

Applications for Industrial Hemp

Half Moon Seminars
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Lombard, IL

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**What Does Hemp Look Like to
You?**

Hemp looks like this.

\$500 million worth of imported industrial hemp contributes to U.S. hemp products, like food, fibers, medicine and parts. Infrastructure manufacturers make hemp more. In 3 months, 1 acre of hemp can produce 4 tons of hemp seed, yielding more than 11,000 gallons of oil. Learn more at TNhemp.org

#TN4Hemp

Photo: iStockphoto.com/Robert G. Thompson



Hemp looks like this.

I am hemp. Less than 3% THC, over 75 U.S. manufacturers make hemp products, like clothing, jeans and more. Hemp is largely imported from Canada & China, but we could make it legal to grow in here. Learn more at TNhemp.org

#TN4Hemp



This product by HempBacon.com, New Jersey

Hemp looks like this.

I am hemp. Less than 3% THC, over 75 U.S. manufacturers make hemp products. Hemp seeds are a nutritious super-food in the growing health food market. You can eat the seed but not grow it. Help free this market for U.S. Farmers. Bring the hemp market home. We need your help! tnhemp.org

#VoteHemp



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Hemp looks like this.

I am hemp. Less than 3% THC, over 75 U.S. manufacturers make hemp products, like drought resistant biofuel crops with 92% efficiency, compared to other biofuels. The U.S. production of biofuel is not growing & employ hemp for the nation? Learn more at TNhemp.org

#TN4Hemp



Hemp looks like this.

I am hemp. Less than 3% THC, over 75 U.S. manufacturers make hemp products. The first concrete house is fire proof, mold proof and offers the ultimate healthy living. 85% of this house's furniture & cabinetry is also made of hemp. This is the future. tnhemp.org

#VoteHemp



Hemp looks like this.

I am hemp. Less than 3% THC, over 75 U.S. manufacturers make hemp products. This handbag is partially made of hemp, good-looking and eco-friendly products. Chemicals can disrupt our endocrine systems & pollute our environment. Hemp is a safer option. tnhemp.org

#VoteHemp



This product was featured at HempBacon.com, USA

Hemp looks like this.

I am hemp. Less than 3% THC, over 75 U.S. manufacturers make hemp products, like building materials, including composite board & hempcrete. Hemp is largely imported from Canada & China, but gov's could make it legal to grow here. Learn more at TNhemp.org

#TN4Hemp



This product was featured at HempBacon.com, USA

Hemp looks like this.

I am hemp. Less than 3% THC, over 75 U.S. manufacturers make hemp products. This isn't a toy car. It's the first a passenger electric car with a hemp body. VoteHemp.org



Hemp looks like this.

I am hemp. Less than 3% THC, over 75 U.S. manufacturers make hemp products. These bio-plastic ski goggles are partially made of hemp. They are lighter than other frames on the market. They have a hemp air vent system. It is legal to buy hemp products but illegal to grow it. tnhemp.org

#VoteHemp



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Hemp looks like this.

I am hemp. Less than 3% THC, over 75 U.S. manufacturers make hemp products. This hemp shoe is durable. It is a better material for your feet & an environmentally stable choice. tnhemp.org #VoteHemp



©2016 Chuck Taylor® made by Converse

TN 
HEMP
TNHEMP.ORG
 @TNhemp | fb.com/TNhempOrg

Hemp looks like this.

I am hemp. Less than 3% THC, over 75 U.S. manufacturers make hemp products. These hats are made of hemp. Hemp is durable, good-looking and creates responsible products. Chemicals can disrupt our endocrine systems & pollute our environment. Hemp is a safer option. tnhemp.org

#VoteHemp



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Talking Points

- Brief History
- Medicinal Uses
- Paper
- Textiles
- Biodegradable Plastics
- Construction Materials
- Fuel
- Food

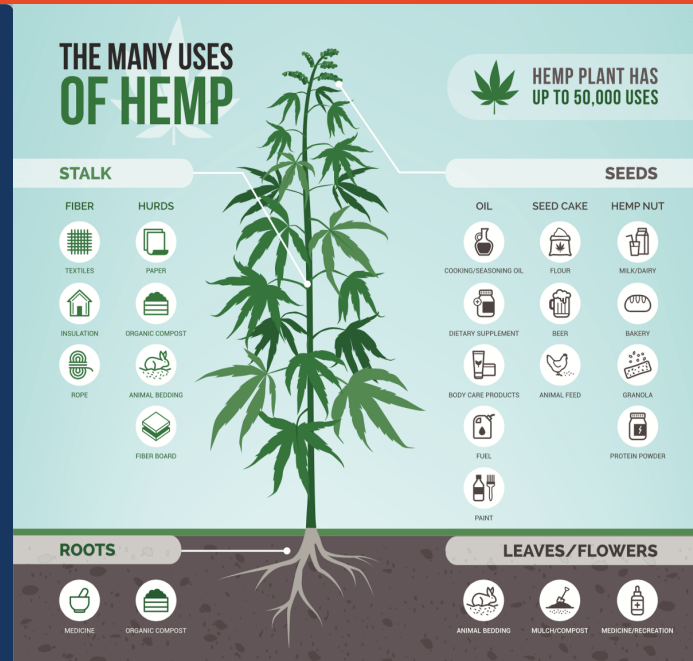


Image Credit: Aaron Cadena

Industrial Hemp

- *Cannabis sativa*
 - *Hemp vs Marijuana*
- Dicotyledonous Plant
- Primarily Dioecious
- Hemp is Photoperiod Dependent
 - Short-Day
 - 10-12 hours darkness

