

Case study in Nazaré on Remote Sensing: Ground survey

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Pinewood Nematode – case study

Objectives

- Development of a tool to detect symptomatic trees minimizing work effort (less time consuming, human and financial cheaper) by remote sensing.

Procedures

- Ground survey to detect symptomatic pines e collect wood samples for pine-wood nematode detection.
- TRAGSA provides an unmanned aerial vehicle or drone (UAV) with RGB, multispectral and thermal sensors onboard.

Pinewood Nematode – case study

Criteria for site selection

- Within affected areas;
- Single flight zone with about 15 ha with trees showing different degrees of affection;
- Slope of the ground, the angle of incidence of sunlight and the angle of view of the sensor;
- Mono-specific stands with homogeneous characteristics in terms of age, height, forest structure and spatial distribution;
- Composition of the understory that allows to discriminate the pine canopy.

Pinewood Nematode – case study

Criteria for site selection

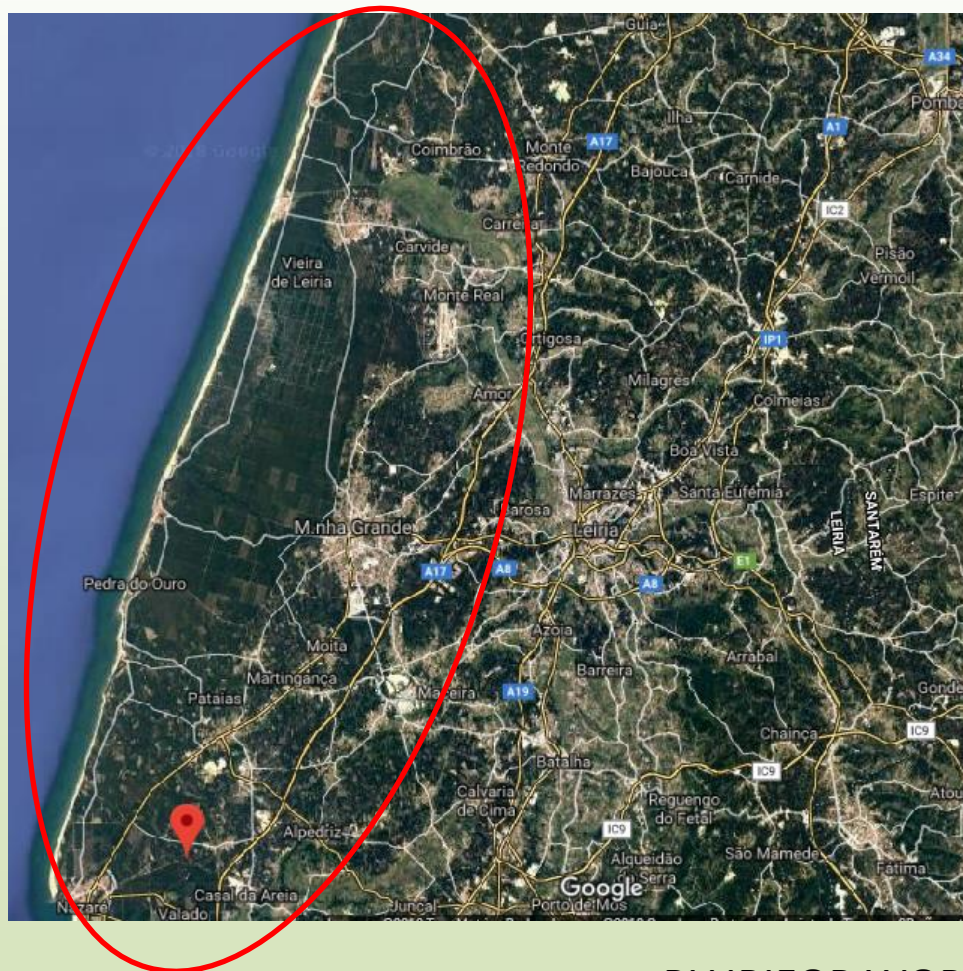
- The area must have an open surface close for the UAV taking off / landing, and to set up the ground control station and the generator for charging the batteries;
- Easy to transport and set up of the equipment;
- Nearby weather stations (which provide auxiliary information);
- Requires flight permission from the Portuguese National Aerial Authority.

Other issues to consider:

- The UAV must fly at least 2.5 km away from any aerodrome or airport;
- The UAV cannot fly over inhabited areas or buildings;
- The UAV cannot fly over crowds (12 people is a crowd).



