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Imagine a crop more versatile than soybeans, cotton, and the Douglas fir

"Make the most you can of the Indian Hemp seed and sow it everywhere."

— George Washington, 1794

PRODUCTS: Discover hemp's 25,000 uses—from cardboard, construction products, cosmetics, fabrics, and foods to inks, paper, and plastics.

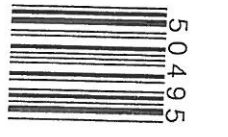
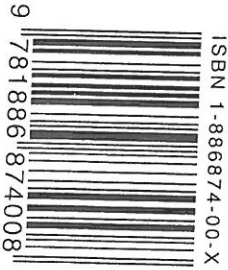
JOBS: Learn how the growing demand for industrial hemp products is creating thousands of new jobs and businesses.

ENVIRONMENT: Hemp grows without any pesticides or herbicides, and conserves oil and timber resources.

"Industrial Hemp eloquently shows how hemp can create new jobs while improving our environment."

— Paul Hawken, author of *Growing a Business* and *The Ecology of Commerce*

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The Industrial Hemp Information Network • Ojai, California

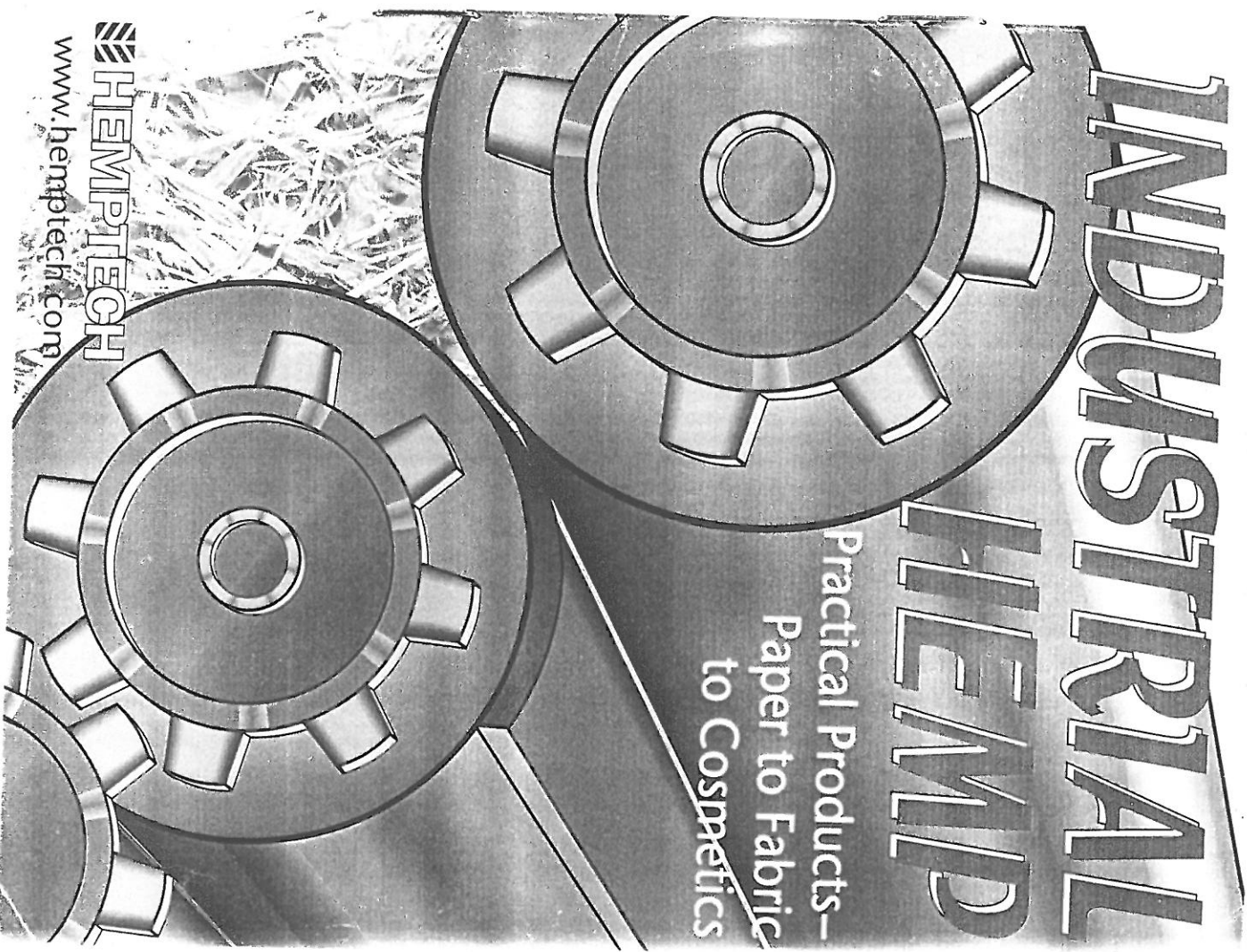


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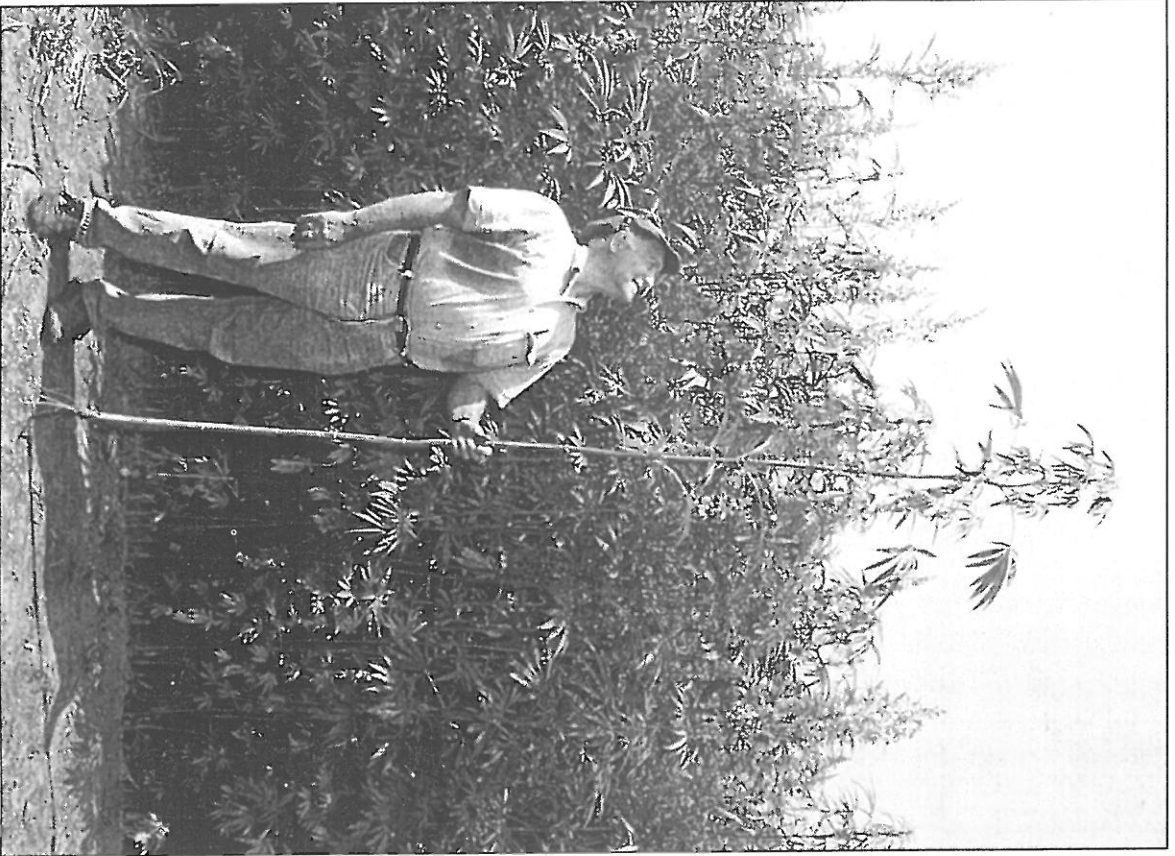
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HEMPTECH
www.hemptech.com



In Ontario in August, 1994, just 70 days after planting, Joe Strobel of Hempline, Inc., admires a 10-foot hemp plant, grown for the first time in over 40 years under a research licence issued by the Canadian federal government [photo © 1994 by Geof G. Kime].

INDUSTRIAL HEMP

Practical Products—
Paper to Fabric to Cosmetics

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The Industrial Hemp Information Network

Introduction

Imagine a crop more versatile than the soybean, the cotton plant, and the Douglas fir tree put together...one whose products are interchangeable with those from timber or petroleum...one that grows like Jack's beanstalk with minimal tending. There is such a crop: industrial hemp.

For decades, hemp has been afflicted by a counterculture image. Today, the plant is being reevaluated as a vital agricultural crop on the order of corn, wheat, or cotton. This reassessment is taking place among a strong new coalition whose participants range from multinational corporations to farmers, entrepreneurs, and government officials. In fact, the 4.6-million-member American Farm Bureau Federation unanimously endorsed the researching and growing of industrial hemp at its January 1996 convention. This book explores how the burgeoning industrial hemp industry is working to transform the way in which thousands of vital products are made. This transformation will help create a profitable, sustainable 21st century.

Hemp was once indispensable to world commerce. New World colonists and traders were able to cross the Atlantic Ocean because the hemp ropes and sails of their ships, unlike other natural fibers, resisted salt damage. Not so long ago, it was inconceivable for an economy to function without hemp. The 1913 *Yearbook of the U.S. Department of Agriculture* called hemp "the oldest cultivated fiber

plant," mentioned how the crop improves the land, and said that it yields "one of the strongest and most durable fibers of commerce."