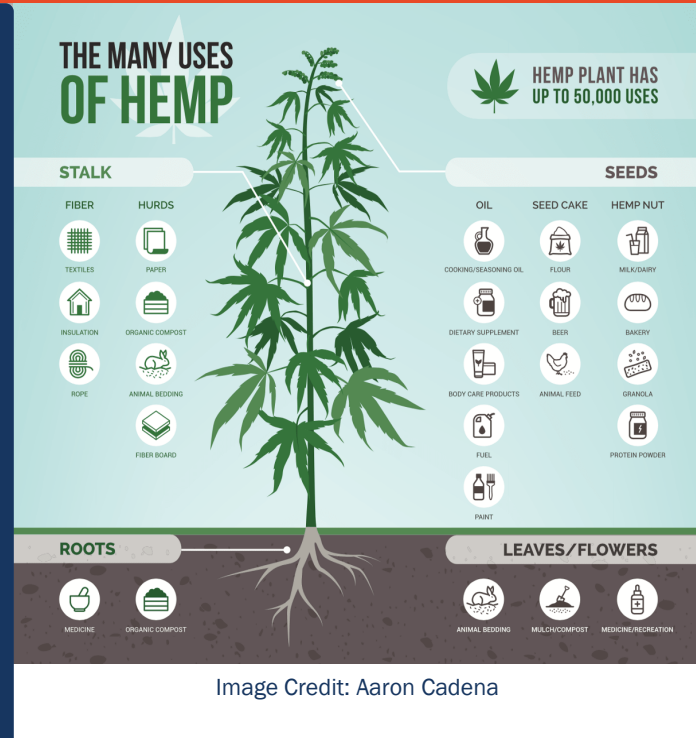
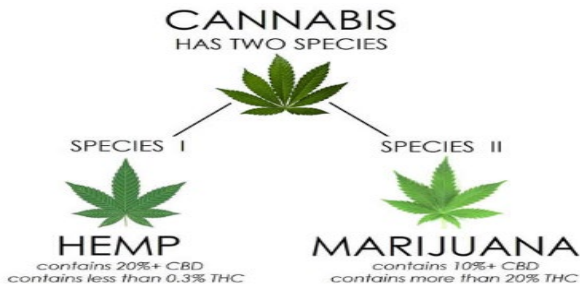


Image Credit: Aaron Cadena

THE CONSPIRACY



William Randolph Hearst



Lamont DuPont



Andrew Mellon

Jack Herer's book *The Emperor Wears No Clothes* is the prime source for the hemp-conspiracy theory. It alleges that in the mid-1930s, when the new mechanical hemp fiber stripping machines to conserve hemp's high-cellulose pulp finally became state of the art, available and affordable, **William Randolph Hearst**, with enormous holdings in timber acreage and investments in paper manufacturing, stood to lose billions of dollars and perhaps go bankrupt. Meanwhile, **Lamont DuPont** in 1937 had just patented nylon and a new sulfate/sulfite process for making paper from wood pulp – so if hemp had not been made illegal, 80 percent of DuPont's business would never have materialized.

It was said Hearst and DuPont had a multi-million dollar deal in the works for a joint papermaking venture. These two moguls, together with DuPont's banker, **Andrew Mellon**, combined and co-ordinated their efforts to demonize "marijuana".

The sheer number of newspapers, tabloids, magazines and film reels that Hearst controlled enabled him to quickly and effectively inundate American media with his propaganda. Hearst preyed on existing prejudices by associating cannabis with Mexican workers who he said threatened to steal American jobs and also African-Americans. With no strong voice to the contrary, Hearst was persuasive in his appeal to prejudice.

Slide Credit: Sean Murphy

CONTROLLED SUBSTANCES ACT OF 1970



The Controlled Substances Act of 1970 (CSA, 21 U.S.C. §801 et. seq.) classifies marijuana as Schedule I controlled substance, placing it among the most harmful and dangerous drugs. Marijuana meets the criteria because of its THC content, which is a "psychoactive hallucinogenic substance with a high potential for abuse."

A key classification made by the CSA regarding marijuana was its broad definition of the drug. The CSA defines marijuana as follows: "The term "marihuana" means all parts of the plant *Cannabis sativa* L., whether growing or not; the seeds thereof; the resin extracted from any part of such plant; and every compound, manufacture, salt, derivative, mixture, or preparation of such plant, its seeds or resin.

This effectively placed the entire use of the hemp plant, whether for drug use or as industrial hemp, squarely under the control of the CSA. Therefore, the DEA views industrial hemp (even that containing less than 3% THC) as the same as marijuana grown for drug use (which commonly contains a 24% THC level, or eighty times more THC).

Strictly speaking, the CSA does not make growing industrial hemp illegal; rather, it places strict controls on the production of hemp, making it illegal to grow the crop without a DEA permit.

Slide Credit: Sean Murphy

HEMP GOES GLOBAL



Approximately 30 countries in Europe, Asia, and North and South America currently permit farmers to grow hemp.

China is among the largest producing and exporting countries of hemp textiles and related products, as well as a major supplier of these products to the United States. The European Union has an active hemp market, with production in most member nations. Production is centered in France, the United Kingdom, Romania, and Hungary.

Acreage in hemp cultivation worldwide has been mostly flat to decreasing, reported at about 200,000 acres globally in 2011. Although variable year-to-year, global production has increased overall from about 250 million pounds in 1999 to more than 380 million pounds in 2011, mostly due to increasing production of hemp seed. Upward trends in global hemp seed production roughly track similar upward trends in U.S. imports of hemp seed and oil, mostly for use in hemp-based foods, supplements, and body care products.

