

# Table of Contents

- A. Executive Summary.....2
- B. Infrastructure needs of Hawai'i hemp farmers
  - 1. List hemp-derived products that can and are being made.....8
  - 2. List low hanging fruit products for Hawai'i.....12
  - 3. Best cultivation practices.....27
  - 4. Field Equipment.....44
  - 5. Analyze shipping of biomass amongst the islands and to the mainland.....47
  - 6. Contribution to the state economy.....51
- C. Outline of recommended infrastructure by island.....55
- D. Schematic diagrams showing the various processing steps and infrastructure needed from harvest to product for various sectors.....69
- E. Approximate costs per infrastructure component.....84
- F. Infrastructure sizing and capacity options based on different processing needs.....85
- G. Suitability of mobile versus fixed infrastructure for hemp processing.....86
- H. Volume and mass requirements for processing per day.....89
- I. Approximate square footage required per component..... 90
- J. Economic implications of the recommended infrastructure by island to the hemp farmers, the hemp industry, and the state of Hawai'i.....91
- K. Task Force Feedback.....93
- L. Findings & Recommendations (By Sector) including any proposed legislation.....108
- M. Definitions.....126
- N. Addendum.....127

## A. Executive Summary

In 1999, Hawai'i became the [first U.S. state](#) to legally cultivate hemp, led by Rep. Cynthia Thielen. Thielen co-sponsored the Industrial Hemp Act of 2014 and launched a hemp project at the University of Hawai'i. Governor Ben Cayetano signed the pioneer bill, commencing a successful hemp research project under Dr. David West. Progress stalled under Governor David Ige due to misconceptions about hemp. After 25 years, little progress has been made since the initial trials.

### Introduction

A state-supported hemp industry in the Hawaiian Islands could revitalize the local economy by filling the gap left by the decline of the sugar, pineapple, and seed corn industries. Unlike these export crops, cultivating hemp creates raw materials for secondary industries, fostering a circular economy and producing various products that could significantly reduce imports. Key products include:

- Prefabricated housing materials
- Locally-made hemp blocks for construction
- Locally-made insulation and wood replacements
- Biodiesel and Renewable Natural Gas (RNG) to replace imported fuels
- Locally-produced high-end health food products

### Environmental and Agricultural Benefits

Hemp is a powerful phytoremediation plant, capable of detoxifying agricultural fields by removing heavy metals and working with soil microbes to metabolize residual agricultural chemicals. Notably, hemp has been shown to increase the yield of subsequent crops by 20%.<sup>1</sup> Given Hawai'i's limited arable land suitable for food production, this is one of the most critical benefits of developing a statewide industrial hemp industry.

### Enhancing Food Security

Hemp prepares land for other beneficial rotational crops, including corn, soybeans, colored beans, adapted wheat varieties, oats, squash, potatoes, sweet potatoes, melons, silage, and other crops that could significantly contribute to Hawai'i's food security. Before the best agricultural lands are sold for luxury homes, it is imperative that Hawai'i adapts mechanized agriculture to support food

---

<sup>1</sup> Biomass Connect: <https://www.biomassconnect.org/technical-articles/hemp-as-a-biomass-crop/>

security. As a pioneer crop, hemp can play an instrumental role in this transition.

### **Recommendations for Establishing a Hemp Industry**

The State of Hawai'i must build its hemp industry within the framework of food security while simultaneously developing local industries to utilize the raw materials produced by hemp. Our recommendations for establishing a hemp industry within an agricultural circular economy are based on four key reasons:

1. **Integrated Crop Cultivation:** Developing a hemp industry in isolation is ineffective; other rotational crops must also be cultivated as hemp cannot be grown continuously on the same land.
2. **Enhancing Food Security:** Hemp is an ideal crop to prepare fields for other food and animal feed crops, thereby enhancing food security in our islands.
3. **Mechanized Agriculture:** Supporting hemp cultivation using mechanization similar to traditional field crops like corn, small grains, beans, and forage crops will facilitate the transition to mechanized field crop production—a system that Hawai'i has scarcely utilized. Large-scale mechanized row crop farming is the basis of the American diet and must be developed in Hawai'i to increase island food security and support a circular economy.
4. **Soil Enrichment:** Hawaiian soils, which are low in organic matter, will benefit from the addition of animal manures from either pasture-raised animals, direct application, or composted additives. Feeding poultry and livestock to obtain manure while increasing food security is a necessary step.

### **Economic Impact and Local Industry Development**

The demand for locally grown construction materials, industry-based jobs, and locally produced food products is undeniable. The state can leverage its power to help private industry meet these needs through various means, including:

- **Grants and Loans:** Providing financial support to farmers and processors to establish a robust hemp industry.
- **Tax Incentives:** Offering tax breaks to businesses involved in the cultivation, processing, and utilization of hemp.
- **State Expertise:** Providing technical assistance and resources to ensure the success of hemp-related projects.

## Immediate Actions

To effectively kickstart a hemp industry in Hawai'i, the state must support farmers, processors, and end-users of hurd and bast fiber concurrently. This can be achieved through the following steps:

- **Processing Plant Development:** Establish a single processing plant on one island before expanding to others. Farmers can begin growing dual-purpose hemp, selling seeds, and storing hemp straw for future processing.
- **Industry Partnerships:** Secure off-takers for primary products from the hemp decortication process—hurd and bast fiber—and support the development of industries prepared to create value-added products from these materials.
- **Construction and Biofuels:** Promote the use of hemp in the construction industry to address housing needs and develop biofuels like biodiesel and renewable natural gas from hemp seed oil and stalks.

## Conclusion

Supporting the development of a hemp industry in Hawai'i within the framework of food security can provide significant environmental, economic, and agricultural benefits. By implementing strategic recommendations and leveraging state support, Hawai'i can create a sustainable and prosperous future centered around the versatile and valuable hemp plant.

## Background

We were hired to investigate the potential for establishing a hemp industry in Hawai'i. Our primary focus was on Industrial Hemp, which involves cultivating hemp for the production of construction materials, biofuels, food products, fiber products, and rejuvenating Hawaiian soils for ecosystem restoration, food security, and carbon sequestration.

However, during our investigation, approximately 80% of our interactions were with the sector of the hemp community focused on producing hemp for cannabinoid extraction. While this sector is vital and offers significant benefits in supporting small farmers and cottage industries around the island, conflating Cannabinoid Hemp with Industrial Hemp creates confusion. Although both can be classified as "Industrial Hemp," merging them confuses the general public, legislative bodies, and policymakers. Therefore, in this report, we will refer to hemp used for industrial uses as 'Industrial Hemp' and hemp grown for cannabinoids as 'Cannabinoid Hemp.'

We acknowledge the efforts of Cannabinoid Hemp farmers and their contributions to food security through supplementary farm income. However, we recommend establishing a dedicated task force<sup>4</sup>

to address the unique issues related to Cannabinoid Hemp, including the production and marketing of CBD products. This task force should have direct access to State employees who can propose changes to State laws and policies to facilitate their success. With the data collected and shared by this consulting team, the Cannabinoid Task Force will be better equipped to suggest State funding to support the growth of a "Made in Hawai'i" cannabinoid industry.

For the purpose of this report, our focus will remain primarily on Industrial Hemp. This includes the large-scale, mechanized cultivation of the hemp plant for producing renewable fuels, human food, construction materials, fiber products, the rejuvenation of Hawaiian agricultural soil, and carbon credits.

### **Overcoming the Chicken-and-Egg Dilemma in Hemp Cultivation**

A significant barrier to hemp cultivation in Hawai'i is the classic chicken-and-egg dilemma: farmers are hesitant to grow hemp unless there are businesses willing to purchase the seeds and fiber, while businesses need a steady supply of hemp products to justify their investments. Currently, Pacific Biodiesel and potentially Agripelago are prepared to buy hemp seeds, but a sustainable solution for the straw byproduct is still needed.

For long-term success, Hawai'i requires processing plants on each island to separate hemp straw into hurd and bast fiber. Additionally, maintaining a processing plant with four shifts per week will necessitate the cultivation of 3,000 acres of hemp, with access to water, rotated with food crops.

### **Strategic Steps for Development**

#### **1. Initial Processing Plant**

- The state should support the development of a single processing plant on one island as a pilot project before expanding to other islands.
- Farmers can start growing dual-purpose hemp even before the processing plant is operational. The seeds can be sold, and hemp straw can be stored for up to two years if properly protected. The goal is to have straw ready for processing when the plant opens.

#### **2. Securing Off-Takers**

- It is crucial to secure off-takers for the primary products from the hemp decortication process—hurd and bast fiber. This ensures a market for the processed materials.

#### **3. Developing Supporting Industries**

- The state can immediately support the development of industries prepared to buy hurd and fibers from the processing plant. These industries will create value-added

products that replace imported goods, such as construction materials for the many needed housing units in Hawai'i.

### **Maximizing Hemp's Potential**

- **Biofuels:** Hemp seed oil can be processed into biodiesel or used as an ingredient in food and beauty products. Anaerobic digesters can convert freshly chopped hemp stalks into renewable natural gas, with the digestate serving as an agricultural amendment or precursor to building materials.

### **Comprehensive Support Framework**

To effectively kickstart a hemp industry in Hawai'i, the state must concurrently support farmers, processors, and end-users of hurd and bast fiber. This comprehensive support should include:

- **Grants and Loans:** Financial assistance to lower the initial investment barriers for farmers and processors.
- **Tax Incentives:** Tax breaks to incentivize the cultivation, processing, and utilization of hemp.
- **State Expertise:** Providing technical assistance and resources to ensure successful implementation and operation.

By taking these strategic steps, Hawai'i can develop a robust hemp industry that supports food security, economic growth, and environmental sustainability.

### **Potential of Industrial Hemp Industry in Hawai'i: Economic Implications**

Hawai'i has 1,930,000 acres zoned for agriculture, of which only 8% (155,000 acres) is used for food production and 39% (753,000) used for pasture. This leaves around 1,000,000 acres unused.<sup>2</sup>

Bob King, co-founder of Pacific Biodiesel, stated his company could process up to 3 million gallons of biodiesel annually from hemp seeds. Each acre of hemp produces about 83 gallons of biodiesel, meaning 36,000 acres could supply Pacific Biodiesel's capacity. These 36,000 acres can also produce 144,000 tons of hemp straw annually, which can be converted into Renewable Natural Gas (RNG) and other products.

---

<sup>2</sup> Civil Beat-Hawai'i Has a lot of Agricultural Land. Very Little of It is being Used to Grow Food: <https://www.civilbeat.org/2021/02/hawaii-grown-maps/>

Agripelago, a Hawaiian startup, aims to adapt European biogas technology locally, promoting energy independence. Hemp straw can also be processed into building materials like hempcrete. One 1,500 sq ft house requires about 14.5 tons of hemp materials, enabling the construction of about 8,000 homes from 36,000 acres of hemp, also producing 3 million gallons of biodiesel.

Hemp can be a rotational crop with corn and soybeans, producing over 600 million pounds of feed annually, supporting 50 million broilers and meeting local chicken consumption needs. Surplus can be used for egg production. Chicken manure can enrich Hawai'i's soil, and hemp byproducts can be used as poultry bedding, converted into compost, and feed.

Adopting hemp could revitalize Hawai'i's agriculture, enhance food security, reduce import dependency, and support sustainable practices over tourism. The state legislature should prioritize food security and sustainability by identifying agricultural land, educating the public, and subsidizing local crops. Let's prioritize food security and sustainability before it is too late!

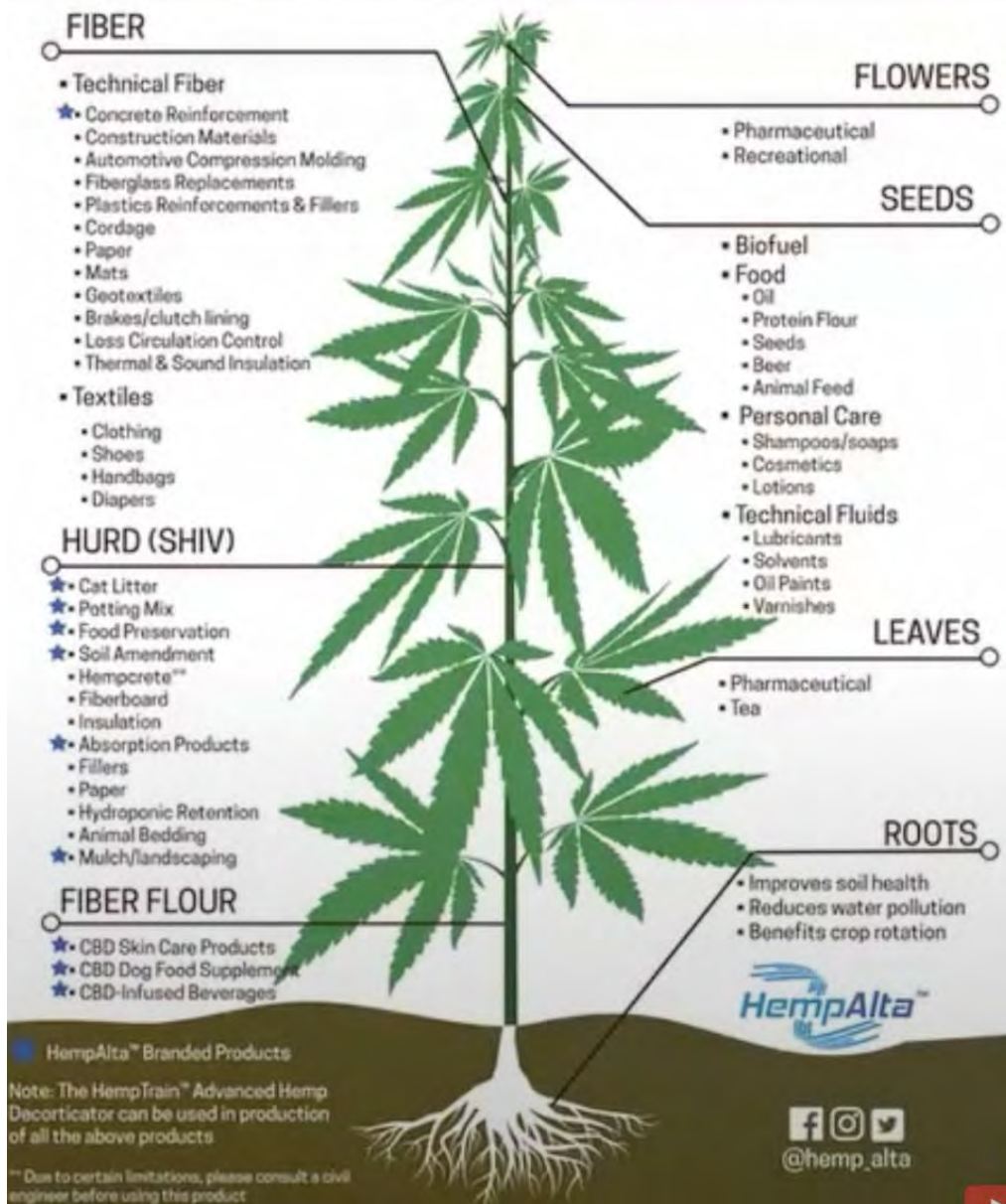
## **B. Infrastructure Needs of Hawai'i Hemp Farmers**

### **B1. Hemp-Derived Products That Can and Are Being Made**

Hemp, with its versatile properties, offers a multitude of uses across various industries. There are three main categories when looking at the different uses/processing methods for hemp. Fiber, Seed/Grain, and Cannabinoids. Primarily valued for its fibers, hemp finds application in textiles, providing durable and breathable fabric for clothing, upholstery, and accessories. Beyond textiles, hemp fibers are utilized in construction materials, such as insulation, fiberboard, and hempcrete, offering sustainable alternatives with excellent thermal properties. Additionally, hemp seeds are rich in nutrients and can be processed into oil, used in cooking, skincare, protein powders, seed milk and nutritional supplements. Hemp seeds can also be used to make biodiesel and hemp straw can be used to make biofuels. The plant's strong and lightweight composition also lends itself to manufacturing biodegradable plastics, reducing dependence on fossil fuels and combating plastic pollution. Furthermore, hemp serves as a renewable resource for paper production, requiring fewer chemicals and less water compared to traditional wood pulp. Its potential extends into the automotive industry, with hemp-based materials being explored for car interiors and panels. The cannabinoids found in hemp including CBD have been known to help treat chronic pain, inflammation, anxiety, insomnia, depression, and PTSD. Moreover, hemp cultivation contributes to soil health and carbon sequestration, making it an eco-friendly choice for farmers. With its myriad applications, hemp emerges as a sustainable solution across diverse sectors, promising a greener and more resilient future for Hawai'i.



# THE MANY USES OF HEMP



\*Infographic via Hemp Alta

## **Products That Can Be Made From Hemp**

### **FIBER SECTOR:**

#### **Industrial Textiles:**

Twine, rope, nets, canvas, tarps, carpets, geotextiles, agro-fiber composites, brake/clutch linings, caulking

#### **Consumer Textiles:**

Apparel, diapers, fabrics, handbags, denim, shoes, fabrics

#### **Paper:**

Printing paper, newsprint, cardboard/packaging

#### **Building Materials:**

Hempcrete, hemp blocks, hempcrete prefab panels, hempcrete spray, fiberboard, insulation, fiberglass substitute, flooring, sound abatement

#### **Industrial Products:**

Oil paints, varnishes, printer ink, fuel, solvents, lubricants, putty, coatings, biodiesel, Hemp ethanol/methanol, graphene/biochar, batteries, surfboards, car doors, bioplastics, mulch, chemical spill cleanup, biodegradable single use plastics

#### **Animal:**

Animal bedding, kitty litter

#### **Fuel:**

Biofuel

### **SEED/GRAIN SECTOR:**

#### **Foods:**

Hemp seed oil, food supplements, cooking oils, birdseed, hemp seed hearts, animal feed (chicken feed), protein powder, hemp mylk

#### **Personal Hygiene:**

Soap, shampoo, bath gels, lotions, balms, cosmetics

**Fuel:**

Biodiesel

**CANNABINOID SECTOR**

**Health:**

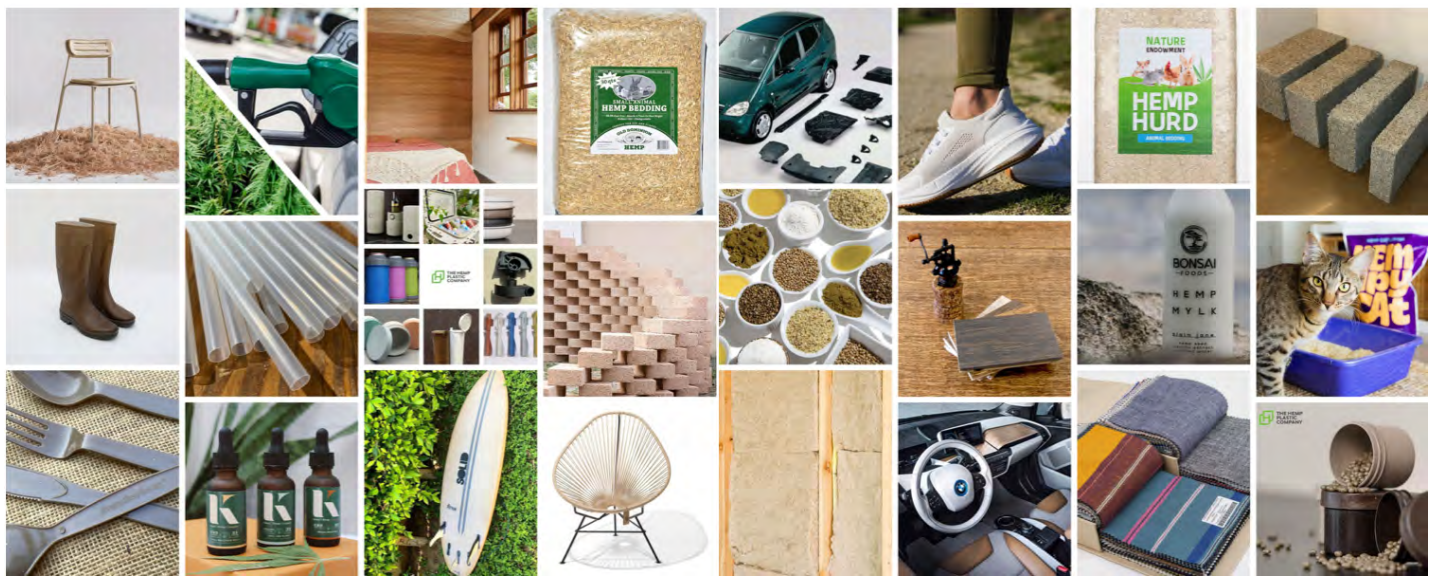
Cannabinoids (CBD, CBG, CBN...)

Topicals

Tinctures

Edibles (\*not yet legal in Hawai'i)

Capsules



The multitude of products that can be made from hemp

## **B2. Low Hanging Fruit Products For Hawai'i**

In Hawai'i, Industrial Hemp offers a multitude of applications that could contribute to the state's economy and sustainability efforts. With its ideal climate and fertile soil, Hawai'i boasts a conducive environment for hemp cultivation. The versatile plant finds extensive use across various sectors, including agriculture, construction, biofuels and bioplastics and health. In agriculture, hemp serves as a valuable rotational crop, enhancing soil health and biodiversity while requiring minimal water and pesticides. Moreover, hemp fibers are utilized in construction materials, such as hempcrete, providing eco-friendly alternatives for building homes and infrastructure that can help solve the housing crisis in Hawai'i. Also, animal bedding would benefit the many hobby farms that have animals such as horses and chickens across the islands. Additionally, hemp cultivation promotes carbon sequestration, aiding in Hawai'i's commitment to combating climate change.

Cannabinoid Hemp, a high value crop grown by small farms can supplement income from their food crops while adding to food security for our islands by being planted as a rotation crop or alongside other food crops. As the state continues to explore sustainable practices, Industrial Hemp can emerge as a promising asset, fostering economic growth and environmental stewardship throughout the islands. Based on what is currently being produced on the mainland utilizing newly built Industrial Hemp processing facilities, the below items are recommendations for what could be made relatively easily in Hawai'i should we have the hemp processing plants in place.

### **Building Materials:**

- [Hempcrete prefab walls](#)
- [Hempcrete bricks](#)
- Traditional hempcrete using forms

- [Spray hempcrete](#) (Ereasy spray)
- [3D printing with hempcrete](#)
- [Hemp insulation](#)
- [Sound abatement](#)

**Pet:**

- [Kitty litter](#)
- [Chicken, farm animal feed](#) utilizing biomass waste from CBD hemp
- [Animal bedding-chickens](#)

**Health:**

- Cannabinoid based products such as: [CBD tinctures](#), [topicals](#)...

**Industrial:**

- [Bio plastics](#)
- [Hemp biodiesel/ethanol](#)
  - [Pacific Biodiesel](#), the first biodiesel company in the nation, is ready to press hemp seed on the Big Island and Kauai
- [Hemp for clean up](#) of oil spills, solvents, coolants...
- [Bio char graphene for batteries](#)

**Food:**

- [Hemp seed hearts](#)
- [Hemp seed oil](#)
- [Hemp protein powder](#)
- [Hemp mylk](#)

**Body Care:**

- Soaps
- Shampoos
- Lotions
- Balms
- Cosmetics

\*Food grade hemp seed oil can be processed today on Big Island and Kauai via Pacific<sup>13</sup>

Biodiesel and supply the many producers of *Made in Hawai'i* beauty/body products

**Agriculture:**

- Rotation crop
- Soil remediation
- Carbon sequestration
- Garden mulch
- Potting soil additive

**Primary hemp products that can be made immediately without further processing at the hemp processing facility:**

- Hemp hurd for hempcrete
- Kitty litter
- Animal bedding
- Premium soil enrichment made from hemp
- Garden mulch
- All-natural chemical spill absorbent
- Biodiesel: Pacific Biodiesel processing facilities are ready to process hemp seed into finished biodiesel on both the Big Island and Kauai.

**Secondary hemp products that can be made once appropriate infrastructure is in place**

The below products are ones that utilize different parts of the hemp plant but need additional processing or know-how to execute. The below products could potentially spawn many small businesses and stoke innovations in the hemp industry in the Hawaiian Islands.

**Building Materials:**

- 3D printing with hempcrete
- Hemp insulation
- Hemp blocks
- Prefab industry for building houses and apartments

**Health:**

- Cannabinoid based products such as tinctures and topicals

**Industrial:**

- Bio plastics products that are currently being imported can be replaced with hemp bioplastics such as school chairs, tables, [single use plastics and straws](#), ...
- Hemp bioethanol
  - Agripelago is an advanced startup in this area
- Biochar
- Hemp batteries

**Food:**

- Hemp seed hearts
- Hemp seed oil
- Hemp protein powder
- Hemp mylk

**Body Care:**

- [Soaps](#)
- [Shampoos](#)
- [Lotions](#)
- [Balms](#)
- [Cosmetics](#)

**A Deeper Look at Each Sector****Fuel Sector**

In recent years, there has been growing interest in exploring renewable energy sources to mitigate the adverse effects of fossil fuel consumption on the environment. One such promising avenue is the utilization of hemp biomass as well as pressing hemp seeds for biofuel production. Hemp offers a sustainable solution to meet the escalating energy demands while reducing greenhouse gas emissions. Below we will dive into the feasibility, benefits, and challenges associated with using hemp biomass for biofuel production.

### **Feasibility of Hemp Biomass for Biofuel Production:**

Hemp has garnered attention for its high biomass yield and versatile applications. It can be cultivated in various climates with minimal water and pesticide requirements, making it a highly sustainable crop. Hemp biomass, consisting of the plant's stalks, leaves, and flowers, contains cellulose, hemicellulose, and lignin—key components suitable for biofuel production.

Both biodiesel and RNG (Renewable Natural Gas) can be made from locally grown hemp. Biofuels can be made from both the hemp seed and the hemp straw by entirely different processes. Biodiesel has been made from hemp seeds for over 100 years and was used to power the first Ford cars. This is the easiest commercial process and the industrial infrastructure already exists in Hawai'i through the forward thinking efforts of Pacific Biodiesel. Hemp biodiesel has been shown to produce 207 gals/hectare ( 83 gals/acre).

RNG is made from the biomass of the hemp plant (stalks, stems, leaves and flowers) through anaerobic digestion of the cellulosic biomass. Anaerobic digestion is a commercially mature technology used throughout Europe and its application to a future Hawaiian hemp industry is under development by Agripelago, a Hawaiian company hoping to use industrial hemp for the dual purpose of food products and RNG production. In trials in Northern Europe hemp for biogas yielded 12,860 pounds per acre with an energy content of 118GJ/A of biogas.<sup>3</sup>

Agripelago makes an interesting argument for anaerobic digestion in that it can use green leaves currently lost in today's harvesting techniques. However, they are quick to point out that even collecting leaves from Industrial Hemp with a confirmed THC content below 0.3% raises suspicions. This lack of understanding is impeding progress in not only biofuels but alternative animal proteins that could be grown locally. According to Grant Overton, CEO of Agripelago, for his industry to move forward “the State of Hawai'i must align our hemp regulations with the US federal law as described extensively under the Farm Bill and as regulated by the USDA. We should never exceed federal regulations, now or in the future.”

Pacific Biodiesel produces over 6,000,000 gallons of biodiesel per year for the local Hawaiian market. They began nearly 30 years ago making biodiesel from recycled cooking oil on Maui and later expanded into using grease trap waste and animal renderings. More recently, this innovative company has been growing sunflowers and safflowers to demonstrate the island's potential for growing oil seed crops to reduce Hawai'i's dependence on imported fossil fuels.

---

<sup>3</sup> Biomass and Energy Yield of Industrial Hemp Grown For Biogas and Solid Fuel:  
<https://www.sciencedirect.com/science/article/abs/pii/S096195341100208X>



They attempted to experiment with growing hemp seeds but were deterred by the political and social stigma associated with the lack of understanding of the many differences between Industrial Hemp and Cannabis. According to Kelly King, Vice President at Pacific Biodiesel, no local bank was willing to fund any hemp biodiesel projects for fear of public pushback. So the founders of Pacific Biodiesel, Bob and Kelly King, had to create a business entity in their personal names even to proceed with experimentation.

If these two successful business leaders in the field of climate change technology and environmental concerns were affected, then consider the pressures on the Hawaiian Cannabinoid Hemp growers. This has been a recurring concern expressed by the task force members not only in terms of banking assistance but commercial insurance under-writing. Once Industrial Hemp is accepted as a valuable crop in Hawai'i, it is important to note that the large Pacific Biodiesel processing plant on the Big Island is capable of producing hemp seed culinary oils as well as biodiesel in the same way that it currently processes from macnut waste culls and purpose grown sunflower and safflower oil seeds. When production of Industrial Hemp begins in the Hawaiian Islands we will be very fortunate to have this infrastructure already in place. Pacific Biodiesel has the status of being the first biodiesel plant in the nation. The company employs over 100 people in meaningful jobs. We spoke with an employee on Maui returning from his 3:30am route of cleaning out grease traps around the island. He said he felt fortunate to work for Pacific Biodiesel because he felt his work was making a difference. His pride was palpable as he showed us around the sunflower farm.

**Conclusion:** Harnessing hemp biomass for biofuel production offers a promising pathway towards achieving sustainable energy goals. The renewable nature of hemp, coupled with its environmental benefits and economic opportunities, underscores its significance as a viable alternative to fossil fuels. Pacific Biodiesel's processing plant is currently able to process hemp seeds for biofuel and culinary oils and they are able to grow potentially many acres of hemp as a rotation crop with other seed crops. Agriplelago has been working on developing Biogas projects: specifically RNG (Renewable Natural Gas) with CCUS (Carbon Capture Utilization and Storage) and if the uncertainty surrounding hemp cultivation laws were removed, they would be able to secure the investment needed to bring this project to fruition. This is why addressing regulatory, technological, and market challenges is essential to realize the full potential of hemp biofuels. With concerted efforts from policymakers, researchers, and industry stakeholders, hemp biofuels can emerge as a cornerstone of the transition towards a cleaner and greener energy future.

## **Building Sector**

Due to the recent wildfires in Lahaina and upcountry Maui, we are at an inflection point with much needed affordable housing. The Maui county council estimated in 2016 that it needed to build 14,000 housing units<sup>4</sup> over the next decade to keep up with demand and now due to the wildfires in August 2023, that burned over 2000 businesses and residences, the situation is even more dire. Hempcrete could potentially offer several benefits in helping address the building crisis on Maui following the Lahaina wildfires as well as the state-wide housing crisis. If we are able to grow and process hemp in Hawai'i, a large portion of that hemp could be used to build affordable, healthy homes. Due to the need for expediency, utilizing [hempcrete blocks](#), [prefab hempcrete panels](#), [3D printing](#) hempcrete building, [spray hempcrete](#) and all manner of wood replacement products would be the best solution to build homes quickly. It would also create new businesses and jobs in the state. All of the products that we reference as hemp replacement for currently imported construction materials are currently in production and can typically be licensed for local production. You will see in our recommendations that we are recommending that HPM be supported to determine which of the many products should be produced in the islands for the biggest impact on reducing imports.

Joe Smith, a builder and founder of [Hemp Home Hawai'i](#), just completed the second hempcrete home on Maui. Since launching his hempcrete focused business this year, there has been a lot of interest in building with hempcrete, the problem is that the hemp hurd still needs to be imported which is an added expense. Joe paid \$0.66/ pound to transport hurd to Maui. With a processing plant even on another island that inter-island cost would drop to about \$0.07/pound. [Hemp Solutions Kauai](#) is looking to make hempcrete bricks in order to build homes faster. Ohana Nui Ventures is looking to partner with them to grow the hemp on potentially 1000 acres on Kauai.

Below are some reasons why building homes with hemp grown in Hawai'i would be beneficial:

**Sustainable Material:** Hempcrete is made from the inner woody fibers of the Industrial Hemp plant mixed with lime and water. The hemp hurd used for hempcrete comes straight out of the decorticator with no additional processing needed. It's a renewable resource that grows quickly and requires minimal water and pesticides compared to other building materials. Using hempcrete can contribute to sustainable rebuilding efforts and reduce the environmental impact of construction.

---

<sup>4</sup> Measuring Housing Demand in Hawaii 2015-2025: <https://files.hawaii.gov/dbedt/economic/reports/2015+805-housing-demand.pdf>

**Fire Resistance:** One of the key benefits of hempcrete is its fire-resistant properties.<sup>5</sup> While it's not completely fireproof, hempcrete is significantly more fire-resistant than traditional building materials like wood. This could be particularly beneficial in areas prone to wildfires, such as the dryer areas of the islands, helping to minimize the risk of future fire damage.

**Insulation:** Hempcrete provides excellent insulation properties, regulating temperature and humidity within buildings. In a tropical climate like Hawai'i, proper insulation is crucial for maintaining comfortable indoor conditions without relying heavily on energy-intensive cooling systems. Additionally, hempcrete's breathability can help prevent mold and mildew growth, which is important in humid environments.

**Carbon Sequestration:** Hempcrete has the ability to sequester carbon dioxide from the atmosphere during its production, making it a carbon-negative building material. By using hempcrete in construction projects, it's possible to offset carbon emissions, contributing to efforts to combat climate change.

**Local Economic Development:** Hemp cultivation and hempcrete production can create economic opportunities for local communities. By establishing hemp farming and processing facilities in Hawai'i, it would create jobs and support the local economy while also providing a sustainable building material for reconstruction efforts.

**Regenerative Agriculture:** Hemp cultivation can improve soil health and biodiversity, as it requires minimal inputs and can be grown in rotation with other crops. In areas affected by wildfires, regenerative agricultural practices can help restore damaged ecosystems and mitigate the risk of future wildfires.

**Renewable Resource:** Due to Hawai'i's climate, there is potential to harvest hemp year around, thereby creating a continuous supply of hemp to build homes with. Utilizing hemp as a rotation crop for smaller farmers can add to the supply chain as well.

**Conclusion:** Building with hempcrete in Hawai'i offers numerous environmental and practical benefits, making it an ideal choice for sustainable construction. The hemp hurd used for hempcrete comes straight out of the decorticator and does not need any additional processing. Hempcrete is highly sustainable due to its low carbon footprint. Hemp plants sequester large

---

<sup>5</sup> Hempcrete Wall product Earns One-Hour Fire Resistance Rating From ASTM International:  
<https://www.ganjapreneur.com/hempcrete-wall-product-earns-one-hour-fire-resistance-rating-from-astm-international/>

amounts of CO2 during their growth, which offsets the carbon emissions associated with construction. Additionally, hemp can be cultivated relatively quickly and abundantly in Hawai'i's tropical climate, providing a local and renewable source of raw materials. The use of locally sourced hemp not only reduces transportation emissions but also supports the local economy and agricultural sector and reduces the need for imported building materials.

