

Detection tools for PWN- infested pines in Portugal

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Pine Wilt Disease in Portugal



North America

Asia: Japan (1905), China (1982), Korea (1988)

Europe: Portugal (1999); Spain (2008);
Madeira Island (2012)

Pine Wilt Disease in Portugal



Bursaphelenchus xylophilus



Susceptible Pine host tree
Pinus pinaster

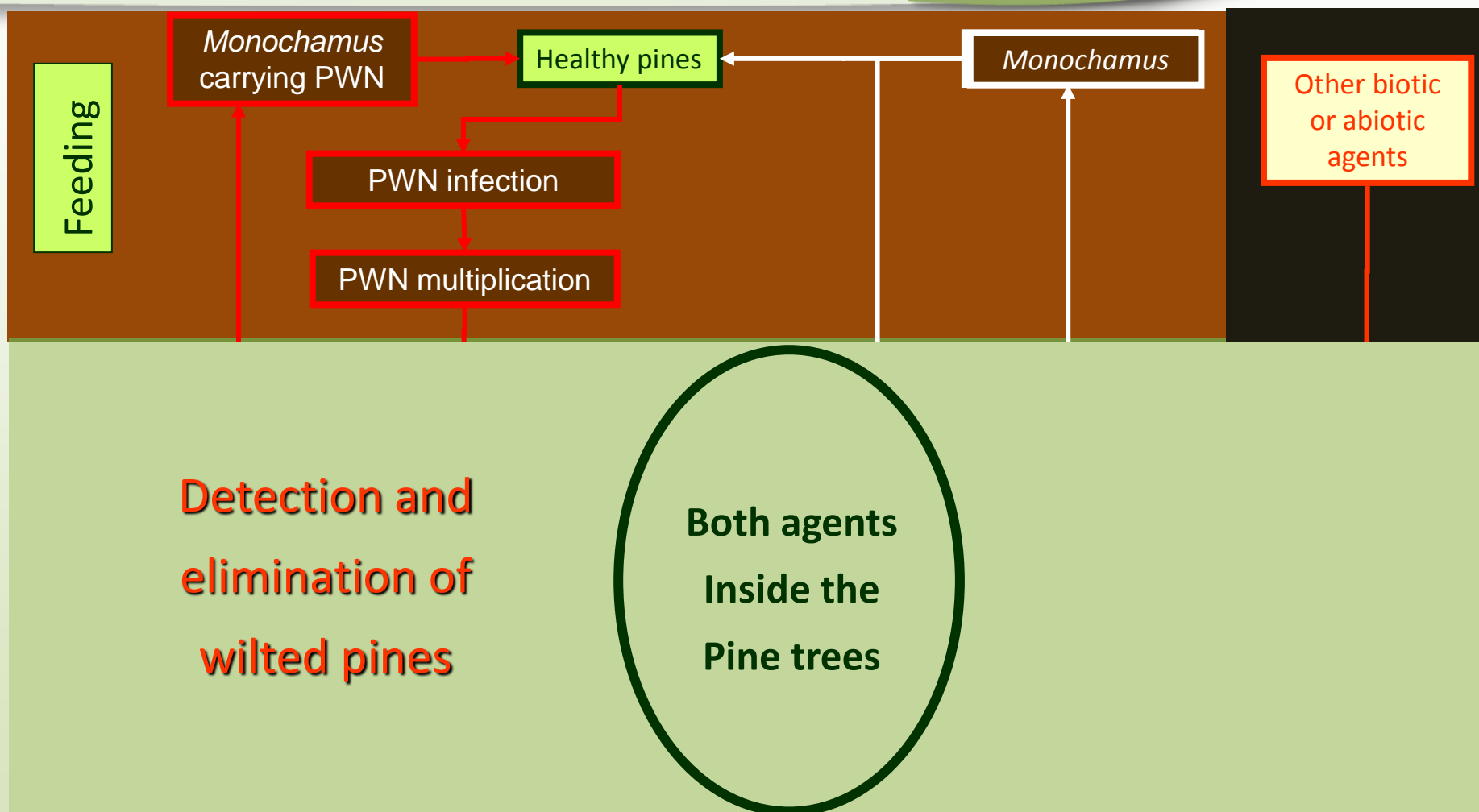
Pinus nigra
Pinus radiata

**PINE WILT
DISEASE**



Insect-vector
Monochamus galloprovincialis

Pine Wilt Disease in Portugal



Symptoms in the field

PWN-INFECTED PINES

- Oleoresin flow decreases / stops



OLEORESIN FLOW ASSESSMENT



Symptoms in the field

OLEORESIN FLOW ASSESSMENT



Symptoms in the field

PWN-INFECTED PINES

- Oleoresin flow decreases / stops
- Wilting canopy (yellowish needles)