Slide Credit: Sean Murphy

CBD Hemp (Specialty Crop)

- **Planting Stock:**
Transplants
- **Planting Method:**
Transplanter
- **Planting Rate:** 1000-2000 plants/acre
- **Harvest Method:**
Hand
- **Post Harvest:** Plants are hung to dry in drying sheds or warehouse



CBD Hemp Production



Cannabinoids

- Cannabis hemp contains at least 85 types of cannabinoids
- Bind to receptor sites throughout our brain and body (65 cellular targets)
- Different cannabinoids have different effects depending on the receptors they bind to

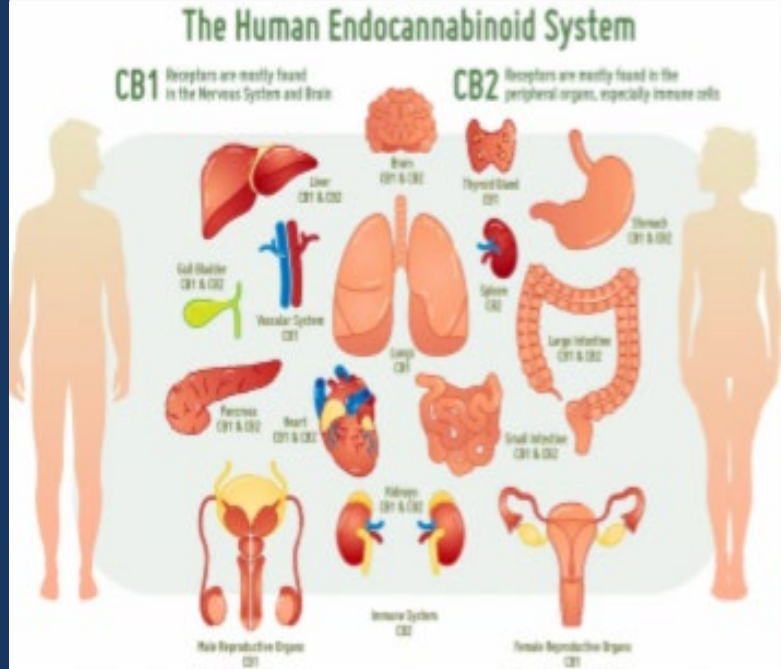


Image Credit: SatiMed USA

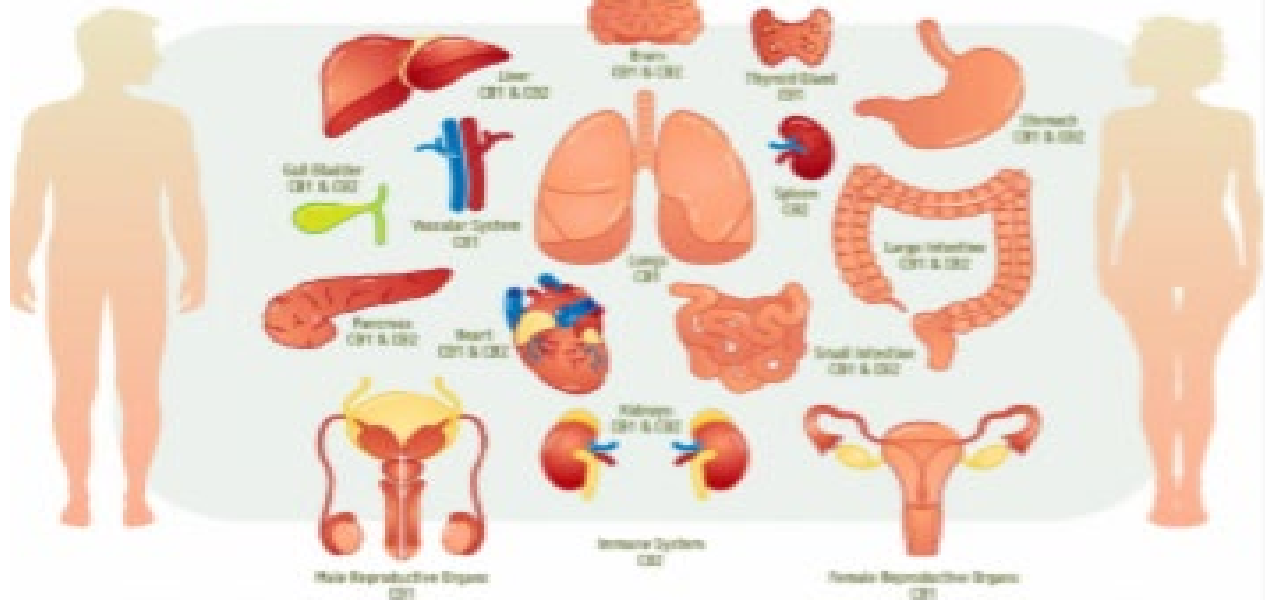


Cannabinoids

The Human Endocannabinoid System

CB1 Receptors are mostly found in the Nervous System and Brain

CB2 Receptors are mostly found in the peripheral organs, especially immune cells



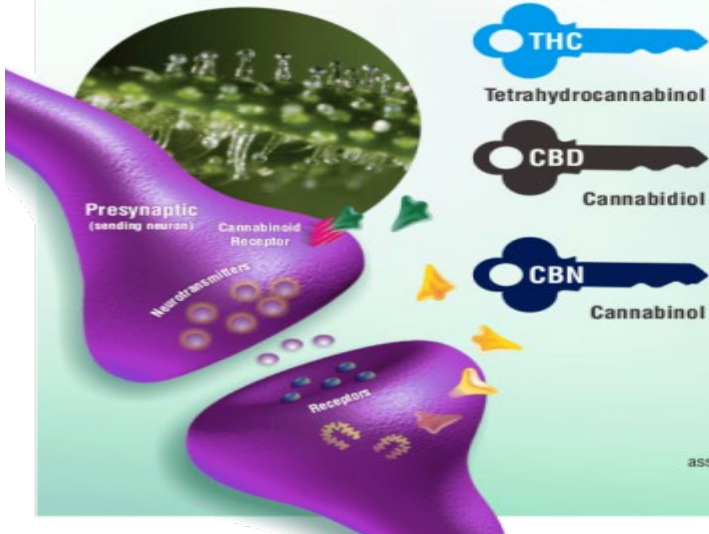
Cannabinoids

The Human Endocannabinoid System

CBD, CBN and THC fit like a lock and key into existing human receptors. These receptors are part of the endocannabinoid system which impact physiological processes affecting pain modulation, memory, and appetite plus anti-inflammatory effects and other immune system responses. The endocannabinoid system comprises two types of receptors, CB1 and CB2, which serve distinct functions in human health and well-being.

