



ELEMENTAL
EXCELERATOR

INSIGHTS

Commercial Pongamia Case Study

The story of how TerViva revitalized 200 acres of distressed agricultural land and validated a new plant protein alternative.

HALEIWA. HI
DEC 2018

MEET TERVIVA

Planting millions of trees to
feed billions of people

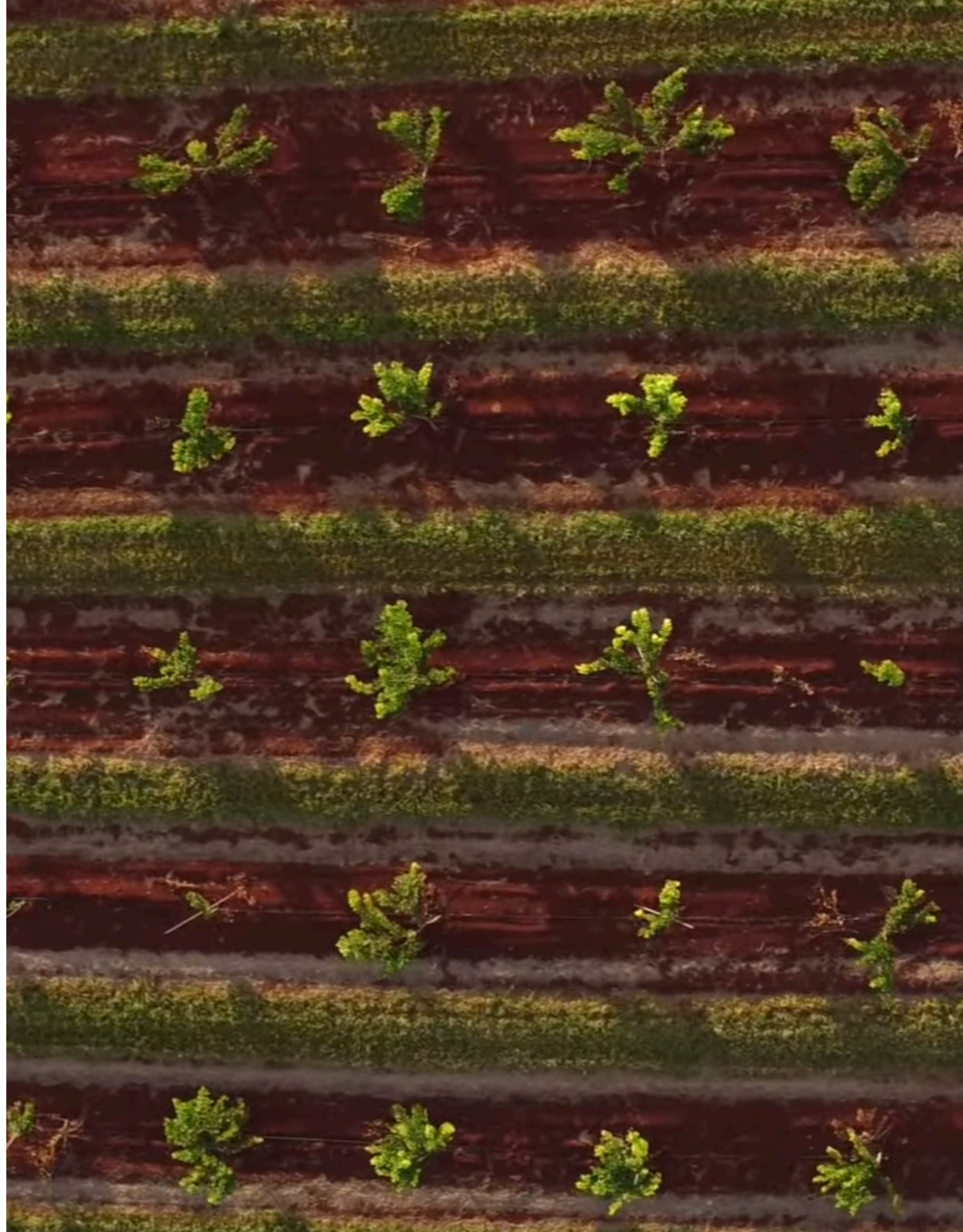
TerViva cultivates pongamia trees that produce abundant, high-protein oilseed that can be utilized for animal feed, among other things. By nature, these robust trees regenerate soil health and restore productivity to distressed agricultural land.

 terviva.com

 Oakland, CA

 Cohort 2

 Established in 2010



THE CHALLENGE

Arable land base continues to shrink at an alarming rate while demand for food and fuel soars.