VISUAL SYMPTOMS EVALUATION



Flag

Symptoms in the field

PWN-INFECTED PINES

- Oleoresin flow decreases / stops
- Wilting canopy (yellowish needles)
- Brown canopy
- Tree death



VISUAL SYMPTOMS EVALUATION



Yellowish



Red-brown



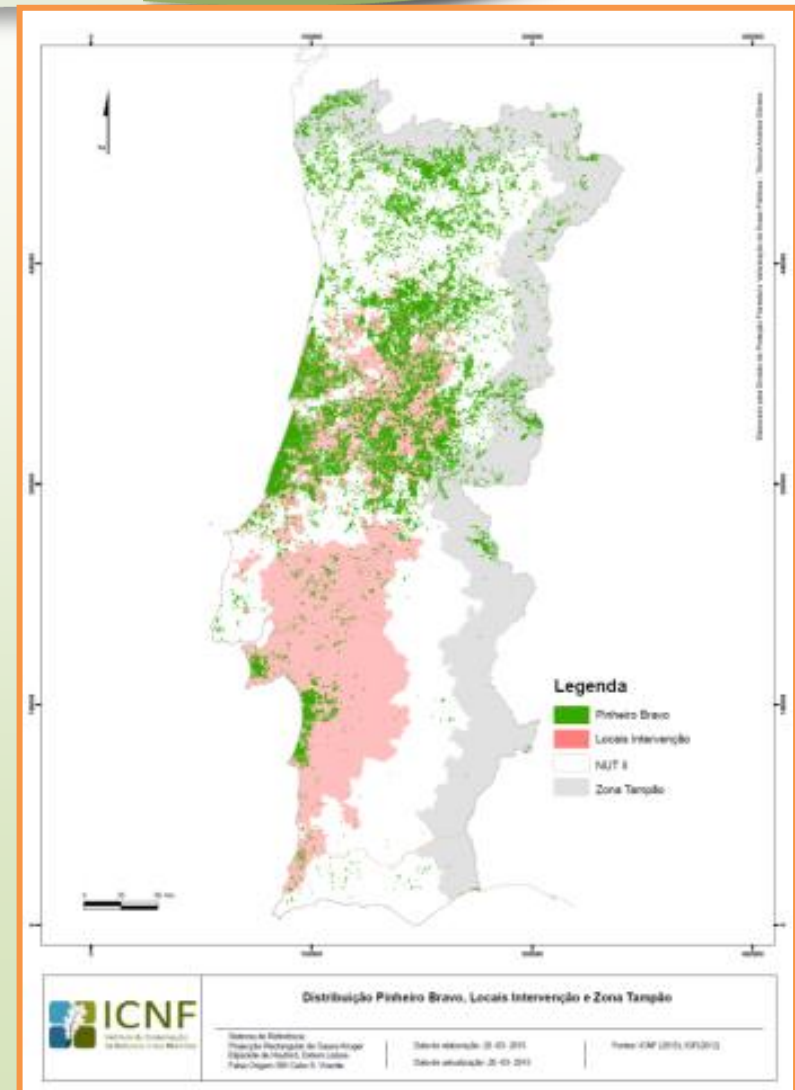
Dry-dead

PWN Survey



PWD SURVEY

- **Priority:** Buffer zone (20 km);
- Remaining territory:
Assessment of PWD risk level.



Assessment of PWD RISK LEVEL

	Proximity to PWD affected areas	Presence of conifers	Proximity to forest fires	Risk level categorisation
PWN incidence	+	+	+	Very high
	+	+	-	High
	-	+	+	Moderate
	+	-	-	Reduced
	-	-	+	Reduced
	-	-	-	Low

FIELD SURVEY OF SYMPTOMATIC TREES

- Field surveys are made by trained technicians, from ICNF (Buffer zone) and from Forest Owners Associations or Municipalities (remaining area);
- Reports of symptomatic trees are GPS inputted on web interface, <http://fogos.afn.minagricultura.pt/sgpp/login.asp> ;
- Wood samples are collected and sent to public certified Laboratories for analysis.

WOOD SAMPLING OF SYMPTOMATIC TREES



FIELD SURVEY OF SYMPTOMATIC TREES



Autoridade
Florestal
Nacional



Sistema Gestão Informação
Sanidade Florestal





Sistema de Gestão de Informação de Sanidade Florestal

Página de início

Nome Utilizador

Palavra-chave

☐ Início automático da sessão até sair explicitamente
☐ Guardar o meu nome de utilizador
☒ Perguntar sempre pelo utilizador e palavra-chave



<http://fogos.afn.min-agricultura.pt/sgpp/login.asp>



INSECT-VECTOR TRAPPING AND PWN SURVEY

- Multifunnel traps lured with Galloprotect used to catch *M. galloprovincialis* (higher trapping intensity in the Buffer zone);
- Traps locations are GPS-inputted on web interface <http://fogos.afn.minagricultura.pt/sgpp/login.asp> ;
- Insects caught are send to Certified laboratories for identification and survey of PWN.



