Polygalaceae	31 n	<i>Polygala vulgaris</i> L.	
Rhamnaceae	32 n	<i>Rhamnus alaternus</i> L.	
Rosaceae	33 e	<i>Pyrus communis</i> L.	
	34 e	<i>Prunus persica</i> (L.) Batsch.	
	35 n	<i>Prunus lusitanica</i> L.	
	36 e	<i>Malus domestica</i> Borkh.	
Rutaceae	37 e	<i>Citrus sinensis</i> (L) Osbeck	
Salicaceae	38 n	<i>Salix atrocinerea</i> Brot.	
Ulmaceae	39 n	<i>Ulmus procera</i> Salisb.	
Vitaceae	40 e	<i>Vitis vinifera</i> L.	

2003. Application for
introduction into
quarantine (**ICN**)











The species is not
included in CITES

2004. Permit to
host-specificity
tests in quarantine

2005-2010. Host-
specificity testing
in quarantine

Host-specificity tests

- Female wasps obtained from galls (South Africa)
- Specificity test
 - 40 non-target species tested

Months	J	F	M	A	M	J	J	A	S	O	N	D			
South H.	Summer			Autumn			Winter			Spring					
<i>A. longifolia</i>				(bud dormancy)											
<i>T. a</i>	(bud with larval development but without external signs of being infested)														
North H.	Winter			Spring			Summer			Autumn					
<i>A. longifolia</i>															
<i>T. a</i>	(Just introduced in the natural environment)														

Host-specificity tests

- Female wasps obtained from galls (South Africa)
- Specificity test
 - 40 non-target species tested
 - Flower & vegetative buds dissected to detect eggs
 - 1 - Non-choice test
 - 2 - Paired-choice test
 - 3 - Trials on potted plants
 - 4 - Field surveys in South Africa and Australia

Host-specificity tests



Results:

- Oviposition in **ONLY** 3 non-target species in non-choice tests (*Acacia melanoxylon*, *Vitis vinifera*, *Cytisus striatus*)
→ **BUT** confinement in cages disrupts normal behavior (false positives)

Trials on potted plants:

- Galls **ONLY** developed on *A. longifolia* (able to complete the life cycle)
- Latter: *A. retinodes* (*A. floribunda*) & *C. striatus* – **NO Galls until now**

Field surveys in South Africa and Australia:

- Galls **ONLY** detected on *A. longifolia*
- (*V. vinifera* is a major crop in South Africa, frequent next to invasive stands of galled *A. longifolia*)

**November 2015 -...
starting release 😊**

2003. Application for
introduction into
quarantine (**ICN**)

ICNF – national authorities for nature
conservation and forests
DGAV – national authorities for plant
health (agriculture and veterinary)

2015. SCPH - OK;
DGAV/ICNF - OK – **permit
to release in the wild**

2004. Permit to
host-specificity
tests in quarantine

2014-15. Risk
Assessment
by EFSA

Next talk

2005-2010. Host-
specificity testing
in quarantine

2013. EC Standing
Committee on
Plant Health

2011-12. Application
for release in the
wild: ICNF → DGAV

Preliminary
evaluation
EPPO PM 6/2 (2)



November 2015 -...
starting release 😊

2003. Application for
introduction into
quarantine (ICN)

>12 years
(BCA previously
selected and tested)

2015. SCPH - OK;
DGAV/ICNF - OK – **permit
to release in the wild**

2004. Permit to
host-specificity
tests in quarantine

2014-15. Risk
Assessment
by EFSA

2005-2010. Host-
specificity testing
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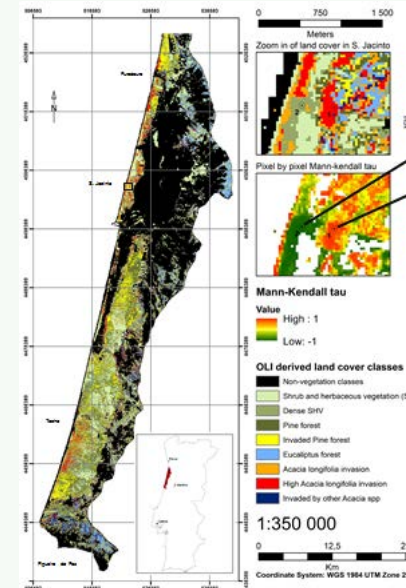
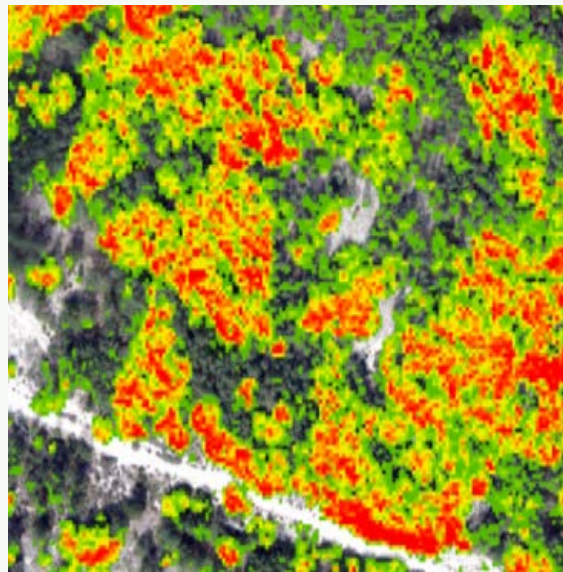
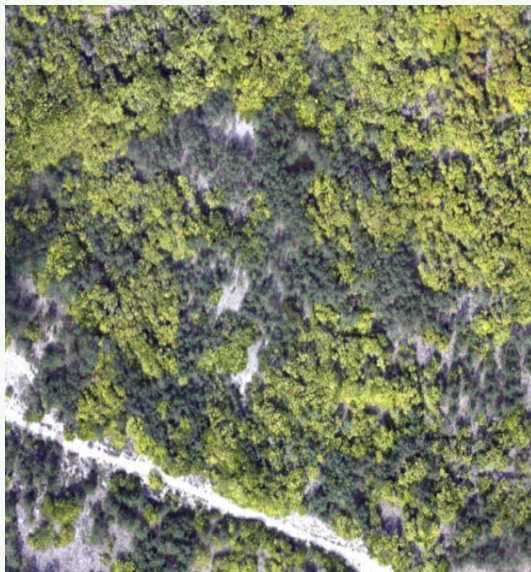
2013. EC Standing
Committee on
Plant Health