Then, in 1937, fiber hemp fell victim to the anti-drug sentiment of the times when the U.S. Congress passed the Marihuana Tax Act. The intent of this law was to prohibit the use of marijuana, but it created so much red tape that the production of industrial hemp became nearly impossible. Now hemp's natural fiber and seed oil were no longer available to compete with wood pulp, cotton, and such newly patented petroleum products as inks, paints, plastics, solvents, sealants, and synthetic fabrics.

The fact is that hemp grown for fiber, whether by George Washington in 1790, by Kentucky growers in 1935, or by English farmers in 1996, has never contained psychoactive qualities. If one were to roll leaves from an industrial hemp plant into a cigarette and smoke them, no euphoric effects would be experienced even if a thousand hemp cigarettes were smoked. The potentially psychoactive chemical in hemp is delta-9 tetrahydrocannabinol (THC). Industrial hemp contains one percent THC or less, while its distant cousin marijuana has a 3 to 15-percent content. Should California poppies, then, be plowed under because a distant member of the poppy family is grown for heroin? Yet this same logic is used to maintain the prohibition on hemp farming.

How do governments continue to justify the prohibition of hemp farming? Their primary justification is that the licensing of industrial hemp farms will lead to an increased supply of illegal marijuana. Yet the vast fields of fiber hemp grown from Great Britain to Russia have never been—*could* never be—used for drug trafficking. (Stands of fiber hemp are planted very closely together, and look noticeably different from cultivated marijuana.)

Hemp's versatility was explained in a 1938 *Popular Mechanics* magazine article, "New Billion-Dollar Crop": "Hemp is the standard fiber of the world... and can be used to produce more than 25,000

products." The list running throughout this book provides a sampling of hemp's cornucopia of products. Chapter 3 will highlight major hemp-product categories, from automobiles, construction materials, and body care products to paper, textiles, and even plastics.

Industrial hemp is a valuable, low-cost biological resource that can be grown in most climates. It is a hardy plant whose rapid growth and high resistance to diseases largely eliminate the need for costly herbicides or pesticides. Hemp can play an important role in rural economic development: new jobs and businesses can be created to produce hemp products, for both local consumption and marketing to other regions.

In his October 30, 1988, editorial in California's most conservative newspaper, *The Orange County Register*, senior columnist Alan Bock stated that "Since 1937, about half the forests in the world have been cut down to make paper. If hemp had not been outlawed, most would still be standing, oxygenating the planet."

Major hemp-growing countries today include Canada, China, England, France, Germany, and Hungary. These countries prohibit the cultivation of marijuana while allowing farmers to grow licensed hempseed varieties. It is becoming ever more clear how nations that still ban hemp production are missing an important economic opportunity. While the DEA asserts that hemp is only a novelty market, such major companies as Adidas, Calvin Klein, Armani, Mercedes Benz, The Body Shop, and Interface Carpets are all making use of industrial hemp. In April, 1998, an editorial in the *New York Times* said it best: "The marketplace, not myopic rules, should determine hemp's future in America."

Hemp will be like the Internet, which several years ago wasn't even on the corporate or government radar screen. By the turn of the 21st century, knowledge of hemp and its products will be spreading to homes and businesses throughout the world.

1

Hemp's Historical Role in Commerce

Few people today realize that hemp, genus *Cannabis sativa* L. of the mulberry family, was once so vital to world commerce.



Chinese ma symbol

Throughout the world for more than 6,000 years (some historians estimate 10,000 years), hemp has been relied upon to supply a wide range of essential products. In 4500 B.C. in China, hemp or *ma* was used for making ropes and fishnets. China later developed the world's first paper industry by using hemp to make scrolls. The great writings of Confucius and Lao Tzu were transcribed on hemp paper, which doesn't turn yellow or brittle, and thus that wisdom was handed down from generation to generation. China also cultivated the fiber for hempen cloth, and used hempsseed for food and oil.

Hemp Travels to Europe

Hempseeds and the knowledge of their use spread from Asia to the Mediterranean and on through Europe. In the area of Stuttgart, Germany, hemp-based rope and fabric dated at around 400 B.C. have been found. In 1886 *The Origin of Plants* stated, "Hiero II, King of Syracuse (270 B.C.), purchased hemp in Gaul for the cordage of his vessels."

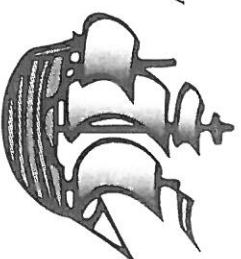
In the 14th century, the traditional Chinese art of making paper from hemp and flax rags arrived in Germany via Italy. The *cannas* on

which Renaissance artists painted took its name from the word *Cannabis*. Hemp's heyday in Germany was the 17th century, when about 375,000 acres were under cultivation. From the 16th to the 18th century, hemp and flax are known to have been the major fiber crops in Asia, Russia, Europe, and North America. Spanish, French, British, German, and Dutch trading ships, like the ships that brought colonists to America, were rigged with hemp ropes and sails. In the mid-1800s, France had more than 800,000 acres of hemp under cultivation. According to the 1913 *Yearbook of the U.S. Department of Agriculture*, "In 1846 M. Herbert sent from China to the Museum of Paris some seeds of the "tsing-ma," great hemp of China... the plants... grew tall, some of them measuring 21 feet."

Hemp Growing Required

In the North American colonies, hemp quickly became an indispensable raw material. Many of the American colonists' Bibles and maps were printed on hemp paper, and much of their lamp oil came from pressed hempseeds. Hemp production was so important for commerce that in 1640 the Governor of Connecticut declared that every citizen must grow the plant. In the 1700s and 1800s, Russia's number-one trading crop was hemp, which supplied sails and ropes for American, Canadian, and European ships. The high value placed on hemp helped create the first recycling business in America: old hemp and flax clothing, rags, and sails were converted into paper. Through trade with Spain, hemp rope and linen factories were developed in Mexico as well as in Central and South America.

America's founding fathers were strong advocates of a hemp-based economy for their new country. In fact, George Washington and Thomas Jefferson were themselves long-time hemp farmers.



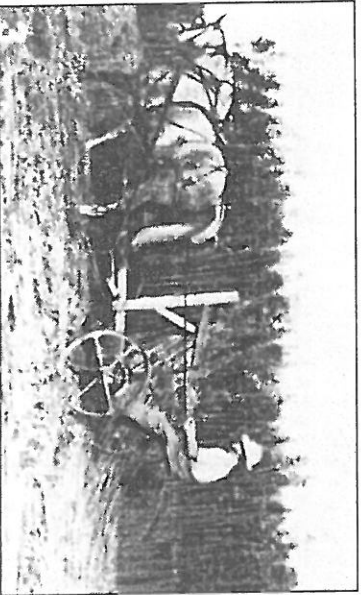
Early ships relied on hemp sails and rigging.



From a 1765 letter:
*"I am prepared to deliver... hemp in your port
 watered and prepared according to
 the Act of Parliament."*

— George Washington

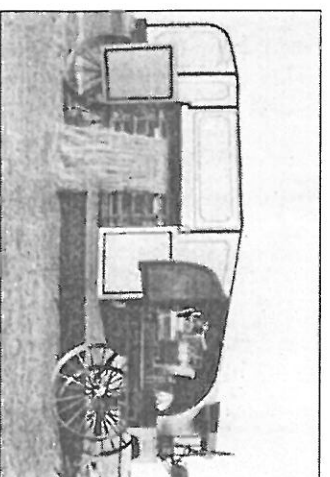
The first two drafts of the Declaration of Independence were written on hemp paper. The Daughters of the American Revolution sewed hemp linens for the Continental Army, without which more Revolutionary soldiers might have frozen to death at the battle of Valley Forge. Hemp rope, which is extremely strong, was used to rig the Early American Navy and Merchant Marine ships. In regions where hemp was prominent, dozens of places such as the following were actually named after the crop: Hempfield, PA; Hemphill, TX; Hemphill, WV; Hemphill, KY; Hemphill, LA; Hemphill Hollow, PA; Hemphill Prairie, TX; Hemp Island, FL; Hemphill Bend, AL; Hempstead, NY; Hempstead, OH; Hempstead, TX; Hempstead, AR; Hempstead Gardens, NY; Hempsted, OR; Hemp Wallace, GA; Hempton Lake, WI; Hemp, GA; Hemphield Lake, MI; Hemphork, VA.



The harvest of a hemp field
 (source: 1913 Yearbook of
 the USDA)



A hemp handbrake
 (source: 1913 Yearbook of the USDA)



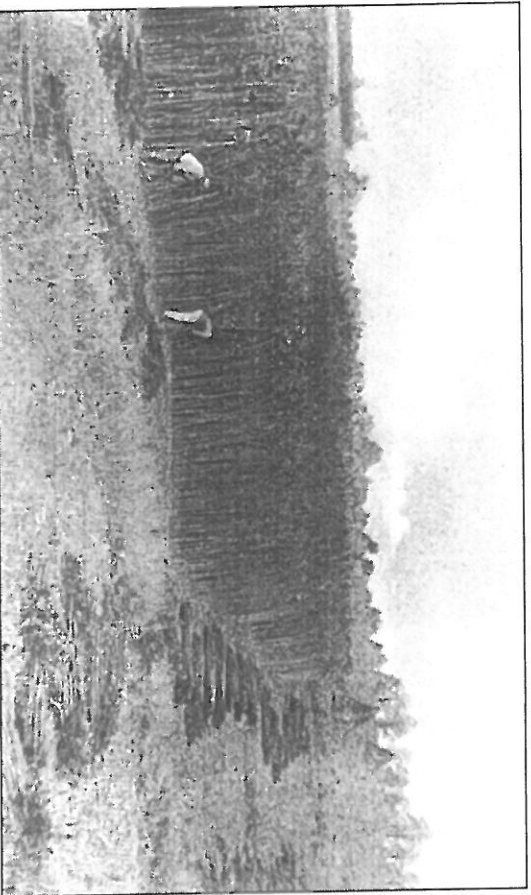
A hemp machine brake
 (source: 1913 Yearbook of the USDA)

A Technology Breakthrough

By the end of the 19th century, hemp's vital role in commerce was in decline throughout the world. Technologies such as the cotton gin had greatly cut labor costs in the cotton industry, whereas the hemp industry was not competitive due to a lack of mechanized harvesting and processing. At that time, only about 25 percent of the hemp stalk was useable. The remaining inner hurds (the shorter fibers) were burned in the fields as waste.