Hempcrete also provides excellent thermal and acoustic insulation, contributing to energy efficiency and comfort in Hawai'i's warm climate. Its breathability helps regulate indoor humidity, preventing mold growth and improving air quality, which is particularly beneficial in Hawai'i's humid environment. The material is fire-resistant, pest-resistant, and durable, enhancing the longevity and safety of buildings. By incorporating hempcrete into building practices, Hawai'i can move towards more sustainable, resilient, and healthy living environments. In order to have a viable hempcrete industry in Hawai'i a processing plant will need to be placed on one of the islands to begin with followed by the other major islands. To supply one decorticator plant at full scale production (4 shifts) will require 3000 acres of land with irrigation in rotational crops.

### **General Fiber Sector**

Hemp fiber, derived from the stalks of the hemp plant, is a versatile and eco-friendly material with a myriad of applications like textiles, paper, building materials, bioplastics, composite panels for cars, rope, mulch, and animal bedding. The downside is that some, but not all of these products need additional processing, but some can come straight from the decorticator. The upside is that once additional infrastructure is in place to process these types of products, Hawai'i can lessen its reliance on many imported goods that can be made from hemp fiber and create new industries in the state. Below are some benefits of replacing traditional products with hemp alternatives.

### **Hemp Based Building Materials**

**Economic Impact:** Hemp biomass (straw) can provide the raw materials for many secondary industries to produce the construction materials currently imported creating a circular island economy.

#### **Construction materials currently being produced from hemp hurd or fiber:**

- Hempcrete
- Hemp blocks
- Hemp/cement structural blocks
- Insulation
- Hempwood panels

- Fiber board
- Sub-flooring

**Pro:** Hawaiian agriculture can focus on producing the raw materials for Hawaiian industries rather than a one-time export.

### **Hemp Paper**

**Environmental Impact:** Hemp grows much faster than trees, maturing in just 3 months compared to 20-80 years for trees. This rapid growth rate means hemp can be harvested and replanted multiple times a year, leading to a sustainable supply of raw material.

**Less Chemical Use:** Producing paper from hemp requires fewer chemicals than from wood pulp, reducing environmental pollution.

**Durability and Quality:** Hemp paper is more durable and resistant to decomposition. It can be recycled more times than wood-based paper.

**Con:** Additional processing and equipment is needed to make hemp paper.

### **Hemp Kitty Litter**

**Absorbency:** Hemp fibers are highly absorbent, making hemp kitty litter effective at controlling moisture and odors.

**Biodegradability:** Unlike traditional clay-based litters, hemp litter is biodegradable, reducing landfill waste.

**Dust-Free:** Hemp kitty litter produces less dust, which is beneficial for both cats and their owners, especially those with respiratory issues.

**Pro:** Hemp kitty litter can come straight from the decorticator with no additional processing equipment required.

### **Hemp Animal Bedding**

**Comfort and Safety:** Hemp bedding is soft and comfortable for animals. It is also dust-free, reducing respiratory problems.

**Absorbency and Odor Control:** Its natural absorbency helps keep animal enclosures dry and odor-free, enhancing the living conditions for pets and livestock.

**Biodegradability:** Hemp bedding is biodegradable and compostable, making it an environmentally friendly option.

**Pro:** Bedding when used in a free-range poultry setting can absorb manure that can be further processed in Black Soldier Fly larvae to be used as poultry or fish food.

### **Hemp Textiles**

**Resource Efficiency:** Hemp requires less water and fewer pesticides than cotton to grow. This makes hemp a more sustainable choice for textile production.

**Durability:** Hemp fibers are stronger and more durable than cotton, leading to longer-lasting clothing and fabrics.

**Comfort:** Hemp textiles are breathable and become softer with each wash, offering comfort comparable to cotton.

**Con:** Additional processing and equipment is needed to make hemp textiles.

### **Plastics**

**Biodegradability:** Hemp-based plastics are biodegradable, unlike conventional petroleum-based plastics, which persist in the environment for hundreds of years.

**Strength and Lightweight:** Hemp plastics are strong, durable, and lightweight, making them suitable for various applications, including utensils, packaging, automotive parts, and construction materials.

**Reduced Carbon Footprint:** Producing hemp plastics emits fewer greenhouse gasses than traditional plastic production, contributing to a lower carbon footprint.

**Con:** Additional processing and equipment are needed to make hemp bioplastics.

### **Hemp Rope**

**Strength and Durability:** Hemp rope is stronger and more durable than cotton rope. It resists rotting and degradation from UV light better than cotton.

**Sustainability:** Hemp cultivation is more sustainable, requiring fewer resources and having a lower environmental impact than cotton farming.

**Versatility:** Hemp rope is versatile and can be used in various applications, from maritime activities to crafting and home use.

**Con:** Additional processing and equipment are needed to make hemp rope.

**Conclusion:** Replacing traditional products with hemp fiber-based alternatives can lead to significant environmental, economic, and practical benefits. Hemp's rapid growth, low resource requirements, and biodegradability make it an excellent sustainable choice for a wide range of applications.

The con is that a lot of these products like rope, paper, textiles, and bioplastics need additional processing. The focus should first be on the low hanging fruit such as hemp hurd for hempcrete, kitty litter, and animal bedding as it can come straight out of the decorticator. Once Hawai'i is able to build a fiber processing plant and industrial hemp is being farmed at scale, then we can begin to look at producing some of the other products that can be made from the fiber.

### **Cannabinoid Sector**

The cannabinoid sector is primarily focused on the extraction and utilization of compounds such as cannabidiol (CBD) and other cannabinoids like CBG and CBN. CBD, in particular, has gained significant attention for its potential therapeutic benefits, including anti-inflammatory, and analgesic, properties. Products derived from hemp cannabinoids include oils, tinctures, capsules, and topicals, which are used for managing a variety of health conditions such as chronic pain, anxiety, and epilepsy. There is already a boutique cannabinoid industry in Hawai'i made up primarily of small farms.

Growing Cannabinoid Hemp in addition to other food crops in Hawai'i offers several benefits for the small farmer:

- 1. Diversified Income Stream:** By adding a high value crop like Cannabinoid Hemp into their crop rotation, it can provide an additional source of revenue. The demand for CBD products is high, and prices for CBD hemp can be lucrative compared to other traditional crops.
- 2. Crop Rotation Benefits:** Incorporating hemp into crop rotation can improve soil health. Hemp has deep roots that can help break up soil, improve soil structure, and reduce soil compaction. This can benefit subsequent food crops by enhancing nutrient availability and reducing pests and diseases.
- 3. Pest Suppression:** Hemp's natural resistance to many pests also means fewer if any pesticides are needed, benefiting the environment, and reducing costs.
- 4. Soil Remediation:** Hemp is known for its phytoremediation properties, meaning it can help remove toxins from the soil. This can be particularly beneficial for land in Hawai'i that has been degraded or contaminated, improving its suitability for growing other crops in the future.

5. **Market Growth:** Selling “Hawaiian Grown Hemp” can be more lucrative than similar products from the mainland or overseas as Hawaiian grown products can usually be sold at a premium and are held in high regard by consumers for their quality. Establishing a reputation for high-quality Cannabinoid Hemp can lead to long-term business opportunities.
6. **Environmental Benefits:** Hemp is an environmentally friendly crop. It requires less water than many traditional crops and can be grown with fewer chemical inputs. This sustainable approach can appeal to environmentally conscious consumers and can potentially qualify for certain grants or subsidies for local farmers.
7. **Resilience Against Market Fluctuations:** By diversifying crops, farmers can mitigate the risk of market fluctuations. If prices for one crop fall, income from another can help stabilize the farm's revenue.
8. **Research and Development Opportunities:** Engaging in the cultivation of Cannabinoid Hemp can open up opportunities for collaboration with research institutions, universities, and companies interested in developing new strains or cultivation techniques.

**Conclusion:** Incorporating Cannabinoid Hemp into a small farm's crop portfolio can enhance financial stability, promote sustainable farming practices, and provide opportunities for innovation and growth. Being able to put “Hawaiian Grown Hemp” on the label can bring a premium price, thereby increasing the income of small farmers with a high value crop that can complement other crops grown on the farm. The cannabinoid farmers need to be supported better by the local government in order for it to grow and flourish as there are many barriers in the way and outside competition which we touch on in more detail in section L.

## **Grain/Food Sector**

In Hawai'i, there is a prime opportunity to leverage Industrial Hemp for grain and food production. Hemp seeds, rich in protein, essential fatty acids, and minerals, offer a nutritious and sustainable alternative for human consumption. There is also potential to utilize the hemp seeds for nutritious animal feed as well once the laws around its use change. With Hawai'i's agricultural sector seeking sustainable food solutions, Industrial Hemp seed is a compelling option.

### **Benefits of Utilizing Industrial Hemp for Grain and Food in Hawai'i:**

1. **Diversification of Agriculture:** Hawai'i's agriculture has historically focused on sugarcane, pineapple, hybrid seed corn and coffee. Introducing Industrial Hemp grown for seed adds diversity, reducing reliance on a few crops and enhancing resilience against market fluctuations.



- 2. Economic Opportunities:** Industrial Hemp grown for seed presents new revenue streams for farmers and stimulates economic growth through processing facilities, distribution networks, and value-added product development.
- 3. Nutritional Value:** Hemp seed hearts are a rich source of protein, omega-3 and omega-6 fatty acids, and various vitamins and minerals. Hemp mylk and hemp protein are also nutritious options that can replace traditional cow milk and other types of protein powders. Integrating hemp-based products into the local food industry can enhance nutritional diversity and promote wellness.
- 4. Animal Feed:** Hemp seed meal is a high-protein, high-fiber, and nutrient-rich byproduct of cold-pressing hemp seeds to extract hemp seed oil. Recently, hemp has moved one step closer to approval as a feed for laying hens after a key U.S. Food & Drug Administration (FDA) agency signed off on a definition of “hemp seed meal” (HSM).<sup>6</sup>

#### **Challenges and Considerations:**

- 1. Regulatory Framework:** Although hemp cultivation is legal in Hawai'i, there needs to be a clear delineation between Industrial Hemp and Cannabinoid Hemp in order to remove any uncertainty in the laws surrounding cultivating hemp grown for food for people or animals.
- 2. Market Development:** Establishing demand for hemp-based products requires education and marketing efforts to familiarize consumers with the nutritional benefits and culinary versatility of hemp seeds and derivatives.
- 3. Infrastructure:** Developing processing facilities for dehulling, and oil extraction is crucial to unlocking the full potential of hemp grain production. Fortunately [Pacific Biodiesel](#) has the infrastructure necessary to support the scalability of the industry.
- 4. Genetic Variability:** Selecting suitable hemp cultivars adapted to Hawai'i's climate and soil conditions is essential for maximizing yield and quality. Research and development initiatives focused on breeding resilient varieties are currently being undertaken by the [University of Hawai'i CTAHR](#).

#### **Strategies for Implementation**

- 1. Collaborative Research:** Foster partnerships between academic institutions, government agencies, and industry stakeholders to conduct research on hemp cultivation techniques, varietal selection, and product development tailored to Hawai'i's unique requirements.

---

<sup>6</sup> FDA Agency Gives Go Ahead on Definition of 'Hemp Seed Meal' For Laying Hens: <https://hemptoday.net/fda-agency-gives-go-ahead-on-definition-of-hemp-seed-meal-for-laying-hens/>

- 2. Value-Added Products:** Encourage the development of innovative hemp-based food products, such as hemp protein powder, protein bars, hemp oil, and hemp milk, to create market demand and increase consumer acceptance.

**Conclusion:** The utilization of Industrial Hemp for grain and food production presents a promising opportunity for Hawai'i to foster agricultural sustainability, economic growth, and nutritional wellness. By clearly defining Industrial Hemp and Cannabinoid Hemp, addressing regulatory barriers, investing in research and infrastructure, and promoting market development, Hawai'i can position itself as a leader in the emerging hemp grain/food industry while contributing to the health and prosperity of its communities.

**Findings/Recommendations Low Hanging Fruit:** There are over 25,000 uses for the hemp plant. In order to get a hemp industry going in Hawai'i, the focus should be on the low hanging fruit first. By focusing on making products that come straight from the manufacturing facility, it can jumpstart the hemp industry and open up new avenues for additional products and businesses which can lead to the innovation of new hemp products like biodiesel, bioplastics, biochar and hemp batteries. After the recent wildfires on Maui, affordable housing is needed more than ever and it is needed quickly. Hempcrete has an opportunity to be utilized in the effort to rebuild Lahaina and build homes across the state and get safe, sustainable homes up quickly with the use of hemp blocks, spray hempcrete and hemp prefab walls. Access to large swaths of land to grow industrial hemp is essential for this industry to flourish. This could be tapping into leasing hundreds or thousands of acres of land from private landowners, working with state owned land to clean up fallow soil to be planted later with food crops and encouraging small farms to grow hemp as a rotation crop to bring in additional income. There are already several companies like Pacific Biodiesel, Agripelago, Hemp Home Hawai'i, Kauai Hemp Company, Ohana Nui Ventures and Hemp Solutions Kauai that are in the process or are currently able to address the low hanging fruit and jumpstart the hemp industry in Hawai'i. A hemp industry could be an economic engine that could provide meaningful jobs and support food security. It deserves the state's support and funding is needed in order for it to grow and prosper.

## **B3. Best Cultivation Practices**

### **Distinguishing Between Industrial Hemp and Cannabinoid Hemp**

For the purpose of writing the laws that will govern the growing of both Industrial Hemp and Cannabinoid hemp in the State of Hawai'i it is imperative that we understand the distinction between Industrial Hemp (fiber and grain) and Cannabinoid Hemp (< .3% THC) and Cannabis (> .3% THC). In the realm of hemp, cannabinoids, and cannabis, there are common misconceptions surrounding their origins and uses. Many believe they stem from the same plant, leading to assumptions about their categorization, regulations, and limitations. However, these substances are distinctly different despite being grouped under the umbrella terms of "hemp" or "hemp products." The prevalence of misinformation has persisted for decades, especially regarding the association of industrial hemp with high THC cannabis. It's time to clarify the disparities between Cannabis, Cannabinoid Hemp, and Industrial Hemp definitively. The confusion arises from interchangeable terminology, such as referring to hemp as "Cannabis"; and vice versa, along with using "CBD"; to denote a plant when it's actually an extract from the Cannabis plant, specifically the female variant. Let's delve into these explanations. For clarity we will use the terms "Cannabinoid Hemp" and "Industrial Hemp" throughout this report.

1. Hemp plants exhibit two genders: male and female. The male plant, commonly referred to as hemp (Industrial Hemp), does not produce flowers and consequently contains minimal THC levels. On the other hand, the female plant, often termed Cannabis (Recreational or Cannabinoid Hemp), is a flowering plant containing the psychoactive compound THC (delta9 tetrahydrocannabinol) alongside the non-psychoactive cannabidiol (CBD) and other non- psychoactive cannabinoids that can be extracted.
2. The cultivation of Industrial Hemp is diametrically opposed to the cultivation of Cannabinoid Hemp. Industrial Hemp is planted with extreme density – 350,000 to 550,000 plants per acre, whereas Cannabinoid Hemp is planted at 1600 to 2000 plants per acre for hand cultivation. This difference can be sited from the road and from a satellite photo.
3. Industrial Hemp looks like a tall hay field ready for tractor drawn equipment and a Cannabinoid Hemp field looks like little Christmas trees ready for hand trimming.

4. The high-density planting makes the plants grow tall and skinny which allows the hemp to not only out compete the weeds but increases the quality of the fiber.
5. If Industrial Hemp were grown like Cannabinoid Hemp it would not only require hand weeding but the additional space would create stalks so thick that they could not be harvested or processed mechanically and the fiber would be shorter and of a lesser quality.
6. Another obvious difference is that Cannabinoid Hemp is traditionally grown by hand and Industrial Hemp is grown with large scale equipment.
7. A Cannabinoid Hemp field is full of flowers while an Industrial Hemp field should be cut before there is any flowering as that reduces quality in both the fiber and in the soil microbiome.
8. The cutting of Industrial Hemp before flowering makes it function as a high value cover crop in that during the vegetative growth period it is actively exuding root sugars to its symbiotic Mycorrhizal fungi and soil bacteria. But upon flowering the plant naturally translocates more nutrients to the flower and seed production.
9. It may be these differences that will make it easy to create a system for identifying whether a farmer is growing hemp for cannabinoids or for fiber here in the State of Hawai'i. Our goal is to help the task force come up with simple ways of distinguishing between Industrial Hemp and Cannabinoid Hemp.
10. To date we think that these unique laws will include:
  - GPS registration of all fields when planted
  - Planting of varieties labeled exempt from THC testing similar to the exemptions given Canadian farmers by the Health Canada's List of Approved Cannabis Cultivars (LOAC)
  - Satellite monitoring of planting density and life cycle stages
  - Visual inspection of planting density and flower emergence
  - THC monitoring if Cannabinoid Hemp is suspected
  - Our logic is that even if you were to plant a high CBD seed in high density planting it would not produce flowers and if it did they would be of very low quality. It is easier to see whether a field has flowers or not than it is to send samples into a lab from flowers

that never developed.

11. Please notice the easy distinguishing qualities of these two fields



Hemp grown for the flower: Cannabinoids

Industrial hemp

Industrial hemp

12. Add to this obvious density difference and the absence of flowers in Industrial Hemp and it should not be necessary to deal with expensive and unreliable testing for THC. With a little education, law enforcement should easily see from the road whether the hemp is being grown for cannabinoids or fiber.

13. Furthermore, if Cannabinoid Hemp were to be grown at high densities the flowers would be no good.

These distinct pathways in the supply chain, farming practices, and distribution are primarily dictated by their intended uses: Cannabis is cultivated for its high THC levels, primarily sought after for its psychotropic and medical effects. Cannabinoid Hemp in which CBD and other non-psychoactive cannabinoids are extracted as an oil is used for health purposes, targeting pain relief, inflammation, anxiety, and other therapeutic applications. Industrial hemp is grown for its long stalks, which yield fiber and hurd (woody core), commonly employed in industrial settings.

Distinguishing seed characteristics for Industrial Hemp versus Cannabis/Cannabinoid seeds that are feminized, yielding flowers with high CBD and THC potential. They are costly due to their high yield value per acre. Industrial hemp seeds are male, utilized to maximize stalks or seed production with negligible THC content. They are therefore economical, aligning with traditional output values per acre.

It's crucial to note that all hemp-derived products, such as protein powders and oils originate from industrial hemp seeds. These seeds boast rich protein, vitamin, and mineral content. Contrarily, Cannabinoid seeds are not consumed but rather planted to facilitate flower growth.

## **Labor Dynamics in Farming**

Cannabinoid Hemp and Cannabis cultivation demands significant labor inputs, requiring constant monitoring and meticulous care, especially for high THC content. Industrial Hemp, in contrast, thrives with minimal intervention during its 90 day growth cycles, necessitating modest water, sunlight, and fertilization. Most importantly Industrial Hemp is grown and harvested like other mechanized crops like small grains and hay.

## **Processing Methods for Hemp**

Cannabis buds are trimmed for THC extraction, utilizing drying processes to preserve cannabinoids and eliminate vegetative flavors. Cannabinoid Hemp CBD extraction employs solvents like butane, CO<sub>2</sub>, or ethanol to isolate oils, subsequently refining them into various products. Industrial Hemp undergoes mechanical processing to separate fibers and hurds, prioritizing scalability and environmental friendliness.

## **Impact Across Industries**

Cannabis garners mixed publicity due to its psychotropic nature but shows promise in medical contexts for pain management and anxiety relief. Cannabinoid Hemp's versatility in health applications positions it as an anti-inflammatory and anxiety alleviator. Industrial Hemp's fibers and hurds offer sustainable alternatives across manufacturing sectors reducing Hawai'i's import dependence as well as offering locally grown building materials. Education of legislators and the general public will allow for informed conversations about the potential for Industrial Hemp as well as Cannabinoid Hemp cultivation to add to the circular economy on these remote islands. Industrial Hemp will allow new industries to replace imported goods. Mechanized cultivation will allow for other mechanized crops to follow in a rotation that will benefit food security on our islands. With the many factors that could result in shipping instability Hawai'i must join the 21st century of mechanical production of food staples. We must remove the roadblocks to the local production of protein – both vegetable and efficient animal conversion of grains to protein with beneficial manure cycling currently absent in the islands.

## **2024 Farm Bill Potential Nomenclature Delineation**

The House Agricultural Committee introduced verbiage in the 2024 Farm Bill, H.R. 8467 (§10006), that was passed by the House and is now being considered by the Senate.<sup>7</sup> This would add a new statutory definition of Industrial Hemp to mean hemp grown for fiber or for the 'whole grain, oil, cake, nut, hull, or any other non-cannabinoid compound, derivative, mixture,

---

<sup>7</sup> 2024 Farm Bill, H.R. 8467 (§10006): <https://www.congress.gov/bill/118th-congress/house-bill/8467/text#toc-H55457B41D83D4C24B6A6DD4631184DE9>

preparation, or manufacture of the seeds of such plant,' among other related changes. H.R. 8467 (§10006) would relax certain regulatory requirements for producers of Industrial Hemp only, including to reduce or eliminate testing requirements and background checks. Should this verbiage end up in the final Bill, it will help to distinguish between true Industrial Hemp and Cannabinoid Hemp at the Federal level. If the 2024 Farm Bill passes with the above or similar verbiage to define Industrial Hemp, the Hawai'i Legislature needs to include this in the state definitions. There needs to be a clear definition/delineation between Cannabinoid Hemp and Industrial Hemp outlined in State law for the industry to move forward.

<b>Characteristics</b>	<b>Industrial Hemp</b>	<b>Cannabinoid Hemp</b>
<b>Plant Gender</b>	Male	Female
<b>Flower Production</b>	No flowers, minimal THC levels	Flowers, contains THC and CBD
<b>Cultivation Density</b>	Extreme density, 350,000 to 550,000 plants/acre <i>100 plants/sq. yard</i>	Very low density, 1600 to 2000 plants/acre <i>1/3 plant per sq. yard (3yds./plant)</i>
<b>Field Appearance</b>	Tall, skinny plants resembling a hay field	Sparse, fat plants resembling little Christmas trees
<b>Growth Characteristics</b>	Tall and skinny, outcompetes weeds	Thicker stalks, hand-weeding required
<b>Harvesting</b>	Mechanized equipment	Hand labor
<b>Flower Presence</b>	Cut before flowering	Full of flowers
<b>Cover Crop Function</b>	High value cover crop during vegetative growth	Translocates nutrients to flowers/seeds during bloom
<b>Seed Characteristics</b>	Male seeds, negligible THC content	Female seeds, high CBD/THC potential
<b>Labor Inputs</b>	Minimal intervention, mechanized cultivation	Significant labor inputs, hand care
<b>Processing Methods</b>	Mechanical processing	Solvent extraction for oils
<b>Product Uses</b>	Fiber and hurd for industrial purposes	Oil extraction for pharmaceutical applications
<b>Seed Costs</b>	Economical due to traditional output	Costly due to high yield value

Differences between Industrial Hemp and Cannabinoid Hemp

Hemp is often thought of as a weed because it will grow just about anywhere but that does not mean that it will produce well under poor conditions. Hemp requires about the same fertility as a small grain crop and the same attention. One advantage of hemp to Hawai'i is that it is a row crop that can be seeded and harvested mechanically without the tremendous hand labor required by pineapple and sugarcane. However, hemp cannot be planted continuously on the same acreage. Because Industrial Hemp is a known bio-remediator it will prepare the soil for other potentially profitable crops like corn, soybeans, mixed forages, sorghum, etc. It makes the perfect crop in rotation with other crops and is consistently shown to benefit the following crop by both increasing soil nutrition and stamping out weeds. In Europe research has shown that hemp preceding wheat increased the wheat yield significantly with increases in both the first- and second-year post hemp.<sup>8</sup>

If we are to reduce our reliance on imported food, the State must invest in helping farmers transition to more mechanized agriculture. Hawai'i, long known for its hand cultivation of tropical fruits, must adopt 21st century agricultural production practices for food staples if it is to feed its growing population. Hemp could be instrumental in this transition to mechanization as its cultivation is similar to a high producing forage crop using the same equipment. With a few additions to this equipment a farmer can add corn and soybeans to a three-crop rotation. Not only can corn and soybeans be processed into many foods for human consumption, but they are the basis for all animal and poultry feeds.

Given that Hawai'i imports over 30 million broiler chickens per year based on USDA per capita consumption and 4.5 pounds of meat per bird,<sup>9</sup> we would recommend that the State support a poultry industry on each island which would further support food security by supplying nitrogen rich manure that when added to low carbon green waste can produce microbial rich compost without which regenerative agriculture is doomed. Our Hawaiian soils are low in organic matter and rich in soil minerals that are unavailable without microbial release. Both of these issues can

---

<sup>8</sup> Hemp Yields And Its Rotation Effects on Wheat Under Rainfed Mediterranean Conditions: [https://www.researchgate.net/publication/317293049\\_Hemp\\_Yields\\_and\\_Its\\_Rotation\\_Effects\\_on\\_Wheat\\_under\\_Rainfed\\_Mediterranean\\_Conditions](https://www.researchgate.net/publication/317293049_Hemp_Yields_and_Its_Rotation_Effects_on_Wheat_under_Rainfed_Mediterranean_Conditions)

<sup>9</sup> Per Capita Red Meat and Poultry Consumption Expected to Decrease Modestly in 2022: <https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=103767>



be addressed with a ready source of manure on each major island.

What's more, a ready source of nitrogen high quality soils could be produced for the use in large shade houses for high intensity vegetable production on each island. These vegetables could be sold fresh, processed or in a value-added product leading to a local processing industry.

Local processing of foods and drinks currently imported are eligible for carbon offset payments in a straightforward analysis that the State could oversee and manage. If the tiny country of the Netherlands can become the second largest exporter of food by using energy intensive, glass covered greenhouses then certainly Hawai'i can supply itself with its own vegetables using the same technology Whole Foods growers use at the same latitude as Hawai'i in Mexico. All that is needed is a simple shade house with regularly renewed soil beds boosted with rich compost. Intensively growing food in shade houses will provide comfortable and meaningful jobs.

Hemp is possibly the best-known crop for phytoremediation. It uptakes heavy metals into its biomass. When this hurd is used to make houses the heavy metals are safely sequestered. Hemp also stimulates the metabolism of residual agricultural chemicals like Atrazine. This breaks down the residues so that they no longer reduce crop production yields. Hemp is a valuable ally in this transition because of its positive effect on the soil remediation and land preparation.

It can be confusing to learn about hemp as it is like the story of the blind man who walked into an elephant and tried to understand what he was touching. So far most American small-scale farmers have been excited about growing hemp that produces the best CBD oils. The Canadian farmers have developed varieties that excel at producing seeds for human consumption such as seeds, protein products or high quality culinary oils. The Europeans and Asians are way ahead in producing and processing Industrial Hemp fiber.

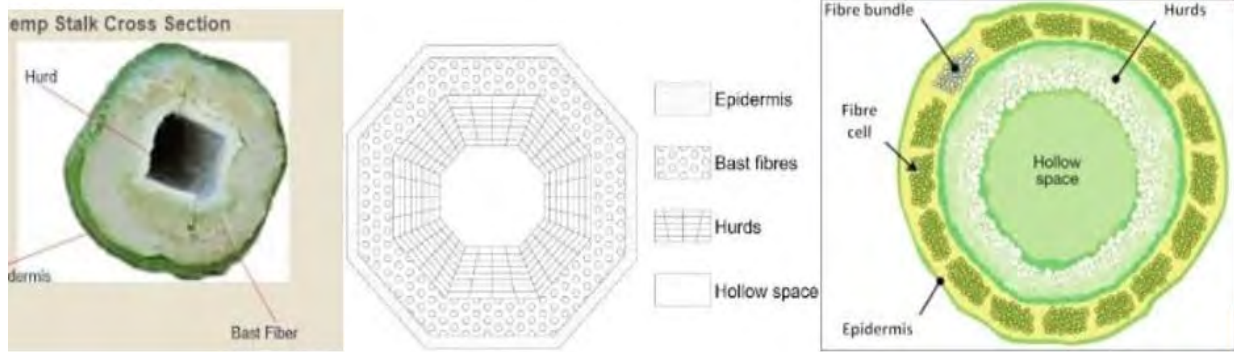
There are basically three types of Industrial Hemp varieties:

- Seed varieties (extensive regulations for human consumption)
- Fiber varieties (for hurd and fiber)
- Dual Seed and Fiber varieties (not recommended for optimal fiber production)

Even though it is possible to grow a dual purpose plant it is not wise to do so for the sake of the

health of the plant and for the sake of attaining maximum yield. This report is going to stick to the potential for Statewide Industrial Fiber Production for producing the raw products needed to kickstart several industries that could drive a significant economic sector and diversify the Hawaiian economic landscape. Our State could be replacing commodities currently imported with locally grown hemp. Additionally, locally grown hemp can be the raw material for a plethora of locally made export items. Hemp is planted like wheat, uses less water than barley and grows easily.

Please note in these graphics that industrial hemp is unique in that the valuable part of the plant is the stem. The stem is the source of both the bast fiber and the hurd. This stem is only valuable if it is less than 1/2 inch in diameter.



Good land preparation for hemp cultivation is key in Hawai'i where broadacre farming is rare. Fields must be brought under mechanical cultivation in many places for the first time. Hemp can be planted with a grain drill, a no-till drill or an air drill. The seed should be planted between a half inch deep and one inch depending on the soil density. Immediate irrigation is key to germination and a uniform stand. Even though in the first month there may be many weeds in the field hemp is sure to outgrow them and eventually so deprive them of light that they die and become food for the microbiome. Hemp could be ideal for No till planting into a high nitrogen fixing cover crop that is crimped and rolled for weed suppression.

When growing Industrial Hemp for fiber production (both bast fiber and hurd) a seeding rate of 40 to 75# per acre in 5-to-8-inch rows for a plant density of 90 to 140/sq meter. The pH ideal of 6.2 to 6.5 with a recommended nutrient availability in the soil of 50#/A available nitrogen, 60# available phosphorus, and 300# of available potassium. The Dutch believe that hemp does not require large amounts of fertilizer because it has a tap root that retrieves nutrients from the depths of the soil.

A Dutch processor, [HempFlax](#), who employs 3 cultivation specialists to help their contract farmers told us that if too much nitrogen is put on the hemp field it becomes impossible to harvest. The contract harvester who uses large equipment refuses to even try as it gums up his machinery.

The goal is to grow a stand that is dense enough to produce smaller diameter stems (3/8 to 1/2 inch diameter) which produces a better quality and higher yield of fiber. A wider stem produces more hurd but may be tough and make the crop too difficult to harvest and process.

All of the hemp grown in The Netherlands has been grown on lesser quality soil – sandy soils – and rotated with potatoes and sugar beets. They report that when hemp follows potatoes that invariably leave little potatoes to sprout in the spring, they do not need to worry about it because the hemp out competes the new potato sprouts.

Because hemp and CBD oil are valuable crops in the Netherlands one of their major banks – The Rabo Bank with an emphasis on food and agriculture funded a study of why the price of CBD oil had fallen so precipitously after the 2018 boom.<sup>10</sup> They found that in the excitement of a potentially lucrative crop farmers had over produced by 2.5 times the market needs. The conclusion was that the price will come back up over time.

---

<sup>10</sup> The Future of CBD in Food and Beverage:  
[https://research.rabobank.com/far/en/sectors/beverages/Future\\_CBD\\_Food\\_Beverage.html](https://research.rabobank.com/far/en/sectors/beverages/Future_CBD_Food_Beverage.html)

HempFlax is the largest processor of hemp in The Netherlands with three processing plants. In 2020 they were purchased in part by an international corporation called [Kingspan Group, PLC](#) that supplies building materials to over 80 countries, with 210 factories and 22,000 employees. This company wants to commercialize the production of natural hemp insulation. Like both the John Deere Co. and the New Holland equipment company they see the future of the value of hemp. According to Manager Tony deVeyra of the Rodale Institute in California, Industrial Hemp has few pests primarily because it is best to harvest the hemp before flowering. This makes for the highest fiber quality. Flowering takes nutrients from the plant which lowers the quality of the fiber by shortening the length and quality of the fiber.

Whereas, the University of Hawai'i, Manoa used a 115 day life cycle for their experiments the Rodale Institute in California in a longer research project found that it only took 90 days to produce 12 ft tall plants with an optimal yield.<sup>11</sup> The fiber had less lignin content and was not old and not coarse. The younger plants produced longer fiber that was easier to peel and there was more of it. Once any plant flowers it stops making biomass and it uses lots of NPK in making protein. This hurts the fiber production and uses more lifecycle fertilizer.

By harvesting before flowering it is like terminating a cover crop before flowering so that the nutrients stay in the soil. Typically, with all cover crops the microbiome increases in vitality until flowering and then it plummets because all of the nutrients are going to the flowering process. So fiber hemp acts like a cover crop in terms of soil building. Another way that specifically fiber hemp does this is that it sheds its leaves as it grows and returns them to the soil to boost microbial activity. Growing fiber hemp increases soil organic matter, soil tilth, mycorrhizal fungi, porosity, drainage and makes for a more vibrant microbiome for the next crop.

Fiber hemp produces lots of root biomass in a ratio of 5.46:1.<sup>12</sup> So if a field is producing say 8 tons of biomass/A then it is contributing 1.47 tons/A of root biomass to boost soil organic matter and feed the microbiome. For a wonderful and [free guide to growing hemp for fiber](#).

\*\*Please remember that Canada is the primary source of edible hemp seeds. The seed hemp varieties do not produce as much fiber and perhaps not the same type of fiber as the fiber hems. The University of Hawai'i is currently undertaking additional research to help resolve these questions.