2011-12. Application
for release in the
wild: ICNF → DGAV

Future?

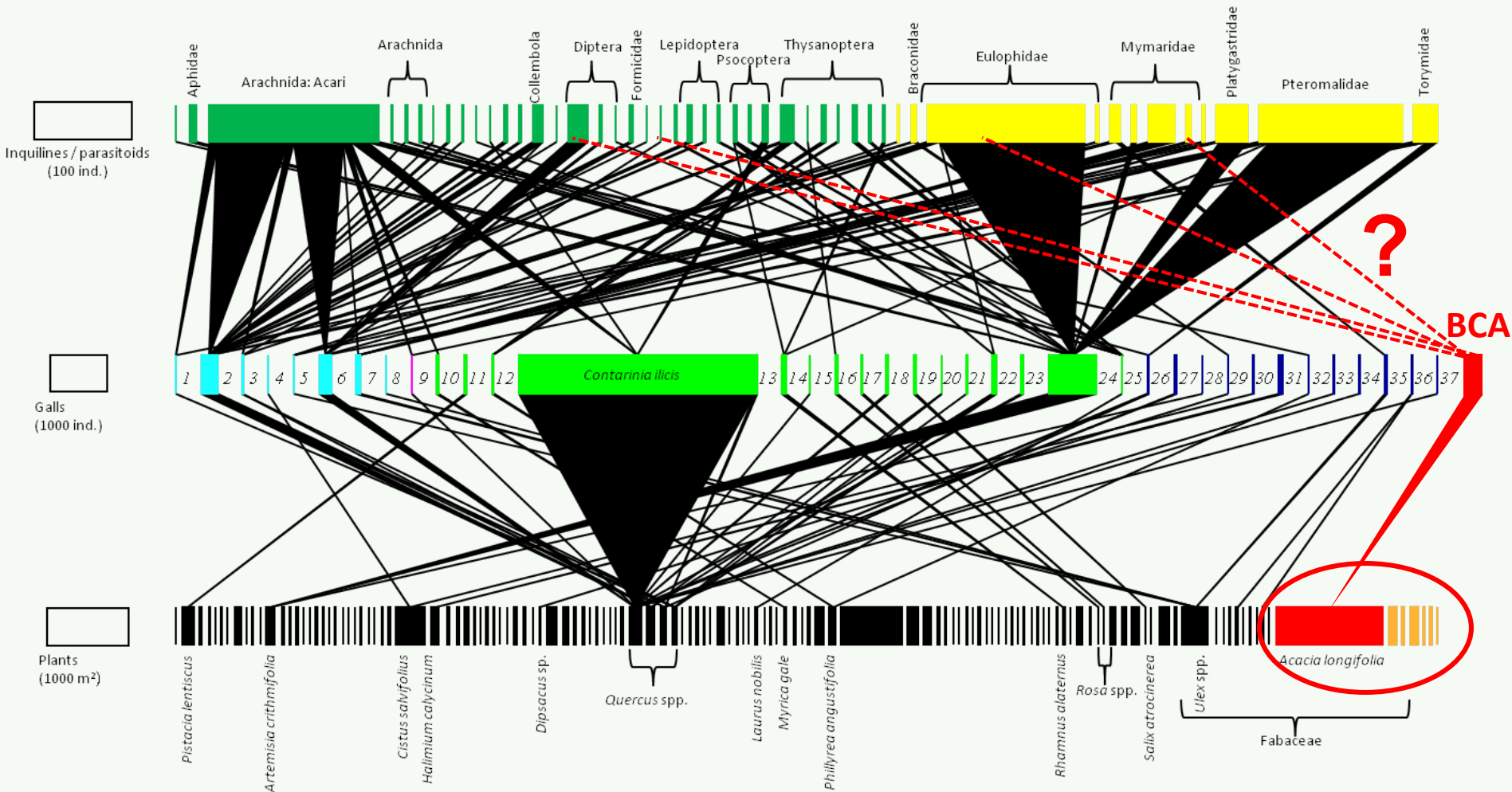
Following up

- Assess/ follow the distribution of *A. longifolia* and biocontrol agent (remote sensing);
- Monitoring plan in place to measure *T. acaciaelongifoliae* establishment and success; including direct and indirect non-target effects



Future?

Ecological networks – plants-galling insects-parasitoids/inquilines



Future?

Ideal conditions to follow up (INVADER-B project - ongoing)

- Assess/ follow the distribution of *A. longifolia* and biocontrol agent (remote sensing);
- Monitoring plan in place to measure *T. acaciaelongifoliae* establishment and success; including direct and indirect non-target effects

TO STRESS:

- Galls imported into quarantine facilities; only females that emerge will be released

Doing nothing is the biggest risk! More species lost, more money spent, more difficult the solution...

Acknowledgements

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Thank you! Obrigada 😊

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