In 1916, there was a major breakthrough for the hemp industry. The U.S. Department of Agriculture produced Bulletin Number 404, "Hemp Hurds as Paper Making Material," which read in part: "This bulletin is printed on paper manufactured from hemp hurds," and declared that a new, labor-saving decorticating machine would slash hemp's labor costs, improve paper quality, and protect forests by providing a low-cost and abundant source to fill the world's growing need for paper. Hemp production, the bulletin said, would once again be America's largest agricultural industry.

In 1917, a patent was issued to inventor George W. Schlichter, whose decorticating machine economically separated the hemp fibers from the previously unusable hurds. Don Wirshafter, author



The harvest of a turn-of-the-century hemp field (source: The Reign of Law: A Tale of the Kentucky Hemp Fields, James Lane Allen, 1900).

of *The Schlichten Papers*, wrote, "It was clearly the work of a genius, solving an age-old problem. Hundreds of inventors had tried to invent an efficient process to gather all the useful fibers. The new technology reduced labor costs by a factor of at least 100." The hemp industry was now in a strong economic position, able to use 95 percent of the stalk versus the former 25 percent, while reducing labor costs as well. Many midwest companies built factories that used this innovative decorticating (fiber-separating) technology.

Hydrocarbon or Carbohydrate?

At about this time, a powerful new vision emerged to promote the use of agricultural crops as raw materials for American industry. David P. West, Ph.D., plant breeder, says: "In the 1930s, a new

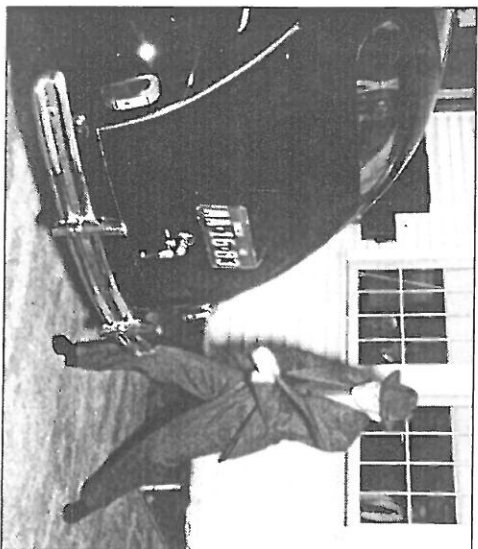
science was developing called 'chemurgy,' the bringing together of agriculture and the organic chemical industry." The term chemurgy was coined by William Hale, a biochemist with Dow Chemical, a company whose origins were rooted in agriculture. The chemurgy catch phrase was:

*Anything that can be made from a hydrocarbon
can be made from a carbohydrate.*

Founders of the chemurgy movement included Henry Ford, Thomas Edison, George Washington Carver, the deans of MIT and Harvard, and the American Farm Bureau, all of whom shared a vision of farm products replacing trees and imported oil for fuels, fibers, and lubricants. Henry Ford even introduced an automobile that ran on fuels derived from agricultural-based resources.

What happened after that, we may never fully know. Historians have speculated about why the agricultural chemurgy industry fell out of favor from the time of World War II. Petroleum was in abundant supply, and therefore was cheaply priced. Perhaps another factor in hemp's downfall was its rural, decentralized approach. Its primary economic beneficiaries were farmers and smaller regional manufacturers. In that era of big government and a few dominant companies, the centralized structure of the petrochemical and timber industries seemed a more profitable approach.

Petroleum technologies promised a new age of synthetics, and people were attracted to the novelty of such products. Sixty years later, the world is still living with the consequences of pollution and economic dependence that synthetics have brought.



Henry Ford demonstrates the strength of one of his autos formed from hemp-and-sisal cellulose plastic, which fulfilled his vision to "grow automobiles from the soil."

"Why use up the forests which were centuries in the making and the mines which required ages to lay down, if we can get the equivalent of forests and mineral products in the annual growth of the fields? I know from experience that many of the raw materials of industry which are today stripped from the forests and the mines can be obtained from annual crops grown on the farms... industrialization of crops will also have the advantage of making a considerable saving to the manufacturer who learns how to accomplish it... the best possible working plan for any man in our civilization is to have one foot on the soil and the other in industry."

—Henry Ford

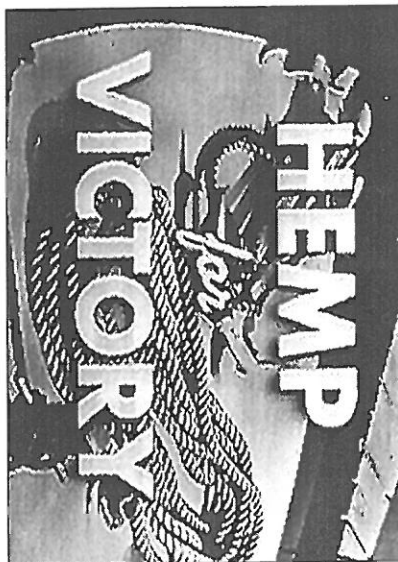
"I believe that the great Creator has put ores and oil on this earth to give us a breathing spell. As we exhaust them, we must be prepared to fall back on our farms, which is God's true storehouse and can never be exhausted. We can learn to synthesize material for every human need from things that grow."

—George Washington Carver

During the 1920s and 1930s, films such as *Reefer Madness* began to appear. Warnings such as "Killer Weed, Marihuana, the Greatest Menace to Society Ever Known" were seen in newspapers. In 1937, the anti-drug sentiment brought the Marihuana Tax Act before Congress. The National Seed Oil Institute also lobbied strongly, pleading that hemp oil was of vital importance in the production of paints and in other industrial processes.

The 1937 congressional bill was signed into law with government assurances that fiber and seed production would not be adversely impacted. Yet historical evidence (documented in the book *Hemp Horizons*) proves that innovative midwestern hemp factories were harassed out of business by federal agents. Dr. West has obtained the testimony of the son of the president of one of the Minnesota companies, who states categorically that government red tape over the marijuana issue caused the industry's demise. By 1939, the midwestern companies (except the Matt Rens Hemp Company, which sold hemp to the US Navy) had ceased to exist. A few Wisconsin farmers, however, continued to grow hemp into the 1950s.

From the 1938 *Popular Mechanics* article "New Billion-Dollar Crop": "American farmers are promised a new cash crop... a machine has been invented which solves a problem more than 6,000 years old... designed for removing the fiber from the rest of the stalk... Hemp is the standard fiber of the world. It has great tensile strength and durability. It is used to produce more than 5,000 textile products ranging from rope to fine laces, and the woody 'hurds'... can be used to produce more than 25,000 products, ranging from dynamite to cellophane. It can be grown in any state of the union."



Scene aboard a Navy ship, from the 1942 U.S. government film *Hemp for Victory*.

Hemp for Victory

Hemp briefly reemerged on the American scene in 1942, when the U.S. Army and Department of Agriculture released their "Hemp for Victory" campaign, featuring a film (now available on video) rallying American farmers to grow hemp for wartime needs. The war had cut off the importation of fibers for textiles and rope, and by 1943 over 100,000 acres of hemp were being grown in the U.S. For its part, Germany produced a book encouraging German farmers to plant hemp. When World War II ended, the U.S. Government canceled virtually all hemp-farming permits and shut down all the hemp mills. No one seemed to question: *If hemp was such an important wartime resource, why not benefit from it during times of peace?*

In June of 1991, the late Jim Young, technical editor of *Pulp and Paper*, wrote an editorial entitled "It's Time to Reconsider Hemp" in which he reported that "United States hemp-growing restrictions were set aside to meet material shortages during World War II. They should now at least be modified to meet pending shortages of fiber, energy, and environmental quality. Tradition, if not federal law, is on the side of hemp."

2

The Earth's Premier Renewable Resource

As the worldwide population increases, so does the demand for resources. For example, in the coming decades China's economic plans call for an annual consumption of fiber and fuel resources similar to that of the United States. In Germany, the term "bioresource hemp" is used to describe this useful plant as a biological resource to meet these needs.

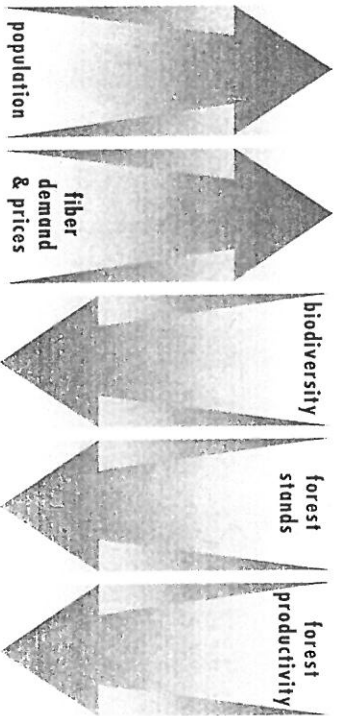
Agricultural Fiber

Besides hemp, a variety of ag-fiber resources exist, including kenaf, flax, and agriculture residues.