---

<sup>11</sup> Rodale Institute Industrial Hemp Trial: <https://rodaleinstitute.org/science/industrial-hemp-trial/>

<sup>12</sup> Rodale Institute Industrial Hemp Trial: <https://rodaleinstitute.org/science/industrial-hemp-trial/>

Charateristic	Detail
Growth Requirements	Similar fertility needs as small grain crops; Requires the same level of attention.
Mechanization Benefits	Can be seeded and harvested mechanically, reducing labor requirements compared to crops like pineapple and sugarcane.
Soil Benefits	Acts as a bioremediator; Prepares soil for subsequent crops; Increases soil nutrition and weed suppression.
Crop Rotation	Ideal for crop rotation; shown to increase yield of subsequent crops such as wheat by 20% in Europe.
Cultivation Reasons	Seed production; CBD production; Fiber production.
Sowing Methods	Can be planted with a grain drill, a no-till drill, or an air drill; Seed depth between half-inch to one inch.
Irrigation Requirements	Immediate irrigation is crucial for germination and uniform stand.
Weed Competition	Outcompetes weeds by depriving them of light, becoming food for the microbiome.
Seeding Rate	40 to 75 #/A in 5-to-8-inch rows; Plant density of 90 to 140/sq meter.
Soil pH and Nutrients	Ideal pH of 6.2 to 6.5; Requires 50#/A nitrogen, 60#/A phosphorous, and 300#/A potassium.
Cultivation Reasons	Best harvested before flowering for highest fiber quality and quantity Flowering depletes nutrients needed for optimal fiber.
Stem Characteristics	Smaller diameter stems preferred for quality and yield; Wider stems produce more hurd but may be too tough to process. <math>\frac{1}{2}</math> inch ideal
Pest Concerns	Minimal, especially if harvested before flowering
Root Biomass Production Phytoremediation Pest Concerns	High ratio of root biomass (5.46:1) contributing significantly to soil organic matter. Bioaccumulates heavy metals and metabolizes
Soil Impact and Microbiome	Increases soil organic matter, mycorrhizal fungi, porosity, drainage; Enhances microbiome vitality.

## University of Hawai'i Research Into the Potential for Industrial Hemp

In a peer reviewed study done in 2014 to 2015, undertaken by 5 individuals from The University of Hawai'i Manoa in conjunction with a participant from The Academy of Agricultural Sciences from Guangzhou, China and a contributor from The University of Chinese Medicine from Guangxi, China which was published in 2021, many things were learned about growing Industrial Hemp in Hawai'i.<sup>13</sup>

- The group studied 3 different sub-tropical, Industrial Hemp varieties.
- Variety V75 was highly daylight sensitive and failed to thrive.
- Seed variety CHY yielded an estimated 2.5 tons/yr/A or about 1.25 tons/crop.
- Fiber variety, CHG, performed very well in yield, drought resistance, additional animal feed, low need for fertilizers and the ability to metabolize Atrazine in Maui soils.
- The commercial seed that was imported from EcoFibre from Australia.
- Hemp in Hawai'i which produced 6.3 tons/acre in the straw crop out performed hemp in The Netherlands ( 3.2 tons/acre/crop) and hemp in Canada (4 tons/acre/crop) leading the authors to conclude that Hawai'i is an ideal location to grow industrial hemp.
- On an annual basis the best variety, CHG, yielded 19 tons to the acre/ year for stalks, with 1.7 tons of seed and an additional 16 tons/acre/year for animal feed from the leaves. The U of H team was figuring 3 crops per year in those figures. So to put it by the crop that is 6.3 tons/A for straw and 5.3 tons/A for leaves and .85 tons per A of seeds (max 2 crops/yr when growing seed).
- This translates to 36.7 tons/A/year if you hand harvest or use special harvesting equipment. What is still unknown is how many of the leaves will be lost to mechanical harvesting. So for this report we are assuming 6 tons of straw and 4 tons of leaves/A/crop.
- Given that Hawai'i imports all of its grain and most of its fodder this could be a new and important revenue stream for Hawaiian farmers.
- Hemp can be harvested earlier to focus on harvesting the green leaves for poultry feed and then using the lesser quality hurd as bedding so that once it was mixed with chicken manure it would become ideal feed for Black Soldier Fly larvae. Imagine if animal feed were a bi-product of processing construction material and if fish food were a bi-product

---

<sup>13</sup> ComparatHawai'ialuation of Industrial Hemp Varieties: Field Experiments and Phytoremediation in Hawaii: <https://www.sciencedirect.com/science/article/abs/pii/S0926669021004477>

of feeding poultry and the 35% waste from gutting fish in turn were used to either feed poultry directly or fed to Black Soldier Fly larvae (BSFs).

- The U of H team did preliminary testing for commercial planting density which helps determine yield/acre/crop.
- They found CHG to be drought resistant -using only 10mm (.4inches) of rain per week. Furthermore, the irrigation of CGH actually reduced both height and weight in the plants harvested.
- In a 90 day crop that is a little more than 5 inches/crop of industrial hemp compared to 70 inches for sugar cane.
- The addition of 100 kg/ha (88#/A) of Nitrogen fertilizer did not increase the yield of CGH over non-fertilized hemp
- When CGH was planted in pots it showed the ability to metabolize Atrazine in the soil. The authors concur that Industrial Hemp can be used to remove 75% of the Atrazine in the soil in as little as 30 days. This is a potentially useful attribute given that Hawai'i is known to have an increased correlation between Atrazine exposure and the birth defect called *gastroschisis*.
- Industrial Hemp is well known for its ability to uptake heavy metals left in soils by agricultural chemicals or in the recent case of Lahaina – an urban fire.
- The maximum yield was obtained when using 100 plants/sq meter density which was in line with the ideal planting rate reported during our visit to a very large hemp grower in The Netherlands.
- The maximum yield also created a stalk that required less energy to process because the stalks were thinner growing under increased population density.

In an in-person interview in The Netherlands with the owner of DunAgro, a farmer who has grown 1300 Hectare (3250 acres) of hemp for 30 years in a rotation with potatoes and sugar beets the farmer noted that crops grow better following hemp but cautioned against using hemp as a mono-crop.

- He averages 8 tons per hectare per crop (3.2 tons/acre) with top yields of about 11 tons per hectare on what is considered less than ideal cropland – sandy soils
- Holland cannot grow a dual-purpose crop that is harvested for both the seeds and the straw because the growing season is too short and the falls are too rainy for retting
- He uses a seeding rate of 35 Kg/Ha (31#/A) with an ideal germination rate of 140 plants per square meter with as little as 90 plants/sqM being acceptable.
- He uses a planting spacing of slightly less than 5 inches row width and about 2-2.5

inches between plants.

- He uses 140 kg of nitrogen fertilizer per hectare or 125#/A.
- This approach to growing a fiber variety of hemp (which is daylight sensitive requires 100 growing days in the long days of the north as well as weeks of retting (a process where the straw is allowed to lay on the ground so that microbial activity loosens the bond between the hurd and the outer fiber portions of the stalk).
- Even before the 20% loss of biomass to the hammermill – this process destroys potentially valuable leaves. Dutch farmers have begun feeding the entire plant to cattle. Although this wastes the hurd we believe there is a bright future for feeding chickens on the young plants once hemp is okayed for chicken feed.
- Albert of DunAgro says his processing plant spends 100 Euros (\$110)/ton to process.
- They pay their farmers 207 Euros (\$230)/ton before any payments for carbon credits which will soon be added onto this price.
- As with all locally produced products for local consumption we can expect to add to this end price due to the avoidance of shipping as well as high carbon credits due to our remote location. The potential end price expected to be paid to farmers should be part of a State Dept of Economics into the potential of a State supported hemp industry.

### **The Best Varieties of Industrial Hemp to Grow in Hawai'i**

The best varieties for Hawai'i depend on whether one is looking for fiber production, seed production or cannabinoid production. It should not matter which island is being cultivated but it should have irrigation. Even though hemp is a low consumer of water it is needed at crucial times – in particular during seed germination. For this reason, transplanting greenhouse starts should be thoroughly compared to broadacre seeding in the future.

1. From July 2014 to Dec 2015 the University of Hawai'i<sup>14</sup> tested 3 sub-tropical varieties purchased from [EcoFiber Industries of Australia](#) that were believed to stem from Asian Growers.
2. Sub-tropical seed variety F75 was tested and being daylight sensitive it grew to two feet and died.
3. The U of HI tested the variety CHY successfully for seed production and estimated that it will yield about 1.25 tons/A/crop in Hawai'i with two crops per year possible for a total of 2.5 tons/A/yr. This is 25% more yield per acre than the average of the Canadian seed hemp grown with irrigation.

---

<sup>14</sup> ComparatHawai'ialuation of Industrial Hemp Varieties: Field Experiments and Phytoremediation in Hawaii: hHawai'i/www.sciencedirect.com/sciencHawai'icle/abs/pii/S0926669021004477



Most of the hemp seed for human consumption is grown in Canada where it garnered \$.061/# in 2018 and averaged nearly 1 ton/A with irrigation plus 1.5 tons of straw at \$200/ton. The cost of production including labor and depreciation was \$751/A leaving a margin of \$890/A. Hawai'i entrepreneurs could benefit from direct sales of specialty foods like energy bars to tourists.

4. Fiber varieties from Europe are almost always daylight sensitive and require a 14 hour day during their growth cycle; making their use nearly impossible here in Hawai'i.
5. The University of Hawai'i tested sub-tropical fiber variety CHG in their July 2014 to December 2015 trials.
  - Variety CHG made yield records far in excess of any varieties grown in Europe or the mainland of the US and Canada proving that Hawai'i is the ideal environment for hemp cultivation.
  - While more agronomic testing is certainly called for, the University of Hawai'i at Manoa has already identified two varieties that could set the stage for new industrial hemp industry in Hawai'i.
  - According to a report written by the Dean of the College of Tropical Agriculture and Human Resources Hawai'ian grown sub-tropical fiber hemp could yield between 27-38 ton of stalk biomass per year with three crops, depending on the density of the planting with higher densities yielding more per acre.<sup>15</sup>
  - In addition, the report found that Industrial Hemp could produce 31 to 35 tons dry weight of stems and leaves/A/year for forages. Oregon State University is leading the charge in further research into using hemp for cattle and sheep forages.<sup>16</sup> Dutch farmers are feeding the entire stalk to their cattle. Hemp leaves could also be fed to poultry (see the section on hemp feeds).<sup>17</sup>

---

<sup>15</sup> University of Hawaii System Report: [https://www.hawaii.edu/offices/eaugovrel/reports/2016/act56-slh2014\\_2016\\_industrial-hemp\\_report.pdf](https://www.hawaii.edu/offices/eaugovrel/reports/2016/act56-slh2014_2016_industrial-hemp_report.pdf)

<sup>16</sup> Hemp Byproducts are Good Alternative For Lambs, Oregon Study Finds: <https://today.oregonstate.edu/news/hemp-byproducts-are-good-alternative-feed-lambs-oregon-state-study-finds>

<sup>17</sup> Other Agricultural Uses For Industrial Hemp: <https://hempgazette.com/industrial-hemp/agricultural-uses-41-hemp/#:~:text=With%20regard%20to%20fiber%2C%20Dutch,feed%20for%20thousands%20ofHawai'irs.>

- Care must be taken that the hemp used for phytoremediation does not get into the forage stream. It is perfectly safe to be used in construction. And with enough removal of phytoremediating hemp and plant residue testing we will be able to harvest it for food.
  - The University of Hawai'i researchers had trouble getting the hemp seeds to sprout and tried starting the seeds in the greenhouse for 15 days and then transplanting. This could be advantageous in that it could potentially mean that only 75 days are needed for field growth and that would allow for more crops per acre per year.
  - Alternatively, the researchers were able to direct seed into the field as long as:
    - They prepared the seedbed carefully for good soil to seed contact
    - They waited for enough rainfall to moisten the soil and then followed it up with hand watering.
    - All in, all care has to be taken to assure that the seeds germinate into seedlings for if the density falls below optimum it may affect yields and make it necessary to use an herbicide to control weeds normally controlled by competition with the virulent hemp plant.
    - Further research needs to be given to the benefits of greenhouse cultivation of hemp starts vs. field planting from seed.
6. A new researcher in the Hawaiian space is [Kanda Hemp Seeds](#), a US based company that is working throughout the mainland. Kanda Hemp Seeds has a research arm in China and an experienced seed geneticist in Colorado. Together with [Ohana Hui Ventures](#) and [Friends of Waimanalo](#), this group is doing seed trials on the farm of Friends of Waimanalo where they are currently testing several seed varieties for use in the new Hawaiian hemp industry.
7. Hemp production for cannabinoids is very personalized with growers preferring their own cultivars and typically saving their own seed.

## **In Conclusion Industrial Hemp Varieties**

1. The University of Hawai'i has successfully identified two superior varieties, one for fiber

and one for seed production that are promising for the start of an Industrial Hemp industry in the islands.

2. Dual purpose varieties produce seeds for either food or biodiesel plus straw for hurd and fiber raw materials for secondary products. It is our understanding that to use hemp for anaerobic digestion that it is beneficial to plant a fiber variety and harvest the crop well before seed production to maximize biogas production.
3. The good start of U of H should be followed up with additional testing of sub-tropical fiber and seed hemp varieties.
4. CBD seeds are up to the individual small scale farmer
5. Further research is needed to compare field seeding to transplanting greenhouse starts.
6. Care must be taken to ensure that hemp used for phytoremediation is only used for construction biomass or after the field is remediated of heavy metals.

## **B4. Field Equipment**

### **Flower and Seed Harvesting**

- We have visited with two companies that have developed commercial harvesting equipment that can simultaneously cut and collect the flowers and green leaves or the seed head while cutting the stalk into 60cm lengths (ideal for European processing equipment but not for the Hemp Train or Formation Ag Track 660.)
- Another benefit of this equipment is that the stalk is windrowed between the wheels of the machine so that it is not driven upon as in a standard sickle bar style hay cutter.
- This equipment is on loan to Cornell University where they are testing its viability and production capacity. This will give us a third party non-biased assessment of its value as Cornell also researches using normal hay making equipment to harvest hemp.
- New Holland and John Deere are both developing this equipment for commercial use. It is obvious that these two giant ag equipment manufacturers believe that the day of hemp is on the horizon, or they would not invest in the necessary R&D.
- In general, all that is required to harvest industrial hemp in the beginning is a common hay sickle mower, a hay rake and a standard hay baler. The baler can make large square bales, small square bales or giant round bales for the Canadian [Hemp Train](#) equipment.
- The Formation Ag CEO says his equipment works best with the long length as it unrolls the big round rolls.
- Until the day comes when research shows which seed varieties are commercially viable in Hawai'i the focus will be on fiber varieties which do not require a separate flower harvesting equipment.
- While the new equipment is impressive and will one day be needed in the islands to begin with, we will stick with the recommendation of Cornell University and stick with the tried and true method of using a side sickle bar mower until the day comes that a seed harvester is needed.
- In the case of harvesting for anaerobic digestion the biomass is simply cut with a hay chopper and shot into a wagon for immediate transport. There is no need to keep long fibers or to go through the retting process if one is making RNG (Renewable Natural Gas).

## Baling Equipment

- The baling equipment for baling hemp straw is the same for baling hay.
- The baling style must be selected after deciding whether the commercial scale processing equipment will come from Hemp Train or [Formation Ag Track 660](#).
- Hemp Train has a sophisticated bale opener that can use small square, large square, small round or large round bales.
- Formation Ag Track 660 on the other hand only works with round bales so this must be sorted out before a baler is selected.
- In Canada they primarily use the large square bales in the Hemp Train.
- However, storage must be considered. It is possible to buy a baler with a good wrapping system that allows the bale to be stored outside for up to a year without serious deterioration while the processing facility is getting up and running. So the storage issue must be considered before a baler is purchased.
- There are also advantages of starting with a smaller tractor and small square or round bales before getting locked into the giant tractor that is required for some large balers.
- Minimum tractor size is something to consider when using regenerative ag principals.

## No-Till Grain Drill

- While a common grain drill is all that is needed for planting hemp seed we highly recommend a No-till drill with a tank and nozzles for adding microbes during planting at a rate of 2 gals of inoculant per acre.
- Once a field is cleared of heavy metals and residual chemicals, hemp should be grown in a three crop rotation. But until that day hemp should be used as a phytoremediation plant with a short term cover crop mix ( 8 variety minimum) in between each crop to avoid hemp on hemp.
- For this a No-till planter is ideal. We like the 96 inch [1st Products Multi-drill](#) out of Georgia for its design and versatility. It can be ordered with corn plates for planting corn, sweet corn and beans with the drill which normally requires a separate corn planter.
- Note: Having been a commercial sweet corn grower, harvester and value added marketer we have been watching the prices on poor quality imported sweet corn over the past 6 years and would estimate that good quality sweet corn could wholesale for \$12/doz. With sweet corn yields of 1500 dozen per acre that would pay for the extra hand labor needed and supply a loved vegetable to the islands.
- Field corn should also be considered for a rotational crop for a variety of reasons.

- The farming entity - ideally a coop will need extra crops that produce extra income and corn has a built in margin because of the avoided shipping charges.
- Corn can also be easily ground in a simple hammer mill and balanced with a protein source and minerals for a simple chicken feed that could feed broilers that graze cover crops between the hemp crops for a maximum benefit and return.

**Conclusion:** The University of Hawai'i has established that Hawai'i has extremely favorable conditions for growing 3 plus crops per year at potentially the highest production rate in the world. Industrial Hemp has the potential to be an economically important agricultural commodity:

1. That once processed can replace currently imported products
2. That can provide the raw materials for many start up businesses
3. That through large scale processing and manufacturing Hawai'i could become an exporter of high value products based on a locally grown crop
4. That can prepare the fields for other high value crops such as field corn, sweet corn, forage crops, sweet potatoes, melons and soybeans

In a 2012 study done by the Office of Planning in the State of Hawai'i Department of Business Economic Development and Tourism they said: *Replacing just 10% of the food Hawai'i currently imports would amount to approximately \$313 million dollars (in 2012 dollars) which would remain in the State. The Strategy recommends actions to market "Buy Local/It Matters" and to brand and label local food products.*<sup>18</sup> Mechanized production of commodity crops has not taken off in Hawai'i and yet grain production is necessary for food security. Grains are the basis for both a poultry industry as well as locally farmed fish in an aquaponics system that fertilizes surrounding fields.

\*Farmer [tool](#) for figuring out the cost of production from University of Pennsylvania.

---

<sup>18</sup> Increased Food Security and Food Self-Sufficiency Strategy:  
[https://files.hawaii.gov/dbedt/op/spb/INCREASED\\_FOOD\\_SECURITY\\_AND\\_FOOD\\_SELF\\_SUFFICIENCY\\_STRATEGY.pdf](https://files.hawaii.gov/dbedt/op/spb/INCREASED_FOOD_SECURITY_AND_FOOD_SELF_SUFFICIENCY_STRATEGY.pdf)

## **B5. Analyze Shipping of Biomass Amongst the Islands and to the Mainland.**

### **Biomass, Processed, Finished Goods**

As the Industrial Hemp industry gains traction across the United States, Hawai'i stands poised to leverage its agricultural potential. Setting up an Industrial Hemp industry will take some time. An initial manufacturing facility will need to be set up, as well as partnerships with local farmers established and additional research on viable seeds to be utilized in our tropical climate. To jumpstart the hemp industry, hemp will need to be imported for the R&D needed to develop secondary industries that use hemp hurd or hemp fiber as a raw material in the production of their end product. At a historical \$0.66/ pound of top quality hurd this is a small price for the State to support to jumpstart a hemp industry until Hawai'i has the infrastructure in place. Below we will look at the pricing and implications of importing hemp hurd from the mainland, as well as approximate costs to ship hemp inter-island once we have the infrastructure in place. Let's delve into how hemp bales are shipped and the associated costs.

#### **Shipping Process:**

##### **Packaging and Preparation:**

Industrial hemp fiber is typically harvested and processed into bales for transportation. These bales are compacted bundles of hemp fibers, weighing anywhere from 100 to 1,000 pounds each, depending on the processing method and intended use. Hemp hurd is typically compressed into high density blocks to enable 40,000 pounds to fit into a standard 40ft shipping container. Or it can be put into reusable super sacks and fit 20,000 pounds of hurd into a 40ft container.

##### **Transportation Modes:**

Shipping hemp between the islands of Hawai'i and from the Mainland to Hawai'i primarily relies on maritime transportation. Barges, freight vessels, and container ships are commonly used to transport goods between islands. Trucks will then be needed to get the hemp from the port to a storage facility or final destination.

##### **Regulatory Compliance:**

Given the legal complexities surrounding hemp, it's crucial to have a clear delineation between the transportation regulations for Industrial Hemp versus Cannabinoid Hemp. There should be no need for THC testing nor movement reports for Industrial Hemp. This will allow the transport of Industrial Hemp between islands to be a smooth process and encourage growth across all islands.

### **Storage and Handling:**

Hemp bales require careful handling to prevent damage and maintain their quality during transit. Adequate storage facilities at both the departure and arrival ports are essential to safeguard the integrity of the product. Bales can typically be stored up to 24 months as long as the packaging around the bales is not punctured.

### **Transporting Hemp Within The State of Hawai'i:**

Per the 2018 Farm Bill, hemp and hemp products may be transported across state lines. Hence, hemp and hemp products in Hawai'i may be transported inter-island, intra-island, or exported. However, [for commercial hemp operations in Hawai'i](#), only hemp producers licensed by the USDA [may transport hemp outside](#) of a field of legal cultivation per state law.

### **The following hemp parts may be transported:**

- Live hemp plants, propagative parts of the hemp plant, and viable seeds
- Harvested hemp leaf material in raw botanical form (including dried)
- Harvested hemp leaf flora material in raw botanical form (including dried)

Hemp transportation must be reported ahead using an [HP-1 Transportation Report form](#).

However, a report is not required for the transportation of the following hemp materials:

- Retted fiber
- Non-viable seed
- Mature hemp stalk material
- Hemp products or processed hemp

Hawai'i requires any transportation of hemp to abide by all applicable laws and regulations, including but not limited to state requirements regarding the importation, inter-island transportation, or exportation of live seed, live plants, and cut flowers. Further instructions can be found on the [planned transportation page](#) of the Hawai'i Department of Agriculture for more information on the importation, exportation, and in-state movement of live seed, live plants, and cut or fresh hemp plant materials.



## **Cost Considerations:**

- 1. Freight Charges:** The cost of shipping hemp between islands as well as from the mainland depends on various factors, including the distance, volume, and mode of transportation. Freight charges typically encompass handling fees, fuel surcharges, and port dues.
- 2. Insurance:** Transporting valuable cargo like industrial hemp necessitates insurance coverage to mitigate the risks associated with loss or damage during transit. Insurance premiums vary based on the declared value of the shipment and the level of coverage desired.
- 3. Regulatory Compliance Costs:** Obtaining the requisite permits, licenses, and regulatory approvals incurs additional expenses. Compliance-related costs may include testing fees for THC potency if applicable, inspection charges, and administrative fees.
- 4. Storage Fees:** If storage facilities are required at the departure or arrival ports, storage fees may apply. These fees are contingent on the duration of storage and the space occupied by the cargo.
- 5. Handling Charges:** Loading and unloading hemp bales onto ships entail handling charges, which contribute to the overall shipping costs. Efficient handling practices help minimize delays and expenses.

## **Rough Costs to Ship Hemp Hurd From The Mainland:**

### **Hemp Homes Hawai'i Shipping Costs Kula, Maui Build**

Joe Smith, the builder for Hemp Homes Hawai'i /Hawai'i Hemp Task Force Member we reference in section 'C', who recently built the hemp home on Maui gave us some insight into what it cost for him to ship hemp hurd from the mainland for this project. He ordered 20,000 pounds of hemp hurd because that is how much will fit in a 40-foot container. It's also the most efficient way to get it here. The Maui hemp house only used about half of that (10,500 pounds to be more precise). The hemp hurd cost about \$15,000 for the 20,000 pounds and shipping it through Matson from Kansas to Maui, cost \$13,250. That \$13,250 is the cost of a 40-foot container no matter how much you have in it.

Shipping cost = \$0.66/pound Total

landed price = \$1.41/pound

## **Rough Costs to Ship Hemp Hurd From Canada:**

### **Hemp Alta Shipping Quote**

960 65L (2.2 cu.ft) bags of hemp hurd for hempcrete \$24.90/bag=\$23,904

Shipping from Calgary to Honolulu; \$7812

Total Cost: \$31,716

## **Rough Costs to Ship Hemp Hurd Inter-Island:**

### **Quote from Young Brothers**

Shipping Container size: 18 ft X 8 ft

Flat rate-\$1420. Anything that can fit in the container, no matter the weight. Shipping to Oahu is cheapest as all shipments go through Oahu, but the price difference is not much different by island.

Reusable Super Sacks are the most efficient way to ship interisland and at 44 sacks/40ft containers each weighing 320 pounds that is a payload of 14,080 pounds for an inter island transport cost of \$0.10/pound.

This would bring the cost of shipping bulk hurd inter island down to \$.10/pound as opposed to the \$.66/# paid by Contractor Joe Smith to build the recent house on Maui which would have reduced a \$6930 for shipment cost for that house to \$1050.

### **Conclusion:**

Shipping Industrial Hemp between islands in Hawai'i as well as from the mainland involves navigating regulatory frameworks, logistical challenges, and cost considerations. Despite these complexities, the burgeoning hemp industry holds promise for Hawai'i's agricultural sector. By streamlining transportation processes and fostering collaboration among stakeholders, Hawai'i can capitalize on the economic opportunities presented by industrial hemp cultivation and distribution. As Hawai'i continues to chart its course in the hemp industry, addressing transportation hurdles will be pivotal in realizing the full potential of this versatile crop. While the Industrial Hemp industry is in its infancy, farmers on all islands can start growing hemp and depending on where the first processing facility pops up, (Hemp Alta is currently looking to potentially open a manufacturing plant on Maui and a processing plant may be opening on Kauai for building materials) the hemp can be shipped inter island for processing. The state could provide subsidies for the shipping costs for the first 3-5 years, enabling farmers on all islands to start growing hemp to help spur the growth of the industry.

## **B6. Contribution to the State Economy**

Industrial Hemp was once widely cultivated in the United States. However, in the 20th century, hemp became entangled with marijuana prohibition, leading to its classification as a Schedule I controlled substance under the 1970 Controlled Substances Act. This effectively made the cultivation of hemp illegal, stifling the industry for decades. The landscape for hemp changed dramatically with the passage of the 2018 Farm Bill. This legislation federally legalized the cultivation of hemp and defined it as cannabis containing less than 0.3% THC. The bill allowed for the establishment of state and tribal plans for hemp production, leading to a resurgence in the crop's cultivation and an explosion of interest in hemp-derived products, particularly cannabidiol (CBD).

Initially, the CBD market boomed, driven by consumer interest in its purported health benefits. However, this rapid growth led to market saturation, price drops, and regulatory uncertainties, causing the CBD market to collapse. Despite these challenges, the broader Industrial Hemp market began to gain traction. Industrial Hemp has diverse applications, including textiles, bioplastics, construction materials, and biofuels. Recognizing these opportunities, more and more processing plants are opening across the country, equipped to handle the various parts of the hemp plant.

Consequently, more farmers are dedicating land to industrial hemp cultivation. The plant's potential for soil remediation and its relatively low environmental impact make it an attractive option for sustainable agriculture. The growing interest in industrial hemp is fostering innovation and investment in processing technologies, which in turn is creating new markets and economic opportunities. As the industry matures, it holds the promise of revitalizing rural economies and contributing to a more sustainable future.

The growth of hemp processing plants on the mainland is an indicator that this industry is just starting to take off and with the loosening of regulations surrounding Industrial Hemp and clearly defining it versus Cannabinoid Hemp, it is on an upward trajectory and Hawai'i needs to jump aboard and reap the benefits for our local community and farmers.



- [Hempitecture](#), based in Idaho, makes hemp insulation and just rolled out a \$5 million equity raise
- [IND Hemp](#), Headquartered in Montana, has built their processing infrastructure and agricultural programs to be the leading USA source for industrial hemp food ingredients and natural fiber biomaterials. They recently earned B Corp Certification.
- [Formation Ag](#), located in Colorado, engineers and fabricates equipment solutions for harvesting, processing, and decortication. We work with our farmers to develop cost-effective and cutting-edge technology to make crops such as hemp possible at an industrial scale.

While we are not economists, common sense dictates that if an island state can produce the raw materials it needs for secondary industries in 90 days there is money to be made in a circular economy. Let's take a simple example of the local production of hemp wood replacement materials. How many times would money change hands if hemp were to be:

- Locally grown
- Locally processed
- Raw materials shipped to different islands and different secondary processors
- Hemp hurd and fiber would then be further processed locally by companies that don't even exist now
- Made into products made with local jobs to replace products currently being shipped in
- Biofuels can be produced that keep all of the production money in the State
- Food products can be produced

Let's take toilet paper for example. How much do we import per year? What size paper mill would it take to produce that much toilet paper? How much hemp would need to be grown? What other products could that mill also make? How many offset carbon credits could the State earn for supporting the local production of such a lightweight product to eliminate the CO2 pollution from shipment? This sort of analysis is beyond the scope of this report but this report and our recommendations point to the need for a deeper analysis. We already have the low hanging fruit products for biofuels and construction materials - both of which are in huge demand.

The benefits seem obvious, and we have repeatedly said that the State should begin immediately to support the development of an integrated hemp industry in our State. And as part of that support, we would assume that the Dept of Business Development would do a thorough investigation into the potential benefit to the State's economy and job creation.

The potential of a circular economy is way beyond the simple growing and exporting of an agricultural crop that the State depended upon in the past. The development of secondary processing is almost without end as hemp raw materials can be used to replace so many of the products that we currently bring in on ships. The State should do a detailed analysis of what is being imported as compared to the ease of making that particular product in order to understand where best to spend its money.

## **C. Recommended Infrastructure By Island**

### **Where to Begin? Which island? Who Should the State Support?**

#### **Let's Start With the Who?**

Through a public State grant we would hope that the State will support an entrepreneurial group ready to efficiently run a processing plant. Once an RFP is made public we anticipate that many applicants will show up - some with experience and some without. It will be up to the State to give support to that group who can most efficiently help the State towards its important goals of food and local employment security.

#### **And Then Where?**

The applicant for support in building a processing plant will need to show that they have lined up farmers capable of growing hemp in a three-crop rotation. These farmers must demonstrate the know-how to grow at least 1000 acres with irrigation to begin the process and three crops a year. If they are a local group that lacks the background in large scale mechanized farming, then they must commit to hiring people from the mainland with the necessary skills. In short it does no good to support a processing plant if there is nothing to process. So, the "where" is dependent on land with access to water being available. The island must have a minimum of 3000 acres available for lease once the processing plant is up to full speed of 4 shifts per week. We hope that local farmers will step up to the plate but will not be surprised if there are mainland farmers willing to relocate to via for the crop subsidies.

We believe that Kauai is the best island to start on but are not ruling out any of the islands. Kauai has the advantage of having thousands of acres recently farmed for seed corn now vacated. It also has the advantage that Pacific Biodiesel has recently put up a processing plant capable of the initial processing of hemp seeds. It also has the advantage of being the home of many Industrial Hemp enthusiasts wanting to develop businesses around this new crop.

#### **And How?**

We believe that the State should start by supporting the building of one processing plant on one island. This must be an open bidding process for State support so it will depend on which group, whether it is a coop or a new business entity or an out-of-state group can show the best path to success. It should be noted here that if the equipment that is being used is a Hemp Train the learning curve should be rather painless. A good mechanic will have no problem understanding the equipment and any trouble shooting that needs to be done. Regardless of the island that starts, all of the hemp entrepreneurs on all of the islands can start developing products because

the raw materials will be readily available on each island by a short barge ride. For example, if a surfboard making company on Maui wants to design and market hemp surfboards they can comfortably do so because they will be confident that the hemp fiber that they will need is within easy reach. Likewise if HPM wants to experiment with buying hemp hurds and bast fiber from the mainland to begin R&D on a variety of products they can do so with the confidence that once they get their manufacturing concepts ready to build in 3D that the processing plant will be ready to produce their raw materials.

### **And Why?**

It is crucial that the State address the issues of food security with all of its power for the very future of our State. As we are attempting to show a hemp industry could be foundational in furthering true food security. Because of the severity of the situation the State must support simultaneous growth in:

A processing plant

- Large scale mechanized agricultural production
- Development of off takers for the primary raw materials of hemp
- Development of secondary processors to strategically replace imported construction materials and consumer goods
  - Hempcrete blocks
  - 50/50 hemp concrete blocks
  - Prefab housing made in a factory
  - Hemp wood and hemp insulation products
  - Hemp paper products
- Feed mill development to make poultry and fish feed

### **Cultivation and Harvesting Equipment Needs for Each Island**

To begin with, the processing plant and all of the cultivation and harvesting equipment must be on the same island. Please see Section B4.

Once the State believes that a second island is needed to keep up with expected production then a second processing plant with a full set of cultivation and harvesting equipment needs to be on a second island.



## The First Processing Plant in the Hawaiian Islands

1. Regardless of which island is the first island we will be recommending the [Canadian Hemp Train](#) as the first model of processing. By starting with one set-up and one 40hr shift per week output can be enlarged by one shift per week up to a maximum of 4 shifts per week for full time use. Once the plant is at full capacity that plant can add another Hemp Train line or the State can support the building of another processing plant on another island.
2. Based on a conservative estimate of yield from the University of Hawai'i of 5 tons per acre per crop of hemp grown for each shift a processing plant will require 500 acres of industrial hemp.
3.  $1.5 \text{ tons/hr} * 2000 \text{ hrs/shift} * 80\% \text{ efficiency} = 2400 \text{ tons of hemp straw/year}$  or roughly 500 acres under cultivation at 5 tons of straw per acre
4. 4 shifts per year will require a minimum of 2000 however throughout this report we have consistently used the figure that an island must have a minimum of 3000 acres (with access to water) from which they can harvest hemp once per year as not all of the hemp will go to the processing plant. This also allows the efficiency factor to increase with experience.
5. Hemp should be one crop in a three crop rotation. However, until crop lands are cleaned of heavy metals and residual agricultural chemicals we recommend that hemp be grown twice a year on the same acreage separated by incorporated cover crops until the hemp land is clean enough to grow food crops. When hemp seeds go to biodiesel and hemp straw goes to construction materials there is no fear of human contamination. Hemp should be used judiciously to clean up soil before that soil goes into a full rotation with food crops.
6. For the purpose of starting up a new processing plant with hemp being grown twice per year on the same soil only 250 acres of hemp is needed.
7. Once the soil is clean we would keep hemp as one crop in a three crop rotation with corn and soybeans being the primary crops but additional crops of high value crops in rotation like: sweet potatoes, sweet corn, squash, sorghum sudan for green chop and silage, soybeans, specialty small grains and pulses
8. Eventually 3000 acres should be available for hemp production 12,000 tons/year to make the factory run 24:7 all week long for maximum efficiency.

9. Bob King, co-founder of Pacific Biodiesel, said in a task force meeting that they have room to make 3 million gallons of hemp biodiesel/ year in their current infra-structure. Given that research has shown that hemp seeds produce 207 gals of biodiesel per hectare (83 gals/acre).<sup>19</sup> Simple math 3,000,000gal/83 gals shows us that Pacific Biodiesel could process 36,000 acres of hemp seeds. Ironically this is the amount of land that the last sugar mill, A&B farmed for sugar on Maui.
10. At any time that this system has proven itself successful the same system can be established on another island or several islands
11. It should be noted that currently contractors are importing hurd for the use in building one off hempcrete houses and this hurd could be imported from the first processing plant from day one to any island at an estimated \$0.10/pound for transport which is way better than \$0.66/pound from the mainland.
12. Wherever the first plant is placed there also should be developed a hemp block plant.

