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Combined effects of drought and pruning: impacts on canopy recovery and wood growth in *Pinus pinea* L. after two years

Alexandra Correia (alexandra.correia@iniav.pt), Silva, João EP Nunes, Alexandra



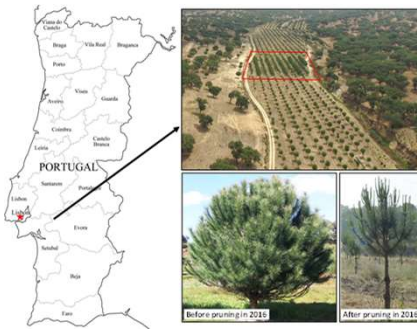
What we want to know ?

Evaluate tree **recovery** after a 2/3 traditional **pruning** followed by a severe spring/summer **drought**.

How and where?

- ✓ 6 years-old stone pine plantation in central Portugal
- ✓ 2/3 pruning (71 % of the total aboveground biomass, 88% of total leaf area)
- ✓ severe spring/summer drought afterwards*

*7 heat waves from March to November, 35% precipitation reduction, +0.75°C anomaly in temperature compared with the 30 years average



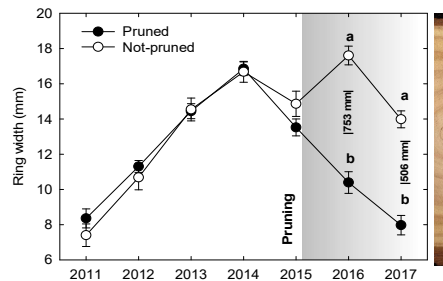
What we measured ?

24 trees (12 pruned and 12 unpruned used as control) were compared for:

- ✓ radial growth
- ✓ canopy leaf area
- ✓ needles morphological traits
- ✓ nutrient content in needles

What did we find?

Two years after pruning, the canopies recovered **76% of the leaf area** (compared with values before pruning). Unpruned trees were **2.6 cm thicker** than pruned ones.



Radial growth was significantly impacted by pruning and, together with drought, led to a **42% stem radial growth reduction** (when compared with the control trees).



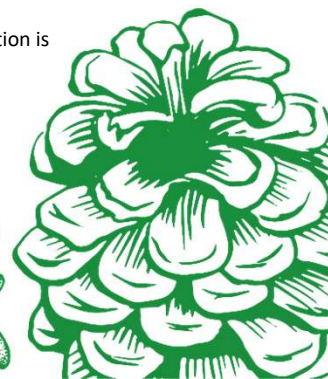
The sudden photosynthetic biomass loss had no effect on needles traits or N content.

Year	Treatment	Length (cm)	Dry weight (g)	N content (mg g ⁻¹)
2016	Pruned	19.1 ± 0.2 ^a	1.12 ± 0.05 ^a	7.30 ± 0.08 ^a
	Control	18.8 ± 0.4 ^a	1.12 ± 0.05 ^a	7.67 ± 0.28 ^{ab}
2017	Pruned	13 ± 0.6 ^b	0.47 ± 0.04 ^b	8.65 ± 0.23 ^b
	Control	15.4 ± 0.7 ^c	0.68 ± 0.06 ^c	9.95 ± 0.32 ^c

Compared with 2016, drought reduced needle length by half and N content was more impacted in pruned trees.

Conclusions

- ✓ Stem growth was significantly impacted within 2 years following pruning, but the canopy recovery was remarkably fast meaning a high capacity of tree recovery > Leaf reconstruction is a **strong resource sink priority**
- ✓ The results show the **high plasticity and recovery capacity of stone pine** to overcome combined drought and severe defoliation in this particular region.
- ✓ However, under a climate change scenario, **lowering pruning intensity (increasing the frequency)** should be a safer strategy



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