CB1 receptors are primarily found in the brain and central nervous system, and to a lesser extent in other tissues.

Receptors are found on cell surfaces



CBD does not directly "fit" CB1 or CB2 receptors but has powerful indirect effects still being studied.



CB2 receptors are mostly in the peripheral organs especially cells associated with the immune system.





Cannabinoids

- May help treat symptoms of many medical conditions
 - Mood/Eating/GI disorders
 - Neurological disorders
 - Pain/Sleep disorders
- Different cannabis varieties produce different ratios of cannabinoids
- Pretreatment with CBD significantly reduced anxiety, cognitive impairment and discomfort in their speech performance*

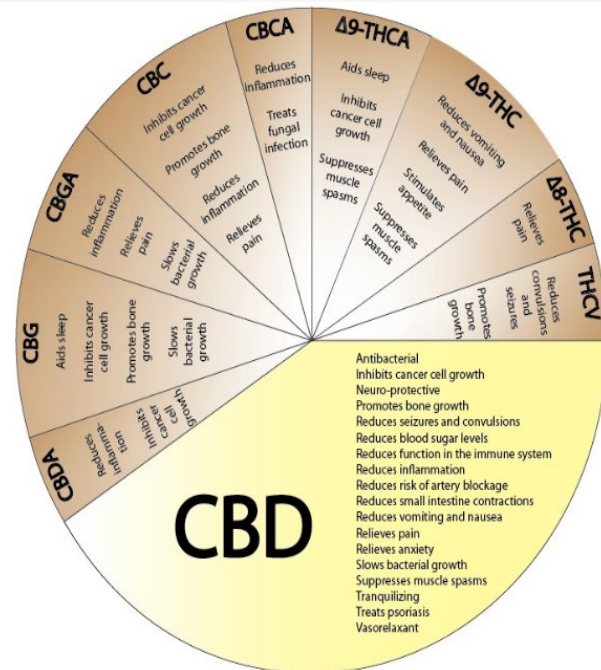


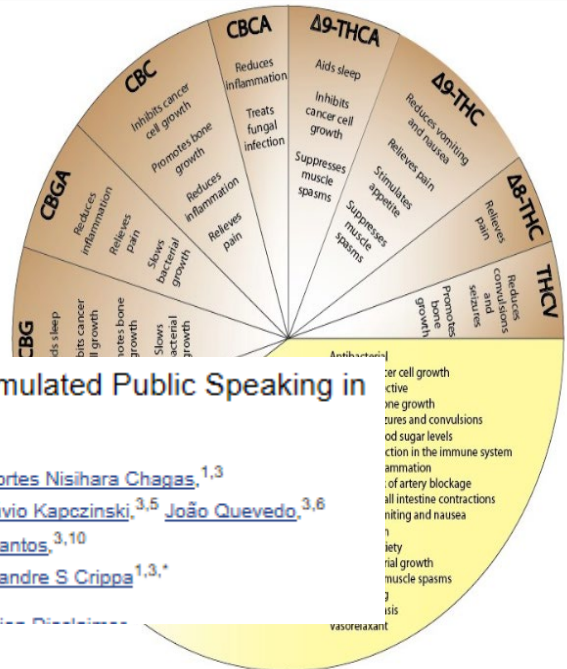
Image Credit: CBDCrew.org



Cannabinoids

- May help treat symptoms of many medical conditions
 - Mood/Eating/GI disorders
 - Neurological disorders
 - Pain/Sleep disorders

- Different cannabis varieties



proc
cani Cannabidiol Reduces the Anxiety Induced by Simulated Public Speaking in
Treatment-Naïve Social Phobia Patients

- Pret
sign
cogr
discomfort in their speech
performance*
- [Mateus M Bergamaschi, 1,2,3](#) [Regina Helena Costa Queiroz, 2,3](#) [Marcos Hortes Nisihara Chagas, 1,3](#)
[Danielle Chaves Gomes de Oliveira, 1,3](#) [Bruno Spinosa De Martinis, 3,4](#) [Flávio Kapczinski, 3,5](#) [João Quevedo, 3,6](#)
[Rafael Roesler, 3,7](#) [Nadia Schröder, 3,8](#) [Antonio E Nardi, 3,9](#) [Rocio Martín-Santos, 3,10](#)
[Jaime Eduardo Cecílio Hallak, 1,3](#) [Antonio Waldo Zuardi, 1,3](#) and [José Alexandre S Crippa 1,3,*](#)

Image Credit: CBDcrew.org

Cannabidiol (CBD)

- CBD is found within the oil/resin glands (trichomes) **NOT** in the seeds
 - Flowers and leaf material
 - **Males MUST** be culled
- CBD is not psychoactive
- CBD is extracted from the plant material
 - Supercritical CO₂
 - Butane/Propane
 - Alcohol/Ethanol



Closeup of female cannabis flower
Photo Credit: Steve Tomlins



Cannabidiol (CBD)

- Most lucrative area of hemp production
- Hemp-derived CBD is available in many forms, concentrations due to processing strategies



Closeup of female cannabis flower
Photo Credit: Steve Tomlins




Full spectrum	Concentrated and filtered	Isolate powder
~10% CBD	~25% CBD	~99% CBD
		

Image Credit: hempmedspx.com

Industrial Hemp

Hemp is harvested for three things:

Stalk



Seed



Flower

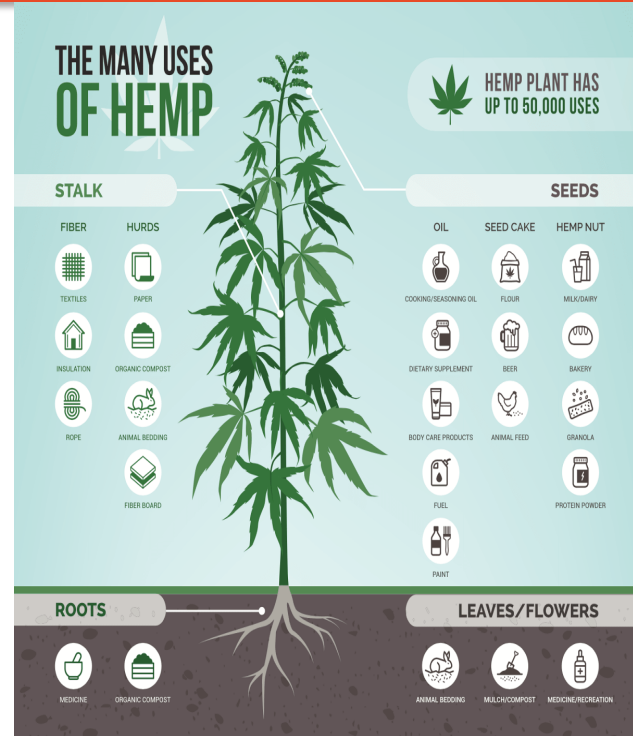


Photo Credit: Natrij- Public Domain



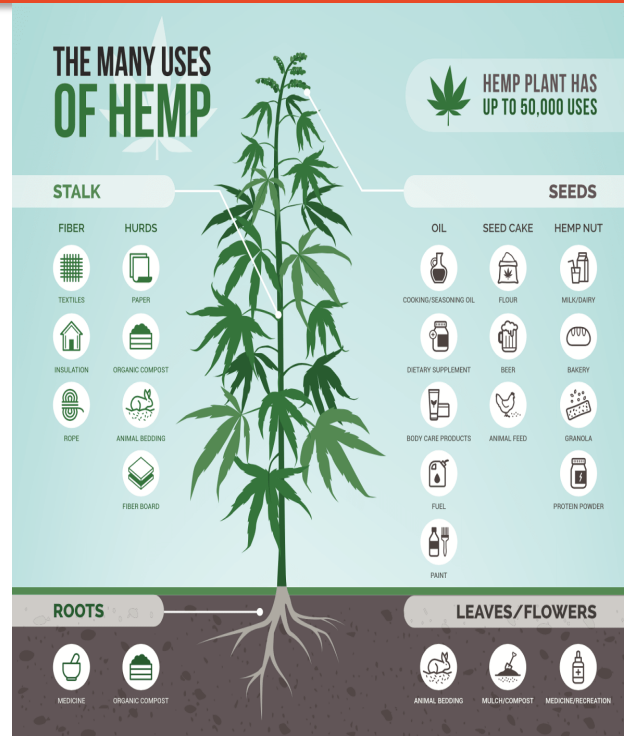
Types of Hemp

- Grain
 - Small Grains (Wheat)
- Fiber
 - Forages (Hay)
- CBD
 - Specialty Crops (Tomatoes)



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Talking Points

THE MANY USES OF HEMP



HEMP PLANT HAS UP TO 50,000 USES

STALK

FIBER



TEXTILES



INSULATION



ROPE

HURDS



PAPER



ORGANIC COMPOST



ANIMAL BEDDING



FIBER BOARD

ROOTS



MEDICINE



ORGANIC COMPOST

SEEDS

OIL



COOKING/SEASONING OIL



DIETARY SUPPLEMENT



BODY CARE PRODUCTS



FUEL



PAINT

SEED CAKE



FLOUR



BEER



ANIMAL FEED

HEMP NUT



MILK/DAIRY



BAKERY



GRANOLA



PROTEIN POWDER

LEAVES/FLOWERS



ANIMAL BEDDING



MULCH/COMPOST



MEDICINE/RECREATION





Fiber Hemp (Hay/Forages)

- **Planting Stock:** Seeds
- **Planting Method:** Grain Drill, Broadcast
- **Planting Rate:** 50-70 lbs./acre
- **Harvest Method:** Mower, Baler
- **Post-Harvest:** Bales are stored at 15% moisture



Hemp Fiber Ready to Be Mowed Down



Hemp Fiber After Being Mowed

Photo Credit: Canadian Hemp Trade Alliance



Fiber Hemp (Hay/Forages)

- Hemp stalks are the stem of the plant.
- To harvest hemp stalks, you mow them down in the field and gather them into a bale.
- Baled hemp stalks can be transported to a decortication mill to be processed.



Hemp Fiber After Being Mowed



Baled Hemp Fiber

Photo Credit: Canadian Hemp Trade Alliance



Fiber Hemp

- Decortication is a word that comes from how the hemp stalks are processed.
- The goal is to separate the fiber from the woody core of the stalk, so we "DE-core" or decorticate the hemp.
- When you decorticate the stalks, three products are made



Hemp Stalk: Bast and Core
Photo Credit: Hemp Gazette

Fiber



Photo Credit: Sundstrand

Hurd



Photo Credit: Plains Hemp

Dust Pellets

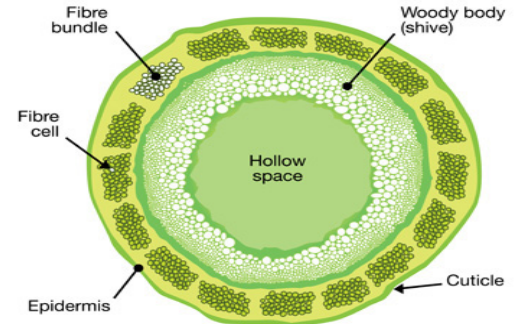


Photo Credit: New Age Hemp



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Fiber



Photo Credit: Sundstrand

Hurd



Photo Credit: Plains Hemp

Dust Pellets

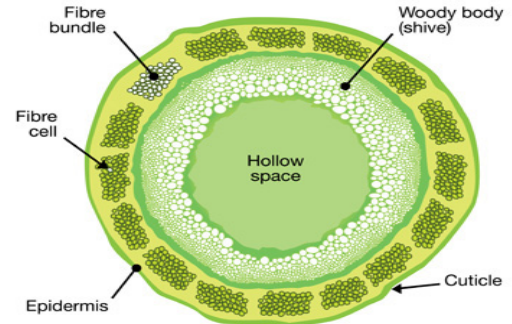


Photo Credit: New Age Hemp



Fiber Hemp

- Fiber (Bast) is the most valuable product from decorticated stalks
 - Textiles
- Bast fiber from hemp can be refined into traditional textiles, technical textiles, and other new use industrial products.
- Hemp fibers make up about 25-30% of the stalk's weight.