INSECT-VECTOR TRAPPING AND PWN SURVEY

Armadiilha

Localização

Código *

Armadiilha

Localização

Entidade

Região

Centro

Tipo Arm

Distrito *

Castelo Branco

Responsável

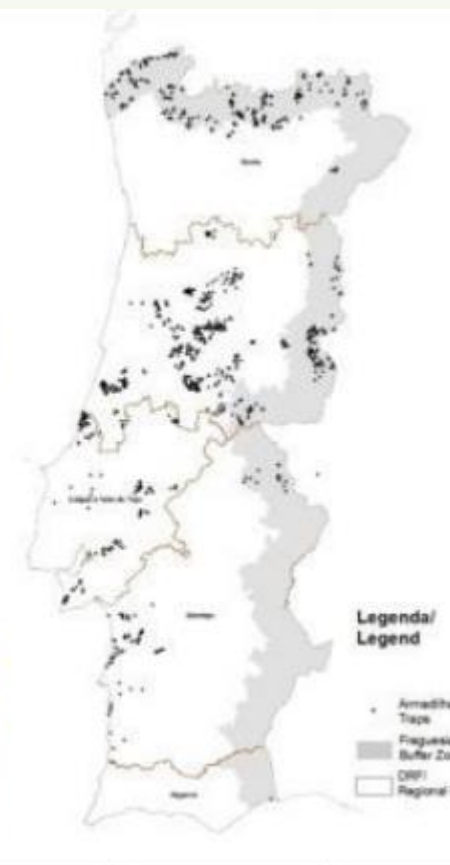
Código	Região	Distrito	Concelho	Entidade Responsável	Tipo Armadilha	Tipo Atractivo
1	Centro	Castelo Branco	Fundão	APFAPN	MultiFunil	A

Visualizar: Armadilhas Recolha Campo

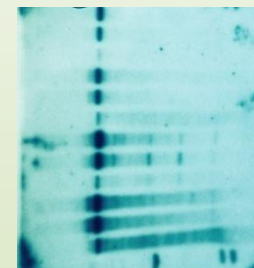
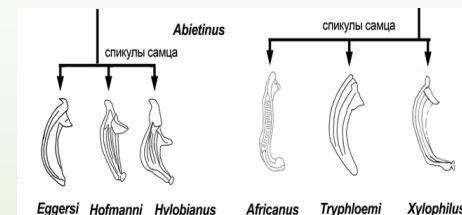
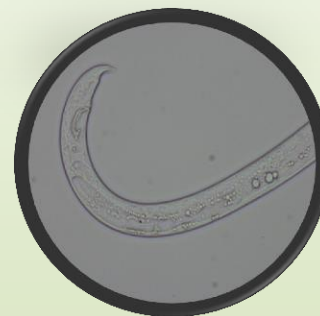
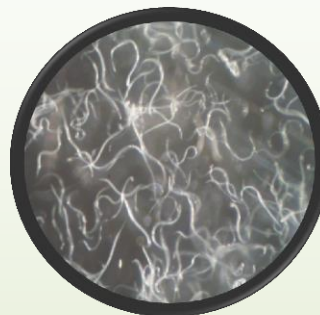
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[Adicionar](#)

	Código Armadilha	Data Recolha	Data Envio Laboratório	Laboratório
✓ ✗	1	7/10/2009		por favor selec
	1	15/10/2009	16/10/2009	INRB
	1	20/10/2009	21/10/2009	INRB



LABORATORY NEMATODE IDENTIFICATION



- Results from PWN survey of **wood samples** and **insect-vector** are directly inputted on web interface,

<http://fogos.afn.minagricultura.pt/sgpp/login.asp> ;

CERTIFIED LABORATORIES FOR NEMATODE IDENTIFICATION

- INIAV (Nematology Lab.) (Oeiras);
- Coimbra University (Instituto Ambiente, Tecnologia e Vida) (Coimbra);
- Évora University (ICAAM – Nematology Lab.) (Évora);
- IPN Fitolab (Coimbra);
- Controlvet Segurança Alimentar (Tondela);
- UTAD University (Forest Fitosanitary Lab.) (Vila Real);
- Madeira Island - Laboratório de Nematologia do Laboratório de Qualidade Agrícola (LQA) (Funchal);
- Azores Islands - Laboratório Regional de Sanidade Vegetal (LRSV) da Direção de Serviços de Agricultura (DSA) (Ponta Delgada).

THANK YOU VERY MUCH!