Pinewood Nematode – case study

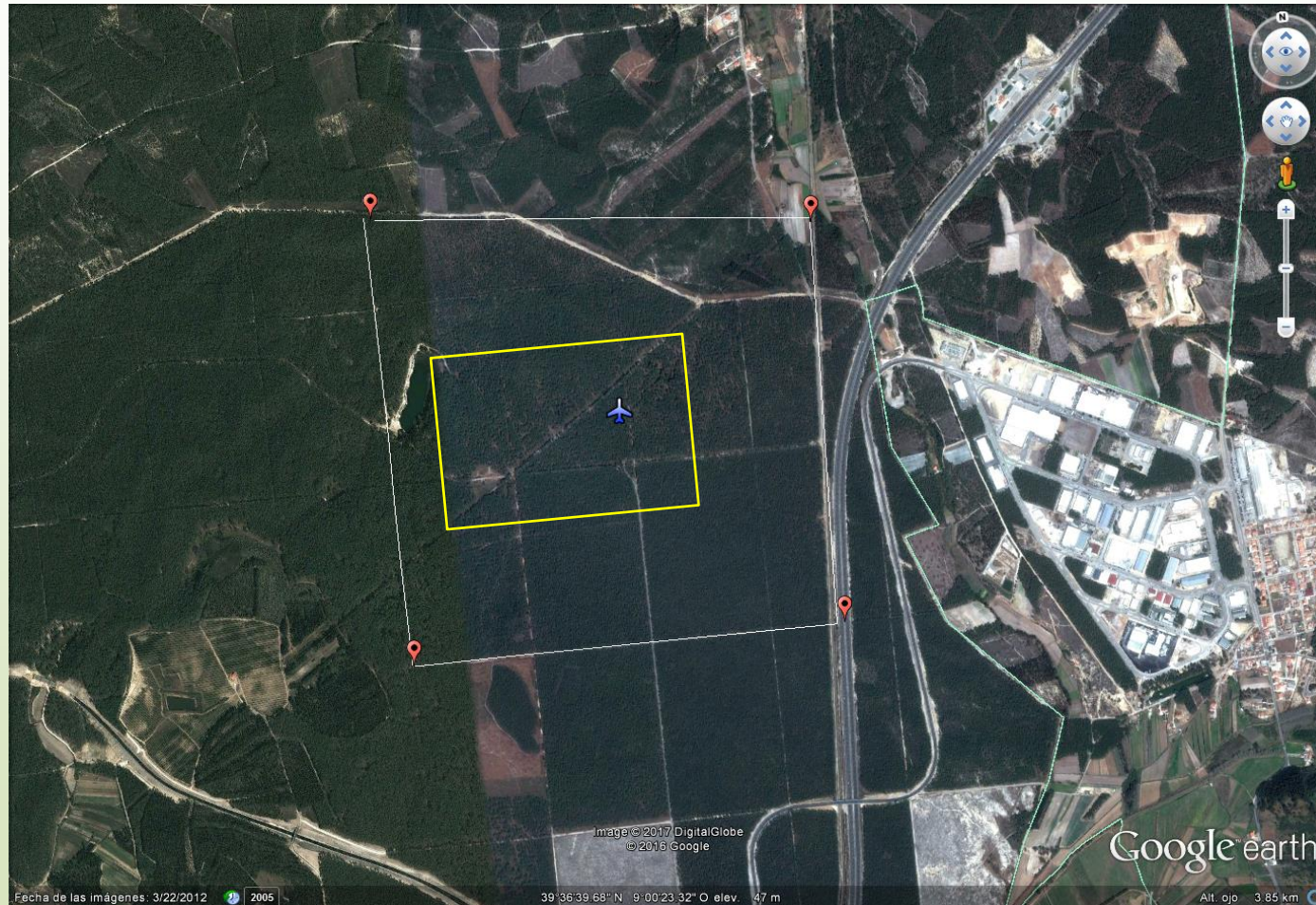


Site selection



**Matas Nacionais do
Pinhal de Leiria e do
Valado de Frades**

Pinewood Nematode – case study

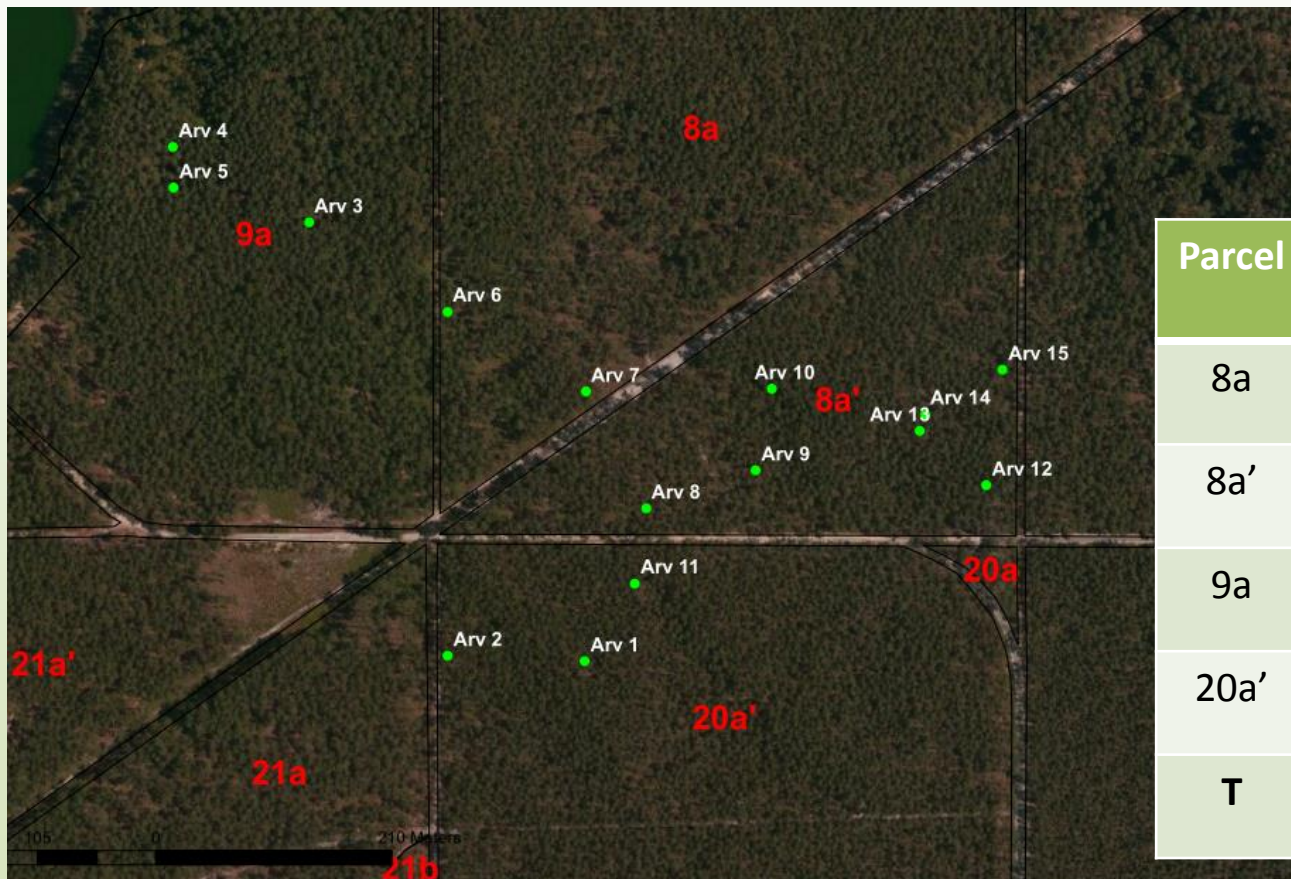


Site
selection

Mata
Nacional