Fiber



Photo Credit: Sundstrand

Hurd



Photo Credit: Plains Hemp

Dust Pellets



Photo Credit: New Age Hemp



Hemp Fiber

- All raw decorticated products can be further refined into specialized materials that are:
 - Sustainable
 - Durable
 - Hypoallergenic
 - Highly absorbent
 - Mold resistant



Fiber

Hurd

Dust Pellets





Hemp Paper

- Hemp paper lasts longer and is more durable than conventional wood pulp papers
- Trees for paper take many years to mature; hemp takes 4 months



Photo Credit: TerraMuse



Hemp Paper

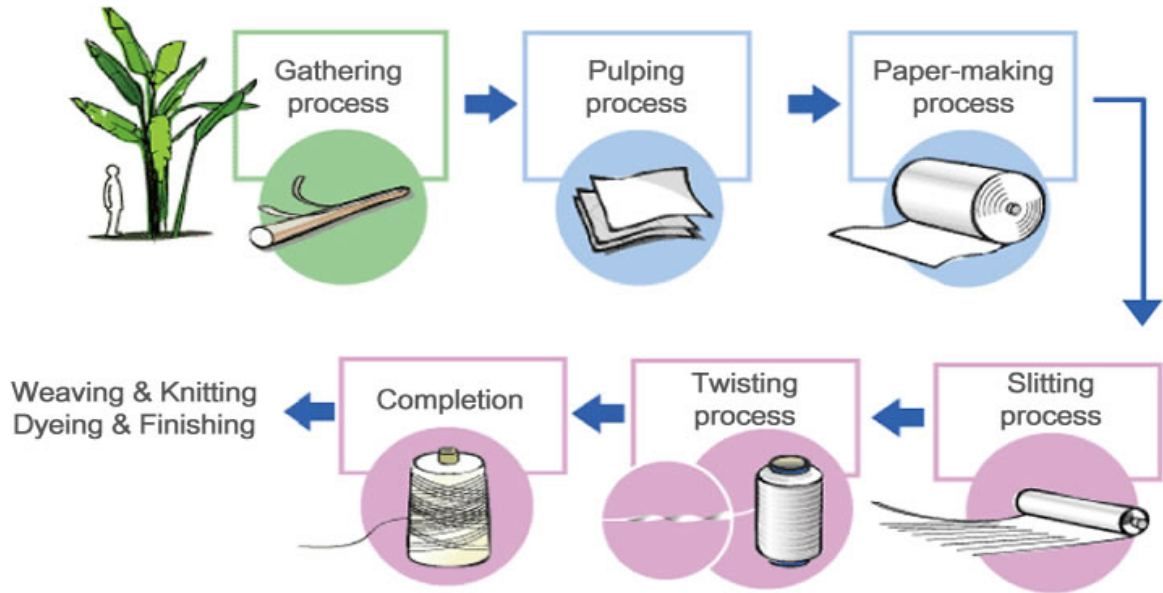


Photo Credit: Montbell

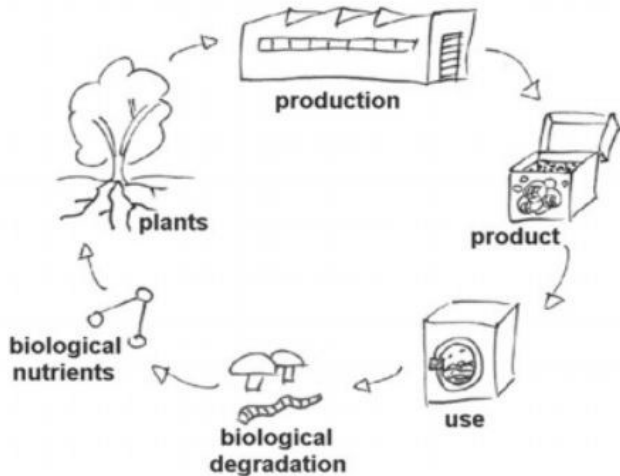
Hemp Plastic

- Conventional plastics are petroleum based and not sustainable; take more than 100 years to break down and release harmful gasses
- Hemp plastics are biodegradable
- Hemp plastics are plant based and sustainable

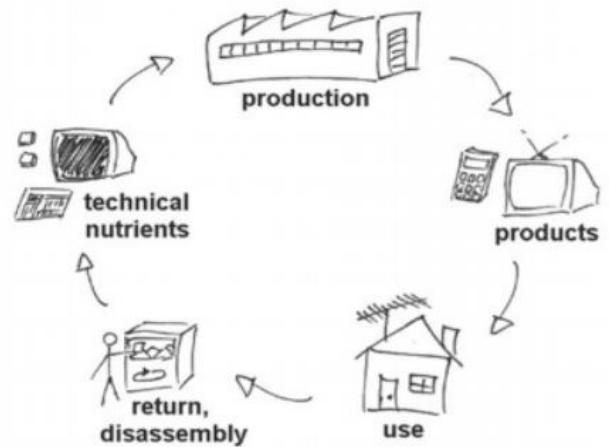


Photo Credit: Return of Hemp

Hemp Plastic



Biodegradation Cycle



Standard Recycling

Photo Credit: Hemp News



Bast Fiber- Cottonized



Photo Credit: HydrogenLink



Bast Fiber- Textiles



Men's Trail Harbor Pocket Tee



Men's Back Step Shorts



Men's Lightweight All-Wear Hemp Pants



Women's Trail Harbor Tee



Women's Garden Island Shorts



Women's Garden Island Dress





Core – “Hempcrete”



