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Comparing how healthy and dying trees respond to drought in Oregon, USA

Droughts limit tree growth, or can cause tree death, because hot and dry weather limits water availability and a tree's ability to produce the sugars it needs for growth. This thesis compared how healthy trees and trees dying from drought responded to a drought in Oregon, USA, during summer 2015. Healthy and dying trees were paired according to size and height so ensure these factors did not influence the results. Healthy and dying trees were identified based on the amount of leaves they had lost due to drought (healthy trees had lost <10% and dying trees \geq 10% of their leaves). Four tree species were investigated: ponderosa pine, western juniper, Douglas-fir and white oak.

The results showed that although the dying trees appeared to be more drought-stressed (due to the large amount of leaves they had lost), there was little difference in the leaf water potential between healthy and dying trees. Leaf water potential is a measure of the water pressure in a leaf: the lower the water potential, the less water the tree is able to access, indicating drought stress. This suggests that by losing leaves, the dying trees were able to compensate for being water limited due to the drought. Measurements of past tree growth showed that in some species, the dying trees had previously grown less or had a stronger reaction to past droughts compared to the healthy trees. These previous patterns in tree growth suggest the dying trees were more likely to die during future droughts.

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