do Valado
de Frades

Pinewood Nematode – case study

Mata Nacional do Valado de Frades

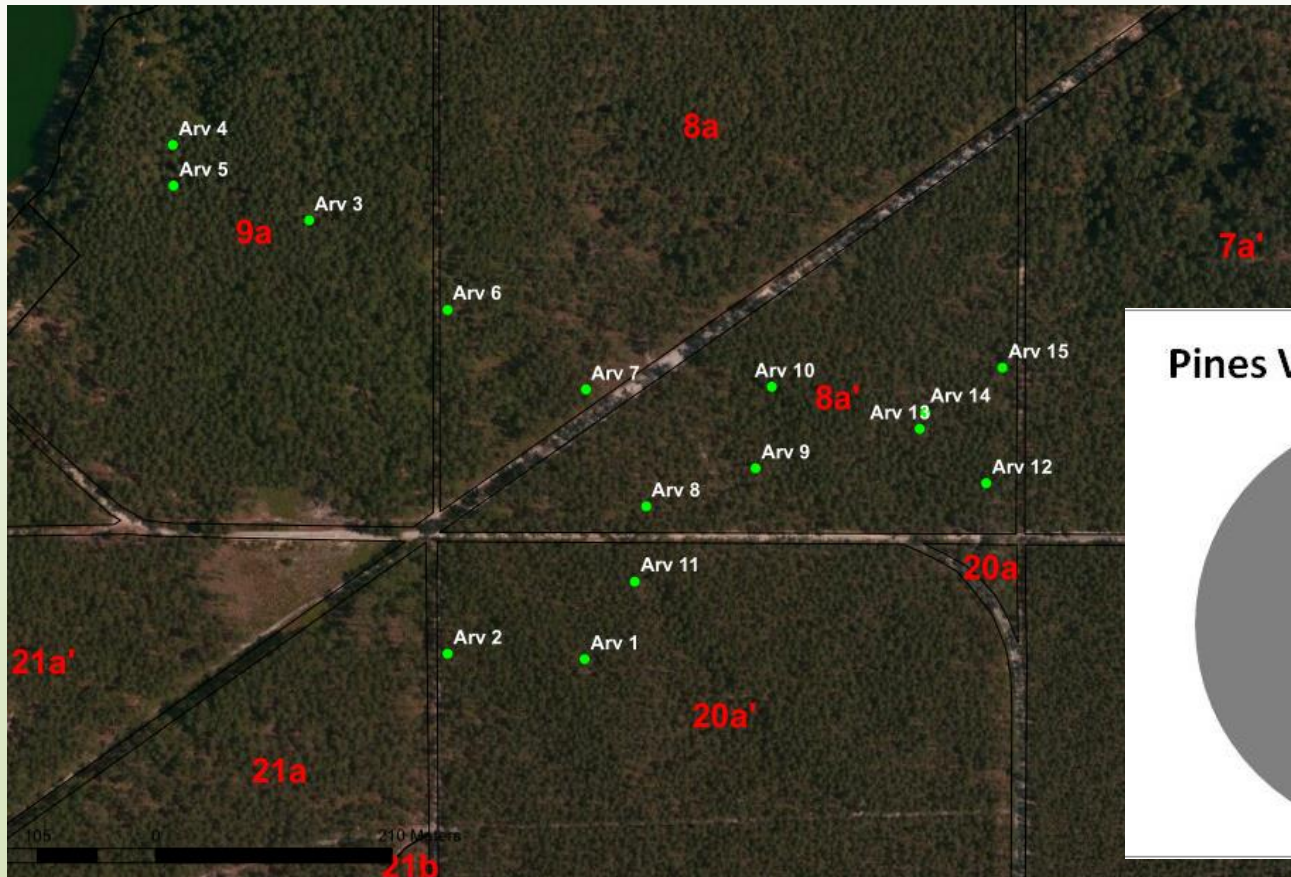


Ground survey
29th May 2017

Parcel	Size (ha)	Age (yrs)	Dead pines
8a	17,5	57	2
8a'	5,5	57	7
9a	17,9	63	3
20a'	23,0	62	3
T	63,9	-	15