Photo Credit: OregonHempWorks



Photo Credit: JustBioFiber



Bast Fiber Board



Photo Credit: Kentucky Hemp Industries Association



Bast Fiber- Insulation



Photo Credit: Ecobati



Bast Fiber Composites

Hemp Fiber



Non-Woven Mat



Finished Door

Pre-Finished Door

Photo Credit: Eric Pollitt



Varnish





Hemp Oakum





Rope and Cardboard



Photo Credit: Townsends



Photo Credit: Kentucky Hemp Industries Association



Geotextiles



Photo Credit: AECWEB



Syngas and Solvents

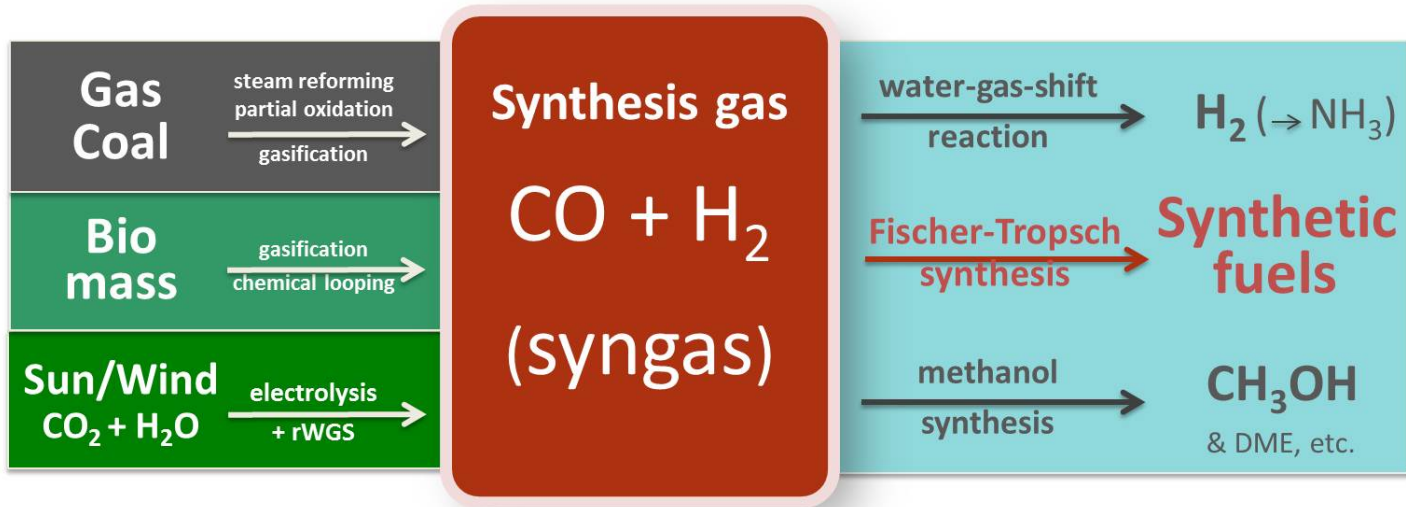


Photo Credit: SyngasChem



Biodiesel

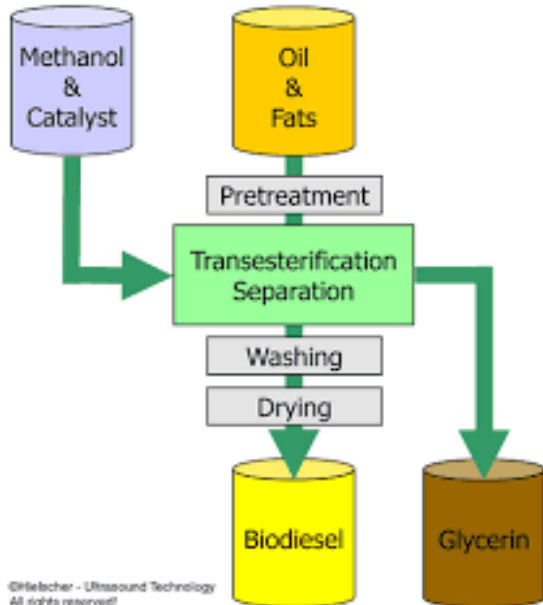


Photo Credit: The Hemp News



Ethanol

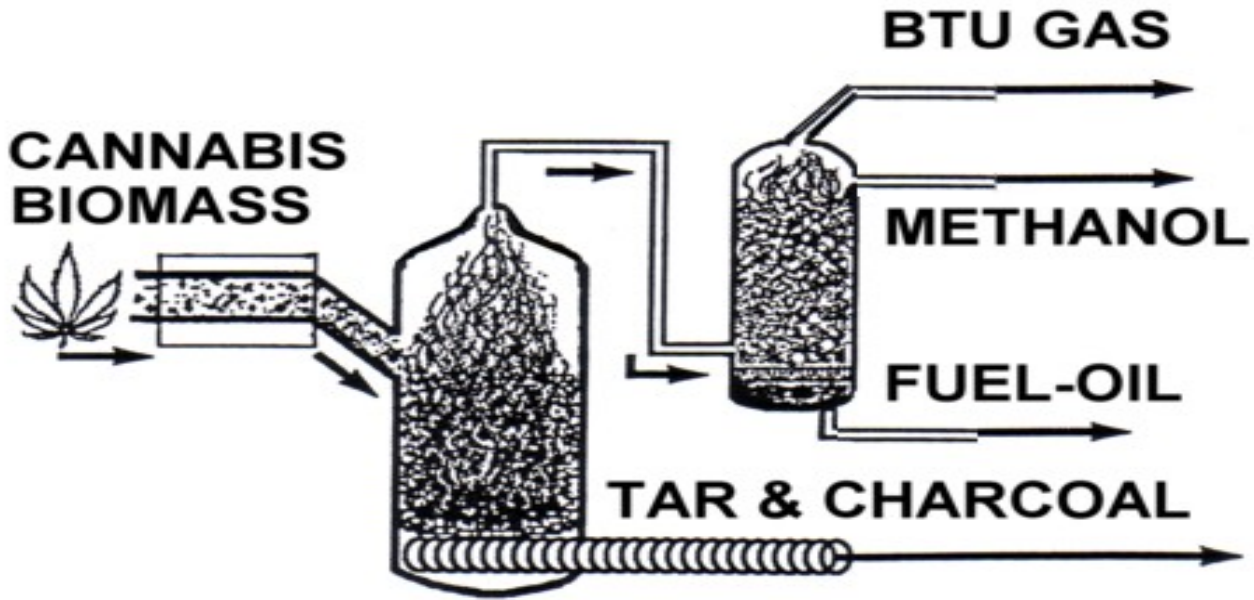


Photo Credit: True Democracy Party



Grain Hemp (Small Grains)

- **Planting Stock:** Seeds
- **Planting Method:** Grain Drill, Broadcast, Corn Planter
- **Planting Rate:** 25-35 lbs./acre
- **Harvest Method:** Combine
- **Post-Harvest:** Dry grain in aeration bins immediately



Male Plant



Female Plant



Hemp as Food!

- Hemp seeds are located at the top of the hemp plant