To put this in perspective please review the photos below of a hempcrete house built on Maui in 2023 by contractor Joe Smith using a simple style of custom hempcrete made by packing forms so that the hempcrete surrounds and petrifies the wooden structure. By using the simple mixer you see below they mixed 1# of hemp hurd with 1.25# of lime and mineral binder and 2# of water and then hand carried the mixture into the house and tamped it into the forms.

- That means that by growing hemp locally we would only need to import 30% of the materials needed to make hempcrete as the hemp hurd and water would be sourced locally.
- To create their 1400 cubic ft of walls they used 10,500# of imported hurd.
- So if our ongoing production of hurd from one Hemp Train at full production is 1.5 tons per hour \* 80% efficiency is 2400 tons of hurd/yr \* 40% processed as hurd = 960 tons \* 2200#/ton = 2,100,000 pounds of hurd/yr/10,500# for the walls in a 1250 sq ft house we could build 200 houses per year shift using this style of building shown below

---

<sup>19</sup> Industrial Cannabis Sativa: Hemp Oil For Biodiesel Production:  
[https://www.researchgate.net/publication/375577652\\_Industrial\\_Cannabis\\_sativa\\_Hemp\\_oil\\_for\\_biodiesel\\_production](https://www.researchgate.net/publication/375577652_Industrial_Cannabis_sativa_Hemp_oil_for_biodiesel_production)





Because hempcrete is a relatively unknown building material in Maui County the Permit office forced them to add extra structural support. By weight only 30% of this material would need to be imported if we were to grow hemp locally. And it is possible that with all of the new bio epoxy (possibly created from mining calcium from sea water) being developed that an alternative to lime will be developed. It is also possible to build with prefab panels that are set in place by cranes or use HempBlocks or shoot a Hemp Shot over a form or onto the underside of a roof.



What you see here is the house with the rough hempcrete. From here they will add a lime finish coat that is smooth and beautiful. Although some people prefer this rough look.



Even with the extra expenses this hempcrete house in Kula cost about \$275/sq ft. to build. With the imported hurd the hempcrete walls cost \$19.25/cu ft and used 8.25# of hurd/cu ft.



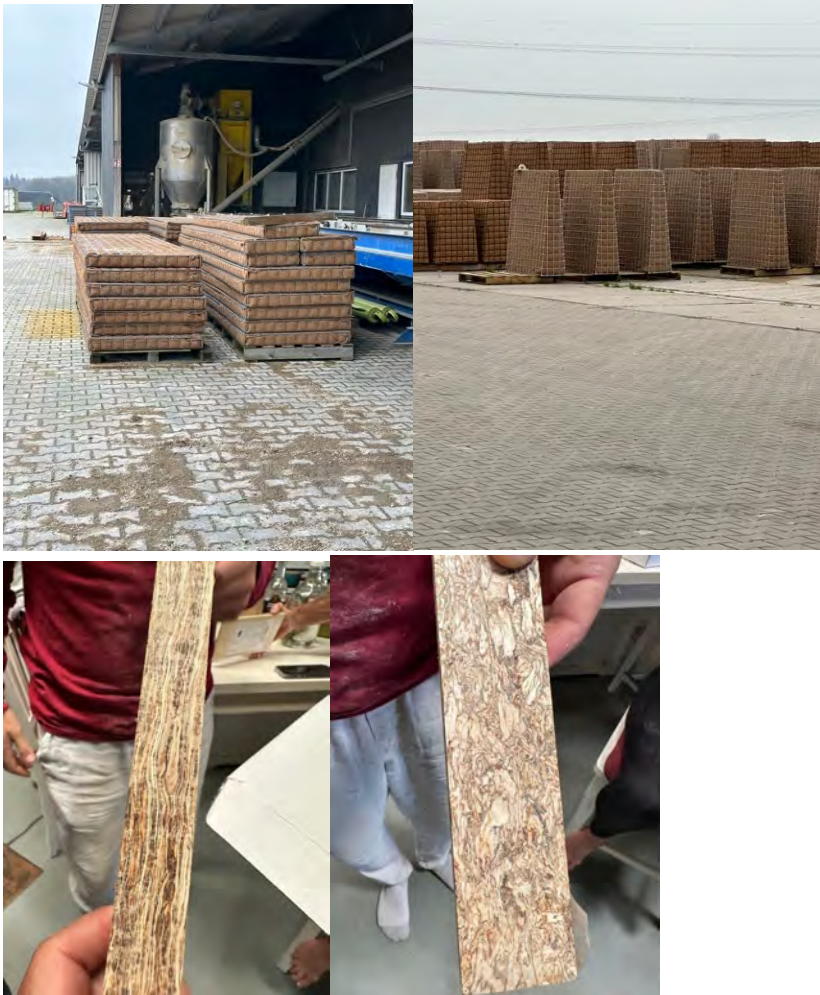
Here is an example of a bamboo house with ferro cement built with a permit here on Maui 25 years ago. The cement roof is coated with a polymer every 5 or so years in half a day and has been totally problem free. This is another potential use for hempcrete as it makes very insulating roofs that can be coated or sheathed in traditional metal roofing.

This particular house was built by the two architects that went on to create Bamboo Technologies – a company that started here on Maui and is the only company in the world to take bamboo through the ICC building code. The County of Maui gave them 7 years of exemptions to the local building code to allow them to get this done while also continuing to build houses on Maui. Today they have built over 500 buildings around the world. They are very interested in incorporating hempcrete into their designs.

Few people know that [Whispering Winds Bamboo](#) grows structural bamboo locally and could and should be incorporated into hempcrete buildings if we are going to reduce our dependence on imported goods. Surely the Office of Innovation and Sustainability could orchestrate the exemption of local building codes once again so that some experimental houses could be built with the owners signing waivers that clear the county of responsibility.

In addition to using hurd (40% of the straw biomass becomes hurd) the other 40% of the straw is fiber which can be made into breathable, non-toxic soft fiber batons for insulation or into fiber board insulation. Hemp is great for sound abatement between floors and rooms.

[DunAgro](#) of The Netherlands came up with another use for its fiber and makes these [Sound Barriers](#) which they sell for sound abatement along freeways. See photos below.



In addition to hempcrete; hurd can be made into a wood like product in 4'X8' sheets that is also useful for cabinetry, tongue and groove flooring, trim, doors, etc.

## Phase One

Research has shown us that there really is no such thing as a mobile hemp decorticator for Cannabinoid Hemp. There are small decorticators that are appropriate for research purposes or for growing and building one's own house. There is no machine that we could find that could take in Cannabinoid Hemp stalks and create a second income stream for Cannabinoid Hemp growers as we had hoped. The problem is that given the way that Cannabinoid Hemp is grown the stalks become 2 to 3 inches in diameter and the little machines can only accommodate one inch on the outside.

However, according to Formation Ag they [have experience in growing](#) Cannabinoid Hemp in narrow rows while maintaining flower quality. If Hawaiian Cannabinoid Hemp growers were to adopt this planting regime then they could use one of the two mobile decorticators that we will be reporting on.

In general, we are recommending only large-scale processing as practical for Industrial Hemp in the Hawaiian Islands at this time.

Furthermore, with inter island shipping of 1000# round straw bales (see shipping prices in section B5) it will be possible for any farmer on any island to grow and sell hemp stalks. This will also provide an easy entry for anyone wanting to experiment with hemp bioplastics, hemp surfboard manufacturing, hempcrete and so much more once one large plant is up and running. Then the other islands can build processing plants as hemp takes off as a sought-after product.

### **Maui, Lanai, Molokai, Oahu**

[Hemp Alta](#), a very successful hemp processor and marketer in Calgary, BC is currently formulating plans to come to Maui to set up a Hemp Train style processing plant. This plant will be able to process about 2400 acres (at an estimated 5 tons per acre/ crop yield) worth of hemp straw/ year if it works 24/7 at an 100% efficiency. This plant could buy hemp straw from Mahi Pono, Lanai, Molokai, Big Island and Oahu to begin with.

This would allow the other islands to get into the business slowly and provide proof of concept for that island.

This would also allow large landowners like Mahi Pono, Maui Land and Pine and Larry Ellison of Lanai to grow hemp as a rotational crop to regenerate and cleanse their soils. It is like growing a cover crop while still realizing a profit in addition to the ecological benefits.

In addition, Oahu has many large vegetable farms that could benefit from growing hemp for the same reason. They could form an equipment co-op to purchase and share the specialized equipment needed:

- Grain drill
- Mower Hay rake
- Straw baler

This would allow them to rejuvenate their soils while also earning a handsome profit per acre renewed. In addition, the Europeans report a 25% increase in wheat when it follows a crop of hemp.<sup>20</sup>

The large vegetable farms on Oahu are:

1. [Sugarland Growers, Inc.](#) – large scale fruit and vegetable farming for 43 years on both Molokai and Oahu

---

<sup>20</sup> Hemp: A More Sustainable Annual Energy Crop For Climate and Energy Policy:  
<https://www.sciencedirect.com/science/article/abs/pii/S0301421513001523?via%3Dihub>



2. [Aloun Farms](#) – family owned for 45 years with 180 full time employees and 3000 acres under production
3. [Kuiliima Farms](#) owned by Turtle Bay Resorts with 468 /acres of gardens
4. [MA'O Organic Farms](#) in Wai'anae with about 300 acres
5. [Kualoa Ranch](#) – old family ranching farm that is now growing fruits and vegetables
6. [Ohana Nui Ventures](#), 430 acres in Wahiawa on Oahu

## **Rebuilding of Lahaina and Other Needs for Affordable Housing**

By processing the straw from 4800 acres (a double Hemp Train at 3 tons per hour) Maui could build and insulate about 1650 houses per year from nearly 100% locally grown and processed materials (see Section J.)

Many builders are surprised to see that it is less expensive to build with hempcrete while greatly reducing the heating and cooling costs of a house which represents 42% of the lifetime carbon impact. Leaving the potential for housing developers to earn carbon credits just by building ecologically sound houses.

### **Kauai**

Because of the departure of the sugar industry, the pineapple industry and most recently the seed corn GMO industry; Kauai has in excess of 20,000 acres of available agricultural land. The larger farmers are [Robinson Farms](#), [Grove Farms](#), [Pacific Biodiesel](#) and a mainland farmer in the Kekaha area.

Because Pacific Biodiesel has recently set up a processing plant with 1000 acres under cultivation this is a perfect place for a co-op to set up a hemp processing plant. Bob King, co-founder of Pacific Biodiesel, is anxious to grow and process hemp seeds for culinary oil as well as biodiesel. Bob always makes an animal feed from the pressed cakes of any seed. At a demonstrated 1.25 tons to the acre production of hemp seeds hemp out produces sunflower seed production by 25% adding to both food security through human and animal feed and fossil fuel independence.

### **Hemp seeds**

- 25-30% oil
- 25-30% protein
- 30-40% fiber

## Sunflower

- 40-50% oil

## Safflower

- 29-45% oil

## Soybean

- 18-21% oil

[Hemp Solutions Kauai](#) is looking to partner with Ohana Nui Ventures to grow approx 1000 acres of Industrial Hemp to make hemp blocks to build homes with. They are in talks with hemp brick companies in order to bring the processing to Kauai.

## How This Affects Kauai Farmers

Additionally, using hemp to clean the soils of the former GMO/ Round-up system of raising seed corn becomes very important for future crops. Round-up has a 22 year half life with a secondary metabolite called AMPA or Aminomethylphosphonic acid which research has repeatedly shown<sup>21</sup> is actually more toxic to life forms than the original Glyphosate. This metabolite is often found in the sediment, surface and groundwater surrounding old Seed Corn fields. Hemp has been shown to uptake heavy metals associated with Seed Corn production as well as help to break down residual agricultural chemicals. In a study done by the University of Hawai'i Manoa hemp was shown to break down Atrazine by 75% in one growing season.<sup>22</sup>

Therefore, we see growing hemp in Kauai as the most important island in the State so that it can facilitate food security on a large scale. Hemp in a rotation allows for other small grains and legumes to be grown for local consumption as well as animal protein. We would like to point out that when A&B Sugar was experimenting with potential crops back in 2017 they were able to grow field corn that yielded 185 bushels to the acre which was 12% above the national average. We do not have a link to this as it was a figure given in public testimony by the then CEO of A&B Sugar.

---

<sup>21</sup> Toxic Effects of Glyphosate on The Nervous System:  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9101768/>

<sup>22</sup> ComparaHawai'ivaluation of Industrial Hemp Varieties: Field Experiments and Phytoremediation in Hawaii: <https://www.sciencedirect.com/science/article/abs/pii/S0926669021004477>

## **Phase Two**

Given that each Hemp Train set up only provides the building material for 800 medium sized homes per year it is logical that other processing plants will quickly follow on each of the islands in order to produce this wonderful building material that reduces the need for large scale importation of building materials while making healthier homes that should require zero heating and cooling in Hawai'i.

## **How the Hemp Industry Can Grow or Develop Into These Five Different Sectors (Fuel, Building, General Fiber, Cannabinoid and Grain Food) Per Island**

### **Maui**

We spoke with Darren Bondar, the CEO of Hemp Alta that is based in Calgary, Canada. Hemp Alta is one of the only commercial-scale hemp processors in North America that manufactures high-value hemp products using a state-of-the-art process known as HempTrain™. They have expressed interest in opening a hemp processing facility on Maui. Due to this development, if they move forward, Maui would be the first island with a commercial hemp processing plant. This would be a huge benefit because they are already a successful, knowledgeable company to get this accomplished. (see sections D-I for estimated costs and time frame as well as more information on Hemp Train and its capabilities). With the urgent need to build houses on Maui due to the wild fires, the timing could not be more perfect. They are also looking into acquiring the necessary equipment to make hempcrete blocks which would aid in building hempcrete homes faster which would result in reduced labor costs and homes can be built quicker as you do not have to wait for the hempcrete to dry after casting in place. By having this infrastructure on Maui, a number of other items can be made immediately (see above for low hanging fruit).

While the infrastructure is being built, Industrial Hemp farms can get up and running. The hemp can be dried and stored on Maui so that it is ready to be processed once the facility is completed.

### **Kauai**

If Hemp Alta does build on Maui that would not preclude the need for a processing plant on Kauai. There is a need for both. Kauai is the most logical island to support the development of either a locally owned processing plant or one owned by a farmer's coop. According to Bob King, President of Pacific Biodiesel Kauai has thousands of acres of agricultural land available for lease left over from the seed corn industry. This has been confirmed by Scotty Wong, River Young and Marcus Serrano, all of whom are making plans to grow hemp on the island.

Kauai Hemp Solutions is working with a Hemp Block company to develop factory made hemp blocks that will make hemp construction faster and easier. Another big advantage of starting the industry on Kauai is that Pacific Biodiesel has a new plant already established on the island that is capable of pressing hemp seed for the production of biodiesel. This will give farmers another outlet for their product. Research is needed by the University of Hawai'i and Kanda Seeds to find hemp varieties that are good for both a seed crop and straw yields as is done in Canada. Done correctly this should increase the income of the farmer's net profit.

## **Oahu**

The public/private partnership between Friends of Waimanalo and Ohana Hui Ventures has demonstrated a remarkable quality of leadership that is moving the hemp industry forward on Oahu by:

- Partnering with Kanda Hemp to test hemp fiber varieties in local conditions
- Partnering with Plant – It Hemp in specialized hemp equipment development
- Training young people in building with hempcrete at Friends of Waimanalo [Build and Trades Academy](#)
- Training young farmers in the cultivation and harvesting of industrial hemp holding educational workshops

While focusing on seed trials, hempcrete experimentation, workforce training and public education on Oahu, Ohana Hui Ventures is working with River Young and Kauai Hemp Solutions and planning to grow 1000 acres of industrial hemp for house construction on Kauai.

Agripelago Industries is headquartered on Oahu and is working in startup mode to buy industrial hemp crops for making both hemp seed products like hemp mylk and hemp protein powder and hemp straw for the use in large scale anaerobic digestion for the purpose of producing RNG (renewable natural gas) at scale.

## **Big Island**

From the many farmer discussions that we have had, the farmers on the Big Island are mostly focused on growing hemp for its cannabinoids. The Big Island is also the home of the Hawai'i Hemp Farmers Association with several members ready to engage in educating the public about the advantages of a hemp industry in Hawai'i should funding become available as we are recommending. Task force member, Greg Smith is interested in opening up his Kau area farm for educational opportunities and research. He has been farming Cannabinoid Hemp for many years and has extensive knowledge in growing hemp in Hawai'i.

## D. Schematic Diagrams Showing The Various Processing Steps And Infrastructure Needed From Harvest To Product For Various Sectors

### Understanding the Uniqueness of Hemp - A Short Intro to Processing Hemp

Hemp is confusing not only because there are two main systems for processing it but because there are so many different products that are made from one plant.

The hemp plant produces:

- Bast fiber (with different finished qualities)
- Lightweight biomass called hurd (large and small finished sizes)
- Seeds
- Leaves (most of which are lost in harvesting however, with a simple haylage chopper and wagon the leaves on young plants 75 to 90 days can be captured for both RNG and animal feed production when hemp is okayed for poultry feed for example)

As you can see in the photo below, an Industrial Hemp field is filled with closely planted hemp plants which forces them to grow tall with a low fiber stalk because it has a small diameter from the competition for sunlight. This is necessary to get the highest yield/acre, suppress weeds and to keep the stalks from being too tough to process.



To harvest the field, it is simply cut like a normal field of hay allowing the stalks to lie on the ground to dry down to 13- 15% moisture or 20% moisture content depending on the type of

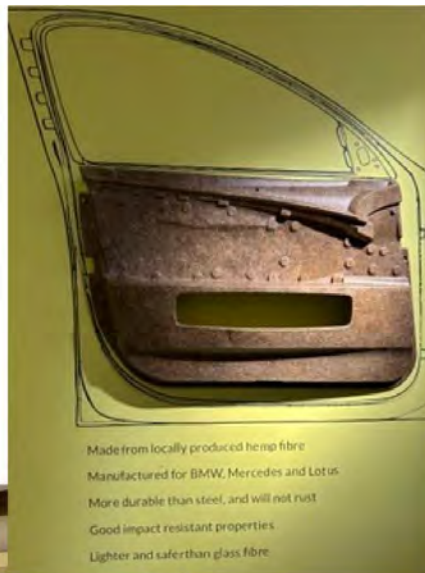
equipment chosen. This process is known as retting. However, New Holland and John Deere are both innovating expensive combines that harvest the seed and top leaves while simultaneously clipping the straw into 60 cm sections and then creating winrows that are never driven upon. This is expensive equipment, and the 60 cm sections are ideal for the European style of decortication but not for the American or Canadian.

Once the straw is dry it is simply baled into 1000# square bales and transported to the processing plant where it can be stored for years if it is kept dry – even with a tarp.

Growing, baling and storing hemp before a processing plant is built could be very advantageous for a new venture in Hawai'i.

Hemp straw bales can be put into the European style equipment or the Hemp Train or Formation Ag style equipment.

The fiber portion that comes from the equipment can be sold as is or it can be further processed and packaged for a variety of consumer and industrial goods depending on the focus of the processor and the market. The fiber can be packaged as a high value garden mulch or further processed into insulation for construction as either fluffy batons or as fiberboard used for insulation and sound abatement. This fiber is also very valuable for bioplastics with endless uses like surfboards, skis, furniture, insulating car panels, textiles, papermaking, and on and on.



The hurd portion is ready for making hempcrete for construction or can be further processed into a variety of consumer goods that help keep the price down on the hurd needed for local construction. The islands are currently importing many of these products. Making consumer goods is key to keeping construction goods affordable by earning more on specialty products while the bulk of the harvest goes to housing. The micro-hurd is simply hurd that is too small for hempcrete but can be used in other end-user products. The green microfiber and seeds are ideal for locally grown and highly nutritious chicken feed.

We must keep in mind what the end products are going to be before we can choose the type of equipment we want to invest in. In a later section we will analyze the needs of the islands against the economics of the potential products that can be made from hemp. Obviously locally grown and made building materials are of utmost importance.

**Note:** In addition to these large scale processing systems see Section G for information on small decorticators that could hand process the stalks from small grow lots.

## **Processing Equipment**

### **Two Styles: Traditional European Hammermill and Modern Canadian Engineered**

In short, the European Hammermill style is large and complex, 20% of the incoming biomass becomes low value dust and generally requires an extra 3 to 5 weeks of lying in the field to complete the separation process called *retting*. It is unknown how much biomass is lost per acre during this *retting* process. The two companies who dominate the market are [Cretes](#) from Belgium and [Laroche from France](#).

The smallest of these systems process 4 tons per hour in a very complicated manner using a lot of dust handling and conveying equipment. The cost is \$6 million plus an estimated set-up fee of \$1 million but the price does not include the US installation team, site work or infra-structure, extensive ductwork or electrical supply, or the shipping of 45 containers from Europe at a cost of \$10,000 each. This estimated cost is from Cretes of Belgium (\*See the bid in the Addendum).

The modern engineered Canadian solution is called [The Hemp Train](#) and was designed by an engineering firm to be simple and dust free, so zero waste. Each unit is stand alone and processes 1.5 tons per hour and delivers 4 finished products from the initial go around whereas the European style passes the biomass from one system to another to get to the finished products.

Another modern engineered American solution is manufactured by [Formation Ag](#) and called the Track 660 out of Colorado. They are an interesting company as they also manufacture cultivation and harvesting equipment.

### **Hemp Train - visited in Calgary, Canada December 2023**

- Hemp Train™ - is a new type of hemp processing equipment in development since 2011 by a Canadian engineering firm. This system does not use a hammermill, does not require retting of the hemp stalk, can handle biomass with a higher moisture content and produces 20% more finished product per ton of straw than a hammermill set-up as well as the longest in tack fiber on the market
- In cooperation with their sister company, Hemp Alta™, they have created marketable products from 100% of the hemp straw with zero waste and zero dust. An accomplishment the Europeans refuse to acknowledge. This system is currently being used with hemp grown for seed as opposed to fiber hemp. In other words a dual use variety hemp with a primary crop of seeds and a secondary crop of straw. After they remove the top 18 inches of the plant with a common combine to harvest the seeds they go through the field again to cut the stalk with common hay making equipment.
- After the biomass dries down to 20% moisture they bale it in 1000# bales with standard hay baling equipment.
- However, unlike the Cretes equipment their equipment can handle small square bales, large round bales and 1000# square bales without supervision by a human being.
- These bales can then be stored for years before processing even under a tarp. This is an important insight as a hemp industry could be developed in Hawai'i with farmers starting to grow and store dry bales while the processing equipment is being installed.
- This style of processing equipment runs 1.5 tons/hr and yields:
  - 40% hurd
  - 40% fiber
  - 10% Hurd Microfiber
  - 10% Green Microfiber

There is no waste. Once the large bales are put into the Hemp Train in these photos the processing equipment automatically spits out 4 different products.





40% Hurd from the inner core



40% Bast Fiber from the outer sheath



10% Green Micro-fibers

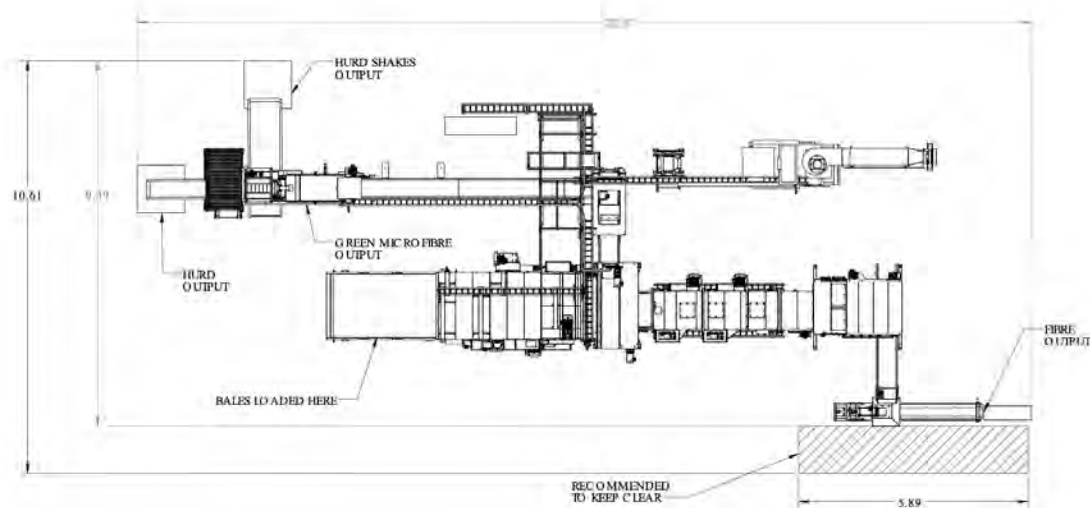


10% Micro-hurd

- The cost of the equipment installed in a local facility will be **\$3,300,000**
- And require 5 – 40ft containers to ship at buyers' expense of an estimated \$6000 per container
- A building of 6000 sq ft with a 110 ft to 120 ft length and a 50 to 60 ft width and not less than 19 ft tall is recommended by the manufacturer - 2000 sq ft for the Hemp Train, 2000 square feet for packing and shipping and 2000 sq ft of covered hay storage with minimal infrastructure needs.
- This compares favorably to the European hammer mill equipment which produces:
  - 55% hurd
  - 25% fiber
  - 20% dust
- Therefore the Canadian equipment is producing an additional 20% more product for every 1000 # of baled hemp straw.
- In addition, several finished products come straight off of the production line.
- This company is doing R&D to produce construction insulation from the fiber portion of the plant and/or an insulating fiberboard.
- The type of unbroken fiber that is produced in this mill without the use of a hammermill makes the fibers ideal for making surfboards and many types of useful bio-plastics fibers.
- Animal feed potential: Please note that when processing seed hemp varieties there in Canada they are still getting 10% by weight of what they call green micro-fibers. These are leaves and stems that can be used as animal feed for poultry, hogs, small ruminants, or cattle once hemp for animal feed is legalized. Poultry feed is very close.
- Because today the majority of hemp is not handled for leaf production it is lost to the ground during growth and harvesting. Although this is important for the soil microbiome an intermittent cover crop would more than replace the value of the fallen leaves while creating an animal food industry of species-specific pellet manufacturing. It is possible to buy a containerized plug and play grain mill made in The Netherlands and deployed to areas wanting to make animal feeds and with an additional leg for also making floating fish food.

Here is a [video of the Hemp Train](#) in action.





**NOTES:**

- DIMENSIONS ARE IN METERS

APPROVED FOR CONSTRUCTION  
 APPROVED BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 QTY: \_\_\_\_\_



DESIGNED BY: \_\_\_\_\_  
 DRAWN BY: \_\_\_\_\_  
 CHECKED BY: \_\_\_\_\_  
 DATE: \_\_\_\_\_

SCALE: 1:100  
 SHEET 1 OF 1  
 DATE: 11/11/2015

**Formation Ag** is similar to the Hemp Train in its throughput and potential for the Hawai'ian Islands. Formation Ag is a wholly owned subsidiary of [Global Fiber Processing](#) out of Colorado. Formation Ag produces hemp processing equipment as well as hemp cultivation and harvesting equipment. We believe that Formation Ag Fiber Track 660 is very advanced but not as commercially proven as the Hemp Train. It can process 1.5 to 1.8 tons per hour. Unlike the Hemp Train the Formation Ag system comes in modules that can mix and match according to the end product needs. The primary advantage here is in the potential for additional processing of the bast fiber to prepare it for different markets by simply adding on additional fiber cleaners. This can also be done with the Hemp Train by special order.

Although they advertise that their equipment can process both green and retted straw their general manager, Randy Wright, was honest and said that it works best with at least a nominal amount of retting to let the soil microbes begin the separation of the outer skin layer. Randy Wright was also honest enough to say that 1.8 tons per hour requires optimal feedstock and processing conditions and we should figure on 1.5 tons per hour.

In general, I believe that the roller system used by Formation Ag is similar to Hemp Train. Hemp Train is in one long enclosed unit that produces very little dust and has an excellent bale opener. The Hemp Train has also been longer in development. Formation Ag has versatility including the ability to process Kanaf (however they report Kanaf is highly flammable and potentially dangerous). They can also easily add dust collectors early on in the production line. We will

consider both of them as outputting 1.5 tons per hour in my calculations elsewhere.

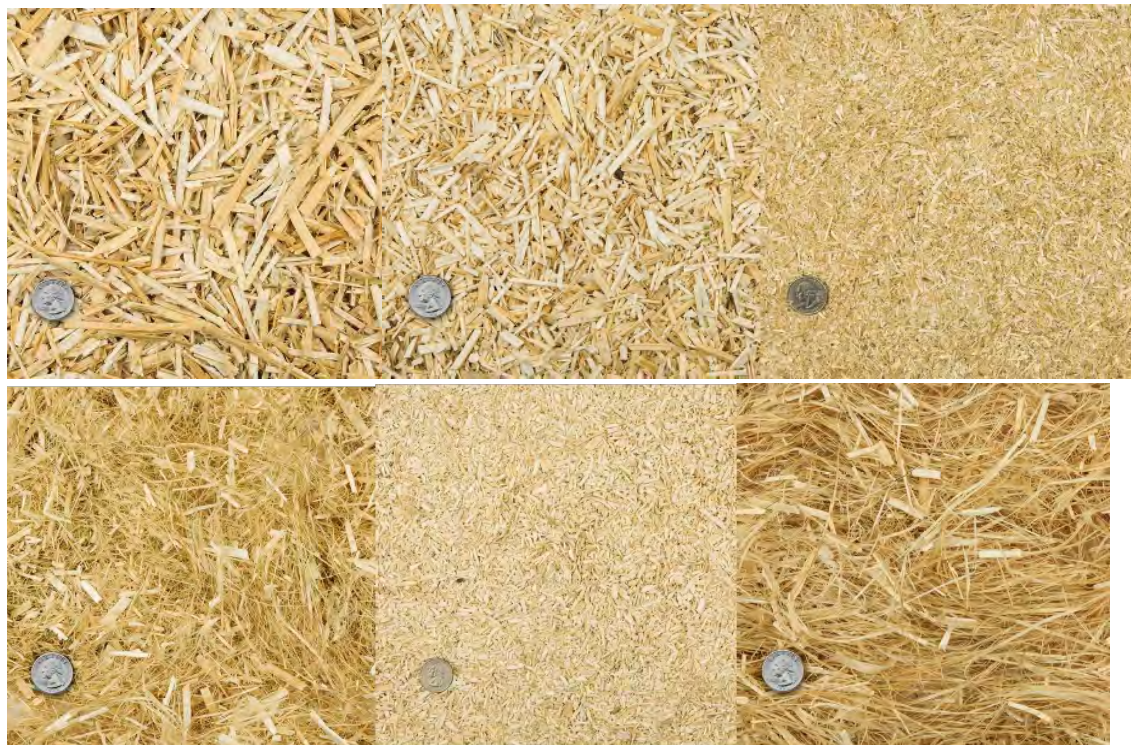
Before a startup venture chooses between these two manufacturers, we would recommend visiting them both to ferret out the differences. A big part of the decision will come down to the intended end use of the products that come from each system.

Two advantages that Formation Ag has over Hemp Train is cost: A stripped-down entry-level system is only \$800,000 and one with all the bells and whistles is \$1.2 million. They recommend a 5000 sq ft building for the processing plant and agree that an open-air building would be best. They also recommend two additional 5000 sq ft spaces for the storage of straw bales and the storage of product and shipping. They are estimating that a full-blown system will take 4 – 40ft HC containers to transport. It will take 3 people to run the system and it will produce 75% hurd, and 25% fiber. They tend to grow fiber hemp in their area of the country which accounts for the different percentages.

They are a fully owned subsidiary of Global Fiber Processing and are ahead of The Hemp Train in creating end user products from the bast fiber. They are also working with the largest consumer and processor of hemp fiber in China and have much better looking bast fiber when it is refined in their equipment. Please see the photos below.

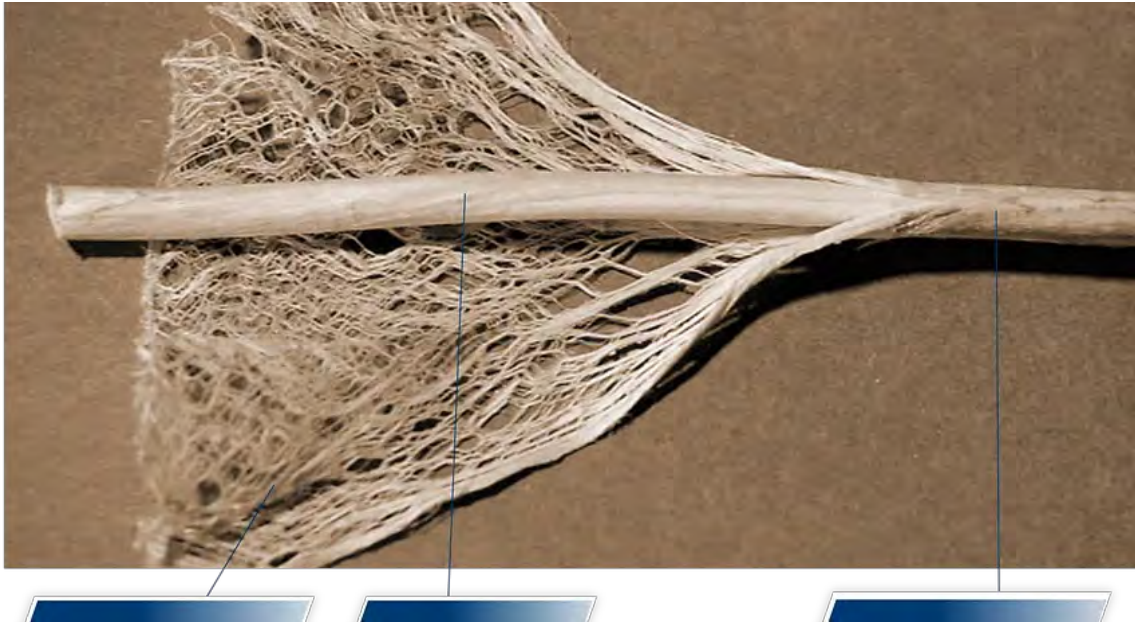
We believe that they are on the cutting edge of hemp innovation and diversification. This company is exciting because they are about to bring structural hemp/concrete blocks to the market together with the [University of Nebraska](#).