Kenaf is a bast fiber plant, native to Africa and currently grown in southern regions of Asia, Europe, and the United States. Research sponsored by the USDA has shown kenaf's excellent potential for uses ranging from paper to potting-soil blends. A tropical plant, kenaf does not grow well in areas where night temperatures drop below 50 degrees. It is also not as hardy as hemp, and some kenaf farmers use insecticides and herbicides to grow the crop.

Historically, flax and hemp have been grown in the same regions, and both have been used for paper and for such textiles as linen. Though a valuable crop, flax yields less than hemp, is harder on the soil, and is more difficult to grow organically. Sisal, manila hemp, and jute are sometimes mistakenly referred to as "hemp," yet it is *Cannabis sativa*, with its superior rot resistance and fiber strength, that early U.S. government regulations refer to as "true hemp."

Bio-Indicators



Via education, awareness is growing that biologically diverse ecosystems serve as a synergistic "glue" for nature. Yet biodiversity is diminishing, due in large part to unsustainable logging and the harsh, chemicalized farming of cotton and other crops. Due to air pollution, soil erosion, and biodiversity loss, wood quality and yield are declining.

Agricultural residues such as the straws of corn, wheat, and rice are now viewed as resources rather than waste. Several North American firms are recycling straw and wood pallets into fiberboard, paneling, and paper as a substitute for wood. *The Straw Bale House*, published in 1995, shows how builders are using straw for energy-efficient construction.

A Worldwide Fiber Shortage

Now as during World War II, the world faces a fiber shortage. In 1994 and 1995, resource shortages caused North American commodity prices for recycled paper to skyrocket. There is an ever-increasing need to find fiber for paper and construction products. With one-half million acres of hemp fiber grown annually to meet this need in nations such as China, England, and France, the current prohibition in Canada and the United States is hard to justify. In this era of global trade, nations with obsolescent market barriers against

hemp needlessly limit the economic and environmental well-being of their citizens.

The annual world consumption of paper has risen from 14 million tons in 1913 to over 250 million tons in the 1990s. So much for the predicted paperless office! A September 1994 *Wall Street Journal* article stated: "... restrictions on logging in federal forests will boost prices of virgin pulp used to make paper. Pete Grogan, manager of market development for Weyerhaeuser Corporation's recycling unit, said, 'We're concerned there might be paper shortages this decade.'" In the United States alone, the demand for fiber is greater than the combined demand for all steel and plastic products. In response to this need, people around the world are rallying for a return to hemp, the earth's premier renewable resource.



A farmer cutting his hemp (source: 1913 Yearbook of the USDA).

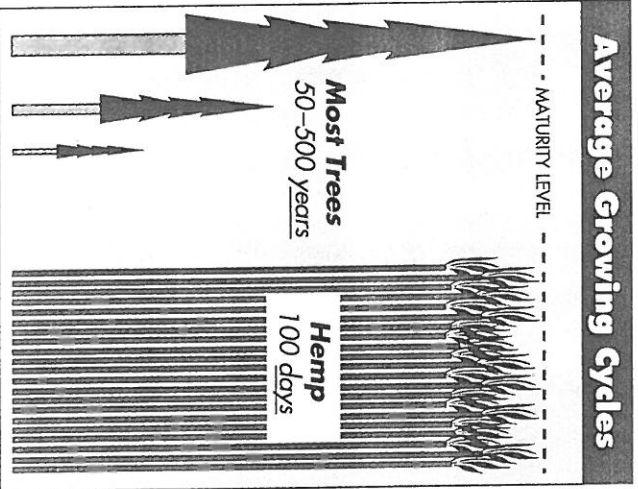
Farming

From a farmer's perspective, hemp is a low-maintenance crop to grow, and one whose advantages are increasingly recognized in the agricultural community. In the October 19, 1994, *Farmer's Pride* newspaper, Ed Logsdon, Commissioner of Agriculture for the State

of Kentucky, said: "It's time to look at producing hemp on a commercial basis."

The following appeared in the George Lower article "Flax and Hemp, From the Seed to the Loom," in the February 1938 issue of *Mechanical Engineering*.

"Hemp, the strongest of the vegetable fibers, gives the greatest production per acre and requires the least attention. It not only requires no weeding, but also kills off all the weeds, and leaves the soil in splendid condition for the following crop... Several types of machines are available in this country for harvesting hemp. One of these was brought out several years ago by International Harvester Company. Paint and lacquer manufacturers are interested in hemp-seed oil, which is a good drying agent. When markets have been



developed with the products now being wasted... hemp will prove both to the farmer and the public, it is the most profitable and desirable crop that can be grown and one that can make American mills independent of imports."

In 1995, cotton prices reached their highest level since the 1860s (the time of the Civil War). Much of the fiber for textiles currently comes from cotton, yet there are pollution problems associated with this crop. The *Wall Street Journal* has reported that

many Asian cotton farmers use up to seven times the directed amount of pesticides for their crops. In the United States, about half the pesticides used today are sprayed on cotton plants. The June 1994 issue of *National Geographic* stated that "in California alone some 6,000 tons of pesticides and defoliants are used on cotton in a single year."

As a result of the great quantities of pesticides sprayed year after year, insects have become immune to these intended deterrents while continuing to eat up cotton fields from Texas to China. Such synthetic compounds are extremely poisonous; if you drank a glass of water with only a single ounce of pesticide stirred into it, you would need to be rushed to a hospital emergency room.

Much of the groundwater tested in agricultural regions around the world has been contaminated by runoff from pesticides, herbicides, and fertilizers. The potential health hazards that pesticides present are well-documented. The Scandinavian countries are reporting a demasculinization of men due to high levels of toxic agricultural chemicals (i.e. "molecular garbage"), resulting in sperm-count losses of more than 50 percent along with other adverse physical and psychological changes. Some U.S. politicians, while promoting family values, are actually softening regulations that protect families from

Hemp-Farming Benefits

- **Naturally hardy** •
In the Midwest, large wild stands of hemp are common.
- **Biological weed control** •
Hemp outruns weeds, creating a virtually weed-free field for the next crop.
- **Low input costs** •
No pesticides or herbicides required.
- **Adds value to the regional economy** •
Provides valuable materials for local manufacturing.

such molecular garbage. According to Tom Mount in his book *World Medicine*, "farmers in the corn belt have the highest incidence of leukemia, prostate, and pancreatic cancer deaths," attributable to "the introduction of chlorinated hydrocarbon pesticides in 1945." Perhaps farmers have felt they've had no choice but to use these chemicals, given the realities of supporting their families in today's economy. But these realities are in the process of change.

Industrial hemp gives farmers a crop that produces a high-quality fiber with few, if any, synthetic chemicals. According to B. B. Robinson, writing in 1943 in issue No. 1453 of the *USDA Farmers' Bulletin*, "Hemp has been recommended as a weed-control crop. Its dense, tall growth helps to kill out many common weeds." Since hemp plants grow 6 to 16 feet tall in 70 to 110 days, farmers of large and small acreages alike can shade out weeds and thus eliminate the use of costly herbicides. After hemp is harvested, the field is often left virtually weed-free for the next crop. This fact alone will save farmers untold thousands of dollars, while improving water quality.

Hemp yields 2.5 to 6 tons of dry stalk per acre, depending on climate and variety. Further, it can be grown easily, not only without herbicides but without any insecticides or fungicides. (In damper European climates, the crop may be subject to minor fungal diseases that are less likely to occur in North American climates.) Hemp can grow wherever corn or wheat grows and has similar fertilization requirements.

Consumer trends in foods and textiles indicate a growing demand for products certified to be organic. Sustainable or organic growers can fertilize their crops with biofertilizers such as compost, manures, and biosolids and by planting nitrogen-fixing crops such as peas, alfalfa, or clovers in rotation (as detailed in the November 1995 *National Geographic* cover story). The 1943 USDA handbook *Hemp Production Experiments: Cultural Practices and Soil Requirements* stated

that hemp yields are highest following an alfalfa green-cover crop, and the next highest following soybeans. Hemp tops and leaves fall to the field, also adding soil fertility.

With the tobacco industry in decline, there is strong interest among tobacco farmers in the cultivation of hemp. The Kentucky Hemp Growers Cooperative Association includes many tobacco farmers who are working to reintroduce hemp in the Bluegrass State. Yet several obstacles still face potential hemp farmers. It's an unfamiliar crop for farmers, and most hemp markets are still in their infancy. The majority of the hemp grown today relies on plentiful labor rather than mechanized harvesting equipment. In developed countries, investments in the designing of new farm machinery will increase the cost efficiency of large-scale hemp farming, especially for the harvesting of hempseed crops.

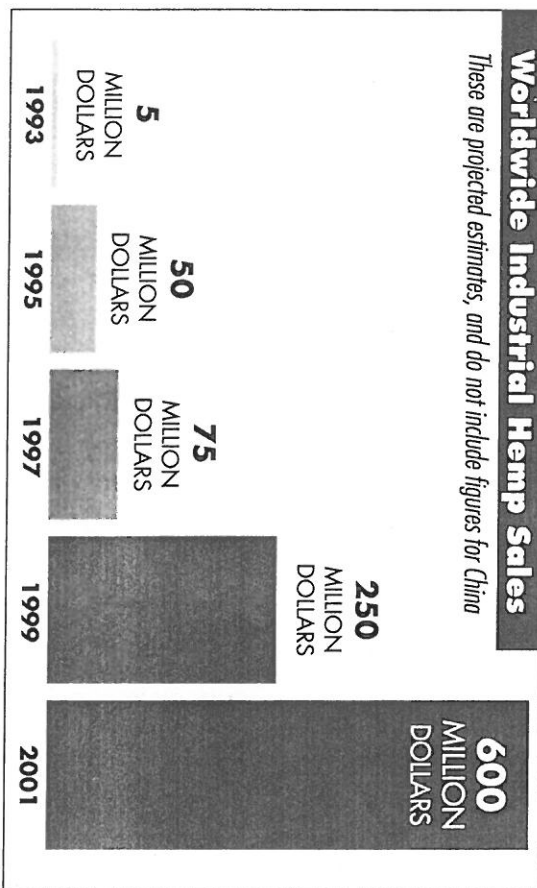
Hempseed Facts

The U.S. Department of Agriculture's National Seed Laboratory in Fort Collins, Colorado, explains that, because hemp was not considered an important fiber resource, the government's hempseed stock was abandoned. Thus, it has been lost to future generations, and, as a result, U.S. farmers will have to rely on imported seed stock for initial plantings.