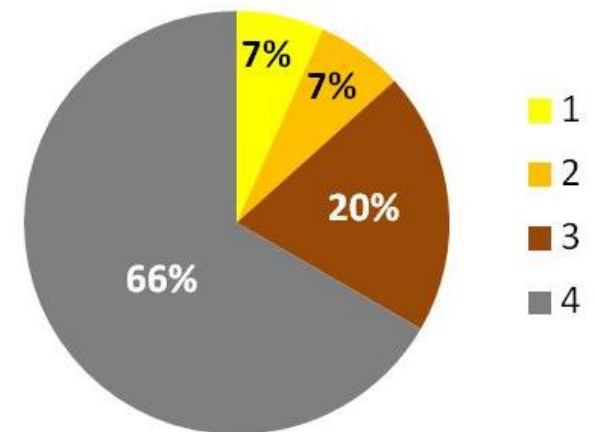
Pinewood Nematode – case study

Mata Nacional do Valado de Frades



Ground survey
29th May 2017

Pines Visual Symptoms Classes



Pinewood Nematode – case study

Dead pines



Pinewood Nematode – case study

Dead pines



PLURIFOR WORKSHOP PWN – OEIRAS

Pinewood Nematode – case study

Mata Nacional do Valado de Frades Ground survey (29th May 2017)



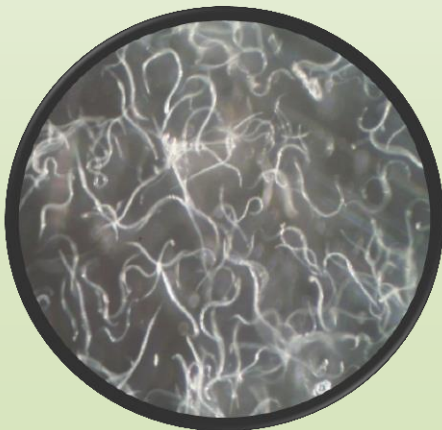
Pinewood Nematode – case study

Preparation of wood samples for nematode extraction



Pinewood Nematode – case study

Identification
and counting
of nematodes

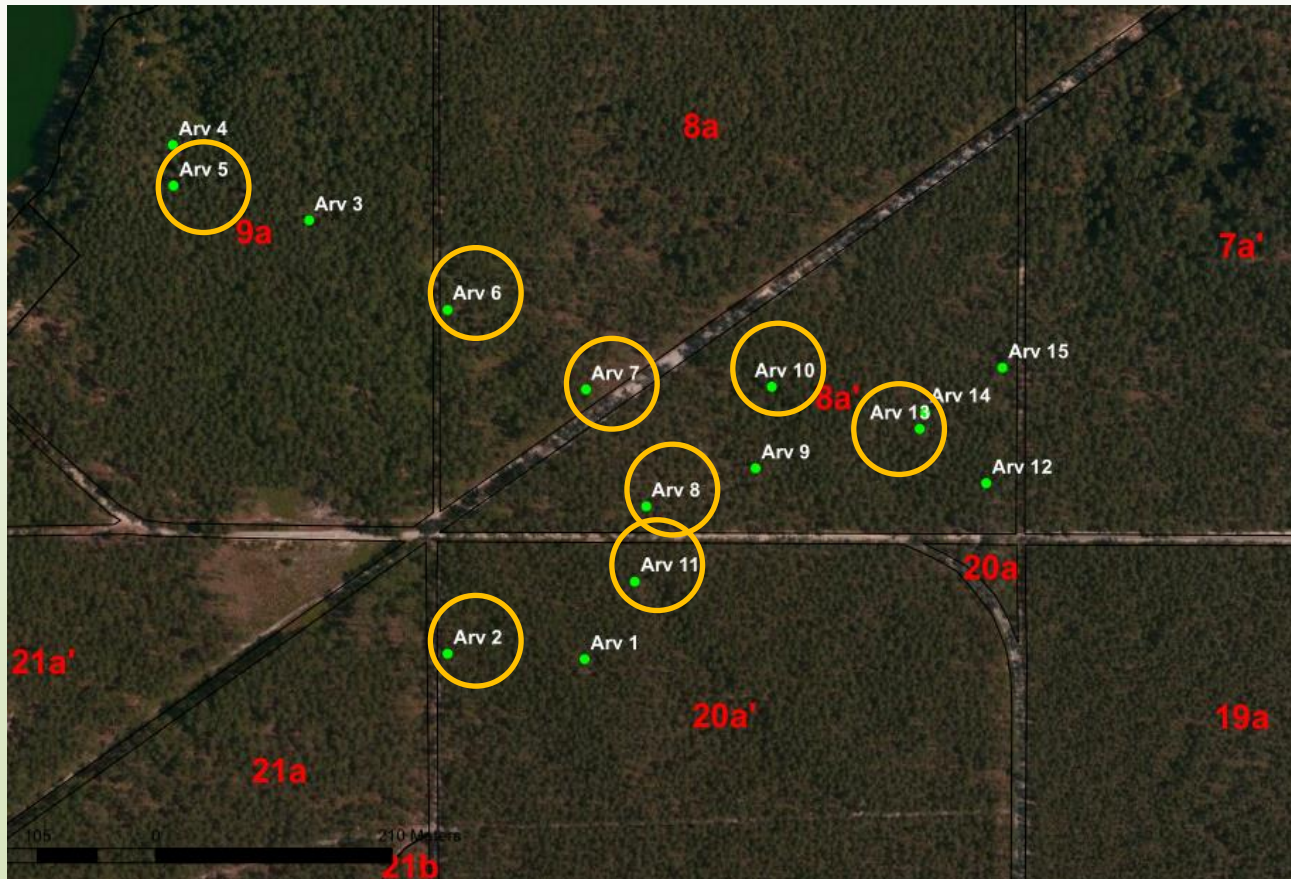


Survey of PWN in dead trees

Parcel	Size (ha)	Age (yrs)	Dead pines	Mortality incidence	PWN infected	Symptom classes
8a	17,5	57	2	0,1 trees/ha	2	(4, 4)
8a'	5,5	57	7	1,3	3	(3, 3, 4)
9a	17,9	63	3	0,2	1	(4)
20a'	23,0	62	3	0,1	2	(4)
T	63,9	-	15		8 (53%)	