### **Traditional European Hammermill Processing – two major manufacturers**

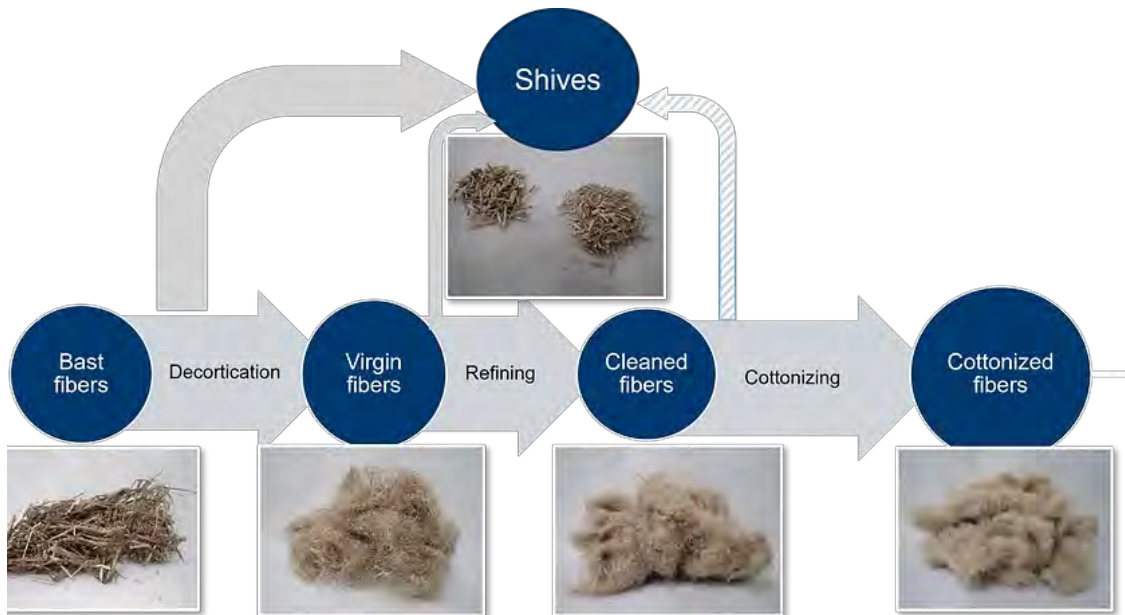


## Cretes™ of Belgium and Andritz Laroche SAS of France

- The advantage of decades of use
- Ideal for the European system of field retting
- We don't yet know if hemp will ret properly in Hawai'i
- They don't know how much biomass is lost to retting before it is baled
- The hammermill literally beats the hemp straw and causes a reduction of 20% to 25% of the straw to be reduced to a low quality dust with 20%– unfortunate!
- Products expected:
  - 20% dust
  - 55% hurd ( high and low quality combined)
  - 25% fiber
- Processing 4 tons per hour with an electrical use of 610 kilowatts of electricity per hour not including the ventilation system and packaging units
- Requires very extensive air ducting systems that are designed by Cretes but are to be built locally at the owner's expense
- Needs a 100 ft by 300 ft by 33 ft tall processing building
- In addition needs a building that will hold one week of straw
- Plus needs a building for storage and shipping of finished products
- Uses only a large round bale of hemp straw – no square bales
- Very fussy on percent moisture – warns of equipment breakdown if over 20%
- Operators: 4 – 1 dedicated to feeding the straw bales and removing the strapping of the bale ( Note: on the Hemp Train one person quickly lifts a bale onto the machine and leaves the machine to do the rest) 1 person for operating the bale and straw cutter. 1 line supervisor and 1 for finished products removal
- Cost of the equipment to process 4 tons per hour
  - Equipment \$6 million
  - Shipping \$5 million
  - Technical Assistance \$1 million
  - Locally contracted installation, infra-structure. They are very vague but are very clear that they will send their technicians at \$1500/day/per person plus food and lodging.
- Hemp needed to run for one plant for one shift per day to start with 1000 A at 4 tons/A and two crops per year with a cover crop in the interim
- Remember that the 8000 tons/year throughput only yields 6400 tons of product because of the old fashioned hammer mill they lose 20% of the biomass



The Raw Bast Fiber Unfurled



It takes 4 passes through the equipment to arrive at finished fiber for sale

Note: this is similar to the Formation Ag equipment in that you can add single specific pieces of processing equipment to go from virgin fibers to cleaned fibers and another to go all the way to cottonized fiber.



This is a close-up photo that we took of the wasted dust. As you can see it is 20% uncaptured hurd and fibers that are wasted. The Canadian Hemp Train does not have any wasted material. In the first pass the entire straw biomass comes out of the machine in 4 materials as shown in the upcoming photos. This is a significant difference between the two styles of equipment.

### **Dunn Agro Traditional European Style Processing Plant with Pre-fab manufacturing - visited in The Netherlands**

- We visited with a traditional hemp processor who uses the common place hammermill system of processing with high throughput. The European systems have always focused on fiber production and their equipment is designed to that end. While the construction insulation they produce is beautiful it will take a deeper dive to evaluate whether or not that output is worth the additional cost of equipment and operational expenses.
- This company processes between 6 and 7 tons an hour and 10-12,000 tons/year working 2 shifts a day. The factory employs 35 people and produces diversified products including CBD products, sold in drugstores throughout the country as well as hurd in super sacs, sound abating structures, prefab houses, etc. The processing plant itself only requires 2.5 people per shift (one being split with the shipping department).
- Because this factory uses the European hammermill style of processing equipment, they end up with 20% of their raw hemp straw being turned into dust. The dust can <sup>80</sup>



be pelletized (it had a caloric value of 14.9MJ/ton) and can be used for process heat or pyrolysis into BioChar with a heat by-product.

- Their equipment produces virgin fiber that is currently shipped to Romania for further processing into beautiful natural, non-toxic insulation that you can literally take a nap on, it is so soft and non-itchy.
- There is one more equipment manufacturer whose equipment is very similar to the Cretes. They are [Laroche](#) from France. This company has sold and installed 2 large processing plants, on tribal lands in the State of Texas. According to one of the Dutch CEOs this project is unfortunately doomed to fail because he says that area of Texas has never grown fiber hemp and that, in fact, the type of fiber hemp that this equipment was made for cannot grow in the Texas climate. In addition, it is not possible to do the retting process in that region due to low humidity.
- As this style of processing equipment is used throughout Europe this claim needs to be investigated.

DunAgro in The Netherlands processing plant for 6 to 7 tons/ hour plus making prefab houses. In addition, they rented two huge buildings for product and cultivation equipment storage nearby. They also farm 8000 acres of hemp themselves and plan on expanding to 12,000 acres.





Additional Processing into [Prefab houses](#) – an ideal process for Hawai'i



The equipment photographed at DunAgro below, which allows for a very wet hempcrete to be poured into a form in a horizontal position could easily be figured out by clever Hawai'i based contractors. Making prefab houses would be a tremendous help for Maui and each of the islands. Minnesota's Lower Sioux Indian Community is pioneering green building with its fully integrated 20,000 sq ft, \$6.2 million [hempcrete facility](#) – a first in the country. They are looking to start manufacturing prefabricated wall panels and blocks and build homes quickly for their community and could be an example of what is possible here in Hawai'i.



## E. Approximate Costs Per Infrastructure Component

### HempTrain, Calgary, Canada

- The cost of the equipment installed in a local facility will be \$3,300,000
- And require 5 – 40ft containers to ship at buyers' expense of an estimated \$6000 per container
- A building of 6000 sq ft with a 110 ft to 120 ft length and a 50 to 60 ft width and not less than 19 ft tall. We are recommending 10,000 sq ft for expansion into 4 shifts
- Process capacity/installed unit 1.5 tph

Item	Cost
Equipment	\$3,300,000
Shipping	\$40,000
Industrial setup (10,000 sq ft, partially enclosed)	\$2,500,000
Small equipment for factory and office	\$250,000
Indirect and management costs	\$500,000
Total	\$6,590,000

- Consider structuring the grant/loan for state ownership, with a potential transfer to the factory's workforce over time.

**\*Formation Ag Track 660 Made in Colorado - very similar estimate as Hemp Train**

### Traditional European Hammermill Processing – two major manufacturers

#### Cretes™ of Belgium and Andritz Laroche SAS of France

- Cost of the equipment to process 4 tons per hour
  - Equipment \$6 million
  - Shipping \$5 million
  - Technical Assistance \$1 million
  - Locally contracted installation, infra-structure ????
  - See Cretes bid in the addendum

## F. Infrastructure Sizing and Capacity Options Based on Different Processing Needs

We are only recommending three processing systems. Here are the recommended areas needed for processing/ bale storage and product storage and shipping.

<b>Equipment</b>	<b>Total</b>	<b>Straw Storage</b>	<b>Shipping/ Product Storage</b>
Hemp Train	6,000 sq ft	2000 sq ft	2000 sq ft
Formation Ag	15,000 sq ft	5000 sq ft	5000 sq ft
Cretes & Laroche	50,000 sq ft	10,000 sq ft	10,000 sq ft

## G. Suitability of Mobile Versus Fixed Infrastructure For Hemp Processing

The only way to start a new statewide hemp industry is to have large scale processing equipment as discussed above. However, there are those farmers who are growing Cannabinoid Hemp who may also want to add another income stream by running their stalks through a mobile decorticator. This is only possible if they grow Cannabinoid Hemp with an unusually slim stalk under one inch in diameter. Artisan builders may want to grow, process and build with their own home-grown hemp and this is very possible and intriguing.

### Small Scale Mobile Decorticators

For both of these groups there are two possibilities. The [HurdMaster](#) and the [Formation Ag Micro Decorticator 118](#).

The HurdMaster is only 575# and is mounted on an easy to move about frame. It can process 100# to 200# of hemp stalks per hour with two operators. It can process either retted or green hemp stalks up to 1 inch in diameter.

The hurd comes out as ¼ inch to just over 1 inch in length which is perfect for hempcrete as well as animal bedding without further processing. The fiber can be used as is for garden mulch.

The HurdMaster is being produced by [Peruza](#) of Lativa - a high quality process engineering and equipment manufacturing company that works worldwide.

The equipment runs on 220V electricity, has SS rollers, gear drivers and stands 32"by 79" by 49". It costs \$14,400 and fits on a shipping pallet that weighs 772#. Once a deposit of half the price is made it will ship in 6 to 8 weeks. This is a wonderful and sturdy solution. There are many others out there made by individuals or university shops for research, but this one seems to be very professionally done.

Please see the HurdMaster Brochure [here](#).

There is also an American made machine that is very similar and runs off of 110V. It is a [Formation Ag Micro Decorticator 118](#) and sells for \$21,000 and is made and shipped from Colorado. The manufacturer manufactures a full-sized system as well so hemp decortication is its primary business and they offer full tech support in processing, marketing and cultivation of hemp. See Formation Ag brochure [here](#).

Formation Ag is a wholly owned division of Global Fibers Inc. and both companies are 100% devoted to the expected roll out of an American hemp industry. Formation Ag is one of the

leading players in development and production of hemp related equipment and offers equipment for:

- Planting
- Cultivation
- Harvesting
- Processing
- Decortication

All with the potential for financing.

### **Medium Scale Decorticators**

There are several medium scale decorticators but only one that we think is as advanced as the Hemp Train. That would be Formation Ag - made in Colorado Formation Ag [Fiber Track 660](#) can process 1.5 to 1.8 tons per hour. Unlike the Hemp Train the Formation Ag system comes in modules that can mix and match according to the end product needs. The primary advantage here is in the potential for additional processing of the bast fiber to prepare it for different markets simply by adding one or two more pieces of equipment to the line.

One potential disadvantage in Hawai'i is that even though their literature says that the equipment can handle green hemp without retting, their very truthful CEO said it works best with retted materials. By contrast the Hemp Train engineers claim that their straw does not need to be retted but this needs to be verified before purchase.

### **A Word of Caution to Cannabinoid Hemp Growers**

It is a tightly held belief that Cannabinoid Hemp straw can be turned into high value hempcrete. However, according to the equipment experts that have been interviewed this is an unrealistic expectation because when hemp is grown at a rate of 1600-2000 plants per acre the stalk will become both excessively fat and tough. No small decorticator could handle a stock thicker than 1 inch in diameter. Formation Ag is doing experiments with growing Cannabinoid Hemp but using Industrial Hemp seeding rates with favorable results so far. However, the extremely high price of the additional high value seed (many times the cost of industrial hemp seed) will most likely make this practice financially untenable.

Stalk disposal possibilities for Cannabinoid Hemp growers. To avoid hemp stalks from going into the landfill there are a few potential uses:

1. Compost them on the farm or take to a professional composting facility
2. Chop and sell as mulch
3. Chop and sell as animal feed
4. Drop off at an anaerobic digester



## H. Volume and Mass Requirements for Processing Per Day

### For Both the Hemp Train and the Formation Ag 660 We Will Use:

- Throughput 1.5 tons/hour
- 8 hours /shift
- 12 tons/shift
- Full time is 168 hours/week
- Which is 4 shifts at 10.5 hours/shift
- We will guess at 80% efficiency to start with
- For a need of 250 tons \* 80% = 200 tons per week to feed the processing plant
- 200 tons per week \* 50 weeks is 10,000 tons per year
- At 5 tons / Acre that is 2000 acres rotated around for 3 crops/year
- 1.5 tons per hour – after processing by weight
  - 40% hurd
  - 40% bast fiber
  - 10% micro-hurd
  - 10% micro-fiber
  - For an annual output of
  - 4000 tons of hurd
  - 4000 tons of bast fiber
  - 1000 tons of micro-hurd
  - 1000 tons of micro-fiber
- Please note that these percentages are based on dual purpose hemp grown primarily for seed in Canada and may be less hurd per ton than when fiber hemp is processed

## I. Approximate Square Footage Required Per Component

**There Are Only Three Areas of the Processing Facility and They Can All Be Under the Same Roof or Spread Out a Bit.**

- Storage for the straw bales needed for the next week's processing.
- Actual processing space.
- Storage for the offtake (often it comes off the processor in bags or is bagged in this area). Plus the shipping of goods.

<b>Equipment</b>	<b>Total</b>	<b>Straw Storage</b>	<b>Shipping and Product Storage</b>
Hemp Train	6,000 sq ft		
Formation Ag	15,000 sq	2000 sq ft	2000 sq ft
Cretes &	ft	5000 sq ft	5000 sq ft
Laroche	50,000 sq	10,000 sq ft	10,000 sq ft
	ft		

## **J. Economic Implications of the Recommended Infrastructure by Island to the Hemp Farmers, the Hemp Industry, and the State of Hawai'i**

According to [Civil Beat](#) Hawai'i has 1,930,000 acres zoned for agriculture, with 39% of those being used for pasture. This leaves us with roughly 1,170,000 acres of potential agricultural land, minus the 8% (155,000) acres that are currently producing food. In the end, we have about one million acres registered as agricultural land that are lying fallow.

Bob King, co-founder of Pacific Biodiesel, informed the Hemp Task Force that his company has the infrastructure ready to process 3 million gallons of biodiesel per year specifically for Hawai'i. Based on peer-reviewed research, one hectare can produce 207 gallons of biodiesel (or 83 gallons per acre). This means Pacific Biodiesel is equipped to handle seeds from 36,000 acres of hemp, coincidentally the same number of acres of sugarcane once produced on Maui by A&B.

Hemp cultivation on 36,000 acres would yield approximately 144,000 tons of hemp straw annually. This straw could be digested in anaerobic digesters across the islands, producing biogas which can then be upgraded to Renewable Natural Gas (RNG), with captured CO<sub>2</sub> as a byproduct for commercial use. Europe, particularly the Netherlands, is ahead in biogas technology, with 250 digesters generating 219 MW of electricity and having upgrade capacities for both RNG and vehicle fuel.

Hawaiian startup Agripelago is working on adapting this well-established technology for local use, aiming to foster Hawai'i's independence from fossil fuels with facilities on each island.

Post biodiesel production, if the 144,000 tons of hemp straw were processed at plants on each island (6 plants with a 3-ton-per-hour capacity), Hawai'i could produce around 58,000 tons each of hurd and fiber. These materials could be used for hempcrete, hemp blocks, hempwood, insulation, fiber boards, and more.

Taking contractor Joe Smith's numbers for a 1,500 sq ft house with hempcrete walls (12,500 pounds) into account, and adding estimates for other hemp-based construction products, a house might use approximately 14.5 tons of hemp hurd and fiber. This would mean that 36,000 acres of hemp could produce 3 million gallons of biodiesel and roughly 8000 new homes from locally grown and manufactured products. Plus, this initiative could earn carbon credits and set<sup>91</sup>

an example for eco-tourism.

But wait, there's more! With Hawai'i's year-round growing season, hemp could be one of three annual crops in rotation with corn and soybeans, supporting the production of broilers, laying hens, and fish — all of which have efficient feed-to-meat conversion ratios. If hemp farmers were subsidized to grow 36,000 acres each of corn and soybeans annually, this would yield over 600,000,000 pounds of feed per year. This feed could support the production of 50 million broilers annually, meeting and exceeding Hawai'i's consumption of 30 million chickens. The excess feed could support egg production to meet local demands.

Additionally, chicken manure from this operation could enrich Hawai'i's soil, which is currently deprived of nitrogen-rich compost. This compost is essential for regenerative agriculture and productive soil for shade houses, where vegetables can be grown year-round, similar to practices in Spain and Mexico.

Hemp hurd rejects could serve as poultry bedding to absorb manure, which can then be used to produce high-quality compost and Black Soldier Fly larvae, enhancing chicken feed and compost quality. This process is already being employed by Tyson Foods with their Dutch partner ProTix.

In summary, using hemp could serve as the cornerstone for revitalizing Hawai'i's agricultural land, aiming for greater food security and reduced dependency on imports. Addressing food security should become a top priority for the state legislature, focusing on sustainable farming practices over tourism. This strategy involves identifying potential agricultural lands, educating the public, and providing subsidies for local crop production to encourage farmers.

Let's ensure food security and sustainability remain at the forefront for Hawai'i's future

## K. Task Force Feedback & Findings By Sector

The first Hawai'i Hemp Task Force Meeting was May 17th, roughly 2 ½ months into our 4-month consulting assignment. After the task force members were finalized, we realized that the majority of the members were cannabinoid farmers. We were tasked with looking into the infrastructure needs of Hawai'i hemp farmers and the hemp industry with a focus on 5 sectors: Building, Fuel, General Fiber, Grain/Food, and Cannabinoids. The majority of the feedback we received when speaking to and emailing with the task force members pertained to the Cannabinoid Sector with a huge emphasis on rules and regulations. We listened to them and took note of their concerns but realized that it was taking the focus away from the larger picture of a hemp industry that could be scalable and have broader reaching effects for Hawai'i's economy.

Unfortunately, we are not able to make many recommendations pertaining to most of these concerns as there were so many differing opinions and feedback and a lack of data to back up some of it. We wanted to acknowledge the importance of the cannabinoid farmers and businesses and that is why we recommend a Hemp-Derived Cannabinoid Task Force in order to thoroughly address many of their concerns below. Due to the fact that the existing hemp industry in Hawai'i is the Cannabinoid Sector, as the Industrial Hemp industry is still in its nascent stages, we have listed as much feedback as possible below from the Cannabinoid Sector so that their voices can be heard and so that they can be documented in this report. We also give a snapshot of the other hemp sectors and who is already creating businesses in those sectors as they are the ones who need the most support now in order to grow the hemp industry in Hawai'i. We highlighted some of the top-level feedback in each sector below while adding additional feedback to the Cannabinoid Sector.

### **Building Sector:**

- The second hempcrete home on Maui, located in Kula, was completed this spring by Hemp Home Hawai'i. The [Maui News](#) recently came out with a cover article about hempcrete and the benefits of building with it which was then picked up by [Hemp Build Mag](#). Ohana Hui Ventures, LLC has just planted its first industrial hemp seeds with the hopes of growing hemp for building materials, Dr. Li from UH Manoa along with PIHA (Pacific Industrial Hemp Alliance) is looking to conduct hemp seed research for fiber and construction materials at the Waimanalo Research Station Hemp, and Hemp Solutions Kauai is looking to grow 1000 acres of industrial hemp on Kauai to make hemp bricks to build homes. The Hemp Building Sector is the most important of the 5 hemp sectors in <sup>93</sup>

this report. There is a housing crisis across the state and the most recent wildfires on Maui have only added to that crisis. Hempcrete is still very new in Hawai'i, but housing is already a high demand product in the state and hempcrete is one of the easiest hemp products to make: hemp hurd, water, and lime. Below is some of the feedback from the task force on the Building Sector. There is some uncertainty surrounding building with hempcrete in Hawai'i. While several homes have now been built with hempcrete, investors want to make sure that if they invest in the hemp building industry in Hawai'i that homes can be built easily utilizing hemp and they will not run into roadblocks.

- Hempcrete was added to the [2024 International Residential Code \(IRC\)](#) but has not yet been adopted by the State of Hawai'i. Once it is, it should be fairly easy to include hempcrete in county building codes. This would help to give stability to the burgeoning hempcrete industry in Hawai'i and allow investment in infrastructure to support it. Having it in the county code should relieve any doubt from those looking to invest in hempcrete infrastructure in Hawai'i.
- There is potentially 1000 acres of state land on Kauai that could grow industrial hemp for hempcrete with the potential to scale up to more acreage. Hemp Solutions Kauai is currently talking to outside investors about opening a processing plant to make hemp bricks but says that since there is still some uncertainty around building with hempcrete as noted above, investors are leary of taking the risk.
- Investors want to see that industrial hemp is being grown so that they feel more secure to build a processing plant here. Investors want to be sure that the hemp can be moved from the farm to the processor and that the bricks can be moved from the warehouse to a build site or retail partner without worry.
- Hemp Home Hawai'i who just completed a hempcrete home in Kula this spring and had to import the hemp hurd from the mainland. Ideally, they would like to use locally grown hemp in their builds. They have clients that want to build with hempcrete, but there is no locally grown hemp currently for them to use.
- Hemp Solutions Kauai is looking for a \$200K grant to get 2 model hempcrete homes built on Dept of Hawaiian Homelands property on Kauai. They would partner with a local trade school. They have a build team on site. They would be used as classrooms for education about hemp and as model/spec homes for politicians, community members and other investors, so they can see what a hempcrete home looks like in person and experience what it is like to live in a home built with hempcrete. The Planning Department can do tests to confirm there are no liabilities with building with hempcrete. It is a great way to show proof of concept.

- We need to be able to build quickly. Prefab hemp panels, hemp bricks, and hemp spray are options to build more quickly and to store resources so that for example when Lahaina is ready to rebuild, there will be plenty of building materials ready to go and because you can grow up to 3 hemp crops per year, there should always be hemp building materials available on the islands.

### **Fuel Sector:**

The biofuel sector already exists in Hawai'i. Pacific Biodiesel was the first biofuel company in the nation and has been around for almost 30 years. They have the capability now to process hemp seeds for culinary oils and are very interested in being able to process hemp for biofuel. They have access to approximately 1000+ acres of land on Kauai to grow seed crops and would need to rotate different crops, so hemp would be a natural fit in their rotation of crops. Oahu based Agripelago has invested a lot of money in R&D on developing biogas projects: specifically Renewable Natural Gas (RNG) with Renewable Natural Gas with Carbon Capture Utilization and Storage (CCUS). Both of these company's need support from the government in order for them to utilize hemp for fuel. By supporting companies like Pacific Biodiesel and Agripelago it will help move Hawai'i toward their goal of 100% clean energy by 2045. Below is some of the feedback from the task force on the Fuel Sector.

- Agripelago wants the State of Hawai'i to apply Federal law.
- Grant Overton, Founder of Agripelago said that Kamehameha schools is unable to license industrial hemp to lease because of the uncertainty.
- Some of the large landowners don't want to take the risk.
- For banking you have to sign something saying you aren't dealing with cannabis. Locally they are not familiar with the federal standards surrounding hemp.
- Moving goal posts-year over year, new regulations proposed. Rules are not given time to be implemented. That uncertainty diminishes their ability to raise money and is killing investment potential.
- Per Grant at Agripelago, equipment is needed, ideally a dual-use hemp crop would be harvested with what is known as a [dual-header hemp harvester or double-cut hemp combine](#). It harvests the entire crop in one pass, so this captures all fractions of the crop while dividing out the seed.

- Per Grant at Agripelago, the issue is that the State of Hawai'i wanted to create a definition of industrial hemp that was not inclusive of green leaves or foliage material. This would have a negative impact for two reasons: 1) it would reduce their useable biomass yield by around 40-50% (so they would be throwing out 40-50% of the biofuel yield) and 2) it would be economically unfeasible to separate the leaf material when using this type of dual-header harvester.
- Grant's top recommendation for the State of Hawai'i is to align Hawai'i's hemp regulations with US Federal law as described extensively under the Farm Bill and as regulated by the USDA.

### **Fiber Sector:**

- There currently is not an existing hemp fiber industry in Hawai'i. Infrastructure is needed as well as land to grow industrial hemp. Hemp Alta has expressed interest in potentially opening an industrial hemp processing plant on Maui which could help kickstart the industry and entice large landowners to add industrial hemp to their crop rotations. Below is some of the feedback from the task force on the Fiber Sector. Have equipment libraries on each island where farmers can check out equipment to farm hemp including a mobile decorticator. The non-profit Friends of Waimanalo already offers something like this. Just need to make sure that the equipment is sanitized before it heads to a farm so as not to cross contaminate or bring invasive species or pests to the farmers land. They already have the capability to sanitize the farm equipment and could be a good model for other islands..
- Per Scotty Wong at Ohana Hui Ventures, LLC, the USDA was doing a hemp call every Wed, they would bring in different experts and talk about hemp regulations at the Federal level. He would like to do something similar at the state level-so that everyone knows what the rules and regulations are and they can have an open dialogue with the government agencies.
- Offer grants for farmers. Make them strictly for Hawai'i hemp farmers to kickstart the industry. It enables the farmers to figure out what equipment is needed and where to get it from.
- Per Scotty Wong, the biggest thing for fiber/hurd is that they need equipment with the proper attachments. Harvesting equipment, seed dryers, decorticators...
- Education is key. Ohana Nui Ventures, LLC is already doing education on their farm.
- Zoning requirements may need to be relaxed in order to build additional farm structures on hemp farms.



- Seed research is vitally important as we need to develop seed varieties that grow well in different climates across Hawai'i. Jari Sugano, the Oahu County Administrator for CTAHR's off campus facilities, is working with Dr. Li from UH Manoa, on the USDA application to conduct hemp research at the Waimanalo Research Station. They will need a processing area and lab to collect data. The State of Hawai'i needs to support hemp seed research in order for farmers to grow profitable hemp crops.

### **Seed/Grain Sector:**

Like the Fiber Sector, there isn't really a seed/grain hemp industry in Hawai'i, but there is a lot of potential for food products like hemp seed hearts, hemp oil, hemp mylk, hemp protein and animal feed. Investment is needed to support this industry as there are many value-added food products that can be made from hemp seed giving rise to more Hawaiian owned hemp food related businesses. Below is some of the feedback from the task force on the Seed/Grain Sector.

- Per Grant at Agripelago, seed has the potential for high value, often +50% of the value chain derivable from a dual use hemp crop. However, much of the potential is from value-added food products, such as hemp milks, flour, and protein products. This requires market development to be realized to attain revenues beyond commodity seed pricing. With commodity seed pricing, there is still significant value, but larger scale production would be needed to compete with other North American producers.

### **Cannabinoids Sector:**

The majority of the members on the task force are cannabinoid farmers, some of which are USDA licensed, some of which have not renewed their licenses and some of which have chosen not to renew their licenses due to the ongoing instability in regulations. Only 3 of the task force members are also DOH licensed to process hemp (there are 4 total DOH processing licenses currently in the state). This has led to a majority of the feedback coming from this sector, a lot of which had to do with rules and regulations. We were tasked to focus on infrastructure for this report, but because there were so many concerns in the Cannabinoid Sector, we felt we needed to list these in the report with the recommendation that a Hemp- Derived Cannabinoid Task Force be formed in order to address all of these issues. Below is some of the feedback from the task force on the Cannabinoid Sector.

- The Hawai'i legislature finds that although the Hawai'i hemp cannabinoid and cannabidiol market is estimated to be \$32,000,000 to \$54,000,000 annually, most of that money flows to out-of-state hemp farmers and businesses due, in part, to consumers in Hawai'i not being able to differentiate between products that are made with Hawai'i-grown hemp and Hawai'i-branded products made with imported hemp because the labeling does not provide where the hemp originated from.<sup>23</sup>
- As of April 2024 there are 58 active USDA licensed hemp farmers in Hawai'i and only 4 of those have the DOH hemp processing license. Based on that math, it would appear that some hemp businesses are processing their hemp illegally and that a majority of the cannabinoid sales in Hawai'i are from imported manufactured hemp products. While a significant amount of cannabinoid products are being imported to Hawai'i, there are some small farms that are growing and processing hemp. The 2024 USDA National Hemp Report states that the acreage is so small that they do not even have an accurate number of acres that are being grown in the state, which may also be due to a lack of reporting on the part of the hemp farmers or it may be that there really isn't much hemp being grown in the state. The current cannabinoid hemp industry is primarily made up of small scale boutique farmers.<sup>24</sup>
- Something that regularly comes up from the task force and has been reinforced by the proposed SB 651, is that although existing State law prohibits the sale of cannabinoid, or CBD -infused foods, such as chocolates or gummies, these products are sold on all islands at multiple venues, including gas stations, airport kiosks, and grocery stores. Although food products account for the most cannabinoid-infused product sales across the country, Hawai'i farmers and manufacturers are prohibited from selling these products, losing significant sales to mainland farmers and manufacturers. Per one task force member, "the two segments: cannabinoid extraction (and synthesis) and industrial hemp should have their own regulations. Hemp CBD should be regulated and synthesized cannabinoids should be banned. Hawai'i cannot compete with the synthesized cannabinoid market and we will always suffer. Local hemp farmers and producers should be allowed greater freedom instead of less freedom to operate."
- There has also been feedback regarding the lack of enforcement for those players who are non-compliant, as stated above regarding edibles being sold in gas stations and the like. They feel that they are able to sell these products illegally with no enforcement

---

<sup>23</sup> HISB 651 2024:

<https://legiscan.cHawaii'text/SB651/id/2893827#:~:text=The%20legislature%20finds%20that%20although%20the%20Hawaii%20hemp%20cannabinoid%20and,products%20that%20are%20made%20with>

<sup>24</sup> USDA National Hemp Report 2024: <https://downloads.usda.library.cornell.edu/usda-esmis/files/gf06h2430/3t947c84r/mg74s940n/hempan24.pdf>

which is affecting the local companies who are trying to be compliant with the rules and regulations surrounding manufactured hemp products.

- Many of the task force members feel that the manufactured hemp industry is over regulated. They claim that Hawai'i is one of the most regulated states in the nation, although we have not been able to get any data to back that up from any of the task force members.
- Currently in Hawai'i DOH-OMCCR is responsible for issuing hemp processor permits and regulating those permittees to ensure compliance with applicable rules. They say they can only regulate those processors that come forward and obtain a permit. DOH has no mechanism for knowing who is operating without a permit. There are currently only 4 active DOH processor licenses in Hawai'i and 58 active USDA Hemp producer licenses which highlights the fact that some farmers are most likely processing their hemp illegally.
- There are several hemp task force members from the cannabinoid sector that do not want manufactured hemp to be regulated by the same entity that regulates cannabis. Gail Byrne Baber said that economist Beau Whitney did a study that showed that in Oregon when they combined cannabinoid hemp and cannabis under the same regulatory entity it ended up having negative effects on the hemp farmers like making it so that hemp farmers were not able to access banking and were losing their insurance. We have asked for that study from Beau Whitney, but he did not send any.
- One of the biggest concerns we have heard from local cannabinoid farmers and sellers is the competition from imported products and the lack of oversight on illegal products being sold in Hawai'i. There also is a lot of uncertainty in the cannabinoid sector when it comes to rules and regulations. The goal posts keep moving every legislative session making it very hard for local hemp farmers and businesses to keep up. Some task force members do not want hemp regulated by the same entity that regulates cannabis as was proposed in HI SB 3335 that eventually died in the House.<sup>25</sup>
- There are only 4 DOH licensed cannabinoid processors in the state. Many farmers on the task force do not have access to processing equipment. Some have asked for a shared processing facility while others want to process on their farms to save money. Kauai Hemp Co was set up as a vertically integrated grower/processor on Kauai who also offers toll processing, white label, and formulation/cultivation consulting, yet not many farmers have been utilizing these services. Some of the reasons that farmers have not been utilizing their processing services have been due to inter island bulk hemp transport costs and regulations.

---

<sup>25</sup> HI SB3335: <https://legiscan.com/HI/bill/SB3335/2024>

- Recommended: test before harvest and then final product not in between as it is too costly and THC could go above .3% but it would need to be below that for the final product anyway, so why test in between as this is affecting business.
- One task force member recommended creating a “Certified 100% Hawaiian Grown Hemp” seal that can be applied for based on proof that the hemp was grown in Hawai‘i. This can apply to all other hemp products made with Hawaiian grown hemp, not just cannabinoid products. There could be a database that lists all of these brands and the seal will enable them to charge a premium for their products. Robert Bence would like the HDOA to get rid of the movement reports and buffer zones and the HDOH to eliminate the fee to get the DOH license.
- Some of the farmers would like hubs on each island where they can have access to farm equipment. Like an equipment library. Brittany Neal noted that if there is shared equipment, they need to make sure that there are no pests or invasive seed matter on the equipment before going to a new farm. Scotty Wong from Ohana Hui Ventures, LLC said that they already do equipment rentals and are able to sanitize the equipment before it goes to a new farm, so it could be replicated on all islands that have an equipment hub.
- The farmers would like to have a shared processing facility for cannabinoids where they can process their flower to make their products.
- Many task force members have said Hawai‘i has made it very difficult to do CBD hemp business in the state.
- Many task force members have said that the testing requirements are unrealistic and expensive.
- Bill 1359 passed in July 2023 but they still don’t have the rules.<sup>26</sup> They want clarity on everything so everything is clear. They feel like hemp is the lowest priority to cannabis and agriculture. There were other cannabis things that passed and they got all the rules and the hemp industry is still waiting. They would love a better roadmap or direction.
- Grants are needed for local farmers. They would love to get some grants for infrastructure. Compliance grants to help uplift some of the smaller businesses. More grants towards STEM and Ag jobs-Shared workspaces-like making CBD soap-shared kitchen.
- Labor costs are high and it’s a small pool for labor, they would like help with bringing labor costs down

---

<sup>26</sup> HI HB1359: <https://legiscan.com/HI/bill/HB1359/2023>

- They wouldn't be opposed to regulation if it was followed up with enforcement. They say you can't make gummies, pre-rolls but lots of people sell them illegally.
- Labeling rule passed but HDOH hasn't set the rules and who is going to enforce it?
- They have had a lot of difficulty with competition. The state prohibits them from producing consumables-gummies-which is 40% of CBD market right now.
- It is difficult to compete at a price point with out-of-state brands, especially some bad players-using marketing tactics using Hawaiian names when they aren't actually made or grown in Hawai'i.
- There is a lack of willingness to engage in conversation from the HDOH-they are hiding their legislation till the last minute. They do not respond to their requests for information, the only time they see each other is at the hearings-but it should be beforehand.
- They want to bring stakeholders together. They suggest one call per month with HDOH and one with HDOA so everyone can discuss concerns, get educated. They need to learn from them-but the HDOH/HDOA need to learn from the farmers as well. Needs to be a two way flow of conversation-very open forum.
- They would like to bring back a hemp conference to Hawai'i to help educate the community and to bring stakeholders together
- Kyle Leong would like to legalize smokable hemp products in Hawai'i. It is a higher profit due to less processing needed. Jared Dalgamouni President of Hawaiian Choice, says that Hawai'i desperately needs a facility to remediate the extracts to broad spectrum that will allow the final product to remain cGMP certified. But with the constantly changing laws and rules, no one will invest into such a facility. remediation facility with cGMP that makes Hawaiian extracts cost effective and also cGMP certified. Distillation and isolation is needed also.
- From Brittany Neal: Local law enforcement uses a Narcotics Identification Kit ("NIK") field test to detect the presence of THC in a substance they believe may be marijuana. With the use of a NIK field test, hemp would be considered marijuana by local law enforcement. The determination that a substance in someone's possession contains any amount of THC, triggers the ability of law enforcement to seize and forfeit property without any due process for the individual in possession. The test does not quantify the amount of THC that is present. The NIK field test is not sufficient for differentiating between hemp and illicit marijuana.