- Most acres of hemp being grown today are grown for hemp seed.
- Harvesting hemp seed can be tricky





Hemp as Food!

- Hemp seed products are high in complete proteins and healthy unsaturated fats
- Hemp seeds and oil can spoil quickly if not handled correctly
- Hemp seed cake can be used as a nutritious animal feed or ground into high protein flour for human consumption



Grain Hemp

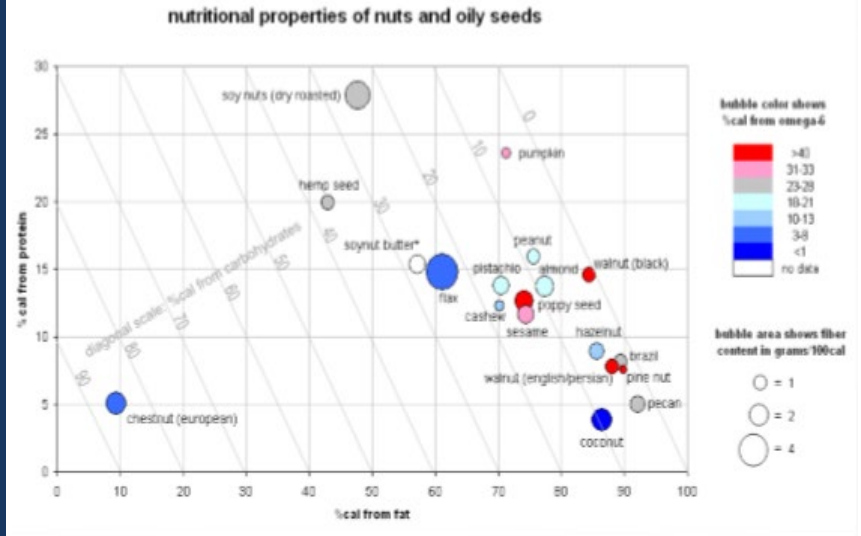
- Hemp seeds are high in complete proteins and healthy saturated fats
- Hemp seed oil (NOT CBD) can be extracted
- Has potential to be used in both animal and human feed
- Storage of both seeds and oil to prevent spoilage is critical





Hemp as Food!

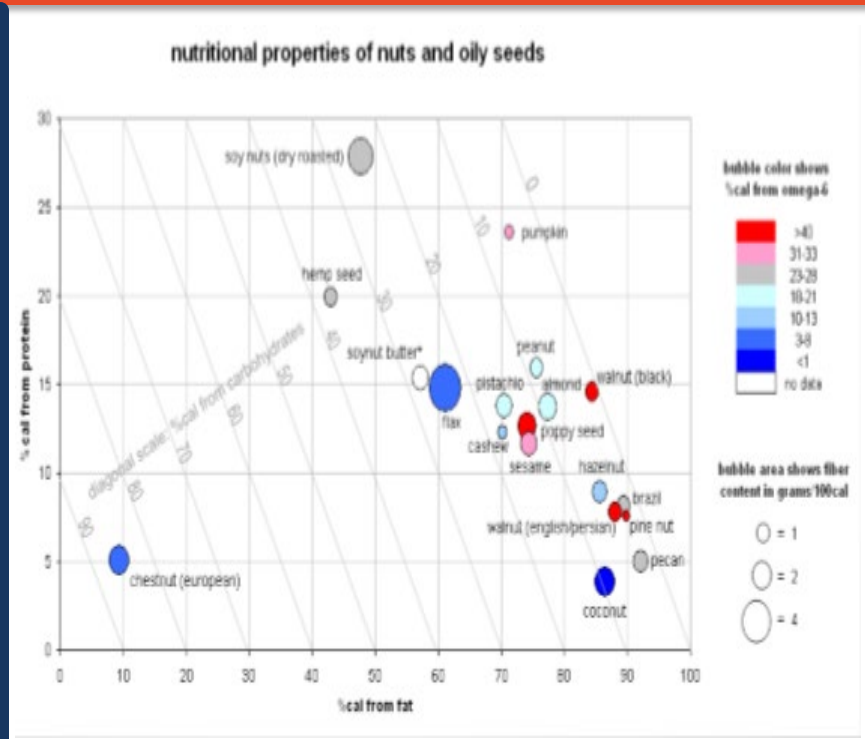
- Hemp seed's nutritional profile is comparable if not superior to other plant based foods
 - Protein
 - Fiber
 - Iron
 - Magnesium
 - Phosphorous
 - Etc.





Hemp as Food!

- Hemp seed's nutritional profile is comparable if not superior to other plant based foods
 - Protein
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 - Etc.



THANK YOU!!!!

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