Pinewood Nematode – case study

Mata Nacional do Valado de Frades



Ground survey
29th May 2017

Pinewood Nematode – case study



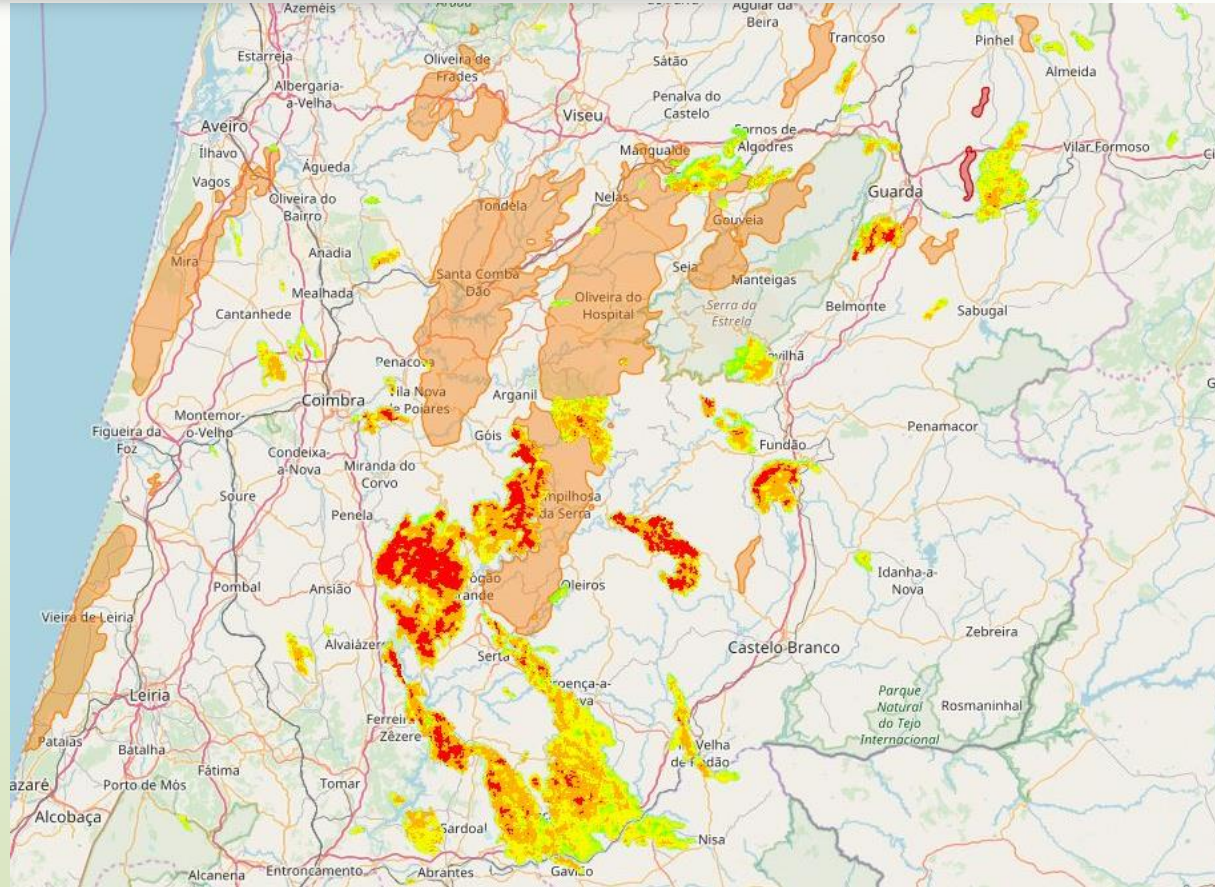
Sunday , 15th October 2017