- Many task force members would like to see a legislative pause for a few years where the legislation that has already been passed is allowed to play out to see what works and what doesn't, before things are changed again or not allowed to happen because of the possibility of changes occurring through new legislation like what happened with the delayed convening of this task force.

### **The Department of Health**

One thing the HDOH (Hawaii Department of Health) has said is that they have noticed many of the USDA licensed farmers in the state do not have the proper HDOH license to process the hemp they grow. As stated above, there are only 4 active HDOH licenses presently in the state of Hawai'i, yet there are 59 USDA licenses to grow hemp; of those, it is very hard to surmise how much hemp the farmers are actually growing as there is limited data available.

The HDOH have also stated that **it is very important the applicant understand the definitions in 328G**. Specifically, what is meant by “processing”, “hemp biomass” and “manufactured hemp product” as these terms work together to determine if someone needs a HDOH permit or not. For example, “**processing**”, *for purposes of chapter 328G, HRS*, specifically means making a transformative change to “hemp biomass” to make crude extract or a “manufactured hemp product”. Processing also includes anyone producing a manufactured hemp product from crude extract or using a manufactured hemp product as an ingredient to make another manufactured hemp product. So, there is a lot of specificity captured in the term “processing” that further requires a clear understanding of what is meant, in 328G, by “hemp biomass” and “manufactured hemp product”.

“Hemp biomass” is defined in 328G as the leaf and floral parts of the plant, as these have been identified as the primary parts of the plant used by industry to extract for cannabinoids, terpenes, etc. This differs *significantly and meaningfully* from the definition of “hemp biomass” in hemp cultivation law – section 141-42(h) – which defines “hemp biomass” as applying only to the stalks of hemp plants. So, a hemp farmer needs to have clear awareness on what is meant by “hemp biomass” depending on which law they are trying to comply with. Finally, the

applicant must have a clear understanding of what is meant by “**manufactured hemp product**”, in 328G, which means any product created by “processing” that is **either consumed orally in tablet, capsule, powder, softgel, or liquid form (e.g. hemp oil) OR is in a form for topical application to skin or hair.**

The law clearly states in 328G-2(i) that “It is the responsibility of the hemp processor to make sure it has a valid permit and is legally allowed to process hemp biomass or prepare a manufactured hemp product and in compliance with any and all laws and regulations.”

### **Some of the Key Players Who are Paving the Way for a Hemp Industry in Hawai'i.**

Based on our research and interviews, some on the task force and some not, we have found that there are several groups on our islands that are already diving head first into Industrial Hemp and Cannabinoid Hemp. We want to highlight them below as they are the visionaries for our state and are leading the way and they need support.

#### **Building:**

[Hemp Solutions Kauai](#)-located on Kauai. They are looking to partner with Ohana Nui Ventures, Inc. to farm approx 1000 acres of industrial hemp to make hempcrete bricks. They are looking to build a processing facility to process the hemp and make the hempcrete bricks.

They are also looking to build two hempcrete homes on Hawaiian Homelands land to help educate policy makers, investors and the community about the benefits of building with hemp. They are currently doing R&D on hemp batteries which could potentially replace the current batteries being used.

[Hemp Home Hawai'i](#)-located on Maui. They have built 2 tiny homes out of hemp and just completed a 1000 sq ft hempcrete house in Kula. They already have prospective clients that want to build hempcrete homes, but will need to import hemp hurd from the mainland until hemp is grown here to support their business.

#### **Fuel:**

[Agripelago](#)-located on Oahu, has invested the last 6 years of their time researching hemp for seed and fuel, but has run up against volatility in the rules which makes it hard for investors to commit. Supporting a company like this who has invested a lot of money and time is crucial for the industrial hemp industry to grow.

[Pacific Biodiesel](#)-based on Maui with operations on Big Island and Kauai, have the infrastructure on Kauai, in place to process hemp for fuel and oil. They recently planted [100 acres of sunflowers](#) on Kauai. Pacific BioDiesel is prepared to press food grade hemp seed into the raw materials needed by the Hawaiian body care industry. They have the infrastructure in place to press hemp seeds into culinary oils and biodiesel - they are just waiting for the hemp seeds

### **Fiber:**

[Scotty Wong & Scotty Reis-Moniz](#): are business partners in Ohana Nui Ventures, Inc. and also help run [Friends of Waimanalo](#) a 501 (c) 3 organization. They run a 400 acre farm in Wahiawa and are looking to expand into growing industrial hemp as a rotation crop on the farm for fiber. They are leading the way as he is working with Alex Wu and Terry Moran of [Kanda Hemp Seeds](#) on hemp seed strains that will grow best here in Hawai'i. They are also working with Kim Philips of Plan-It Hemp. She is a farmer who grew her own hemp and built the first hempcrete home in Montana and is now living on Oahu to work with them on growing hemp for industrial use. They are also looking to partner with Hemp Solutions Kauai as noted above, to farm approx 1000 acres of industrial hemp on Kauai for hempcrete.

### **Grain Food:**

[Agripelago](#) (see above Fuel section) has been researching utilizing the seeds for hemp protein powder, hemp mylk,...

### **Cannabinoids:**

[Kauai Hemp Company](#), located on Kauai, is the largest cannabinoid grower and manufacturer in Hawai'i. They are vertically integrated, USDA licensed, and one of only four DOH-licensed processors in the state. They produce their own products and also offer white labeling services for other companies. However, due to pending legislation, they are currently unable to produce gummies, which are among the highest-selling cannabinoid products. Additionally, they face challenges with redundant testing requirements for distillate and logistical issues with farmers moving their flower to the processing plant.

Despite these hurdles, Kauai Hemp Company is well-equipped to process flower from other farmers, making them an excellent option while other processors are being established on different islands.



However, to make this feasible, shipping costs between islands would need to be subsidized, and there must be assurances that flower can be transported from farmers to processors without additional barriers.

### **Hemp Processors:**

[Hemp Alta](#): based in Canada, is a hemp processing company that has expressed interest in opening a processing plant on Maui. They use the HempTrain™ Advanced Processing System developed, designed, engineered and manufactured by Canadian Greenfield Technologies Corp. The HempTrain™ system enables the processing of hemp straw bales into three streams: long, strong, intact bast fiber, clean size-specified hurd and nutrient-rich green microfiber – at the rate of around 2,000 pounds an hour. This would enable the state to process hemp and help to scale the industrial hemp industry in Hawai'i.

### **Research:**

PIHA (Pacific Industrial hemp Alliance) is working with the University of Hawai'i on seed genetics that will help local farmers utilize the best seeds for their climate. They should be given the full support they need to do research on the best seed varieties that will work in Hawai'i. This is a key component of a successful industrial hemp industry in the state.

### **Farmer Support:**

[Hawai'i Hemp Farmers Association \(HHFA\)](#), is a 501(c)(3) Nonprofit organization founded to further the multi-faceted hemp industry in Hawai'i and advocate for the needs of the industry, especially farmers. HHFA shares knowledge regarding farming, processing, best practices amongst membership and with community and politicians. They have built relationships with national and international relationships experts to help inform the best direction for Hawai'i industry.

### **Education/Outreach:**

Ohana Nui Ventures, Inc./Friends of Waimanalo mentioned above in the Fiber section, also provide outreach and educational opportunities. They have a bunch of different hemp samples on the farm like hemp plastic utensils, hemp rope, hempcrete, hemp wood... Anyone who stops by can learn more about hemp and see a lot of the different possibilities of products that can be made with it. Students have stopped by to learn how to make hemp paper, politicians have stopped by to learn more about hemp.

Friends Of Waimanalo already has a Build and Trades program that could potentially support hemp education-especially building with hemp. Their educational efforts should be supported as education along with proper seed varieties for our climate, are very important to the growth of the industrial hemp industry in Hawai'i.

[Greg Smith owner of Earth Matters Hemp Hawai'i](#)-located in the Kau district on the Big Island, is interested in utilizing his farm for education and research as well. He has been growing hemp for CBD for many years. The farm is totally off grid with solar and catchment with three large greenhouses on the property. He received a \$75K grant from the state back in 2017 to do hemp seed research, so he would be a valuable educational tool for hemp farmers on the Big Island. He would need support to get this going.

[Kauai Hemp Company](#)-located on Kauai, is looking to build out an educational area on their farm and give tours. We visited their farm in July as they were just starting to put the seedlings in the ground. They grow and process the flower on their farm and do processing for other farmers and can create white label products as well. They have a small shop setup to sell their products. They are looking to expand and create a welcoming space for guests to come and tour the farm to see how the products are made and learn about the benefits of hemp.

[Hemp Solutions Kauai](#)-they are looking to build two hempcrete houses/classrooms that would be utilized for educational purposes and also to help sell hempcrete as a building material. They are looking to work with local tradespeople so they can teach them how to build with hemp.

Hemp education is very important, and the above entities are already doing it or are in the process of expanding into more education. Ideally there would be at least one educational location on each island where the community members, stakeholders, investors, local council members and state officials can come to see and experience all that hemp has to offer. The state needs to support these educational opportunities in order to destigmatize hemp because it is still very closely associated with cannabis and the stigma needs to be removed in order for an hemp industry to be successful in the state.

#### **HDOA (Hawai'i Department of Agriculture)**











Create a manual like [this one](#) on how to grow hemp, best seed varieties,... and basic rules like buffer zones, transportation reports.

## HDOH (Hawaii Department of Health)

Clearly define the rules and regulations so that farmers and business owners can understand, especially since the rules keep changing and can be quite confusing. The below flow chart is a great example of the types of educational content needed to help inform hemp farmers and processors.

July 2024

**HAWAII DEPARTMENT OF HEALTH - HEMP PROCESSOR PERMIT**  
*The following hemp processing operations require a permit and compliance with interim rules 11-37, HAR*

<p><b>A</b></p>  <p>Anyone processing hemp biomass to make a compliant MHP.</p>  	<p><b>B</b></p>  <p>Anyone processing hemp biomass into compliant crude extract.  <i>"Crude extract shall be sold only to a hemp processor with a valid permit issued by the department, or to a person with equivalent authority from a regulatory agency in another jurisdiction." Not allowed for sale to consumer.</i></p> 	<p><b>C</b></p>  <p>Anyone completing the process of producing a compliant MHP from crude extract.  <i>Those that do not want to process hemp biomass can obtain compliant crude extract and complete the manufacturing process into a compliant MHP.</i></p>  	<p><b>D</b></p>  <p>Anyone using a compliant MHP as an ingredient to make another MHP.  <i>Those that do not want to process hemp biomass or start with crude extract can obtain compliant MHP to use as ingredient to make another MHP.</i></p>  
---	---	---	---

**Crude Extract** = initial cannabinoid containing extraction from hemp biomass that is not fit for use or consumption. Further processing required to create cannabinoid containing MHP.  
**Hemp Biomass** = floral and leaf plant material.  
**Manufactured Hemp Product (MHP)** = cannabinoid containing product applied topically to skin or taken orally in a form allowed in rules.

[Permit application, Law – Ch 328G, HRS and \\*Interim Rules – Ch 11-37, HAR](#) \*tentative Aug/Sept 2024. Email: [doh.hemp@doh.hawaii.gov](mailto:doh.hemp@doh.hawaii.gov)

Applicant requirements:

**1. Complete application and return with permit fee and supporting documentation:**

- Valid USDA license to grow hemp or consent to background check establishing proof of no disqualifying felony conviction.
- Indoor facility and planned processing operations (e.g., extraction methods) comply with local zoning, building and fire codes.
- Or, processing operations (e.g., extraction methods) do not include use of heat, volatile compounds or gases under pressure and operations occur in enclosed indoor facility that is:
  - Exempt from building permit and building code requirements pursuant to section 46-88, HRS.
  - Or, occurs in a food hub or agricultural park.

**NOTE:** Applicants sharing a facility, like a food hub or commercial kitchen, with a business permitted by [Food Safety Branch \(FSB\)](#) should consult with permit owner and FSB to ensure hemp processing operations can occur in same shared space.

**2. Indoor processing facility criteria:**

- Facility used to process hemp biomass, as described in pathway "A" or "B" above, must be at least 500 ft. from playgrounds, schools, state parks, state recreation areas, residential neighborhoods, hospitals, or daycare facilities. This requirement does NOT apply to applicants that limit their processing operations to those described in pathway "C" or "D".
- Applicant must provide description how their processing facility will comply with relevant sections of Ch. 11-37, HAR, with respect to facility design and construction (e.g., easily cleanable materials), ventilation control, source water for cleaning and sanitation operations, facility plumbing to carry water to required locations and to convey sewage and liquid waste away from facility, access to plumbed hand wash sinks and toilets with water under pressure, etc.

**NOTE:** Please consult DOH - [Environmental Management Division](#) and [Environmental Health Services Division](#) to ensure your planned hemp processing operations comply with the laws and rules they administer. If your process uses solvents or other hazardous materials, please contact the DOH's Hazardous Waste Program (808-586-4226) for information on waste management regulations.

## **L. Findings & Recommendations**

### **Introduction to Each Section is the Same:**

#### **1. Current Status and Required Support:**

There is currently no existing Industrial Hemp industry in Hawai'i. Pacific Biodiesel is prepared to grow and has the infrastructure to process 1000s of acres of industrial hemp for the purpose of making renewable biodiesel. Agripelago is in start-up mode for developing an anaerobic digester to convert hemp biomass into RNG renewable natural gas. Ohana Nui Ventures has planted 4 acres of seed trials to help move things forward. The University of Hawai'i is preparing for additional cultivation trials. Hemp Homes Hawai'i is importing hemp hurd for the purpose of developing a market for homes built from hempcrete. We are distinguishing between Industrial Hemp and Cannabinoid Hemp and are recommending that a new Cannabinoid Task Force be set up to advance the Cannabinoid industry in the State.

#### **Our recommendations are based on our interpretation of:**

- extensive interviews, task force meetings, emails and in person meetings with the members of the task force
- visits to operating hemp farms
- visits to operating hemp processors in both Canada and The Netherlands
- visits and zoom conversations with hemp processing equipment manufacturers
- internet research
- communicating with manufacturers for quotes
- our background in mechanized agriculture and food security issues

#### **2. The Purpose of this report:**

Is to make recommendations based on the potential we have observed from other parts of the world that are benefiting from a hemp industry. We are attempting to tell the State of Hawai'i that they should support this industry not based on what is currently in Hawai'i but on the potential given the assets we have and our tremendous need for local industry and food security. We recognize that this is a heavy lift but one that is essential for the future of our State. This is an industry that can supply jobs and food while being paid by carbon credits to reduce our imports.

### **3. For more details:**

These findings and recommendations were written in a condensed format to make it easy for the Hemp Task Force to read and vote upon. More details can be found in the full report. The details in the report follow the outline we were given.

## **Findings General Fiber Sector (Straw):**

**1. Current status of the General Fiber sector:** There are currently no general fibers being produced in Hawai'i other than a 4 acre test plot being grown by Ohana Nui Ventures on Friends of Waimanalo land on Oahu. Our recommendations are meant to kick start this industry.

### **2. To develop this industry, State support is necessary for:**

- University of Hawai'i's selection of the best hemp varieties and cultivation practices.
- Subsidies to encourage farmers to grow hemp.
- Development of a primary processing plant.
- Use of hemp for biofuels, including both biodiesel and RNG.
- Development of hemp-based construction materials.

### **3. Primary Processing Plant:**

The key to starting an Industrial Hemp industry is establishing a primary hemp processing plant, known as a "Decorticator." Without a buyer, farmers will not risk growing hemp. Processing hemp straw into hurd and bast fiber is essential for producing construction materials in Hawai'i.

### **4. Processing Equipment Placement:**

The island chosen for the first processing plant must have at least 3000 acres of land with access to water available for lease.

### **5. Infrastructure Assessment:**

To assess infrastructure needs for an Industrial Hemp industry in Hawai'i, we attended Hawai'i Task Force meetings and conducted interviews with:

- Task Force members.
- Local farmers and prospective hemp growers.

- Experts in hemp construction and biofuel production.
- Potential buyers of hemp hurd and bast fiber.
- Hemp entrepreneurs and non-profits conducting hemp research.

## 6. Visits and Research:

Visits and interviews were conducted with:

- [Canadian Greenfield Technologies](#) and [Hemp Alta](#) in Calgary, BC.
- [Dunn Agro](#), a fully integrated company in The Netherlands.
- [Formation Ag](#), a manufacturer of decortication equipment.
- The [Hemp Museum](#) in Amsterdam.
- Various international experts in hemp equipment and product development.
- Andrew Oscar from [United Fiber](#) and internet research.
- [Kauai Hemp Company](#)
- Recently completed Kula, Maui hempcrete home

## 7. Products from Industrial Hemp:

- Industrial Hemp farmers have four primary products to sell: seeds, mature straw (once seeds are removed), green straw (before seed setting), and carbon credits.
- The primary hemp straw processor can sell fiber, microfiber, hurd, and micro hurd. The proportions of these products depend on the hemp variety and harvest age.

## 8. Local Initiatives:

- [Ohana Hui Ventures, Inc.](#) (OHV), in partnership with the non-profit [Friends of Waimanalo](#) (FOW), has a 430-acre farm in Wahiawa on Oahu with 40% of the acreage licensed to grow hemp.
- Initiatives include partnerships for seed genetics, soil remediation, R&D on innovative hemp processors, and extensive education and outreach programs.

## Recommendations General Fiber Sector:

### 1. Processing Plant Development:

- Recommend a public competition for grants, loans, loan guarantees, tax incentives, and expertise to support building and operating a 1.5-ton-per-hour decorticator plant for processing hemp straw into hurd and bast fiber.

- Consider the first plant using the [Hemp Train](#), with the [Formation Ag Fiber Track 660](#) as an alternative.
- Avoid early-stage hammer mill European-style equipment.
- Estimated cost for the initial 1.5-ton/hour processing plant:

<b>Item</b>	<b>Cost</b>
Equipment	\$3,300,000
	0
Shipping	\$40,000
Industrial setup (10,000 sq ft, partially enclosed)	\$2,500,000
	0
Small equipment for factory and office	\$250,000
Indirect and management costs	\$500,000
<b>Total</b>	<b>\$6,590,000</b>

- Consider structuring the grant/loan for state ownership, with a potential transfer to the factory's workforce over time.

## **2. Subsidies for Growing Hemp:**

- State subsidies for selling hemp straw at \$300/ton and seeds at \$0.40/lb for at least five years to encourage hemp and food crops rotation.
- Support for farmers needing equipment purchase assistance.

## **3. Hemp is Grown in a 3 Crop Rotation:**

To increase Hawaiian food security, we recommend that corn and soybeans be subsidized crops as well as a new poultry industry all of which will ultimately support the hemp industry.

## **4. University of Hawai'i Support:**

Grant for specialty equipment for hemp research, including:

- 1st Products No-Till 96-inch Grain Drill with corn plates.
- Roller crimper.
- [Formation Ag FiberTrack 118](#) Micro mobile decorticator.
- Used hay baler, rake, and mower.

## 5. Support for Ohana Hui Ventures and Friends of Waimanalo

Grants for equipment similar to the University of Hawai'i, plus a hempcrete mixer, to continue collaboration with Kanda Hemp on seed variety testing, demonstration plots, hempcrete building, and public education.

## 6. Seed Variety Research:

- State-supported University of Hawai'i and Ohana Hui Venture research on hemp seed varieties tailored to Hawai'i's climate.
- Support for Jari Sugano and Dr. Li's USDA application for hemp research at the Waimanalo Research Station, including a processing area and lab.

## Findings Building Sector:

1. **Status in the Building Sector:** Hemp Home Hawai'i is importing hemp hurd for the purpose of developing a market for hempcrete homes by building demonstration homes on Maui. Ohana Nui Ventures and Friends of Waimanalo have been holding classes and demonstrating to their students that homes can be built with this locally grown material. Kauai Hemp Solutions is a startup looking to develop a hemp block production facility on the island of Kauai as well as a hemp block construction company.

## 2. Uncertainty Surrounding Hempcrete:

Commercial contractor Joseph Smith of [Hemp Home Hawai'i](#), River Young of [Hemp Solutions Kauai](#), and Scotty Wong of Ohana Hui Ventures note uncertainty around hempcrete construction in Hawai'i. Although some hempcrete homes have been built, investors and banks are cautious. Hemp Solutions Kauai is looking to partner with Ohana Hui Ventures to grow 1,000 acres of industrial hemp on Kauai for construction.

## 3. Building Code Integration:

David Sellers, Principal Architect at [Hawai'i Off-Grid Architecture and Engineering](#) highlighted that hempcrete has been added to the 2024 International Residential Code<sup>27</sup> (IRC), but it has not yet been adopted by Hawai'i. State adoption would streamline local code updates, providing stability to the hempcrete industry and encouraging investment. Current emergency housing proclamations also limit actions by the state building code council. Adoption at the state level would facilitate county-level adoption and provide clarity

---

<sup>27</sup> 2024 International Residential Code: <https://codes.iccsafe.org/content/IRC2024P1/appendix-bl-hemp-lime-hempcrete-construction>



and stability for hempcrete investors.

#### **4. State Support for Hemp Products:**

To develop a hemp industry, the State must encourage demand for hemp-based products. The primary large-scale uses of hemp in Hawai'i will be for biofuels and construction materials.

#### **5. Housing Shortage Solution:**

Hemp-based products could significantly replace building materials needed for Hawai'i's housing shortage. Hemp straw processed into construction materials offers zero waste. Given the urgent housing needs, experts advocate for developing hemp-based building products, infrastructure, plans, and demo houses. The development of a statewide industrial hemp industry would significantly benefit Hawai'ian housing needs.

#### **6. Secondary Construction Products:**

It is important to support the early development of building materials made from hurd and bast fiber, such as:

- Pre-made hemp building blocks
- A prefab hempcrete factory
- A hybrid hemp/concrete block factory using existing infrastructure
- Research by companies like [HPM Building Supply](#) into locally made hemp products such as:

- § Hemp fiberboards

- § Hemp insulation

- § Hemp sub-flooring

- § Hemp roofing materials

- § Hemp wall boards

- § Hemp plastics

- § Hemp flooring and trim boards

- § Wood replacement materials

### **Recommendations Building Sector:**

For a thriving hemp industry, primary raw materials must be in demand even before they are produced. This requires state investment in secondary industries to transform primary hemp products into value-added items. We recommend the following steps:

- 1. Convene a Task Force:** Assemble architects, engineers, and builders to:
  - Review and update Hawai'i's building codes for hempcrete structures.
  - Design three sets of [hempcrete house plans](#) and two accessory buildings for pre-permitted state-wide construction.
  - Design one 500 to 1000 sq ft agricultural building using hempcrete and locally grown, borate-treated structural bamboo from [Whispering Winds Bamboo](#) of Maui.
  - Work with Hawaiian company, [Bamboo Living](#) to permit some hybrid ICC permitted structural bamboo with hempcrete panels for shed construction.
  - Develop a system of interchangeable panels for prefab housing using locally produced hempcrete.
  
- 2. Prefab Panel Demo Building:**
  - Issue an RFP for a company to develop a prefab hempcrete building factory in collaboration with the Hemp Task Force and local truss companies.
  - Turn the prefab panel designs into a demo building.
  - Develop a comprehensive plan for a hemp prefab panel factory, detailing the support needed from the State.
  
- 3. Hemp Block Company:**
  - Support a hemp block company on the same island as the hemp processing plant.
  - Issue an RFP to develop interlocking hemp blocks with an internal structural system for rapid construction.
  - Partner with existing technology to construct a demonstration building for state approval.
  
- 4. Hemp Cinder Block Company:**
  - Support an existing concrete block company to license technology for structural hemp/concrete hybrid blocks from the [University of Nebraska](#) and Global Fibers.
  - These blocks, 50% lighter than standard CMUs, would replace some cement and aggregates with hemp.
  - Prepare a company for production through an RFP process as soon as locally produced hemp is ready.
  
- 5. Support Local Construction Material Manufacturers:**

Encourage local manufacturers like HPM Building Supply to develop techniques for producing the following from locally grown hemp:

- Hemp fiberboards
- Hemp insulation
- Hemp sub-flooring
- Hemp roofing materials
- Hemp wall boards
- Hemp plastics
- Hemp flooring and trim boards
- Wood replacement materials

All these products are currently found in the marketplace and existing technology could be licensed by a Hawaiian production facility for local sale.

#### **6. Support Equipment Acquisition:**

Ensure builders have access to hempcrete mixers and hempcrete spray equipment by placing these items with rental companies on each major island, with two on the Big Island.

By implementing these recommendations, Hawai'i can establish a sustainable hemp industry to address housing needs and support an agricultural circular economy.

### **Findings Biofuel Sector:**

1. **Current status of the biofuels sector:** The State of Hawai'i is very fortunate to be the home of Pacific Biodiesel with the processing capacity to process 3 million gallons of biodiesel from hemp as soon as the hemp seeds are harvested. In addition, Archipelago is a start-up working to bring anaerobic digestion technology to the state for the purpose of producing RNG (renewable natural gas) from hemp. Both of these companies deserve State support.
2. Both biodiesel and renewable natural gas (RNG) can be produced from locally grown hemp using distinct processes. Biodiesel, derived from hemp seeds, has been produced for over 100 years and was initially used to power the first [Ford cars](#). This process is commercially viable with existing infrastructure in Hawai'i, primarily due to [Pacific Biodiesel's](#) efforts. Hemp biodiesel production can yield approximately 207 gallons per hectare (83 gallons per acre).
3. RNG, on the other hand, is produced from the straw of the hemp plant through anaerobic digestion of cellulosic biomass. This commercially mature technology is being developed for use in Hawai'i by [Agripelago](#), which aims to leverage industrial hemp for both food

products and biomass biofuel production. Research from the Estonian Environmental Investment Center has demonstrated high yields from hemp biomasses.<sup>28</sup>

4. Agripelago also highlights that anaerobic digestion can utilize green leaves lost during current harvesting techniques. Collecting these leaves, even with THC content below 0.3%, raises suspicions that hinder progress in biofuels and alternative animal protein production. Utilizing the green stalk of hemp to produce biofuels offers a solution for farmers with crops exceeding the 0.3% THC threshold, ensuring they do not enter the consumables market.
5. Pacific Biodiesel currently produces over 6,000,000 gallons of biodiesel annually for the local Hawaiian market. They began nearly 30 years ago by making biodiesel from recycled cooking oil on Maui, later expanding to using grease trap waste and animal renderings. More recently, they have demonstrated Hawai'i's potential for a locally grown circular agricultural economy by growing sunflowers and safflowers, predicting that 80% of revenues generated would stay in the state while reducing dependence on imported fossil fuels. Their efforts with hemp, however, were stymied by political and social stigma and a lack of funding from local banks, forcing founders Bob and Kelly King to create a business entity in their personal names to proceed with experimentation.
6. If these successful leaders in climate change technology and environmental concerns faced such barriers, one can imagine the pressures on Hawaiian cannabinoid hemp growers. This challenge underscores the banking and commercial insurance difficulties experienced and reported by task force members and highlights the need for improved banking and commercial insurance support.
7. With the acceptance of Industrial Hemp in Hawai'i, Pacific Biodiesel's large processing plant on the Big Island is poised to produce hemp seed culinary oils and biodiesel, leveraging existing infrastructure used for processing macadamia nut waste and sunflower and safflower oil seeds. This facility, employing over 100 people, is a critical asset for the future of hemp cultivation on the islands.

---

<sup>28</sup> An Agro-economic Analysis of Briquette Production From Fibre Hemp and Energy Sunflower: <https://www.sciencedirect.com/science/article/abs/pii/S0926669013004834>

## Recommendations Biofuel Sector:

### 1. Support Business Integration

The State should mitigate the business and banking stigma associated with hemp processing to support biodiesel and RNG production.

### 2. Financial Incentives

The State should foster RNG and biodiesel production through grants, loans, tax incentives, and other financial mechanisms.

### 3. Subsidies

The State should subsidize hemp seed production at \$0.40 per pound of seed and hemp straw at \$300 per ton produced to stimulate production.

### 4. Farmers needing support for upfront equipment purchases should have the option to take an advance on their subsidies.

By addressing these areas, Hawai'i can unlock the full potential of its hemp biofuels industry, contributing to economic growth, environmental sustainability, and energy independence.

## Findings Grain/Food Sector:

Hemp is increasingly recognized as a valuable food source, offering a range of nutritional and economic benefits.<sup>29</sup> This document outlines the key reasons why hemp is an excellent addition to our food systems, particularly highlighting its high protein content, health benefits, and potential as a value-added food product.

### 1. Current status of the Grain/Food sector: Hawai'i excels at health food consumption and cottage industries. Currently there are no hemp seeds being grown in Hawai'i but once organic seeds can be produced, the 'Made in Hawai'i' food and beauty products markets will be prepared to capitalize on this new resource.

### 2. Nutritional Benefits of Hemp

- **High Protein Content** Hemp seeds are an exceptional source of protein. Unlike many other plant-based proteins, hemp protein contains all nine essential amino

---

<sup>29</sup> Medical News Today: <https://www.medicalnewstoday.com/articles/323037#nutrition>

acids, making it a complete protein source. This makes it an excellent option for vegetarians, vegans, and those with dietary restrictions that limit traditional protein sources such as meat or dairy.<sup>30</sup> According to Agripelago Industries one acre of cultivated hemp can produce 2000 gals of Hemp Mylk.<sup>31</sup>

- **Omega-3 and Omega-6 Fatty Acids** Hemp seeds are rich in Omega-3 and Omega-6 fatty acids, which are essential for maintaining heart health, reducing inflammation, and supporting overall well-being. These fats are also crucial for brain function and development.

### 3. Health Benefits of Hemp

- **Digestive Health** Hemp seeds are high in fiber, which aids in digestion and helps maintain a healthy digestive tract. This can help prevent common digestive issues such as constipation and bloating.
- **Allergy-Friendly** As the consumption of hemp-based protein increases, it provides a viable alternative for individuals with allergies to milk, wheat, and other common allergens. Hemp protein is hypoallergenic and can be safely consumed by most people with food sensitivities.
- **Skin Health** Hemp oil, derived from hemp seeds, is beneficial for skin health. It is rich in essential fatty acids and vitamins that nourish and hydrate the skin, making it a popular ingredient in body products.

### 4. Economic and Market Potential

- **Value-Added Food Products** Seed has the potential for high value, often +50% of the value chain derivable from a dual use hemp crop.<sup>32</sup> Hemp is most beneficial when utilized in value-added food products. Products such as hemp mylk, hemp flour, and hemp protein powder not only provide nutritional benefits but also offer higher market value compared to raw hemp seeds. These products require market development to fully realize their potential and achieve revenues beyond commodity seed pricing. With commodity seed pricing, there is still significant value, but larger scale production would be needed to compete with other North American producers.
- **Local Food Security** Processing hemp seeds for human consumption can significantly contribute to local food security. By producing hemp-based products

---

<sup>30</sup> <https://jcnabisresearch.biomedcentral.com/articles/10.1186/s42238-022-00156-7>

<sup>31</sup> <https://www.agripelago.com/home/hemp-based-foods>

<sup>32</sup> Grant Overton, CEO of Agripelago

locally, we can reduce reliance on imported foods and strengthen our local food systems.

- **Made in Hawai'i Label** Locally produced hemp products can benefit from the "Made in Hawai'i" label, which is expected to enhance their appeal in the marketplace. This label can help differentiate Hawai'i-grown hemp products from those produced elsewhere, adding value, and boosting local economies.

## **Recommendations Grain/Food Sector:**

### **Eliminate Regulatory Barriers**

The state should eliminate any unnecessary laws limiting the use of hemp seeds for human or animal consumption. <sup>33</sup>This will facilitate the development and commercialization of hemp-based food products.

- 1. Support for Product Development** The state should support requests for proposals (RFPs) from companies interested in developing and marketing hemp seed products. This can help stimulate innovation and growth in the hemp food industry.
- 2. Dual-Use Potential** Hemp seeds have the potential for high value, especially when used for both food and biofuel production. The waste products from biofuel production can be repurposed as animal feed once legal restrictions are lifted.

By leveraging the nutritional benefits and market potential of hemp, we can create a sustainable and profitable food source that supports both human and animal health while boosting local economies.

## **Findings Cannabinoid Sector:**

- 1. Current Status of the Cannabinoid Sector:** There were a total of 101 active USDA licensed hemp farmers in 2020. In 2024 there are now only 58 active USDA licensed hemp farmers, 39 expired, and 4 surrendered (see attached addendum). In 4 years the number of Cannabinoid Hemp farmers has fallen by almost half. Only 4 of those USDA licensed hemp farmers have the HDOH hemp processing license. Of those 4 HDOH licenses, 3 are on the Hemp Task Force. Based on that math, it would appear that some hemp businesses are processing their hemp illegally and that a majority of the cannabinoid sales

---

<sup>33</sup> University of Oregon White Paper: Identification of Research Priorities For the use of hemp By Products as Feed Ingredients for Livestock and Animals:  
[https://agsci.oregonstate.edu/sites/agscid7/files/hemp/2023-hemp\\_feed\\_workshop\\_white\\_paper.pdf](https://agsci.oregonstate.edu/sites/agscid7/files/hemp/2023-hemp_feed_workshop_white_paper.pdf) 119

in Hawai'i are from imported manufactured hemp products. While a significant amount of cannabinoid products are being imported to Hawai'i, there are some small farms that are growing and processing hemp. The 2024 USDA National Hemp Report states that the acreage is so small that they do not even have an accurate number of acres that are being grown in the state, which may also be due to a lack of reporting on the part of the hemp farmers or it may be that there really isn't much hemp being grown in the state.<sup>34</sup> In 2021 the USDA Farm report said there were 17 acres of hemp grown, but there is no data from 2022 onward, so it is very hard to get any idea of the size of the local cannabinoid market.

