

Frankincense production 'doomed' warn ecologists

December 21 2011

used in incense and perfumes across the world and a key part of the Christmas story – are declining so dramatically that production of the fragrant resin could be halved over the next 15 years, according to a new study published in the British Ecological Society's *Journal of Applied Ecology*.

Ecologists from the Netherlands and Ethiopia say tree numbers could decline by 90% in the next 50 years. If fire, grazing and insect attack – the most likely causes of the decline – remain unchecked frankincense production could be doomed, they warn. Their predications are based on large-scale field studies – the first to monitor the fate of the frankincense-producing tree.

Frankincense is obtained by tapping various species of *Boswellia*, a tree that grows in the Horn of Africa and the Arabian peninsula. Yet despite its economic importance – incense has been traded internationally for thousands of years – little is known about how tapping affects *Boswellia* populations.

Working in an isolated part of north-west Ethiopia near the source of the Blue Nile the team, led by Dr Frans Bongers of Wageningen University, studied 13 two-hectare plots, some where trees were tapped for frankincense and some where they were untapped. Over two years, they monitored survival, growth and seed production of more than 6,000 *Boswellia* trees, collecting over 20,000 individual measurements.

They then used this data to construct demographic models capable of predicting the fate of *Boswellia* populations in coming years. Alarming, the model shows *Boswellia* populations are declining so dramatically that frankincense production could be halved in the next 15 years.

According to Dr Bongers: "Current management of *Boswellia* populations is clearly unsustainable. Our models show that within 50 years populations of *Boswellia* will be decimated, and the declining populations mean frankincense production is doomed. This is a rather alarming message for the incense industry and conservation organisations."

Crucially, the researchers found all populations they studied are declining, not only those from tapped stands of trees, suggesting that factors other than tapping are at the root of the problem.

"Frankincense extraction is unlikely to be the main cause of population decline, which is likely to be caused by burning, grazing and attack by the long-horn beetle, which lays its eggs under the bark of the tree," says Dr Bongers.

In the areas they studied, the team found that as well as high levels of mortality among adult trees, the older trees in the population were not being replaced because few *Boswellia* seedlings survived to become saplings.

"The number of fires and intensity of grazing in our study area has increased over recent decades as a result of a large increase in the number of cattle, and this could be why seedlings fail to grow into saplings. At the same time, a large proportion of [trees](#) we studied died after being attacked by the long-horn beetle," Dr Bongers explains.

He says strong and far-reaching management incentives need to be introduced if *Boswellia* populations – and future frankincense production – are to be preserved.

In the short term this involves preventing fires and beetle attack, although the latter is difficult because scientists know little about its lifecycle. In the long-term, Dr Bongers says areas should be set aside and protected from fire and grazing for 5-10 years to allow *Boswellia* saplings to become established.

More information: Peter Groenendijk, Abeje Eshete, Frank Sterck, Pieter Zuidema and Frans Bongers (2011). 'Limitations to sustainable frankincense production: blocked regeneration, high adult mortality and declining populations', [doi: 10.1111/j.1365-2664.2011.02078.x](https://doi.org/10.1111/j.1365-2664.2011.02078.x) , is published in the Journal of Applied Ecology on Wednesday 21 December 2011.

Provided by Wiley

Citation: Frankincense production 'doomed' warn ecologists (2011, December 21) retrieved 10 April 2024 from

<https://phys.org/news/2011-12-frankincense-production-doomed-ecologists.html>

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