Pinewood Nematode – case study



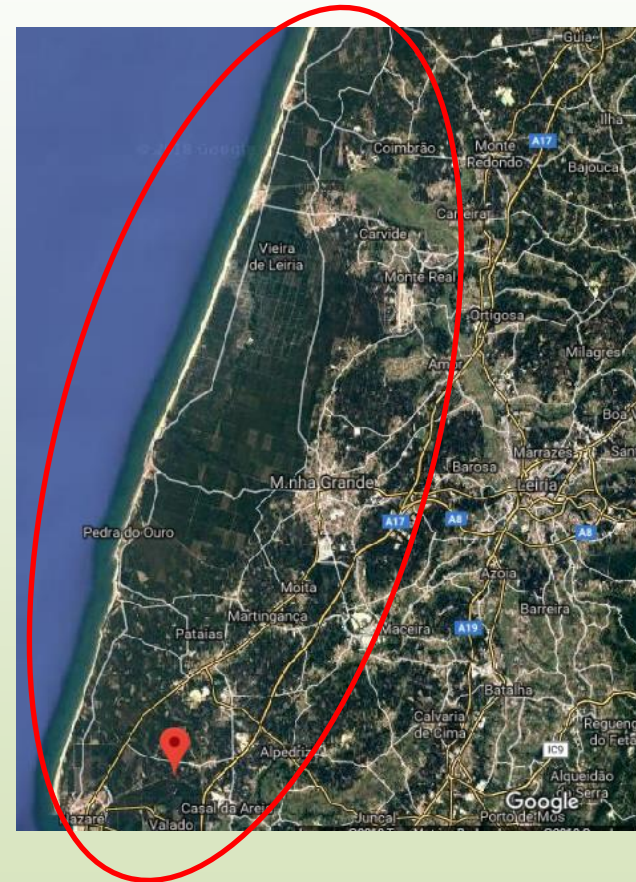
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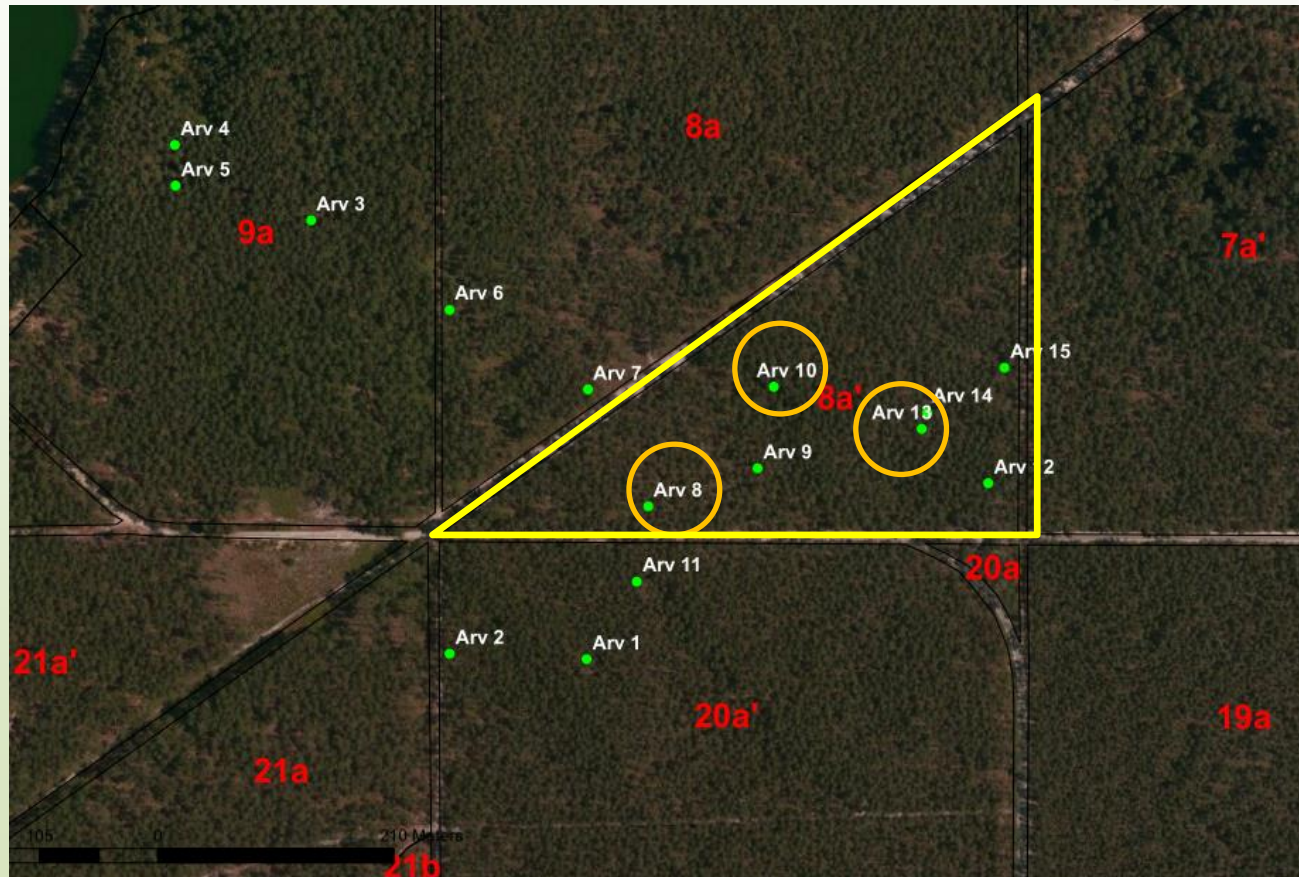
Pinewood Nematode – case study