Based on interviews and surveys with the Task Force, most of them are not farming yet or have chosen to pause farming due to the uncertainty in rules and regulations surrounding the Cannabinoid Hemp Industry. The current local Cannabinoid Hemp industry is primarily made up of small-scale boutique farmers and there is a lack of data to truly understand the current local Cannabinoid Hemp industry.

2. Hemp grown for cannabinoids is a high value crop for local farmers in Hawai'i. Most of the farmers that grow hemp for flower also grow other crops which contributes to food security in Hawai'i. They also utilize the hemp to remediate their soil, as a companion crop or as a rotation crop. It is hard to make money in farming in Hawai'i due to higher labor costs, lack of access to water, variable weather conditions like fire, high winds, excess rain or lack of rain, and competition from out of state imports that are cheaper in the marketplace. The farmers want to be able to focus on farming and not have to constantly fight battles on new rules and regulations surrounding the cannabinoid industry. Being able to grow and sell a high value crop can enable them to keep farming, make money and support food security in Hawai'i.
3. One of the biggest concerns we have heard from local cannabinoid farmers and sellers is the competition from imported products and the lack of oversight on illegal products being sold in Hawai'i. Companies from the mainland and overseas are selling illegal hemp-derived cannabinoid products in Hawai'i with virtually no oversight. They are selling gummies and other edibles; hemp flower and hemp pre-rolls yet local farmers are not able to make or sell these products. Online retailers are also able to ship CBD products that are not legal in Hawai'i, like gummies to Hawai'i but local businesses that want to be compliant cannot legally make or sell them in Hawai'i. There are also CBD companies with Hawaiian

---

<sup>34</sup> USDA National Hemp Report 2024: <https://downloads.usda.library.cornell.edu/usda-esmis/files/gf06h2430/3t947c84r/mg74s940n/hempan24.pdf>



names using misleading marketing tactics to make it seem as if these products were grown and made in Hawai'i when they were imported from the mainland. Hopefully the new labeling requirements will fix this, but if there is no oversight over illegal products being sold here currently, then who will be overseeing the new labeling requirements to make sure brands are complying with them?

4. According to many of the Task Force members, there is also a lot of uncertainty in the cannabinoid sector in Hawai'i when it comes to rules and regulations. According to many of the Task Force members, the goal posts keep moving every legislative session making it very hard for local hemp farmers and businesses to keep up. They are still waiting on clarification from the HDOH on some of those rules from Act 1359<sup>35</sup> that was passed in May 2023. Also, over regulation of production and processing has driven hemp farmers out of business.<sup>36</sup> There were a total of 101 active USDA licenses in 2020. In 2024 there are now only 58 active USDA licensed hemp farmers, 39 expired, and 4 surrendered (see attached addendum). This highlights the fact that there have been barriers put into place for local hemp farmers, yet the cannabinoid industry is flourishing in the state due to the influx of out of state and international cannabinoid products being imported to Hawai'i at a detriment to the local farmers.
5. Many of the task force members do not want hemp regulated by the same entity that regulates cannabis as was proposed in HI SB 3335 that eventually died in the House.<sup>37</sup> A task force member stated that when hemp and cannabis were combined in Oregon, some of the hemp farmers lost their insurance and access to banking. They said that hemp economist Beau Whitney did a study on the effects of the comingling of hemp and cannabis in Oregon, but he would not share that data with us to confirm this when asked.
6. There are only 4 HDOH licensed cannabinoid processors in the state as of this writing. Yet there are 58 active USDA licensed hemp farmers in the state. We have been unable to gather information on where all of these farmers are processing their hemp. Many farmers on the Task Force do not have access to processing equipment. Some have asked for a shared processing facility while others want to process on their farms to save money from outsourcing.

---

<sup>35</sup> HI HB1359: <https://legiscan.com/HI/bill/HB1359/2023>

<sup>36</sup> Civil Beat-Hemp Farmers Are Fed Up With Government Regulations Hampering the Industries Potential: <https://www.civilbeat.org/2022/05/hemp-farmers-are-fed-up-with-government-regulations-hampering-the-industrys-potential/>

<sup>37</sup> Hawai'i SB3335: <https://legiscan.com/HI/bill/SB3335/2024>

7. Kauai Hemp Company was set up as a vertically integrated grower/processor on Kauai who also offers [toll processing, white label, and formulation/cultivation consulting](#), yet not many farmers have been utilizing these services. Some of the reasons that farmers have not been utilizing their processing services have been due to inter island bulk hemp transport costs and regulations and additional testing requirements between harvest and end product. Other farmers have said that it is too expensive for them to process their flower with Kauai Hemp Company.

## **Recommendations Cannabinoid Sector:**

1. This recommendation addresses findings 2-6 above, with a complete list of feedback from the cannabinoid farmers in **Task Force Feedback in section K.** of the accompanying report. After speaking to all of the cannabinoid farmers on the Task Force, we came to realize that many of their concerns were around rules and regulations that are affecting their businesses and a lot of this is very complex and they all had different things that were affecting their individual businesses. Our task per HB 1359 Act 263<sup>38</sup> was to address infrastructure needs, so that is why we are recommending that a separate Hemp-derived Cannabinoid Focused Task Force be created during the next legislative session in order to directly address the well-founded concerns of the cannabinoid farmers and business owners and come up with concrete solutions to help grow the hemp-derived cannabinoid sector in Hawai'i.

We recommend that this Task Force be made up of cannabinoid farmers as well as representatives from both the HDOA and HDOH as well as a hemp economist who can bring all the relevant data to the table for discussions. This task force can have direct dialogue with the HDOA and HDOH to come up with tangible solutions to help support and grow the local cannabinoid industry in Hawai'i and help create an even playing field with the out of state competitors. They also need to come up with a plan for oversight and determine whose role it is to monitor and take action against illegal products being sold in the state. They feel that their voices are not being heard and more and more Cannabinoid Hemp farmers are leaving the industry due to the ever- changing regulations. They want to be able to voice their concerns and be informed of new potential legislation in a timely manner and not when it is about to hit the floor as what happened with the proposed HI SB

---

<sup>38</sup> HB 1359 Act 263: [https://hdoa.hawaii.gov/wp-content/uploads/2024/07/Act263-SLH2023-GM1377\\_HB1359-Hemp.pdf](https://hdoa.hawaii.gov/wp-content/uploads/2024/07/Act263-SLH2023-GM1377_HB1359-Hemp.pdf)

3335.

2. Toll processing already exists on the island of Kauai where Kauai Hemp Company is fully licensed and legally set-up to safely process Cannabinoid Hemp for other farmers. Yet not many farmers are using this service and from what we have learned from members of the Task Force, is that they are nervous about the laws governing transportation of Cannabinoid Hemp as well as worried about the expense. We recommend that the state subsidize the extra transport and processing fees to help grow the cannabinoid industry in the islands and address any other concerns (these can be hashed out in the Hemp-derived Cannabinoid Task Force) that may be impeding farmers from processing their hemp there.

## **Findings General:**

### **1. Nomenclature Confusion:**

There is significant confusion in the nomenclature surrounding hemp. The terms “Industrial Hemp” and “Hemp” are currently used interchangeably, causing confusion about applicable rules and regulations for different plant end uses. Industrial Hemp grown for construction should not be subjected to the same regulations as hemp grown for cannabinoids. The broad current definition is hindering the development of a conventional Industrial Hemp industry due to the plant’s similarities with Cannabinoid Hemp but differing end uses.

### **2. Market Growth:**

The global hemp market is rapidly growing, from \$7.9 billion in 2023 to a projected \$47.82 billion in 2032.<sup>39</sup> The Hawai’i Hemp Task Force unanimously believes that a vertically integrated hemp industry would benefit the state economy and support sustainability goals. However, there is a lack of statewide economic analysis for this potential new industry in the islands.

### **3. Environmental Benefits:**

Studies show that hemp is remarkably proficient at extracting heavy metals like lead, cadmium, and nickel from contaminated soil, accumulating them in its tissues.<sup>40</sup> University

---

<sup>39</sup> Fortune Business Insights-Industrial Hemp Market Size:  
<https://www.fortunebusinessinsights.com/industrial-hemp-market-102459>

<sup>40</sup> NRFHH-Exploring the Potential of Industrial Hemp in Phytoremediation of Heavy Metals:  
<https://www.nrfhh.com/Exploring-the-Potential-of-Industrial-Hemp-in-Phytoremediation-of-Heavy-Metals,176819,0,2.html>

of Hawai'i research demonstrated that Industrial Hemp can metabolize 75% of residual atrazine in Hawaiian soil within 30 days. This capability suggests that growing hemp in burned areas of Lahaina could significantly aid large-scale remediation efforts.

## **Recommendations General:**

### **1. Clarify the Definition of Industrial Hemp:**

The House Agricultural Committee introduced verbiage in the 2024 Farm Bill, H.R. 8467 (§10006), passed by the House and now considered by the Senate.<sup>41</sup> This bill would establish a new statutory definition of industrial hemp, distinguish it from hemp grown for cannabinoids, and relax certain regulatory requirements. If passed, the Hawai'i Legislature should incorporate similar definitions to create clear distinctions between cannabinoid and industrial hemp for both industries to progress.

### **2. Support for Education:**

We recommend grant funding from the Department of Education to support hemp education statewide:

- Launch a hemp educational campaign for residents and tourists to explain the difference between hemp and cannabis, promoting the benefits of Hawai'i grown hemp products in the state.
- Create an Industrial Hemp handbook in partnership with the Department of Agriculture, based on local seed trials and research, to guide farmers on best practices in Hawai'i. Similar to [this one](#) from California.
- Partner with and fund non-profits like Friends of Waimanalo to offer workforce training for hempcrete construction, benefiting new and existing farmers, as well as the building industry.

### **3. In-depth Economic Analysis:**

The Hawai'ian Department of Economic Development should conduct a thorough analysis of the potential benefits of a statewide Industrial Hemp industry. This study should assess the cascading effects of using locally grown hemp as raw materials for secondary processing industries, replacing a variety of imported items. The findings should support legislative funding for both Industrial and Cannabinoid Hemp industries and foster public and institutional acceptance.

---

<sup>41</sup> Hemp Provisions in the Farm Bill and FY2025 Agriculture Appropriations Bill: <https://crsreports.congress.gov/product/pdf/IN/IN12381>

#### **4. Support for Hemp Cultivation Equipment:**

Provide a grant to the Hawai'ian non-profit [Na 'Aikane o Maui Cultural Center](#) of Lahaina for purchasing hemp cultivation equipment to remediate Lahaina soils and demonstrate hemp's restorative value. Equipment should include:

- 40 hp Bobcat Compact Hydrostatic Drive Tractor
- Soil prep equipment
- 6 ft No-till seed drill with corn plate adapters
- Roller crimper for terminating cover crops
- Side bar hay cutter
- Miscellaneous attachments (front end loader, brush hog, grapple loader, etc.)
- Hay rake
- Small hay baler
- Mobile Decorticator
- Mobile Hempcrete Mixer

#### **5. Workforce Training and Education:**

Encourage the creation of workforce training and educational opportunities to teach the building sector about hemp building materials, creating new jobs and training professionals like carpenters and plasterers.

#### **6. Support from the Carbon Market:**

- Hemp generates significant carbon credits and produces ten times the biomass of pine annually. These credits could be sold to local airlines to offset tourist transportation emissions, thus supporting both eco-tourism and the hemp industry.
- This can be a fairly difficult process to maneuver for a farmer so to support farmers getting the full value of their verified carbon credits we recommend that the State develop a staff position to help the farmers and primary and secondary processors in these negotiations.

## M. Definitions

**Hemp:** Defined as “the plant *Cannabis sativa* L. and any part of that plant, including the seeds thereof and all derivatives, extracts, cannabinoids, isomers, acids, salts, and salts of isomers, whether growing or not, with a delta-9 tetrahydrocannabinol [THC] concentration of not more than 0.3 percent on a dry weight basis” (7 U.S.C. §1639o).

**Cannabinoids:** No specific definition of cannabinoids exists in the U.S. Code. Cannabinoids refer to the unique chemical compounds produced in the *Cannabis sativa* plant, which are known to exhibit a range of psychological and physiological effects.

**Cannabinoid Hemp** \*Floral hemp): Hemp used for the extraction of essential oils from plant resin, such as cannabidiol (CBD), cannabigerol (CBG), cannabinol (CBN), or other phytocannabinoids. Floral hemp includes smokable hemp.

**Industrial Hemp:** Hemp grown for fiber or for the “whole grain, oil, cake, nut, hull, or any other non-cannabinoid compound, derivative, mixture, preparation, or manufacture of the seeds of such plant,”

**HDOH:** Hawai'i Department of Health

**HDOA:** Hawai'i Department of Agriculture

**USDA:** United States Department of Agriculture

## N. Addendum

<b>Hawaii Hemp Task Force Members</b>	
<b>HAWAII ISLAND</b>	
Gloria V. A. Ilagan	Cannabinoid
Brittany Neal	Cannabinoid
Rusty R. Tapp	Cannabinoid
Greg Smith	Cannabinoid
<b>OAHU</b>	
Tai Cheng-DOH Licensed	Cannabinoid
Kyle Leong	Cannabinoid
Qing X. Li	Industrial
Michele Matsuda	Cannabinoid
Grant Overton	Industrial
Scotty K. Wong	Industrial
<b>MAUI</b>	
Robert Bence	Cannabinoid/Industrial
Dr. Janine Holstein-DOH Licensed	Cannabinoid
<b>KAUAI</b>	
Judiah McRoberts-DOH Licensed	Cannabinoid
<b>MOLOKAI</b>	
Liliana Napoleon	Cannabinoid
<b>SECTOR AT LARGE</b>	
Joe Smith	Industrial
Bob/Kelly King	Industrial
Rob Bramlett	Cannabinoid
Jared Dalgamouni	Cannabinoid
Raymond Maki	Cannabinoid



Charlene Matila	Industrial
Jari Sugano	Industrial
Gail Byrne-Baber	Industrial

<b>USDA Licensed Hemp Growers as of May 2024</b>					
<b>Business or License Holder Name</b>	<b>License Number</b>	<b>City</b>	<b>State</b>	<b>Zip Code</b>	<b>Status</b>
<b>Mauna Kea Trading Company, LLC</b>	USDA_15_0043	Captain Cook	Hawaii	96704	Active
<b>Ryan Stone</b>	USDA_15_0072	Haiku	Hawaii	96708	Active
<b>Island Hemp LLC</b>	USDA_15_0067	Hilo	Hawaii	96720	Active
<b>Kapu Kine Farms LLP</b>	USDA_15_0058	Hilo	Hawaii	96720	Active
<b>Ryan Marshall</b>	USDA_15_0097	Hilo	Hawaii	96720	Active
<b>Young Michael Tarring</b>	USDA_15_0084	Hilo	Hawaii	96720	Active
<b>Agripelago Corporation</b>	USDA_15_0095	Honolulu	Hawaii	96822	Active
<b>American Hemp Growers</b>	USDA_15_0104	HONOLULU	Hawaii	96817	Active
<b>American Hemp Growers</b>	USDA_29_0030	HONOLULU	Hawaii	96817	Active
<b>American Hemp Growers</b>	USDA_33_0038	HONOLULU	Hawaii	96817	Active
<b>American Hemp Growers</b>	USDA_37_0528	HONOLULU	Hawaii	96817	Active
<b>American Hemp Growers</b>	USDA_49_0051	HONOLULU	Hawaii	96817	Active
<b>American Hemp Growers</b>	USDA_50_0018	HONOLULU	Hawaii	96817	Active
<b>American Hemp Growers</b>	USDA_55_0347	HONOLULU	Hawaii	96817	Active
<b>American Hemp Growers</b>	USDA_C56206_0011	HONOLULU	Hawaii	96817	Active
<b>American Hemp Growers</b>	USDA_P13203_0005	HONOLULU	Hawaii	96817	Active
<b>Dong Chul Choi</b>	USDA_15_0099	Honolulu	Hawaii	96813	Active
<b>Hawaii Gold Farms, LLC</b>	USDA_15_0071	Honolulu	Hawaii	96816	Active
<b>Intellectual Ag LLC</b>	USDA_15_0015	Honolulu	Hawaii	96814	Active
<b>James E Wilson Jr</b>	USDA_15_0101	Honolulu	Hawaii	96830	Active
<b>Jon Windham</b>	USDA_15_0059	Honolulu	Hawaii	96813	Active
<b>Kulele LLC</b>	USDA_15_0012	Honolulu	Hawaii	96707	Active
<b>Timer Hawaii Collective</b>	USDA_15_0091	Honolulu	Hawaii	96816	Active
<b>Zane DeMello</b>	USDA_15_0094	Honolulu	Hawaii	96816	Active
<b>Cucun Lam</b>	USDA_15_0082	Honomu	Hawaii	96728	Active
<b>Dong Wei</b>	USDA_15_0081	Honomu	Hawaii	96728	Active
<b>Brittany Neal</b>	USDA_15_0003	Kaeaa	Hawaii	96749	Active
<b>Eric D. Freitas</b>	USDA_15_0083	KAILUA	Hawaii	967342332	Active
<b>Kona Coast Botanicals LLC</b>	USDA_15_0070	Kailua Kona	Hawaii	96740	Active
<b>Lono Holdings, LLC</b>	USDA_15_0029	Kamuela	Hawaii	96743	Active
<b>Hi 2 O LLC</b>	USDA_15_0031	Kaneohe	Hawaii	96744	Active

<b>Procana Hawaii LLC</b>	USDA_15_0004	Kapolei	Hawaii	96707	Active
<b>Napoleon Gentry, LLC</b>	USDA_15_0069	Kaunakakai	Hawaii	96748	Active
<b>David Neal Rieck</b>	USDA_15_0087	Keaau	Hawaii	96749	Active
<b>Hokukano Ranch, Inc.</b>	USDA_15_0063	Kealakekua	Hawaii	96750	Active
<b>Jason Fried</b>	USDA_15_0107	KILAUEA	Hawaii	96754	Active
<b>Nancie Bean</b>	USDA_15_0061	Kilauea	Hawaii	96754	Active
<b>Janine Holstein</b>	USDA_15_0045	Kula	Hawaii	96790	Active
<b>Maui Majesty LLC</b>	USDA_15_0026	Kula	Hawaii	96790	Active
<b>Pan Pacific Ventures, LP</b>	USDA_15_0030	Kula	Hawaii	96790	Active
<b>Robert Bence</b>	USDA_15_0102	KULA	Hawaii	967908705	Active
<b>Ronald Dickson</b>	USDA_15_0047	Kula	Hawaii	96790	Active
<b>Omao Labs LLC</b>	USDA_15_0106	Lihue	Hawaii	96766	Active
<b>Omao Lands LLC</b>	USDA_15_0009	Lihue	Hawaii	96766	Active
<b>Atto Assi</b>	USDA_15_0086	Mountain View	Hawaii	96771	Active
<b>James Haberer</b>	USDA_15_0079	Mountain View	Hawaii	97661	Active
<b>Kamaaina Ventures LLC</b>	USDA_15_0068	Mountain View	Hawaii	96771	Active
<b>Michael Ruggles</b>	USDA_15_0066	Mountain View	Hawaii	96771	Active
<b>Kip Riihiluoma</b>	USDA_15_0105	Mt View	Hawaii	96771	Active
<b>Annette Keanu</b>	USDA_15_0108	NAALEHU	Hawaii	967721162	Active
<b>Bobbie Beevers</b>	USDA_15_0073	Naalehu	Hawaii	96772	Active
<b>John Douglas Beaton</b>	USDA_15_0080	Paaulo	Hawaii	96776	Active
<b>Satomi Yamanaka</b>	USDA_15_0103	Waialua	Hawaii	96791	Active
<b>Waianae Valley Farms</b>	USDA_15_0078	Waianae	Hawaii	96792	Active
<b>Maui Best Inc.</b>	USDA_15_0076	Wailuku	Hawaii	96793	Active
<b>Solvate Services LLC</b>	USDA_15_0053	Wailuku	Hawaii	96793	Active
<b>Sunshine Farming Inc</b>	USDA_15_0075	Wailuku	Hawaii	96793	Active
<b>Ohana Hui Ventures, Inc</b>	USDA_15_0093	Waimanalo	Hawaii	96795	Active
<b>Proxarus Inc.</b>	USDA_15_0064	Waimanalo	Hawaii	96795	Active
<b>Business or License Holder Name</b>	<b>License Number</b>	<b>City</b>	<b>State</b>	<b>Zip Code</b>	<b>Status</b>
<b>Curt Hiraga</b>	USDA_15_0019	Aiea	Hawaii	96701	Expired
<b>Hillary Leano</b>	USDA_15_0021	Aiea	Hawaii	96701	Expired
<b>No Ka Oi Orangics</b>	USDA_15_0010	Ewa Beach	Hawaii	96706	Expired
<b>Aloha Green LLC</b>	USDA_15_0033	Hilo	Hawaii	96721	Expired
<b>Corey Ogles</b>	USDA_15_0057	Hilo	Hawaii	96720	Expired

<b>Goodbye Kitty LLC</b>	USDA_15_0037	Hilo	Hawaii	96720	Expired
<b>Maulua Investments LLC</b>	USDA_15_0035	Hilo	Hawaii	96721	Expired
<b>Ono Nut Farms, Inc.</b>	USDA_15_0044	Hilo	Hawaii	96720	Expired
<b>Shropshire Group LLC</b>	USDA_15_0034	Hilo	Hawaii	96721	Expired
<b>TROPICAL SUNSET FARMS LLC</b>	USDA_15_0002	HOLUALOA	Hawaii	96725	Expired
<b>AJA Nursery, LLC</b>	USDA_15_0018	Honolulu	Hawaii	96825	Expired
<b>HC Ventures Inc.</b>	USDA_15_0039	Honolulu	Hawaii	96839	Expired
<b>New Pineapple Properties Limited</b>	USDA_15_0007	Honolulu	Hawaii	96819	Expired
<b>Vespucci Collective Inc.</b>	USDA_15_0008	Honolulu	Hawaii	96822	Expired
<b>AINA Hawaiian Tropical Farms LLC</b>	USDA_15_0040	Honomu	Hawaii	96728	Expired
<b>Gail Byrne Baber</b>	USDA_15_0001	KAMUELA	Hawaii	96743	Expired
<b>Hawaii Royal Hemp</b>	USDA_15_0025	KAMUELA	Hawaii	96743	Expired
<b>Leif Lindsey</b>	USDA_15_0062	Kamuela	Hawaii	96743	Expired
<b>Lisa Cash</b>	USDA_15_0049	Kamuela	Hawaii	96743	Expired
<b>Lono Holdings, LLC</b>	USDA_15_0041	KAMUELA	Hawaii	96743	Expired
<b>Leia Gardem, LLC</b>	USDA_15_0050	Kapolei	Hawaii	96707	Expired
<b>Imua Energy, LLC</b>	USDA_15_0016	Kihei	Hawaii	96753	Expired
<b>Mina Yamagaki</b>	USDA_15_0005	Kihei	Hawaii	96753	Expired
<b>R-Dam LLC</b>	USDA_15_0011	Kihei	Hawaii	96753	Expired
<b>R-Dam LLC</b>	USDA_15_0038	Kihei	Hawaii	96753	Expired
<b>Aina O Ho'okupu O Kilauea</b>	USDA_15_0046	Kilauea	Hawaii	96754	Expired
<b>Hawaii Organic Nutraceuticals Inc.</b>	USDA_15_0020	Kilauea	Hawaii	96754	Expired
<b>Jaime Means</b>	USDA_15_0048	Kilauea	Hawaii	96754	Expired
<b>J. Hearl, LLC</b>	USDA_15_0042	Kula	Hawaii	96790	Expired
<b>Ahimsa Sanctuary Farms, LLP</b>	USDA_15_0055	Makawao	Hawaii	96768	Expired
<b>Evoked Innovative Solutions Inc.</b>	USDA_15_0060	Makawao	Hawaii	96768	Expired
<b>Mauna Loa Farms, LLC</b>	USDA_15_0013	Mountain View	Hawaii	96771	Expired
<b>Gregory Smith</b>	USDA_15_0027	Naalehu	Hawaii	96772	Expired
<b>Ronald Foreman</b>	USDA_15_0024	Ninole	Hawaii	96773	Expired
<b>Marianne Fong</b>	USDA_15_0017	Pepeekeo	Hawaii	96783	Expired
<b>Hawaiian Hempyre Farms LLC</b>	USDA_15_0036	Volcano	Hawaii	96785	Expired
<b>Martin and Associates LLC</b>	USDA_15_0032	Volcano	Hawaii	96785	Expired
<b>Carefree CBD LLC</b>	USDA_15_0006	Waialua	Hawaii	96791	Expired
<b>Bradley Bayless</b>	USDA_15_0028	Wailuku	Hawaii	96793	Expired

<b>The Maui Third Wave</b>	USDA_15_0014	Wailuku	Hawaii	96793	Expired
<b>Business or License Holder Name</b>	<b>License Number</b>	<b>City</b>	<b>State</b>	<b>Zip Code</b>	<b>Status</b>
<b>Lindsey Andrews</b>	USDA_15_0089	Hilo	Hawaii	96720	Surrendered
<b>Loud Goat Farms LLC</b>	USDA_15_0054	Kapaa	Hawaii	96746	Surrendered
<b>Maurice Munechika</b>	USDA_15_0023	Lihue	Hawaii	96766	Surrendered
<b>Cultivation Sector Consulting</b>	USDA_15_0085	Makawao	Hawaii	96768	Surrendered



# QUOTE

1560 Hastings Crescent SE  
Calgary, Alberta, T2G 4E1  
Phone 1-877-622-3354

**DATE:** May 3, 2024  
**INVOICE #**

**Bill To:** **Ship To:** Honolulu, HI

**Comments or Special Instructions:**

40ft Seacan of Hurd for Hempcrete to Honolulu

P.O. NUMBER	SHIP DATE	SHIP VIA	F.O.B. POINT	TICKET NUMBER	TERMS
	TBD	TBD			50% deposit, 50% at ship

QTY (bags)	DESCRIPTION	UNIT PRICE	TOTAL
960	Hurd for Hempcrete- 65L Bags	\$ 24.90	\$ 23,904.00
	Freight (Calgary, AB to Honolulu, HI)- Estimate		7,812.00
SUBTOTAL			\$ 31,716.00
GST# 76586 6801 RT0001			
TAX			\$ -
<b>TOTAL (USD)</b>			<b>\$ 31,716.00</b>

# MODULAR DESIGN WITH SCALABILITY FOR ALL POSSIBILITIES



Installation

MODULAR



Winterization

-60 °C



Automation

OPTIONAL



Processing

~80 LBS /CENTRIFUGE



Ethanol Recovery

~97%



Capacity

CUSTOMIZABLE



Product

CRUDE

# C E M S



\* Actual layout and structure may vary for different needs.



✉ [info@pureyindustry.com](mailto:info@pureyindustry.com)

🌐 [www.pureyindustry.com](http://www.pureyindustry.com)

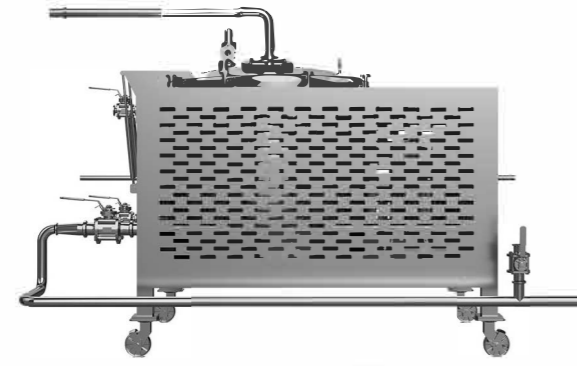
📍 808, Haitong Rd.,  
Wenzhou, ZJ, 325025  
China

CENTRIFUGE EXTRACTION MODULAR SYSTEM



## PRE-CHILLING

- MOC SUS304
- Dimple jacketed
- Fully insulated
- -60°C / -76F working temperature
- From 52 gal to 260 gal
- Level control system (optional)
- Flow rate control (optional)
- Movable skid with brakes



## CENTRIFUGE

- MOC SUS316L
- Jacketed and insulated
- Scalable for massive processing
- From 25 LBS to 80 LBS each
- Biomass to ethanol ratio 1 LBS to 1 gal
- Level control system (optional)
- Siemens control PLC (optional)
- Unique design
- Movable skid with brakes



## FILTRATION

- MOC SUS304
- Filter model optional:  
bad filter 50 micron; micro filter;  
titanium rod filter
- Holding tank integrated
- Transfer pump integrated
- Level control system (optional)
- Movable skid with brakes



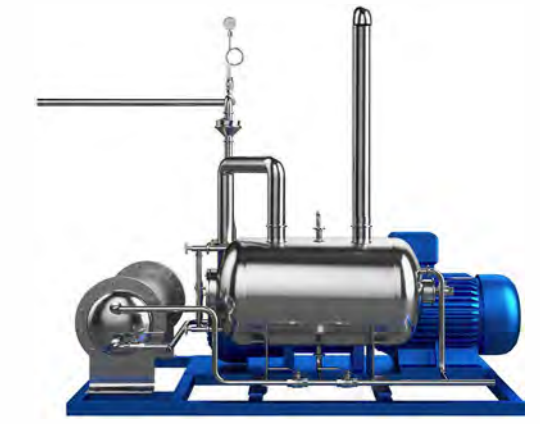
## FALLING FILM

- MOC SUS316L & SUS304
- Evaporation cap.: 200L/h to 1000L/h
- Oil heating circulator (optional)
- High efficiency for ethanol recovery
- Movable skid with brakes



## DECARB REACTOR

- MOC SUS316L & SUS304
- Capacity: from 26 gal to 132 gal
- Oil heating circulator 150°C / 302F (optional)
- Insulated and jacketed
- Movable skid with brakes



## VACCUM STATION

- Sliding-vane rotary vacuum pump
- Vacuum buffer tank
- Explosion-proof
- Movable skid with brakes

## UTILITIES

For whom is building from scratch, utilities circualtors are available for optional:

- Chilling circulator
- Cooling circulator
- Oil heating circualtor

## INSTALLATION

Modular designed sections, sitting on movable skids, easily fit for different sizes of workshop, with full potential for further expanding.

Simply connect each section with the sanitary hoses comes with the system. Plug it, add biomass and ethanol, it's all good to go.

## ELECTRICAL

All pumps and motors are explosion-proof, pre-checked before shipping.

UL rated motors available.  
Runs @ 460V 60Hz 3 Phase or as per your requirements.

## SERVICE

On-site training and guidance of installation services available.

MOC certificate, explosion-proof certificate, QC, UL and CE.

1 year parts and service warranty.



## Commercial proposal

Date: 29/3/2024  
Contact: Alex Teodorescu  
Offer Ref: O24-0047  
Version: A  
Your Ref:

To the attention of  
Char O'Brien and Megan Villa

## Hemp Fiber Processing line 4 t/h

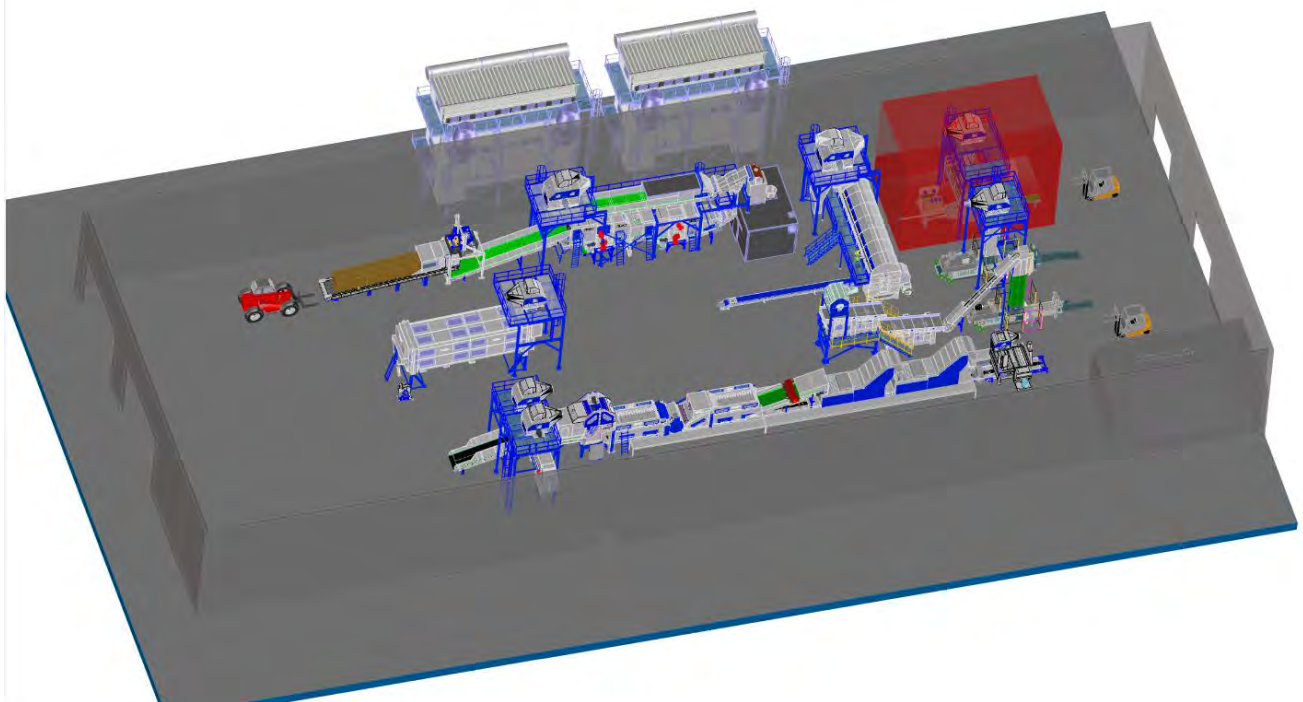
We are pleased to submit this commercial proposal, free of engagement, according to our general terms of sale.

