

# Pongamia trees grow where citrus once flourished, offering renewable energy and plant-based protein

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Young pongamia trees grow in a grove in St. Lucie County, Fla., Thursday, June 6, 2024. The ancient tree, native to India, Southeast Asia and Australia, is now thriving in groves where citrus trees once flourished in Florida. The tree produces a legume that can be processed into plant-based protein and sustainable biofuel. Credit: AP Photo/Marta Lavandier

An ancient tree from India is now thriving in groves where citrus trees once flourished in Florida, and could help provide the nation with renewable energy.

As large parts of the Sunshine State's once-famous citrus industry have all but dried up over the past two decades due to two fatal diseases, greening and [citrus canker](#), some farmers are turning to the pongamia tree, a climate-resilient tree with the potential to produce plant-based proteins and a sustainable biofuel.

For years, pongamia has been used for shade trees, producing legumes—little brown beans—that are so bitter wild hogs won't even eat them.

But unlike the orange and grapefruit trees that long occupied these rural Florida groves northwest of West Palm Beach, pongamia trees don't need much attention.

Pongamia trees also don't need fertilizer or pesticides. They flourish in drought or rainy conditions. And they don't require teams of workers to pick the beans. A machine simply shakes the tiny beans from the branches when they're ready to harvest.

Terviva, a San Francisco-based company founded in 2010 by Naveen Sikka, then uses its patented process to remove the biopesticides that cause the bitter taste, making the beans suitable for food production.

"Florida offers a rare opportunity for both Terviva and former citrus farmers. The historical decline of the citrus industry has left farmers without a crop that can grow profitably on hundreds of thousands of acres, and there needs to be a very scalable replacement, very soon," Sikka told The Associated Press. "Pongamia is the perfect fit."



Terviva's John Young, left, and Ron Edwards walk in a grove of pongamia trees, Thursday, June 6, 2024, in St. Lucie County, Fla. Terviva, a San Francisco-based company founded in 2010, has patented a process to remove the biopesticides from the pongamia tree legume that cause a bitter taste, making the bean suitable for food production. Credit: AP Photo/Marta Lavandier

## **What is the pongamia tree?**

The pongamia is a wild tree native to India, Southeast Asia and Australia.

The legume is now being used to produce [several products](#), including Panova table oil, Kona protein bars and protein flour.

The legumes also produce oil that can be used as a biofuel, largely for aviation, which leaves a very low carbon footprint, said Ron Edwards, chairman of Terviva's board of directors and a long-time Florida citrus grower.

Turning a wild tree into a domestic one hasn't been easy, Edwards said.

"There are no books to read on it, either, because no one else has ever done it," he said.

Bees and other pollinators feast on the pongamia's flowers, supporting local biodiversity, Edwards said. An acre of the trees can potentially provide the same amount of oil as four acres of soy beans, he added.

What's left after the oil is removed from the pongamia bean is "a very high-grade protein that can be used as a substitute in baking and smoothies and all kinds of other plant-based protein products," Edwards said. "There's a lot of potential for the food industry and the oil and petroleum industry."



The pods of a pongamia tree are ready to pick at a grove, Thursday, June 6, 2024, in St. Lucie County, Fla. The legume of the pongamia tree produces a plant-based protein high in Omega 9. It also has the potential to produce a sustainable biofuel. Credit: AP Photo/Marta Lavandier

## **Why Florida?**

"We know pongamia grows well in Florida, and the end markets for the oil and protein that come from the pongamia beans—biofuel, feed, and food ingredients—are enormous," Sikka said. "So farmers can now reduce their costs and more closely align to the leading edge of sustainable farming practices."

At a nursery near Fort Pierce, workers skilled in pongamia grafting

techniques affix a portion of the mother tree to a pongamia rootstock, which ensures the genetics and desired characteristics of the mother tree are perpetuated in all of Terviva's trees.

## **Pongamia vs. citrus**

Citrus had been Florida's premier crop for years until disease caught up with it starting in the 1990s with citrus canker and later greening.

[Citrus canker](#), a bacterial disease, is not harmful to humans, but causes lesions on the fruit, stems and leaves. Eventually, it makes the trees unproductive.

Citrus greening, also known as Huanglongbing, slowly kills trees and degrades the fruit, according to the U.S. Department of Agriculture. Greening has spread throughout Florida since 2005, devastating countless groves and reducing citrus production by 75%. The disease has spread to Louisiana, Texas and California.

Hurricane Ian caused about \$1.8 billion in damages to Florida's agriculture in September 2023, hitting the citrus industry at the beginning of its growing season.



A Terviva employee puts a pongamia tree in a larger pot at the company's nursery, Thursday, March 21, 2024, in Fort Pierce, Fla. The tree grows in wet and dry soils and is mostly pest resistant. It also adds nitrogen to the soil and stores carbon, which helps to mitigate the effects of climate change. California-based Terviva has removed the bitterness from the pongamia bean to make it edible. Credit: AP Photo/Marta Lavandier

Disease and climate issues have also affected most of the world's top citrus-producing countries. For example, this year's harvest in Brazil—the world's largest exporter of [orange juice](#)—is forecast to be the worst in 36 years due to flooding and drought, according to a forecast by Fundecitrus, a citrus growers' organization in Sao Paulo state.

But climate and disease have little effect on pongamia trees, the

company's officials said.

"It's just tough, a jungle-tested tree" Edwards said. "It stands up to a lot of abuse with very little caretaking."

Pongamia also grows well in Hawaii, where it now thrives on land previously used for sugarcane.

## **What are citrus farmers saying?**

John Olson, who owns Circle O Ranch, west of Fort Pierce, has replaced his grapefruit groves with 215 acres (87.01 hectares) of pongamia trees.

"We went through all the ups and downs of citrus and eventually because of greening, abandoned citrus production," Olson said. "For the most part the citrus industry has died in Florida."

While the grapefruit grove was modest, it was common for a grove that size to be profitable in the 1980s and 1990s, Olson said.





Elisabeth Beagle, Terviva's director of tree operations, places a newly grafted pongamia tree in a high- humidity greenhouse at the company's nursery, Thursday, June 6, 2024, in Fort Pierce, Fla. The tree produces a legume that is now being used to produce several products, including Panova table oil, Kona protein bars and protein flour. Credit: AP Photo/Marta Lavandier

Edwards said farmers used various sprays to kill the insect that was spreading the disease. Eventually, the cost of taking care of citrus trees became too risky.

That's when he decided to go a different route.

"What attracted me to pongamia was the fact that one it can repurpose fallow land that was citrus and is now lying dormant," he said. "From an

ecological point of view, it's very attractive because it can replace some of the oils and vegetable proteins that are now being generated by things like palm oil, which is environmentally a much more damaging crop."

## **What about biofuel?**

In December 2023, Terviva signed an agreement with Mitsubishi Corporation to provide biofuel feedstock that can be converted into biodiesel or renewable diesel.

"Our partnership with Mitsubishi is off to a great start," Sikka said, noting that the company coordinates closely with Mitsubishi on tree plantings and product development and sales. "Terviva's progress has accelerated thanks to Mitsubishi's expertise and leadership around the globe on all facets of Terviva's business."

## **What food products does pongamia produce?**

The research is ongoing, but Edwards said they've made really good graham crackers in addition to the table oil and other plant-based protein products, including flour and protein bars.

Pongamia offers an alternative to soybean and yellow pea protein "if you don't want your protein to come from meat," he said.

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