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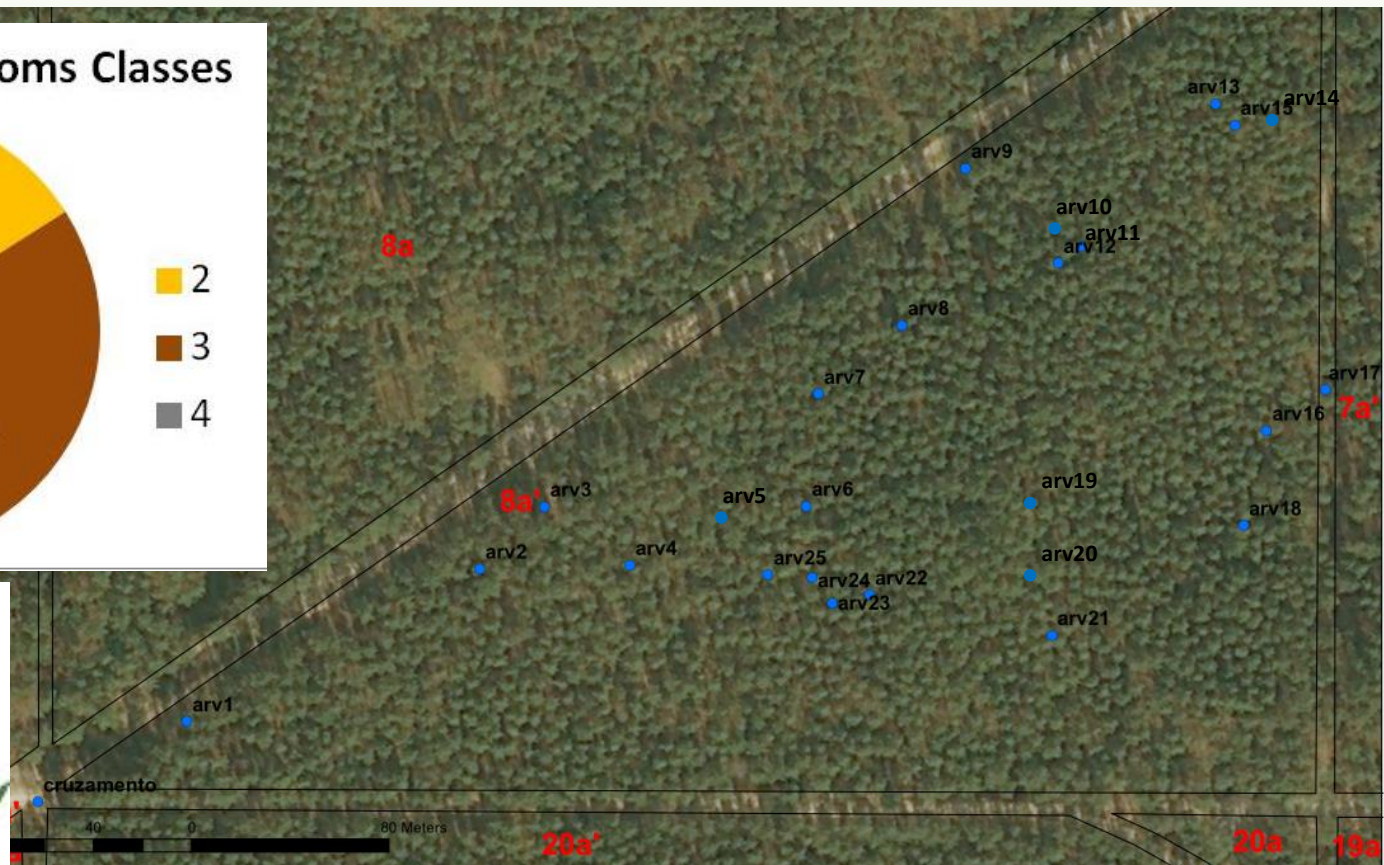
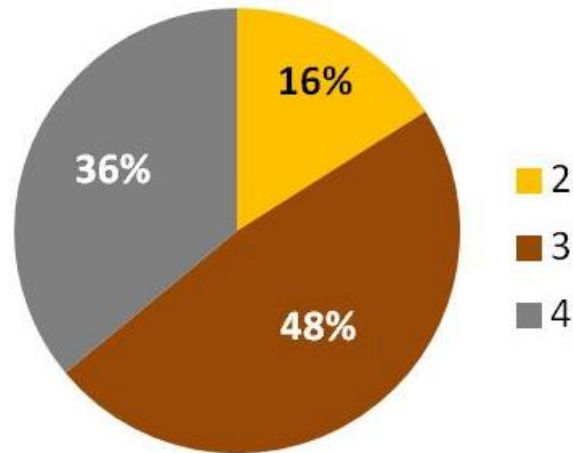
Mata Nacional do Valado de Frades – Ground Survey 7th Nov. 2017



Pinewood Nematode – case study

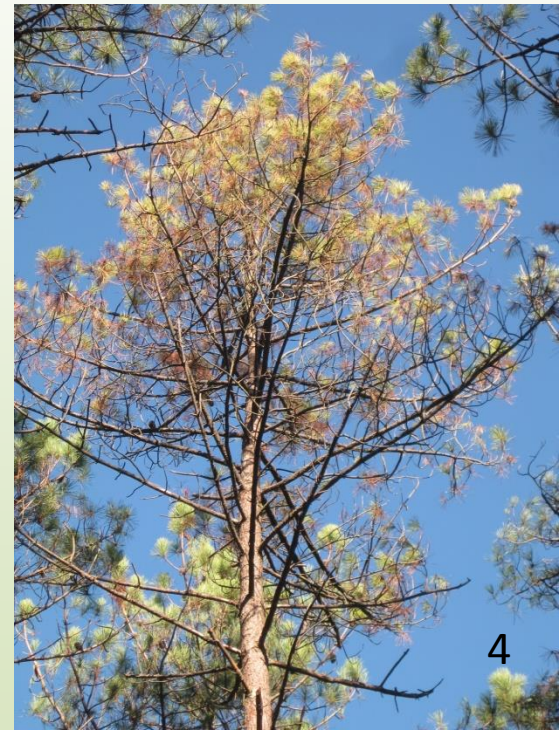
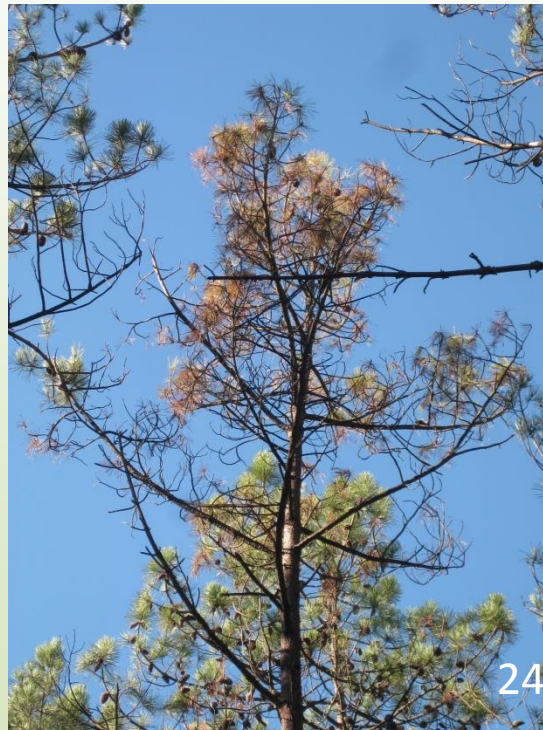
Mata Nacional do Valado de Frades – Ground Survey 7th Nov. 2017