### 1. Basic data

#### 1.1. Processing capabilities:

- Hemp processing :
  - Input capacity: 4000 kg/h.
  - Output: Technical fibers containing <2% of hurd material, baled in bales.
  - Output: Cleaned hurd in bulk. Optional baled in 20kg bales.
  - Output: Short fibers with up to 35% of hurd in them (related to the weight of the short fibers) in bulk.
  - Output: Dust in bulk.

Example of 4tph processing line (*this is just an example - the line in the scope of the proposal can differ from the one in this image*):



#### 1.2. Given:

- Round bales with max. dimensions Ø1800x1500 mm.
- Bulk material can also be fed in the line.
- Bale density: around 155 kg/m<sup>3</sup> (between 140 kg/m<sup>3</sup> and 165 kg/m<sup>3</sup>)
  - Max bale size Ø1800x1500 weighs between 500 and 620 kg.
  - Min bale size Ø1600x1200 weighs between 330 and 400 kg.
- Moisture content: between 13% and 18% (everywhere in the bale – no wet spots).
- Yellow color, dry or retted to a light grey color; if the input material is green (green flexible stalks), the result will be worse. If the straw is over-retted the quantity of dust will be much higher and the capacity will drop.
- If the humidity of the material is higher than 20%, you will risk blocking of the line, reducing the capacity (sometimes to less than half of the max.) and possibly damaging the equipment.
- Operation: 24h/day – 5days/week.

### 1.3. REMARKS:

- Cleanliness: when we talk about 2% of hurd in the fiber, this means that of the total amount of technical fiber there is 2% of hurd in there. So 100 kg of technical fiber contains max. 2 kg of hurd. So it is never related to the total amount of hurd in the plant.
- Stones, rocks, metals and other foreign parts can reduce the capacity and/or damage the equipment. It is recommended to educate farmers to keep the amount low so that the chance of getting them out after the straw opening is high. If the amount is too high, not all will be taken out and some will continue through the equipment making sparks, fire or damaging the equipment.
- The following equipment is being used by Hempflax, La Chanvrière de l’Aube, Cavac, AITF, Natural Fibers, ...
- The modular composition of the line allows easy modification if and when it is needed.
- Our equipment has proven its reliability and its performance on many levels during the past decades. We have built in the highest possible flexibility in terms of output material.
- The equipment is very efficient in decortication and in energy use because of the fact that all main motors are on frequency drive in order to avoid losses at partial load.
- Due to the fact that everything works in suction, there the dust level in the production room is very low, even if ductwork would have a puncture due to the wear. The fans are high efficiency fans which are running under optimal conditions and because they are placed in the clean air side there is no wear on the fans.
- The operation is visualized so that almost anyone can operate the system after a short training.
- The set-up is compact and maintenance is quite easy.

## 2. Feeding and decortication.

### 2.1. Process:

2.1.1. Input: round and rectangular bales of hemp straw

2.1.2. Output:

- Fiber containing approx. 20% of hurd – in bulk (option of baling is indicated)
- Uncleaned hurd in bulk
- Dust in bulk

### 2.2. Feeding and decortication

- Storage conveyor, 10 m long, 1.5 m wide – straps from the bales to be taken off manually.
- Bale and straw cutter:
  - The cutter has to be operated by one person.
  - The bale will be positioned, with the center under the knife, by the operator.
  - The bale retainer is closed to prevent the bale from falling onto the next step.
  - The first cut through the center of the bale creates two half bale parts.
  - The conveyor has to move backwards until the front of the first half is at the position of the knife.
  - The operator can set the length after which a button is pushed and the full bale is cut to the set length. During this operation the bale retainer is in the upward position.
  - The cut straw drops onto the transfer conveyor that feeds the straw opener.
- Transfer conveyor, inclined, length 7.5 m – brings the slices to the straw opener.
- Twin straw opener composed of the first part for coarse opening of the straw, followed by the second part for final opening and feeding to the line.
- Decorticator, type CRD1301-IDS.
- Spark detection to be placed in the ductwork between the decorticator and the air-separator + valve to shut off the suction and valve to discharge the material to the floor instead of in the hurd separator.
- Air separator: type RK1815 – discharges the decorticated material into the hurd separator. The dust loaded air is separated and goes to the filtration units.
- Supporting structure, platform, access ladder for this air separator.
- Hurd separator type DIII-10M to remove as much hurd as possible from the fiber.
- Conveyor at the outfeed side of the hurd separator, that can turn to the left or to the right. When turning to the left, the fiber is being moved to the buffer conveyor before passing a second time through the decorticator. When turning right, the fiber is being move to the fiber cleaning part.
- Air separator: type RK1810 – discharges the fiber after the first pass onto the buffer conveyor. The dust loaded air is separated and goes to the filtration units.
- Supporting structure, platform, access ladder for this air separator.
- Buffer conveyor, 12 m long, placed above the twin straw opener. Once this conveyor is full, the infeed of straw automatically stops and a valve switches, after which the fiber runs through the decorticator a second time.
- Air separator RK1410, connected to the hurd exit of the hurd separator, to bring the hurd to the next step.
- Air separator RK1410, positioned above the buffer conveyor of cleaning line, connected to the exit of the right side of the conveyor at the fiber exit of the hurd separator, to bring the fiber to the cleaning line.
- Supporting structure, platform, access ladder for the air separator.
- Coupling parts.
- Lay-out and engineering.
- Installed power in this part: 387 kW – 50Hz – 3phase 400V.



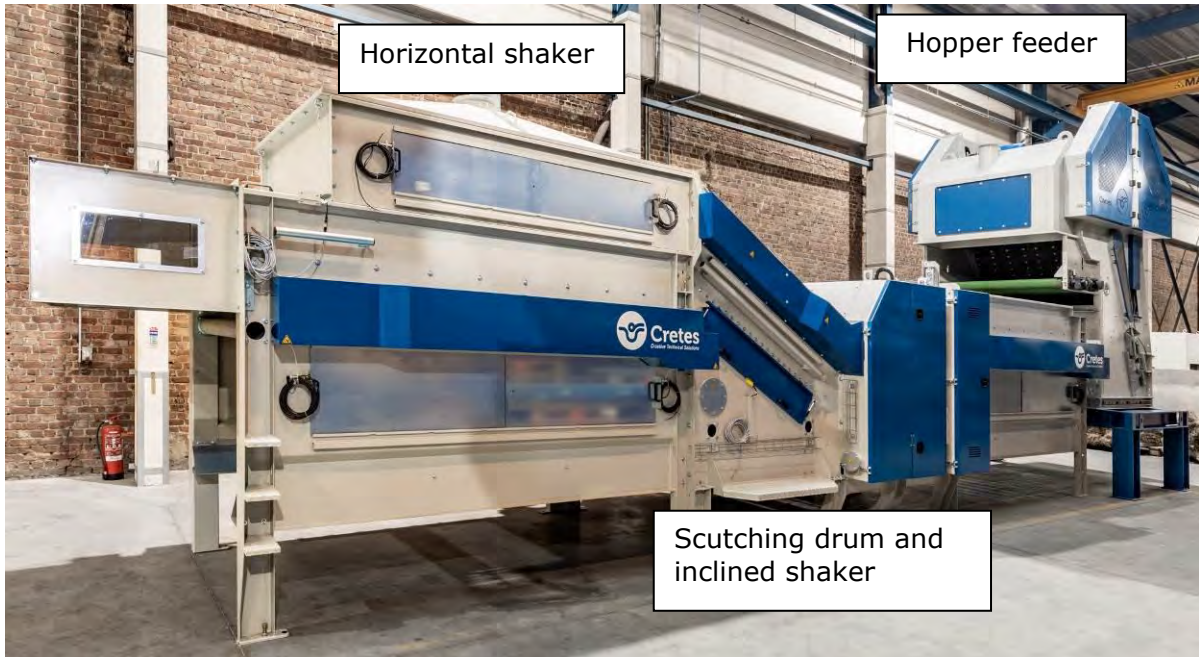
Bale cutter



Twin straw opener







## 4. Fiber baling.

### 4.1. Process:

4.1.1. Input: fiber coming from the fiber cleaning section

4.1.2. Output: bales of fiber – dimensions see below.

- Weight of the bales depends on the degree of hurd in the fiber and is between 200 and 250 kg.

### 4.2. Technical fiber baling

- Automatic baling press C40S1000M-45: bales 735x765 – length is adjustable but generally around 1100 mm. Metal wire strapping.
- Filling shaft for the baling press.
- Coupling parts.
- This machine has its own electrical cabinet, with detections on the machine and safety devices.
- Installed power in this part: 49 kW – 50Hz – 3phase 400V.



Automatic fiber baler fed by an air separator



## 5. Hurd (shives) cleaning.

### 5.1. Process:

#### 5.1.1. Input:

- Flow 1 : hurd coming from the decortication.
- Flow 2 : hurd coming from the refining.

#### 5.1.2. Output:

- Cleaned hurd (dust extracted and low fiber content)
- Short fibers containing 35% of hurd (amount is below 10% in case of good raw material)
- Dust in bulk

### 5.2. Hurd cleaning for hurd from the decortication part:



Hurd cleaner

- Hurd cleaner, 8 m long with interchangeable sieves.
- Suction of cleaned hurd, connected to an air separator RK1410 that is placed at the next step. We transport by suction to do a final dust extraction before the hurd moves to the final step.
- Supporting structure, platform, access ladder for the air separator.
- Collecting conveyor for fibers and oversize hurd.
- Blower Z603 to blow the fibers and oversize hurd back to the infeed of the second decorticator.

### 5.3. Hurd cleaning for hurd from the fiber cleaning part:

- Under the cleaning line there is a collecting conveyor for hurd and short fibers. This conveyor feeds a simple shaker table.
- The goal is to retrieve as much hurd as possible and feed that hurd to the hurd cleaning under 5.2.
- The remaining hurd and short fibres will be transported with an inclined conveyor to the short fiber baler.

### 5.4. Other:

- Coupling parts.
- Installed power in this part: 27 kW – 50Hz – 3phase 400V.



Shaker table

## 6. Second cleaning step for hurd

- Elevator to take the hurd under the cleaning drum and transport it to the oscillating shaker.
- Oscillating shaker to do a second cleaning step.
- Conveyor to transport the short fiber and oversize hurd to the fan under 5.2.
- The cleaned hurd will be collected by the suction system and air separator RK1108 that is quoted under 5.2.
- Coupling parts.
- Addition to the electrical cabinet.
- Lay-out and engineering.
- Installed power in this part: 13 kW – 50Hz – 3phase 400V.



## 7. Automatic hurd baling

### 7.1. Process:

- 7.1.1. Input: cleaned hurd.
- 7.1.2. Output : 20 kg bags of hurd (or 15 kg).

### 7.2. Hurd baling :

- Air separator : RK908 + supporting structure.
- Receiving buffer with augurs – 0,8 m<sup>3</sup>.
- Weighing bunker with pneumatic valves and augurs – 0,25 m<sup>3</sup>.
- Vertical compression unit.
- Horizontal compression unit with hydraulic slide.
- Bags made from rolls of PE foil:
  - The foil is put over a formation shoulder and pulled over a rectangular tube.
  - A longitudinal seal bar seals at the top.
  - A transversal bar seals at the bottom.
- The compressed hurd is pushed in the formed bag and the transversal bar seals also the top.
- The baler produces up to 200 bags per hour of 20 kg (or 15 kg).
- A roller conveyor brings the bales to the exit of the machines.
- Coupling parts.
- The baler has its own electrical cabinet, with detections on the machines, safety devices. The basic connections to interact with the rest of the process are included.

- Installed power in this part: 95 kW – 50Hz – 3phase 400V.



## 8. Short fiber baling.

### 8.1. Process:

- 8.1.1. Input: short fiber loaded with hurd, coming from the second hurd cleaning.
- 8.1.2. Output: bales of fiber – dimensions see below.

- Weight of the bales depends on the degree of hurd in the fiber.

### 8.2. Short fiber baling

- Automatic baling press C40S1000S-22: bales 535x565 – length is adjustable but generally around 1100 mm. Metal wire strapping.
- Filling shaft for the baling press.
- Coupling parts.
- This machine has its own electrical cabinet, with detections on the machine and safety devices.
- Installed power in this part: 26 kW – 50Hz – 3phase 400V.



Picture showing 2 baling presses next to each other

## 9. Suction and filtration

- All suction points have to be connected with ducts to the filtration system.
- Dust filtration: 2 automatic bag filters, each type APF200, each with a capacity of 75000 m<sup>3</sup>/h and with platform and ladder.
- Total capacity = 150000 m<sup>3</sup>/h.
- Rotating air lock at the bottom of each filter.
- Inclined dust augur to bring dust to a bin (bin not included).
- To be installed outside the building – under a roof.
- Total height is 9800 mm.
- Each filter has a suction fan, capable of generating 75000 m<sup>3</sup>/h suction at a negative pressure of 4000 Pa.
- Dust control sensor at the outlet of each filter: detects when too much dust comes out the clean side (this may happen when a bag is punctured or loose).
- Installed power in this part: 273 kW – 50Hz – 3phase 400V.



## 10. Electrical system

- Central electrical cabinet with main switch.
- Only the baling press has its own electrical cabinet.
- Motor starters for motors with fixed speed.
- Frequency drives for motors with variable speed and for motors over 15 kW (except on the balers).
- Safety circuits.
- Motor protection systems.
- Sensors pre-wired on the machines that are transported in one piece: optical sensors, inductive sensors, ...
- Door switches pre-wired on the machines that are transported in one piece.
- Emergency stop circuits.
- Push buttons and action buttons on certain machines.
- PLC Siemens.
- Visual interface on a screen to operate the system.
- Necessary components to make everything work.
- Programming – control software.

## 11. Auxiliary, delivery and installation

### 11.1. Ductwork

- Ductwork can be determined when the exact lay-out is finished.
- Cretes will supply drawings of the ductwork that has to be made and installed by a local company.

### 11.2. Cables and cable trays

- Cretes provides the drawing where the cable trays have to be put and also the cable list. This work needs to be done by a local contractor.

### 11.3. Transport, installation and start-up

- Transport: 45 containers 40ft (OT-HC) on land with train/truck: price to be determined when shipping is arranged.
- We have included the price for packing the equipment and loading the containers (FCA Gullegem, Belgium).
- Mechanical installation by local crew, with guidance of 2 Cretes technicians (6 local mechanics during  $\pm 72$  working days on site – effective working hours = 10 hours per day, 6 days per week). Rates for Cretes technicians (Max. 24 consecutive workdays on site): 6910 euro/week, traveling at cost, hotel + breakfast at cost, rental car at cost.
- Ductwork : to be installed by the ductwork manufacturer. We estimate that he will need +/- 50 working days with 4 persons to install the ductwork. Part can happen during mechanical installation.
- Electrical installation: A local electrical contractor has to put the cable trays and all cables (control and power wiring). A Cretes electrician supports the local contractor during this process as long as it is required. Rates for electrical technician (Max. 24 consecutive workdays on site): 6910 euro/week, traveling at cost, hotel + breakfast at cost, rental car at cost.
- Start-up, commissioning and training of staff:
  - 3 weeks – 2 software engineers check the I/O's and rotation directions and test the program.
  - 3 weeks – 2 engineers for balancing the air-flows.
  - 2 weeks – 2 engineers for starting up, running with material and training of staff.
  - 2 weeks – 1 engineers for follow up after running a few weeks.Rates for Cretes engineers (Max. 24 consecutive workdays on site): 8110 euro/week, traveling at cost, hotel + breakfast at cost, rental car at cost.
- The above are estimates that can vary depending on circumstances, motivation and skills of local people. These cannot be controlled by Cretes and fall outside of our responsibility.
- Installation and start-up has to happen under acceptable atmospheric conditions to preserve the safety and health of everyone on site. Onsite work will be suspended when temperatures are below 5°C or higher than 32°C, during rain, hail or snowfall when working outside, or other conditions that prevent the people from delivering quality work. This may result in additional (traveling) costs for supervisors.
- Daily rates for additional work: 1210 euro/day/person, traveling at cost, hotel + breakfast at cost, rental car at cost.





## 13. General specifications:

### 13.1. Manuals and maintenance instructions:

- Are delivered by CRETES, written in English, after final commissioning and in digital format (PDF)
- On request, we can provide the manuals in other languages, but extra translating costs will be invoiced.
- Unfinished equipment as described in the European Directive 2006/42/EG are delivered with a Declaration by the Manufacturer of the type Annex II.1.B from this Directive. The person completing this equipment or implementing it in the installation for which it is intended, is responsible for the CE-marking and this only after evaluation of the remaining risks and the reduction of these risks to an acceptable level.
- Completed equipment/installations as described in the European Directive 2006/42/EG are delivered with a EC Declaration of Conformity of the type Annex II.1.A from this Directive.

### 13.2. Finishing:

- Standard CRETES finishing and colors:
- Machines and parts: RAL 7044 (silk grey) and RAL 5009 (blue azure)
- Safety items: RAL 1023 (traffic yellow)

### 13.3. Electric:

- Required power supply: 3 phase 400V – 50Hz.
- Standard European components (mainly Siemens).
- Total installed power (without options) : 994 kW – power consumption at full capacity : approx. 610 kW per hour.

### 13.4. Space and operators:

- Operators: 4 persons: 1 man feeding bales and taking off the straps, 1 operator for the bale and straw cutter, 1 line supervisor and 1 man taking away finished products.
- Required space: Building 90 m long and 30 m wide with clear height of 10 m.
  - Ware housing for raw material is not included in this: make sure to have at least storage for 1 week on site.
  - Ware housing for finished products is not included in this: to be determined according to your sales conditions.

### 13.5. Compressed air:

Compressed air quality should be in accordance with standard DIN ISO 8573-1:

- Max particle size: 0.1micron – class 1
- Dew point (pressure): -20°C – class 3 min.
- Oil content: max. 0.01mg/m<sup>3</sup>d – class 1
- Min. required working pressure: 8bar
- For the full processing line you will need approx. 240 Nm<sup>3</sup>/h.



Warranty	<p>Duration: 1 year in 2-shift system after commissioning</p> <ul style="list-style-type: none"><li>• On parts and on-site work (max 18 months after availability in our workshops)</li><li>• The warranty does not apply to parts subject to wear and tear and to parts that have been improperly used, neglected, improperly maintained or damaged due to an external cause.</li></ul> <p>Travel, accommodation and transport costs are not included in the warranty.</p>
Mounting & start-up	<p>The complete site must be cleaned and set free to enable the mounting and assembly in a practical and safe way.</p>

We hope we have made you a suitable offer. We wish to thank you for your inquiry and we remain at your service for any further information.

For Cretes nv  
Alex Teodorescu

## CRETES NV

Bissegemstraat 169

8560 Gullegem – Belgium

Tel +32(0)56 411 094 – Fax +32 (0)56 419 956

[www.cretes.be](http://www.cretes.be) – [info@cretes.be](mailto:info@cretes.be)

BTW BE0412 423 610 – RPR Kortrijk



### GENERAL TERMS AND CONDITIONS OF SALE – CRETES NV

- 1. ORDERING** By simply placing an order, the buyer accepts the terms and conditions specified below. Even when the general terms and conditions of the customer contain provisions that should be different from Cretes NV's terms and conditions, the seller's terms and conditions shall always prevail.
- 2. PRICES** The prices and remittances are established based on the current economic situation. Except for a contrary provision, they shall apply for 30 days as from the date of the offer. Prices are net ex-factory and without packaging unless specified otherwise. All taxes, input duties and stamps of whatever nature that encumber the contract shall be borne by the buyer.
- 3. DELIVERY TERM** The delivery term shall start as from the payment of the contractually foreseen advance payment. The determined delivery terms are only indicative and, therefore, non-binding. A delay in the delivery shall not entitle the buyer to compensation or interest payment unless this was stipulated formally. The delivery term shall be deferred by operation of law and the buyer may not claim losses in case of force majeure (including strikes, interruption or delay when supplying raw materials).
- 4. INSTALLATION** The installation, foundations, positioning, electrical connection, personnel training and after sales services are not included in the obligations of the seller. They will always be a part of an additional contract at the expense of the buyer and for the price that shall be determined when the performance is made but always while applying the present general terms and conditions. The costs for using forklift trucks required for loading and positioning the sold items shall be at the expense of the buyer. If the installation is included in the sales price, the buyer shall commit to having the installation take place without delay and the buyer must pay compensation should the buyer not comply with his/her obligations.
- 5. DELIVERY** The delivery shall take place at the agreed location. If a location for delivery was not agreed, it shall take place ex-factory. It is assumed that items are accepted before departure from the storerooms of the seller. Any guarantee for construction errors shall apply for a year to start as from the delivery date or from the date on which delivery should have taken place. In any case, a complaint shall be inadmissible in whatsoever form either from the 8<sup>th</sup> day after receipt of the items or from the 3<sup>rd</sup> day after receiving the invoice. The seller shall not accept the return of items without the seller's prior permission. When a return is accepted, this shall take place carriage paid at the address of the seller. Should the complaint concerning the quality of the items be admissible and with foundation, the obligations of the seller shall only entail the free replacement of the item that is faulty without the seller being asked to pay additional compensation in any other way. The repair or replacement of parts during the guarantee period shall not, in any case, extend the guarantee. The return and complaints shall suspend, in any case, the demandability of the sums due and payable. The guarantee shall no longer apply should the buyer decide to make repairs or changes or have a third party make repairs or changes without prior approval from the seller.
- 6. INTELLECTUAL PROPERTY** After delivery, the seller shall transfer to the buyer all required plans and documents to assure the operation of the delivered devices and equipment. Plans that are transferred to the buyer by the seller may never be given to third parties and shall always continue to be the material and intellectual property of the seller. The implementation plans, however, shall remain with the seller without the buyer being entitled to examine them.
- 7. TRANSPORT** The items shall travel at the risk of the buyer even when the sale takes place carriage paid including all the costs or by using the seller's own ordering service unless specified otherwise. If the seller contracts with the shipper, the seller shall only do this as a mandatory of the buyer. In case of loss, damage, etc., the buyer can only turn to the shipper or the third party responsible without intervention from the seller.
- 8. RETENTION OF TITLE** The seller shall retain the title of the delivered items until all claims on the buyer, whichever these may be, are fully paid. The buyer commits to inform the seller immediately should items be encumbered at the buyer's expense or in the buyer's hands. Every partial or total disposal of items by the buyer contrary to the seller's property rights shall be deemed to be a breach of trust as referred to in the provisions of Article 491 of the Belgian Penal Code.
- 9. EXPRESS AVOIDANCE CLAUSE** The seller shall be entitled to consider the contract terminated without a notice of default or any intervention by the court being required in the following cases: when the advance is not paid, upon bankruptcy of the seller, when an application for a composition has been filed regarding the seller, upon the liquidation of the seller, when the sold items are the object of a buyer's attachment, when the buyer does not comply with the buyer's obligations and liabilities on the expiry date and when everything points to the buyer not intending to comply with the buyer's obligations and liabilities. Should the seller invoke the express avoidance clause in relation to the buyer, the seller must do this through a registered letter or bailiff's notification. In this case, compensation shall be due and payable of at least 40% of the order amount to be increased by all losses linked to the items as well as the termination of the contract.
- 10. PAYMENT** Invoices must be paid in cash where all costs shall be at the expense of the buyer at the registered office of the seller unless agreed otherwise expressly and in writing. Issuing bills of exchange and receipts shall not entail substitution of one debt for another. When an invoice is not paid on the expiry date, the invoice amount shall be increased by an interest of 1% per month and a fixed compensation of 15% of the amount of the order where a minimum of € 124 shall apply by operation of law and without notice of default being required.
- 11. CANCELLATION** Should the contract be cancelled by the buyer, the already invoiced and/or not yet paid advance payments shall continue to be deemed acquired definitely by the seller. Should, however, the suffered losses as a result of the cancellation (loss of profits and suffered losses) be higher than the already invoiced advance payments, the seller shall be entitled to claim the integrally suffered losses.
- 12. COMPETENT COURT** Belgian law shall apply to all offers and contracts of the seller. Should there be a dispute, only the court of the registered office of the seller shall be deemed competent. The seller, however, shall continue to be entitled, as the claimant, to summon to appear in front of the Court of the residential town or city of the respondent.
- 13. REGULAR PAYMENTS** The buyer recognises the right of the seller to stop the further execution of the contract when an invoice is not paid on the expiry date with regard to contracts where successive services must be delivered that are invoiced regularly. The seller also retains the right to refuse the execution of running orders when the previous deliveries to the same buyer or an associated company were not yet paid.
- 14. SAFETY** In case of installation and commissioning by the seller's staff, the buyer must provide all required information regarding safety regulations at the relevant site. The regulations must have been provided before the contract is entered into. The instructions must have also been provided and explained to the seller's staff expressly before the activities commence. The buyer must take all required measures to assure safety. If the safety regulations should not be observed by the seller's staff, the buyer must inform the seller immediately so that the seller can take the required measures. Delays due to this shall never be borne by the seller. If the safety regulations are not or are notified too late, all additional costs for taking the required measures shall be borne by the seller.

### RECIPROCAL LIABILITY RESTRICTION

The parties declare to be professional equal trading partners unreservedly. They declare that they have arrived at the entered into contract based on their free will and with reciprocal respect. Based on the above, they have decided to restrict the reciprocal liability with regard to and because of the opportunity of executing this contract. The parties shall never be liable to each other for whatever damage or loss whatsoever that should exceed the sole limit of € 5 million agreed here even when different provisions should have been made elsewhere in the contract.

This amount also includes any claims or amounts owed from their appointed individuals, contractors, subcontractors or other trading partners to whom they may appeal or whom they may control or be responsible for. The parties shall indemnify each other to the extent that they may exceed the specified limit. They shall ensure that the involved parties waive their rights.

The parties shall make the following exceptions:

When a party should be to blame for a proven, intentional or important error or omission that may be deemed intentional. In this case, this party cannot appeal to the restriction specified above and this party's liability shall be without restriction.

The immaterial damage that is not the result of material damage. The parties declare that they shall restrict this reciprocal liability to € 1 million for this purely financial and immaterial damage.

#### Definitions:

Damage (and loss) is deemed to mean the following:

Both based on contractual and non-contractual liability.

Both direct and indirect damage.

Physical injury is deemed to mean the following: injury of the physical integrity (that may or may not lead to death) and the financial and moral consequences thereof.

Material damage is deemed to mean the following: damage, destruction or loss of items including animals.

Immaterial damage is deemed to mean the following: other damage than the one described above that may arise from loss of use of an item or a right such as loss of enjoyment, being unemployed, production standstill, loss of profits and any other financial disadvantage. The parties make a distinction between the following within this context:

The immaterial damage that is not consequential damage (or the purely immaterial damage): the immaterial damage that is not the result of physical damage or material damage.

The immaterial damage that is consequential damage (or the immaterial consequential damage): the immaterial damage that is the result of physical or material damage.

### LIMITATION OF LIABILITY WITH REGARD TO STUDY CONTRACTS:

The sole purpose of the offered (or ordered) study contract is to better investigate the terms of reference as described in this document with the goal of producing a quotation for an installation that offers a solution for the requested terms of reference. The results thereof cannot continue as an executable design or plan and may not be used as such. Should the customer use the results of the study contract for other objectives than described above, we can never be held liable for possible errors, shortcomings or omissions. Any liability regarding this is emphatically rejected under these conditions. By having the study contract executed (i.e. ordered), the customer waives any recourse and the customer commits to indemnify us with regard to all claims due to damages or losses that may have occurred under these conditions.

## Overview of the CEMS-50 Ethanol CBD Extraction System

Sourced in China this is turnkey ethanol extraction equipment for making full spectrum CBD crude oil. This system can process 10 kilograms (22 lbs) of dried and shredded hemp flowers per hour. The basic system costs \$155,000, \$13,000 for installation and education and \$5600 for shipping. It will also require a 400 sq ft processing room and a separate room for drying and shredding. From this process can be expected.9 kilograms of crude oil per hour. Delivery time is about 120 days and about two weeks to install and train staff at a rate of \$200/day plus travel and per diam.

This turnkey set up comes with all required cooling, heating and vacuum.

The main processes of this system are:

- dehydration unit
- shredding unit
- chilling section for taking cane ethanol down to 40°C for cold extraction
- extraction section for biomass extraction
- filtration section
- evaporation section for recovering ethanol
- concentration section for making full spectrum OK oil

With an add on Molecular Distillation System that will cost an additional \$29,500 the system will produce .675 kilograms of distillate per hour.

With an additional add on of a Crystallizing System costing \$17,000 isolates can be produced at a volume .4kg per hour from the same 10Kg/hr of dried and shredded flowers.

## Hawaii Hemp Industry Opposed to Including Hemp Cannabinoids in Rec Cannabis Bills

Pull all hemp, *including* cannabinoid hemp, out of the recreational marijuana bills, HB 2600 and SB 3335. See letter addressed to the members of the legislature for additional detail, file named, *Answers\_to\_Questions\_Hemp\_Impacts\_from\_Rec\_Cannabis\_Bills\_240124\_signed.pdf*

1. The USDA and FDA will be addressing the cannabinoid hemp issues this year, changing and establishing new regulations. It makes no sense to establish a new regulatory structure in Hawaii for hemp at this point, especially since the problem gummy and vape products, which are imports, are not legal and the authority for the state to enforce on these products in Hawaii has been established and confirmed by federal court, according to DOH. The problem is an enforcement issue.
2. Data from experts shows that co-mingling regulatory programs, legislation, or rules for marijuana (a federally illegal schedule 1 drug) with hemp (a federally legal crop) can result in the loss of essential business services such as banking and insurance to all hemp sectors (building, fiber, food, CBD).
3. If Hawaii hemp farmers, processors, and manufacturers lose their hemp business services such as banking, nutrition, they can't afford the services offered to marijuana businesses. Monthly banking fees for marijuana businesses average \$2,500 per month (range \$1,500 to \$5,000).
4. It is more costly for the state to include in the cannabis commission regulatory framework.
5. The American Banking Association does not want the risk of providing financial services to any hemp business because of the co-mingling of hemp and high THC cannabis policy and regulations in several states.
6. Despite what the director of the Oregon Liquor and Cannabis Commission may have stated about the hemp industry in Oregon last week, we have confirmed that hemp farmers and hemp processors and manufacturers have been impacted in Oregon by the regulatory structure has impacted business services. Ken Iverson of Iverson Farms - <https://www.iversonfamilyfarms.com> - one of Oregon's largest hemp farms and farmers has been told by his bank and insurance company that he will lose both services if he grows hemp this year. Ken does not grow for intoxicating products. The OLCC must not be aware of this situation.
7. 2023, Whitney Economics testified before the Oregon Legislature confirming that hemp farmers and processors have lost \$75 million to \$100 million due to the change in cannabis regulatory policy in Oregon that placed cannabinoids under the OLCC.
8. There are no functional regulatory gaps regarding hemp in Hawaii. There *is an enforcement gap* on illegal products such as high THC gummies and vaping, which are imports. It is

easy to identify illegal products and sweep them off the shelves. See regulatory structure on next page.

9. Hawaii is a unique agricultural state, especially given our islands and geographic spread. Often what works on the mainland for agriculture (farming methods, cultural and regulatory structures) does not work here. Hawaii's hemp industry (what is grown and made here – not imports) is different from the mainland with much smaller farm sizes, restraints for processing due to being an island state, no multi-state operations (MSOs), no legal gummy or food or beverage products, and Hawaii hemp farmers are still rebounding from onerous rules that prevented farmers from moving hemp off their farms for years, etc. The Legislature can't guarantee that Hawaii hemp farmers and businesses will not lose their banking, insurance, or other hemp business services as a result of this proposed cannabis regulatory framework. No hemp farmer, processor, or manufacturer should be put out of business because the state legalizes recreational marijuana.

---

## SUMMARY OF EXISTING HEMP REGULATIONS IN HAWAII

### Cultivation, Processing, Manufacturing

#### I. CURRENT CULTIVATION REGULATIONS

##### USDA

- Must pass FBI background check and fingerprinting for a license to cultivate,
- Every planting is entered into USDA database and the designated purpose of the planting, e.g. food, cannabinoid, hempcrete, etc.
- Every harvest requires inspection and testing by USDA approved laboratory,
- Every harvest must pass USDA inspection and lab test or crop is destroyed,
- Each hemp variety or planting area requires a separate test,
- All lab tests must be entered into USDA database,
- Law enforcement has 24/7 access to USDA database and can see where all hemp plants are in real time as well as designated use of plants after harvest

##### HI DOA

- Requires USDA license,
- Act 263, 2023: 300 ft buffers from public spaces such as parks and schools and 100 ft of dwellings not owned or controlled by the hemp licensee, except for farms that were part of the initial hemp pilot project,
- Law enforcement may enter at any time if there is sufficient concern marijuana is being grown illegally,

#### II. CURRENT TRANSPORTATION REGULATIONS

##### HI DOA

- Transport of harvested hemp can only be between USDA licensed farms or a licensed processor,
- All hemp transportation must be reported to the State DOA,
- All transport must include a copy of the farmers USDA license and lab test,

**III. CURRENT PROCESSING REGULATIONS (applies to cannabinoids only) – HI DOH**

- Must apply to DOH for a processing license,
- Must pass background check or have USDA hemp license with passed FBI background check
- Requirements and restrictions for a processing license,
- Act 263 (no rules yet) - Hemp farmers may process in non-permitted agricultural buildings and Food Hubs if the farmers are using non-volatile compounds or compressed gases, e.g. extracting hemp oil using ice, water, or coconut oil. Buildings must be enclosed structures such as steel retrofitted shipping containers.
- Must comply with good manufacturing processes,
- Concentrated hemp extract may not be sold to consumers.

**IV. CURRENT MANUFACTURING REGULATIONS (applies to cannabinoids only)**

For using hemp cannabinoids as an ingredient in a hemp cannabinoid product:

- Only legal hemp cannabinoid products are tinctures and external products such as lotions, salves, soaps, etc.
- Manufacturing should follow good manufacturing processes,
- All final products sold to consumers must be tested to the highest requirements for any hemp CBD products of any state in the U.S.,
- Lab reports (certificate of analysis) must be posted on company websites for every batch of CBD products manufactured so the public can see for themselves the products are compliant with THC levels, accurate regarding compounds advertised, and free of pollutants (metals, mycotoxins, etc.)
- Act 263 (HB 1359): Labels must disclose where (the origin) of where the hemp was grown for all hemp products, including CBD, and must state, if the origin is not Hawaii where the hemp was grown and percentages if it is a mixture of origins.
- Manufacturing location must be on label.
- Act 263 (HB 1359) gave DOH the authority to introduce new products and set THC dose limits. For instance, gummies and flower products are not currently legal. Act 263 allows DOH to set non-intoxicating limits for THC in new products, such as gummies. New 2024 legislative session introduced HB 2449/SB3138 that clarifies that DOH can add products by rules.