In the United States, 40 million acres of arable land have been lost in the past 40 years. And in the past 20 years in Hawai'i, all 200,000 acres of sugarcane land have been abandoned due to cost of production and land development issues. Much of that land was left in distressed condition, making productive and profitable use more difficult.

THE SOLUTION

TerViva's hardy, high yielding oilseed tree crop called pongamia can thrive in nutrient deficient soil.

Like soy, which is the most common source for the growing market of protein alternatives, pongamia has downstream uses ranging from cooking oil and biofuel to food products and animal feed. But compared to growing soy, pongamia:

- produces 10x more oil per acre
- results in 3x more protein-rich seedcake per acre
- requires 1/3 the water and fertilizer inputs

PROJECT OVERVIEW

What were the goals of the demonstration project?

Building off the company's initial success reviving fallow orange groves in Florida, TerViva partnered with Elemental Excelerator to establish a commercial operation in Hawaii. The primary goals of the project was to prove the feasibility of using pongamia as a viable source of cattle protein as well as proving the ability to grow in Hawaii's climate and soil conditions.

How did we achieve this?

TerViva, in partnership with Kamehameha Schools, cleared invasive grass and trees from over 200 acres of former Waialua Sugar Company land, built physical infrastructure, and refurbished the abandoned irrigation system. After preparing the site, TerViva established a planting of proprietary cultivations of pongamia trees that have thrived in Hawaii's ecosystem.

Simultaneously, TerViva discovered a method to purify the plant protein in the seedcake that remains following oil extraction from pongamia seeds. Through a collaboration with Texas A&M University, TerViva validated the safety of pongamia as a cattle feed supplement, and developed a feed formulation for Hawaii.

What role did Elemental Excelerator play?

- Patient Capital -

We understand that startups in the agriculture sector need long and flexible timelines to successfully scale their solutions.

Trees don't grow overnight!

PARTNERS

Hawaii Agriculture Research Center
Kamehameha Schools
Alexander & Baldwin
Kunoa Cattle Company
Alluvion Nursery
Kahuku Farms
Texas A&M University

RESULTS & KEY INSIGHTS

14,701 trees

planted

121 acres

planted on Oahu and Maui

13 jobs

supported, including 6 full time TerViva employees in Hawaii, 3 farm fields, 2 agricultural equipment suppliers, and 2 tree nursery positions

360 tons

of high protein seedcake per year (expected)

48,000 gallons

of plant oil per year (expected)

In addition to demonstrating cultivation of pongamia as a commercially viable endeavor in Hawaii and learning how to optimize for the state's unique ecosystem, this project provided a variety of unique long-term value propositions for TerViva.

Hawaii is a pongamia living laboratory where TerViva can test new agronomic techniques:

- TerViva observed accelerated pongamia growth in the region, which exemplified significant advantages of tree grafting, as opposed to traditional cloning models. As a result, TerViva instituted a company-wide pivot, exclusively producing grafted trees.
- TerViva has established the infrastructure, personnel, and expertise to produce over 25,000 grafted trees per year for planting in Hawaii.
- TerViva reduced herbicide and diesel usage by over 5x from the baseline established by local farming partners and completely eliminated insecticide use.

The orchard in Hawaii serves as a model to establish methods tailored toward cultivation of pongamia in isolated and/or fragmented geographies:

- Expanding into analogous markets with limited transportation and logistics infrastructure like isolated regions of Africa or Asia is a key component in TerViva's vision for the future.
- Pongamia cultivation in these regions can improve the local environment via permanent orchard crop cultivation, while producing plant oil and protein in close proximity to where agricultural products are in high demand.

WHERE ARE THEY NOW?

Expanding in Hawai'i

TerViva is partnering with Alexander & Baldwin to establish a 200-acre pongamia orchard on former sugarcane land on Maui.

Raised \$20M Series D

This brings their total funding to \$40M as of 2019. TerViva currently has 150,000 trees under contract with existing customers to include several of the largest citrus farmers in Florida. It will use its fresh funding to deliver an additional 200,000 trees in the coming two years, as well as grow their team and their geographical focus.





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