The 12-country European Economic Community (EEC) permits farmers to grow hemp that is certified to contain 0.3 percent THC or less. France, which heavily lobbied the EEC for this 0.3 tolerance, is the major seed supplier for such ultra-low-THC varieties. The North American Industrial Hemp Council advocates a standard of one percent THC or less, which would allow for the cultivation of more productive Chinese and Eastern European strains ranging from 0.2 to one percent. As was explained in the Introduction, these seed varieties produce plants with no psychoactive qualities.

Worldwide Industrial Hemp Sales

These are projected estimates, and do not include figures for China



Economics

In this era of shrinking government, the marketplace has come to be the greatest influence for innovation in our society. So it is not surprising that both large and small businesses are now promoting industrial hemp while many government and environmental organizations still sit, politically correct, on the sidelines.

Hemp surpasses both cotton and wood in strength, durability, and environmental performance. In the global economy, businesses rise or fall by their ability to develop high-quality, cost-competitive products. Industry is looking for reliable, long-term, sustainable fiber sources such as hemp. Today, extractive industries such as oil, timber, and cotton receive huge government subsidies while green industries such as hemp do not. Thus, in the short term, hemp will be used in such specialty areas as food, body care, and composites.

Manufacturers and Processors

Hemp's versatility yields a range of materials that can be processed into thousands of valuable products: fiber and hurds (the core of the stem) from the stalk, and seed, seed oil, and seed cake (crushed seed). The U.S. government, while not officially researching hemp, is advocating the use of crops such as kenaf to replace unsustainable manufacturing resources. Much of the kenaf research is applicable to hemp. Robert Armstrong of the USDA Alternative Agricultural Research and Commercialization Center says: "We are beginning to recognize that these (agricultural crops) are renewable materials that can be used in a vast area of industrial products from plastics to lubricants."

While hemp has a long history, it is currently a kind of agricultural Rip Van Winkle, just reawakening from its 60-year sleep. It is now, in effect, a new resource for manufacturers and processors. Like any new resource, it will require innovative processing technology. Currently, European and American firms are developing a variety of such methods.

Hemp's higher-quality long fibers are well suited for textiles, and the medium-length tow fibers are ideal for paper and for non-wovens such as diapers. The remaining hurds can be ground into a powder for use in thousands of products, including fiberboard, packaging, etc. The hempseed, like the soybean, can be processed into many nutritious food products. Hemp-seed oil offers promising opportunities for use in cosmetics, nutrition, printing inks, and industrial coatings. The remaining crushed seed is also valuable for food, including animal feed. From a processing and marketing perspective, hempseed and oil offer farm communities a much easier path than does fiber, which is very capital-intensive and technologically challenging.

Individual Citizens

Many hemp products are long-lasting and can be processed in an ecologically responsible manner. As farming restrictions are lifted worldwide, hemp goods will be priced at levels similar to those of competing products, if not below them.

Many existing products, such as cotton, rely on farm chemicals manufactured at huge petrochemical refineries. These facilities create some of the worst pollution of air, soil, and water in the world. Underprivileged people find affordable housing near these facilities and, due to their impoverished circumstances, must live with toxicity. When we support the use of these chemicals through our purchases, we send the message: "Please continue to produce these products, no matter how you do it or who it harms." By purchasing hemp and other such sustainably grown goods, we support farmers while reducing the amount of toxins released into the environment.

As thousands of communities around the world strengthen their economies with hemp, there will begin to be positive impacts on the global environment. Oil consumption will drop, due to a reduction in the use of synthetic chemicals and in the number of trucks and tankers carrying products around the world. As an added environmental benefit, the restoration of our forests and the planting of millions of acres of fast-growing hemp will add life-giving oxygen to the atmosphere. Many scientists and economists now recognize that our current overconsumption of resources in the Western world is not sustainable, especially as developing countries such as China, India, and Indonesia emulate our resource-depletion model. According to Peter Russell in *The Global Brain Awakens*, "... few people will willingly reduce their consumption so long as their sense of identity is derived from possessions and material status." Incorporating hemp in the products we make and use is a powerful first step, yet we need to find still more ways to reduce waste and energy use in our personal and organizational lifestyles.

3

Hemp's 25,000 Practical Products

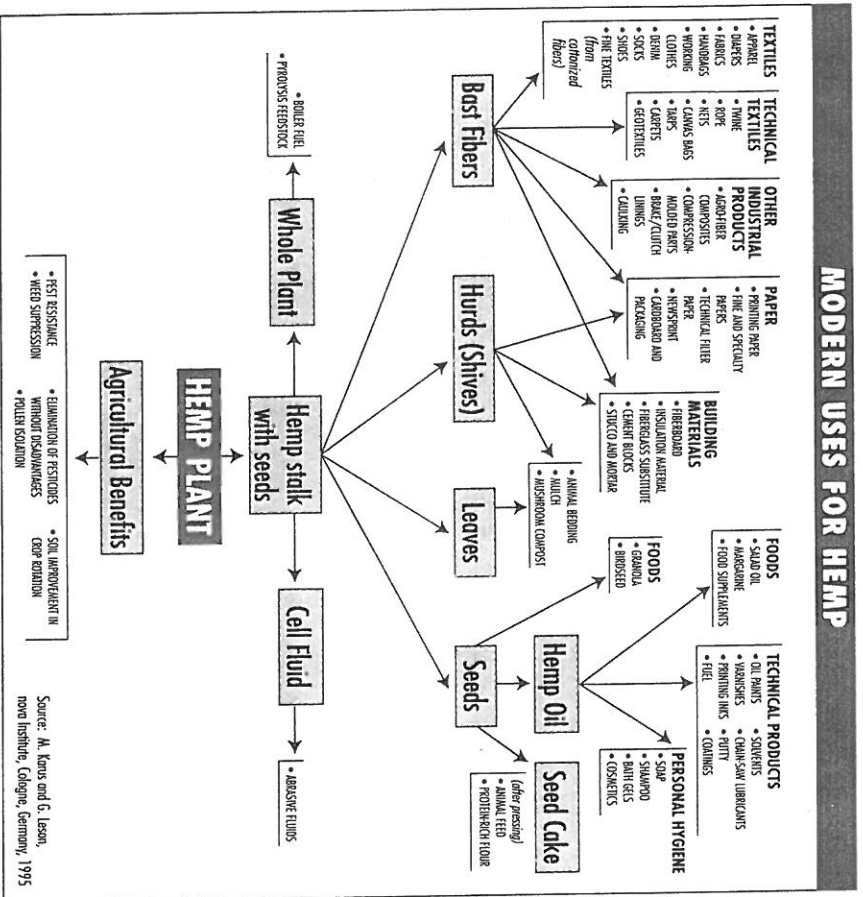
In 1938, *Popular Mechanics* magazine stated, "Over 25,000 products can be manufactured from hemp, from cellophane to dynamite." Since it would be impossible to list all of these here, this chapter provides an overview of some of the major hemp products.

The fiber-composite industry, which manufactures fiberboard, paneling, and plywood, is the largest potential market for hemp fibers. At current tree-harvesting levels, composite mills need to find an alternative fiber source to stay in business. These factories can substitute hemp for wood and still use existing production equipment.

Hemp jeans, shirts, and hats are becoming fashionable from Hamburg to Los Angeles to Tokyo. *The London Financial Times* reported in an October 26, 1994, article: "... fibre hemp... is making a comeback in Europe and the U.S. as an ecologically friendly raw material for clothing and paper." In Germany, a new line of hemp-oil-and-enzyme-based detergents is surpassing the performance of synthetic cleaners.

Automobiles

At the March 1995 Bioresource Hemp Symposium, a presentation by the German Aerospace Institute stated that, potentially, every car made can use more than 25 pounds of manufactured hemp in components such as gaskets, seat covers, floor mats, and interior paneling. In Europe, automakers Ford, Mercedes, and BMW are using hemp in these ways. In the U.S., auto-parts suppliers to GM, Ford, and Chrysler are testing the use of hemp fiber for paneling and as a replacement for fiberglass.



Body Care

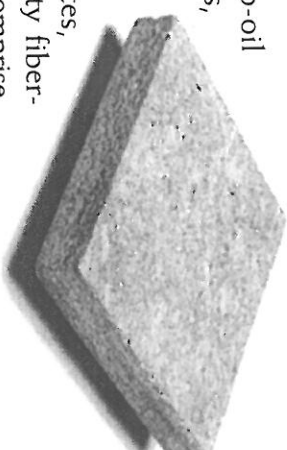
Numerous cosmetic products can be manufactured using the oil extracted from hempseeds. Research has shown that hemp oil assists the body's natural ability to heal, both externally and internally. Because of its ability to restore and moisten skin, hemp oil is becoming popular for use as a massage oil and in lip balms, soaps, shampoo, and lotions. Its essential fatty acids are readily absorbed into skin cells.

When combined with herbs, hemp-oil salve assists in healing skin irritations, insect bites, and minor cuts.

Composites

The products known as composites, including paneling, medium-density fiberboard, trusses, and support beams, comprise the fastest-growing segment of the wood-products industry. Washington State University's preeminent Wood Composite Laboratory has tested hemp for use in medium-density fiberboard. The lab results show that hemp is twice as strong as wood. According to lab director Tom Maloney, "The use of hemp fiber in multidensity fiberboard and other composites looks very promising."