Pines Visual Symptoms Classes



Pinewood Nematode – case study

Mata Nacional do Valado de Frades – Ground Survey 7th Nov. 2017



Pinewood Nematode – case study

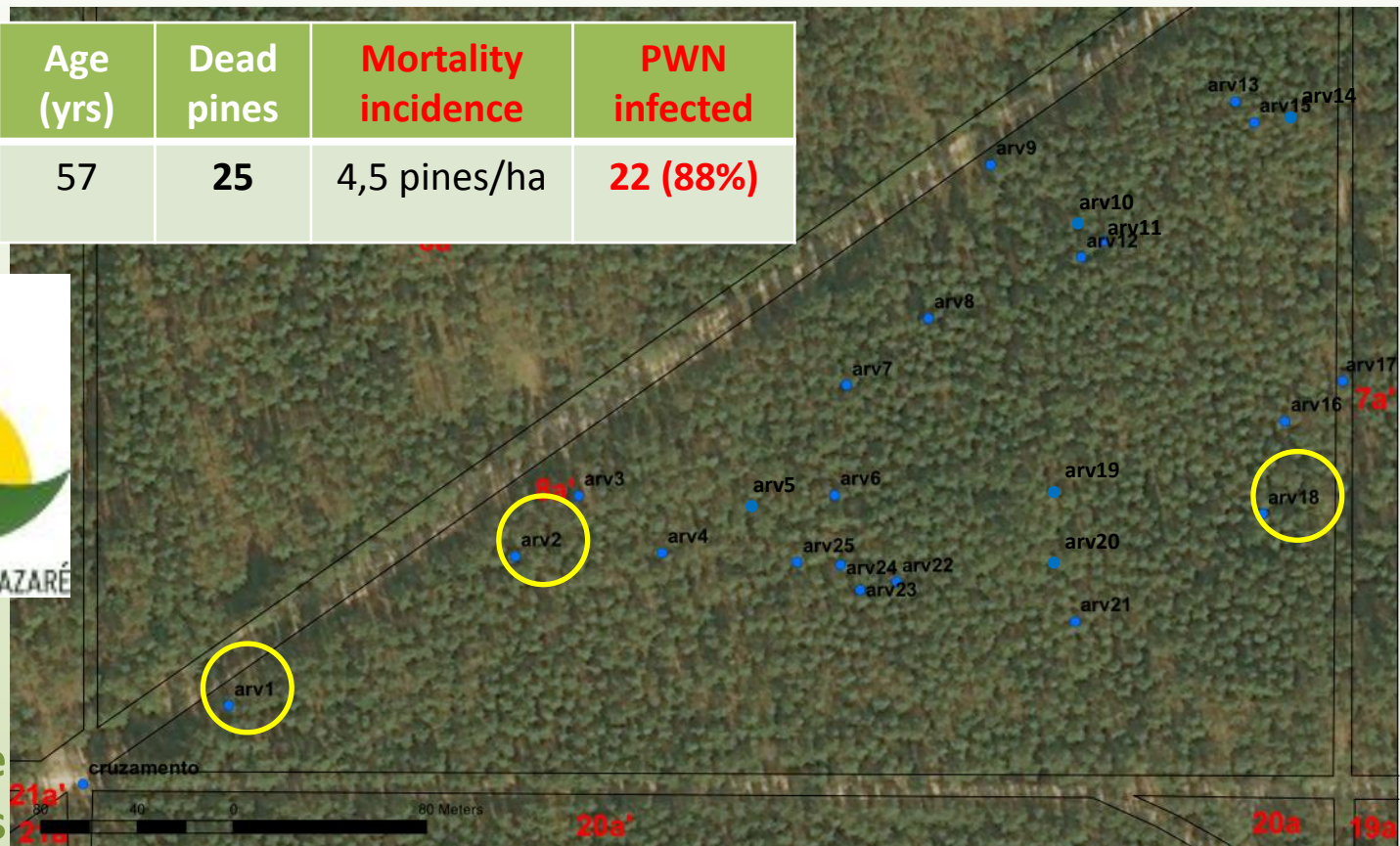
Mata Nacional do Valado de Frades – Ground Survey 7th Nov. 2017



Pinewood Nematode – case study

Mata Nacional do Valado de Frades – Ground Survey 7th Nov. 2017

Parcel	Size (ha)	Age (yrs)	Dead pines	Mortality incidence	PWN infected
8a'	5,5	57	25	4,5 pines/ha	22 (88%)



Only 3 PWN-free
1 of each class



Instituto Nacional de
Investigação Agrária e
Veterinária, I.P.

THANK YOU VERY MUCH!