

Gone with the wind: Far-flung pine pollen still potent miles from the tree

April 5 2010



A new study suggests that pollen from the loblolly pine -- the most commonly planted tree in the southern US -- can still germinate after drifting long distances. Far-flung pine pollen makes it difficult to contain transgenic trees, researchers say. Credit: Available via Creative Commons license on Wikimedia Commons

When forest biologist Claire Williams boards ferries bound for North Carolina's Outer Banks, the barrier islands that line the NC coast, ferry captains call her the "Pollen Lady."

Each spring from 2006 to 2009, Williams traveled back and forth from the islands to the mainland, collecting pine pollen blown far offshore.

She wanted to find out if pollen from the loblolly pine — the most commonly planted tree in the southern United States — can still germinate after drifting long distances.

The answer could have profound implications if and when the USDA approves transgenic trees. "Long-distance dispersal of transgenic pine pollen is a potential problem only if that pollen is viable," said Williams, currently at the Forest History Society and the National [Evolutionary Synthesis](#) Center in Durham, N.C.

The loblolly pine, *Pinus taeda*, grows on nearly 60 million acres in the southern U.S. and provides more than 15% of the world's timber. "Roughly one billion loblolly pines are planted in the American South each year," Williams said. "But right now, none are genetically modified."

During peak pollen season in late March and early April, loblolly pines shed millions of pounds of pollen into the air. Although the majority of that pollen lands nearby, a fraction floats far from the source, she explained.

Once windborne, pollen is exposed to extreme cold, [UV radiation](#), and moisture from clouds and rain. "Pine pollen can travel up to 1800 miles in a short amount of time," said Williams. "But is it viable?"

To see how far, and how high, pine pollen can travel and still germinate, Williams and her colleagues used a hand-held device called a spore sampler to capture and analyze pollen found miles from the mainland. Sampling by helicopter and by ferry, they found viable pine pollen as far as 2000 feet in the air and 25 miles offshore.

"Until then, the highest pine pollen had ever been found in the atmosphere was 1000 feet," she said.

More than 50% of pine pollen still germinates after drifting those distances, they discovered. "The odd thing is that pollen germination did not decline as distance increased," Williams explained. "You would expect germination to gradually drop off as pollen floats further away, but that's not the case."

The research, funded by the USDA, means that a single tree can send its DNA dozens of miles. This makes it difficult to prevent traits developed in transgenic trees — such as drought tolerance and disease- and pest-resistance — from spreading to their wild counterparts, Williams said.

Although transgenic trees have not yet been approved for commercial use, they are planted as field trials. The long life span of pines makes it difficult to evaluate the environmental impacts of these trees, Williams said. Loblolly pines can cross-pollinate with other closely related pine species, and are typically grown for 25 to 35 years before harvest, she explained. "The older a tree gets, the more pollen it produces each year."

On the other hand, potency of far-flung pollen could be good news for forests facing climate change, Williams added. "Under human-induced climate change we expect higher wind speeds and more frequent storms will move pollen and seeds even farther from the source," she said. That means that genes needed to adapt to warmer temperatures will have a better chance of mixing with populations that don't have them, she explained.

The findings were published online March 26, 2010 in the *American Journal of Botany*.

More information: Williams, C. G. (2010). "Long-distance pine pollen still germinates after meso-scale dispersal." *American Journal of Botany* 97(5): 1-11. [DOI:10.3732/ajb.0900255](https://doi.org/10.3732/ajb.0900255)

Provided by National Evolutionary Synthesis Center

Citation: Gone with the wind: Far-flung pine pollen still potent miles from the tree (2010, April 5) retrieved 26 April 2024 from

<https://phys.org/news/2010-04-far-flung-pollen-potent-miles-tree.html>

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