Masonite Corporation, a division of International Paper, is actively researching the use of hemp fiber in manufacturing building products.



Sample from a hemp fiber composite board manufactured in Poland.

Feed

Hempseed has long been popular as a feed stock for a variety of animals. Birds are especially attracted to the hempseed for its superior nutritional qualities. After hempseed is crushed to extract the oil, the remaining seed meal is approximately 25 percent protein, and makes excellent feed for animals. Initial research done by the University of Kentucky shows promising results from feeding hempseed meal to fish and cattle.

Foodstuffs

Hempseed is a nutritious food source, high in protein, calcium, magnesium, phosphorus, potassium, and vitamin A. Like soybeans, hempseed can be made into numerous food products, yet it is easier

to digest. The seeds can be ground, soaked, or crushed for their oil content. After the seeds are crushed, the remaining seed cake can be processed into a flour for making high-quality breads, cakes, pastas, and cookies.

A nourishing confection can be made from hempseeds, nuts, and honey. Nondairy cheese, milk, and even ice cream can be made by soaking and processing the hempseed. Udo Erasmus, Ph.D., the author of *Fats and Oils: The Complete Guide to Fats and Oils in Health and Nutrition*, states that "hemp butter puts peanut butter to shame for nutritional value."

The oil can be taken as a nutritional supplement similar to flaxseed oil, or can be used in salad dressings and other oil-based recipes. At a volume level of 81 percent, hemp oil is the richest known source of polyunsaturated essential fatty acids (the "good" fats). Hemp oil also contains gamma linoleic acid (GLA), a very rare nutrient also found in borage, black currant, primrose oil, and mothers milk. These essential fatty acids are needed for healthy skin, hair, and eyes, and for overall physical health. Hemp oil, like other volatile oils, should be refrigerated to prevent rancidity.

Hempseed and its oil contain no psychoactive qualities whatsoever. In countries where hemp cultivation is prohibited, imported seed must be sterilized in steam for 15 minutes to make their germination impossible. The sterilized seed can then legally be used. Hulled hempseed from which the hard outer shell of the seeds has been removed is becoming popular because it is easy to process into foods.

Insulation

Hemp can be processed into a variety of insulation products that are safer than fiberglass and easy to install. A French firm is converting hemp hurds into a fluffy cellulose product that is blown into walls and attic air spaces, or placed there in bags.

Paints and Sealants

Until the 1930s, linseed and hemp oils made up the majority of all resins, paints, shellacs, and varnishes. In Texas, for example, the Sherwin Williams paint company made use of hemp oil for its products. Yet, with the advent of less-expensive petroleum-based paints and sealants, combined with the government hemp ban of 1937, hemp products disappeared from the marketplace.

Paper

This book is printed on tree-free hemp paper. Hemp has a yield-per-acre several times higher than that of trees. Its longer fibers create high-quality paper for books, magazines, and stationary, while the shorter fibers make excellent newspaper, tissue paper, and packaging materials. Until the late 19th century, the world relied on annual crops such as hemp, flax, and cotton for its paper.

The low lignin content of hemp fiber allows for environmentally friendly bleaching, without the use of harsh chlorine compounds. Tree-free paper mills, unlike many traditional pulp mills, can sustain healthy fish populations downstream. Hemp paper resists decomposition, and is not subject to the age-related yellowing of wood-derived papers. In fact, hemp paper more than 1,500 years old has recently been found. Because of the strength of hemp fiber, paper made of hemp can be recycled several times more than paper made of wood. Rising populations, combined with accelerated deforestation, are motivating the paper industry to explore nonwood fiber sources. Several companies, including International Paper, are developing an innovative process whereby whole hemp stalks are pulped without going through a fiber decoration process. Such emerging technologies will allow for more cost-efficient pulping. Hemp observers are predicting that farmers will grow hempseed for the food and bodycare markets, with the stalk going for paper production.

Pharmaceuticals

In the early 20th century, hemp extracts were commonly used by major pharmaceutical companies such as Eli Lilly to make a variety of medicines. Perhaps that is why the American Medical Association testified against the prohibition of hemp at the 1937 congressional hearings to ban the crop. It is becoming increasingly well known that hemp oils, high vitamin and essential-fatty-acid content assists the body's natural healing ability.

Plastics

Hemp can be used to manufacture plastic products in a variety of different ways, including the following: (1) The hurds are processed into cellophane packaging material (plant-based cellophane, common until the 1930s, is still in use today). (2) The hurds can be manufactured into disposable plates and cups for a low-cost, compostable styrofoam replacement. (3) The seed oil can be converted into a valuable plastic resin.

Several German firms are developing 100-percent-hemp cellulose plastic composites for the manufacture of snowboards and skateboards. As was mentioned previously, Henry Ford even used hemp to build car doors and fenders.

Plant-based plastics such as hemp and corn can be completely biodegradable. The use of hemp for plastics will reduce oil consumption and the processing of petrochemicals. Plastic packaging (the kind found inside cereal boxes, for example) made from hemp could be composted at home, eliminating some of the high cost of landfilling or of recycling petroleum-based plastics.

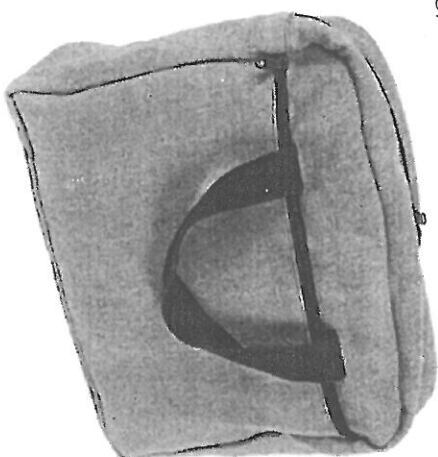
Textiles

The third-largest industry in the world is the manufacture of textiles. Hemp textiles offer a multiplicity of fabric uses, for bedspreads,

blankets, backpacks, carpeting, clothing, draperies, furniture, hats, luggage, mattresses, sails, sheets, shoes, shirts, tents, and towels, to name only a few items.

Hemp textiles have a number of advantages over other fabrics. Compared to cotton fibers, hemp fibers are longer, stronger, more lustrous and absorbent, and more mildew-resistant. Hemp fabrics also keep the wearer cooler in the summer and warmer in the winter than do cottons or synthetics.

The hemp-textile industry is developing yarn that is lighter-weight and more uniform than what is currently available. This will allow for the much-anticipated manufacture of hemp T-shirts. Still another way of making fine textiles from hemp is now being rediscovered in Europe. The "cottonization" process converts long, thick hemp fibers into cotton-like bundles, or hemp flock, that can then be processed in existing spinning and weaving equipment. It may take a major player such as Levi or Wrangler to fund and help jump-start cottonized hemp. Many apparel companies are pioneering the blending of hemp with fibers such as wool, flax, and cotton to produce fashionable clothing.



A briefcase made of Hungarian hemp, manufactured in the US

4

Today's Hemp Industry

Many of the world's major industrialized countries are presently expanding their hemp industries in order to reap enormous economic and environmental benefits. The following is an overview of the current status of hemp production around the world. In addition to those nations covered, Austria, Chile, Denmark, Egypt, Finland, Mongolia, Portugal, South Africa, Thailand, the Ukraine, and Yugoslavia produce hemp, as do most former Soviet Bloc countries.

Australia

In 1994, government officials permitted one farmer to grow the crop on a small-scale research plot. Today, hemp is being grown commercially in several of the Australian states. The combination of media interest and strong support from both farmers and the public is expected to lead to nationwide production by 1999. Australia is also considering hemp for the official fiber of the Olympic Games to be held in 2000. An informative, one-hour Australian TV documentary, *The Billion-Dollar Crop*, is available on video.

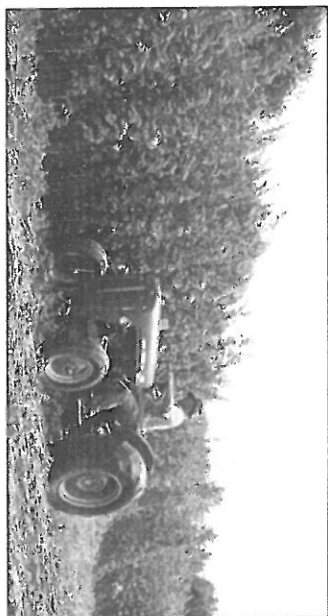


Canada

Canada was a major hemp-growing region until the 20th century, when that country followed in America's footsteps by prohibiting hemp production. In 1994, the country issued its first license in over

Today's Hemp Industry

Hempline, Inc., used a simple tractor and mower for the first hemp harvest in North America since the late 1950s at their 10-acre test plot in Ontario, Canada. (Photo: Geof G. Kime © 1994)



40 years to Hempline, Inc., which was allowed to plant 10 acres of industrial hemp in the Province of Ontario, on land that previously had been cultivated for tobacco. Dozens of hemp manufacturers and retail outlets, supplied by hemp importation, have appeared in major cities across Canada. Agricultural Canada, the federal agricultural department of Canada, published in December of 1994 their *Bi-weekly Bulletin* Vol.7, No.23, on hemp farming, and printed it on hemp paper. New Canadian hemp regulations become law in 1998, allowing for full scale commercial hemp planting. In Fall 1998, 5,000 acres of hemp were harvested throughout Canada. Processing facilities are being developed by companies including Hempline, Kenex, Hempola, CQP and R&D Hemp. Canadian exports of hemp products to the U.S. are expected to increase rapidly via the NAFTA agreement.



