



**Frequently Asked Questions (FAQ)
About Pongamia**

Pongamia (*Pongamia pinnata*) is a non-GMO tree crop that produces oilseeds that can be processed into high-value oil for biofuel, plant protein for animal feed or biogas, and biomass for baseload electricity generation. Pongamia is fast-growing and requires little to no irrigation, depending on where it is grown. As a legume tree, it can fix atmospheric nitrogen to feed itself, minimizing the need for additional fertilizers and restoring health to depleted soils. Pongamia's pressed seed meal is high in protein, but possesses several active compounds—particularly karanjin, pongamol and tannins—that have a disagreeable aroma and bitter taste. These compounds prevent insects and herbivores from feeding on the tree's leaves or oilseeds. In spring, pongamia's vibrant green leaves sprout hanging clusters of fragrant white, pink, or lavender blossoms up to ten inches long. These beautiful flowers and the tree's brilliant green leaves have helped make pongamia a favorite for use as an ornamental, shade, or windbreak species.

Below are some of the most frequently asked questions about pongamia, especially from people that are interested in its widespread use in agriculture.

- » **1. Is pongamia an invasive plant?**
- » **2. Are pongamia leaves and oilseeds toxic or a danger to wildlife?**
- » **3. Is pongamia a cost competitive feedstock in the absence of price supports?**
- » **4. How much use of chemicals does pongamia require?**
- » **5. How much water does pongamia need to grow?**
- » **6. Are your pongamia trees genetically modified (“GMO”)?**
- » **7. How many jobs can potentially be created by this emerging industry?**

1. Is pongamia an invasive plant?

TerViva currently plants pongamia trees in Florida and Hawaii. Pongamia is considered native to Southern Asia (India, Australia, Southeast Asia), and pongamia trees were first introduced into Hawaii in 1860 and into Florida in the early 1900s. To date, they have not demonstrated any invasiveness.

Some organizations have identified pongamia as potentially invasive based on its propensity to produce oilseeds that can float on water. However, a definitive [assessment](#) of pongamia's invasiveness conducted by the government of Queensland in Australia found that pongamia is not a weed. Still, as with any fast-growing and hardy plant species, proper management is vital to ensuring responsible cultivation. TerViva has created best management practices for pongamia cultivation that we apply to all of our plantings.

2. Are pongamia leaves and oilseeds toxic or a danger to wildlife?

Among pongamia's many benefits is that it produces natural chemical compounds, such as karanjin and pongamol, which taste bitter. These compounds deter consumption by herbivores and insect infestations, resulting in lower management costs and enhanced sustainability. In addition, these compounds are valued for use in crop sprays, cosmetics, and sunscreen products.

While pongamia is not eaten by herbivores because of its taste, TerViva has, in collaboration with Texas A&M University, demonstrated that the bitter compounds in pongamia can be removed during oilseed processing. The plant protein in pongamia oilseed meal has great value for animal feed and, potentially, for edible products for humans as well. More research must be done to fully explore the feasibility of pongamia for human and animal consumption, however.

Despite its natural bitterness, there is no evidence that pongamia is toxic. Many naturally occurring parts of other plants do not taste good, and if consumed in excess, would probably cause harm to humans and animals. No cases of poisoning from pongamia oilseeds have been reported. Pongamia powder is sold internationally and in the United States as an Ayurvedic herbal dietary supplement. Other products from the oil or active compounds are present in hundreds of products for human use or application, from soaps to skin creams and beyond.

3. Is Pongamia a cost competitive feedstock in the absence of price supports?

Yes, pongamia is a cost competitive feedstock in the absence of price supports.

TerViva has proven through collaborations with multiple different independent partners that pongamia oil can be converted to biodiesel, renewable diesel, and renewable jet fuel that meets commercial specifications and is cost competitive.

TerViva supports government incentives in the renewable energy sector, as these policies allow for more rapid deployment and adoption of domestically produced, environmentally friendly fuels.

For data on conversion of pongamia oil to renewable fuel products, please send us an inquiry through the “Contact” link on our website.

4. How much use of chemicals does pongamia require?

Pongamia is a naturally vigorous, hardy tree. It grows fast and is resistant to many diseases and pests. As a legume, pongamia fixes nitrogen, thereby reducing the need for nitrogen-based fertilizers. Pongamia does not necessarily require chemical inputs in the form of synthetic fertilizers or pesticides to grow.

TerViva currently farms pongamia orchards in Florida and Hawaii. In both states, some orchards have been successfully managed with very minimal use of fertilizers and pesticides. In Kunia and in Hilo, pongamia trees have grown without the use of any chemicals since 2012. In other orchards, TerViva has successfully utilized synthetic fertilizers and pesticides to enhance productivity and reduce weed pressure from competing plants around the trees.

Ultimately, whether or not to use chemical inputs in a pongamia orchard is a choice the farmer must make. Fertilizers and pesticides can enhance the growth of the trees and provide better, more consistent cash flow per acre. Pongamia is hardy enough to allow for a wide range of farming practices, from organic to conventional.

5. How much water does pongamia need to grow?

Pongamia is most commonly found in parts of India and Australia where rainfall is “monsoonal” – meaning significant amounts of rainfall fall within a relative short period of time during the summer (e.g., 3 months) and then the rest of the year is mostly without rainfall. For this reason, pongamia is considered “drought tolerant”.

TerViva has planted pongamia trees in many diverse soils and environmental conditions over the years. In the US alone, we have planted trees in Florida, Hawaii, New Mexico, Arizona, California, and Texas, and we have observed thousands of trees growing in their natural environments around the world. Based on our experiences, we have determined that pongamia grows best with steady access to water in the general range of 25-35 inches per year, whether that water is provided through rainfall or supplemental irrigation. Accordingly, we encourage growers to set up drip irrigation systems as needed to support pongamia’s ability to grow and yield well.

Compared to soybean, pongamia requires slightly more water per acre, but also yields significantly more oilseeds per acre (4 times or more the amount of oilseeds compared to

soybean). Because it's a tree, pongamia is able to make better use of available soil moisture across an acre than annual oilseed crops such as soybean.

6. Are your pongamia trees genetically modified (“GMO”)?

No, our pongamia trees are not genetically modified. We have employed traditional breeding approaches to developing our elite pongamia varieties, such as vegetative propagation, grafting, and field evaluations. After 7 years of direct work by TerViva, and another decade of work beforehand by TerViva collaborators, we have a deep pipeline of pongamia tree varieties in varying stages of commercial readiness.

7. How many jobs can potentially be created by this industry?

TerViva is creating a new agricultural industry based on the cultivation of pongamia, producing sustainable energy, feed, and food, and creating jobs in rural agriculture communities. Via our pongamia orchards, jobs are created in the areas of nursery tree propagation, tree planting and maintenance, harvesting, transportation and oilseed processing. The orchards also indirectly create jobs in all sectors of the economy that touch the agriculture industry— from agriculture equipment vendors to shipping companies.

For every 10,000 acres of pongamia trees that are planted, TerViva will directly create an estimated 170 full time positions and 75 part time positions in nurseries, agriculture fields, and processing facilities.