China

China has been growing hemp (*ta ma* in Chinese) for at least 6,000 years, and is currently the world's largest consumer and exporter by

postage stamps

• purses

• PVC

• quilts

• resins

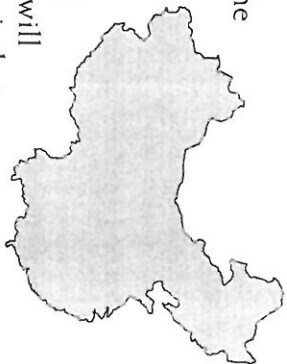
retaining walls

• ribbons

• rigging

• roofing materials

far of hempseed, paper, and textiles. The majority of pure hemp and hemp-blend textiles in Western markets originate in China, and even larger amounts stay in China for domestic use or are sold to other Asian markets. With its vast natural resources and labor pool, this country will have a major influence on the future hemp industry.



INDUSTRIAL HEMP



A Chinese peasant farmer harvests his hemp crop with hand tools. (Photo: Robert C. Clarke, International Hemp Association)

the book *The Rediscovery of the Resource Hemp* sparked renewed interest among the media and general public. Since then, a small yet innovative and fast-growing domestic hemp industry has formed. This industry is focused on the design and manufacturing of high-quality

France

In France, over 10,000 tons of industrial hemp (in French, *chanvre*) were harvested in 1995. Kimberly-Clark Corporation manufactures specialty hemp papers, including Bible and cigarette papers, in this Gallic country. French companies are also combining hemp fibers and lime to make a lightweight natural cement that can also be used as plaster.



Germany

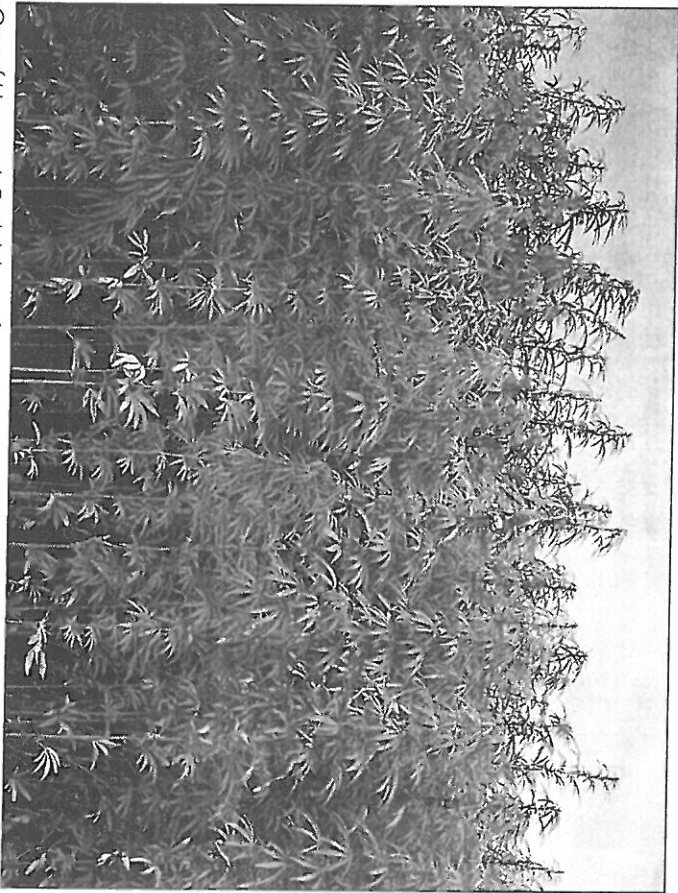
The cultivation and use of hemp or *hanf* in Germany had been in steady decline even prior to the 1982 ban on its farming. The 1993 publication of the book *The Rediscovery of the Resource Hemp* sparked renewed interest among the media and general public. Since then, a small yet innovative and fast-growing domestic hemp industry has formed. This industry is focused on the design and manufacturing of high-quality

Great Britain

In 1993, the English Home Office lifted the British prohibition against hemp farming. More than 5,000 acres of industrial hemp were grown in 1998, mainly under contract with Hemcore and primarily for use as animal bedding. The government has been supportive, giving grants of £100,000 (U.S. \$150,000) to Hemcore



Today's Hemp Industry



One of Hemcore's English hemp farms, taken in Essex (photo © 1993 by Ed Rosenhall).

and the Natural Fibres Organisation to develop new markets for hemp and flax fibers. In 1995, Bioregional Development Group, in partnership with farmers and industry, succeeded in producing the first UK-grown, machine-processed, 100-percent hemp fabrics of this century. (See the report *Hemp for Textiles* for details.) Such organizations are working toward the reestablishment of the processing and production of hemp paper and other products in the UK. One exciting endeavor is the blending of flax, cotton, and wool with hemp fibers. A key component of the embryonic textile industry is the development of hemp cottonization (see *Textiles*, page 31).

Hungary

Before the collapse of the Eastern Bloc, Hungary was a major supplier of hemp (*kender*) rope, twine, and textiles to the Soviet Union. Although little acreage is now devoted to hemp-fiber production, the Hungarians are currently rebuilding their hemp-textile industry by utilizing surplus hemp fiber stockpiled in Hungary, Romania, and Slovakia. They are exporting hemp fabric, much of it to the United States. Hungarian hemp cultivars produce the world's highest yields of fiber and seed, and these are exported worldwide.



India

Large stands of naturalized Cannabis are found throughout many regions of India and Southeast Asia. The fiber is used locally for the production of cordage and crude textiles and the seeds are sometimes pressed for oil. Although very little hemp is intentionally grown as a fiber crop, peasant craft items and clothing fashioned from hemp are found in Western markets. Pilot programs are currently studying the potential use of large tracts of naturalized Cannabis for the production of textiles, paper pulp, and building materials.



Netherlands

The Dutch government recently funded an extensive four-year study to evaluate and test the practical aspects of growing hemp (*hennep*) and processing it into pulp for paper production, which resulted in an economically promising outcome. In 1995, the Dutch firm Hemp Flax B. V. grew 2,750 acres of hemp for use as animal bedding, composite board, and virgin



pulp for strengthening recycled paper. A respected Dutch researcher, Hayo van der Werf of the International Hemp Association, has written an up-to-date treatise on hemp cultivation, entitled *The Crop Physiology of Fibre Hemp*. The cultivation of hemp for pulp is increasing in the Netherlands, along with the development of processing equipment and of pilot projects to test the feasibility of Dutch textile production.

Poland

Poland currently grows hemp (*penek*) for textiles and manufactures hemp particle-board products for construction. The Institute of Natural Fibers, a leading ag-fibers research organization, has demonstrated the use of hemp and flax cultivation as a means to cleanse soils contaminated by heavy metals (see the report *Bioresource Hemp: Proceedings of the Symposium*).



Romania

Romania is currently the largest commercial producer of hemp textiles in Europe, and the world's second largest exporter after China. There is strong traditional peasant use of the crop. Like Hungary, Romania has based much of its textile production of the past two years on surpluses of stalks left over after the fall of the East Bloc. Much of this stockpiled surplus is currently exported to Hungary for processing before its ultimate exportation to the West, since Romania's own processing facilities are antiquated.



Russia

Until the 1900s, Russia was the world's largest cultivator and exporter of hemp (*konophli*), employing much of its large peasant labor force in that industry. The N.I. Vavilov Scientific Research Institute of Plant Industry (VIR) in Saint Petersburg maintains the largest hemp germ

plasm collection in the world, one that includes many varieties not found in other gene banks. The International Hemp Association is raising funds so that the VIR can continue to plant and maintain these irreplaceable hempseeds.



Spain

In Spain, hemp is known as *cañamo*. Spain is currently the sole exporter of hemp pulp for specialty papers. Several decades ago, the country's hemp products included rope and textiles. With the demand for hemp products on the rise, Spain's domestic production of hemp products can be expected to resume.



The United States

The U.S. government has not granted any permits for large-scale farming of "true hemp" in over 40 years. However, increasing interest among Americans in the use of environmentally friendly products has created a growing demand for hemp goods. In early 1992 there were only a handful of active hemp importers and manufacturers in the United States. Today, hundreds of firms are offering a wide range of hemp products. Major designers such as Ralph Lauren and Calvin Klein now offer hemp fashions in high-end department stores. Successful hemp-business start-ups are surpassing the one-million-dollar mark for annual sales, with total annual hemp-product sales exceeding 25 million dollars. Given the renewed public interest and the fact that supplies are still limited (all raw and processed materials must be imported), costs are artificially high. U.S. farmers are questioning why they are being prevented from growing the crop. In fact, the 51 state chapters of the American Farm Bureau have voted unanimously to endorse the

researching and growing of fiber hemp. In 1994, the Hempstead Company was permitted to plant a field of hemp at the USDA field station in California's Imperial Valley. Unfortunately, overzealous state officials had the field plowed under just before harvest. The Kentucky Hemp Growers Cooperative Association, originally founded in 1941, has been reactivated by a group of 100 Kentucky farmers and civic leaders. Also, based on legal



research, it is the opinion of experts that individual states have the right to allow farmers to plant industrial hemp. In November of 1995, the University of Kentucky conducted a poll which found that 76 percent of Kentucky citizens support the licensing of hemp farmers. The legislative bodies of several states, including Hawaii, Missouri, North Dakota, and Vermont, passed legislation in 1996/97 supporting research on industrial hemp. The 1996 Colorado Hemp Production Act passed the Senate yet was voted down in the House after lobbying by non-farm interests. In early 1996, the North American Industrial Hemp Council was founded by a strong coalition of industry, agriculture, ecologists, entrepreneurs, and government. In 1998, a legal petition was filed with the DEA and the USDA to request that regulatory authority over industrial hemp be vested with the USDA. In the same year, tobacco farmers filed a lawsuit in federal court challenging the current U.S. government hemp policy. Such major U.S. trading partners as Canada, China, France, Germany, and Great Britain are growing and exporting tens of millions of dollars worth of hemp goods to the United States. In coming years, Free Market traders will continue to jump over the U.S. "Hemp Wall" to deliver imported hemp products. Purchasers of hemp products are voting with their dollars, and the race is on to sell to this expanding group of buyers.

5

Jobs and Business Opportunities

The demand for hemp products is increasing as more people look for high-quality, longer-lasting goods, manufactured in an environmentally responsible manner. International corporations are downsizing, thus encouraging people to turn to smaller-scale jobs and business opportunities. Today's top-selling business books promote ethical and spiritual business practices, along with "corporate greening." Hemp offers numerous fields (see chart at left) in which

Hemp's 25,000 commodities will positively impact major worldwide industries:

- agriculture
- automotive
- body care
- construction materials
- food
- furniture
- industrial resins
- paper
- plastics
- retailing
- textiles

hardworking entrepreneurs can create profitable new businesses.

Hemp can supply the products that will allow us to live comfortably in the 21st century, while offering significant opportunities in areas that include farming, processing, manufacturing, retailing, and cooperatives. Countries such as England, Germany, and Hungary are already developing new jobs by expanding their hemp industries.

Bioregional Economics

The term "bioregional" describes a biological region based on natural land boundaries, such as a valley or river basin. The goal of bioregional economics is to stimulate economic activity that is beneficial both to people and to the ecology. The ability of hemp to grow in most climates, as well as its amazing product versatility, perfectly suits it to bioregional economics.

Producing goods for local use benefits the local job and tax base, whereas importing the same goods from thousands of miles away does not.

Rural economies will receive a boost as hemp manufacturers and processors reduce transportation costs by locating their operations close to large hemp-growing regions, and the number of new jobs will grow as the hemp industry grows.

Where Have Your Blue Jeans Been?

Let's compare the effects of purchasing a pair of locally manufactured blue jeans versus buying one from across the globe.

The local farmer grows some hemp, and sells it to a regional processor who offers good-paying jobs. The processor markets the resulting hemp textiles to a local garment factory, where a pair of hemp jeans is made. These jeans are then resold at a local, family-owned retail store. The net effect of this sequence of events (the growing, processing, manufacture, and retailing all in one region) helps the local economy by creating jobs and circulating currency within the community. Thus the wearer of these jeans contributes to the well-being of his or her bioregion.

Meanwhile, the cotton farmer, under pressure from an international textile company to reduce prices, increases the use of

chemicals to try to boost yields, thereby polluting the groundwater. The textile company manufactures a pair of jeans from that cotton, and ships them thousands of miles across the sea. Upon their reaching the country of import, further transportation is required. The quantity of petroleum used in moving such goods around the world is phenomenal. To meet this demand, major oil companies are drilling for oil in the world's rain forests, where repeated oil spills kill fish, harming indigenous tribes.

While international trade will always play an important role in our lives, communities can positively influence local economic outcomes. The millennium computer bug may well stimulate communities to draw upon regional resources such as hemp to supply basic needs. Regions where factories will be shut down due to the impact of global trade agreements can effectively "weatherize their economic houses" against financial storms by pursuing bioregional economic strategies. A growing number of informed farmers, workers, and business people are developing a strong hemp industry that will benefit not only their own and their children's lives, but their communities as well.

*A sower of hemp
(source: The Reign
of Law: A Tale of
the Kentucky Hemp
Fields, James Allen,
1900).*



6

The Hemp House of the Very Near Future

While the following scenario may read like a futuristic fantasy, today's projections are the source of tomorrow's reality. A hundred years ago, the idea that so many of today's household products would be made from wood composites and synthetic petroleum would have been a fanciful one.

On a day within the next 10 years, you wake up in a house whose walls, roof, flooring, insulation, and paint are derived from hemp. It's a beautiful morning, and you feel great after sleeping on your hemp-stuffed mattress and soft sheets and pillowcases spun from hemp fiber. You sink your feet into the hemp rug as you get out of bed and open the hemp drapes.

You jump into the shower, where you use soap, shampoo, and hair conditioner made from hemp. You step out onto the hemp bathmat, drying yourself with a superabsorbent hemp towel. You clean your ears with H-Tips (better and cheaper than the old cotton swabs), and apply hemp-oil lotion, moisturizer, and lip balm. You make a mental note to buy some more hemp toilet paper, recalling how it wasn't too long ago that we were still cutting down 200-year-old trees to flush down the toilet. Opening your closet, you dress in hemp jeans, shirt, and jacket, then put on hemp socks and shoes, tie the hemp laces, and grab your hemp wallet, which holds checks and currency printed on hemp paper.

You're hungry, so you walk into the kitchen with its hemp-based linoleum floor. You eat a sandwich made with wheat and

hemp-flour bread and a salad with hemp-oil dressing, and pour a glass of fresh, organic hemp milk. After eating, you wash your dishes, using hemp-oil dish soap and a hemp pot scrubber, and put the dishes away in a cabinet built of hemp fiberboard. Sitting down on the hemp-framed and -upholstered couch, you glance at a newspaper printed with hemp ink on hemp-content paper, and learn that the hemp industry is now the largest agribusiness and job provider in your state. You turn on the stereo, which sits on a hemp fiberboard cabinet, and listen as music vibrates from speakers also made from hemp fiberboard, containing specialty hemp paper for the speaker cones, and covered with black hempen cloth.

Leaving the house for work, you open the door of your car, built from strong, lightweight composites that include hemp. Relaxing into the reclining seat, luxuriously upholstered with hemp textiles, you rest your feet on floor mats that look like rubber but are made from hemp. As you drive to your job at the new hemp-fiber processing facility, you pass farmers harvesting the hemp that is revitalizing your community's rural economy.

Sowing Seeds of Hope

Each one of us can help bring the above scenario into earlier manifestation through personal action. By purchasing hemp products, you're voting with your dollars and supporting the expansion of the hemp industry. You can help increase the number of industrial hemp supporters by sending a copy of this book to a friend, relative, or civic leader. Consider writing a letter to your government representative or newspaper editor, or making a presentation to a community group. Also, please stay in contact with HEMPTech. Our Internet address is www.hemptech.com. Click "News" to read about the latest political and economic developments, "Bookstore" to learn about new hemp books, videos, and reports, or "Products" to find thousands of hemp products and companies from around the world.

Glossary

bast fibers: The long fibers present in the outer portions of hemp stalks. Historically, bast fibers have been used for the manufacturing of textiles and paper.

bioregional economics: The practices of communities that value and encourage local enterprises healthy for the people, the economy, and the environment of their region.

bleaching: The process of whitening paper pulp to obtain a bright-looking sheet of paper. Almost all wood-pulp mills use a bleaching process that deposits acids, chlorine, sulfur, and dioxins into the environment.

composites: Industrial substances such as fiberboard, made up of various elements such as binders and the woody fiber from trees or hemp.

decorating machine: A hemp-processing machine first invented around the turn of the 20th century to separate hemp bark from the hurds. This machine allowed the previously unused 80 percent of the hemp stalk (or hurds) to be converted into a raw material from which thousands of different products are made, and also dramatically reduced labor costs.

essential fatty acids: The "good" or polyunsaturated fats found in certain fishes and plants, termed "essential" because they cannot be synthesized by the human body and must be included in the diet for good health.

hemp fiber: A product extracted from the stalk of the hemp plant and used to make a wide range of paper and textile products.

hemp hurds: The short-fiber core portion of the hemp-plant stalk.

hempseed: The seeds of the hemp plant, which contain approximately 25 percent protein and have an oil content of 25 to 30 percent which can be extracted for its superior nutritional value.

hempseed meal: The portion of the seed that remains after the oil has been extracted, an excellent food source for human or animal consumption.

hydrogen peroxide: An environmentally friendly bleaching substance used for processing fiber such as hemp into useable pulp.

industrial hemp: A variety of *Cannabis sativa* L., a tall annual herb of the mulberry family, native to Asia. The plant is grown for a wide range of consumer and industrial products, and possesses no psychoactive qualities.

kenaf: A tall annual of the hibiscus family, native to Africa and grown in warmer climates. The plant is used for various consumer and industrial products.

low-THC seed varieties: Hempseeds that will grow plants with no psychoactive properties. These varieties range from less than 0.3 percent (the European Economic Community standard) to one percent in their delta-9 tetrahydrocannabinol (THC) content.

pulping: The process of extracting woody pulp from fiber. In comparison to wood pulping, hemp pulping uses considerably fewer chemicals, due to its lower lignin content.

stalk: The woody, fibrous portion of the hemp plant. Stalks are harvested after 70 to 100 days when they are 6 to 16 feet tall, for processing into two major elements: fiber and hurds.

tree-free: A term used to describe products made without the use of trees. For example, hemp, flax, cotton, and kenaf are used to make tree-free paper.

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Publications and Videos

*Ag Fiber Composites: A Comprehensive
Report on the Use of Agricultural Crops
to Manufacture Building Products,*
Erwin Lloyd with David Seber

*Bioresource Hemp: Proceedings of the
Symposium,* nova Institute

Crop Physiology of Fibre Hemp,
Hayo van der Werf

*Hemp for Textiles, Bioregional
Development Group*

*Hemp for Victory, U.S. Department
of Agriculture, 1942 (video)*

Hemp: Lifeline to the Future,
Chris Conrad

*Hemp Pages - The Hemp Industry
Sourcebook 1996, Hemp World*

Hemp Times (magazine)

Hemp World (magazine)

*Journal of the International
Hemp Association*

*Nutritional Medicinal Guide to
Hemp Seed, Kenneth Jones*

*The Billion-Dollar Crop, a one-hour
Australian television documentary*

The Emperor Wears No Clothes,
Jack Herer