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June 22, 2021

# Production, Marketing, and Regulation of Hemp Products

Changes enacted in the Agriculture Improvement Act of 2018 (P.L. 115-334; 2018 farm bill) removed longstanding federal restrictions on the cultivation of hemp. Hemp is a form of *Cannabis sativa*, the same plant as marijuana, grown for non-psychoactive purposes. It is an agricultural crop regulated by the U.S. Department of Agriculture (USDA). Although USDA regulates hemp production, the 2018 farm bill explicitly preserved the authority of the Food and Drug Administration (FDA) under the Federal Food, Drug, and Cosmetic Act (FFDCA, 21 U.S.C. §§301 et seq.) over certain hemp-derived products.

## Leading Hemp Markets

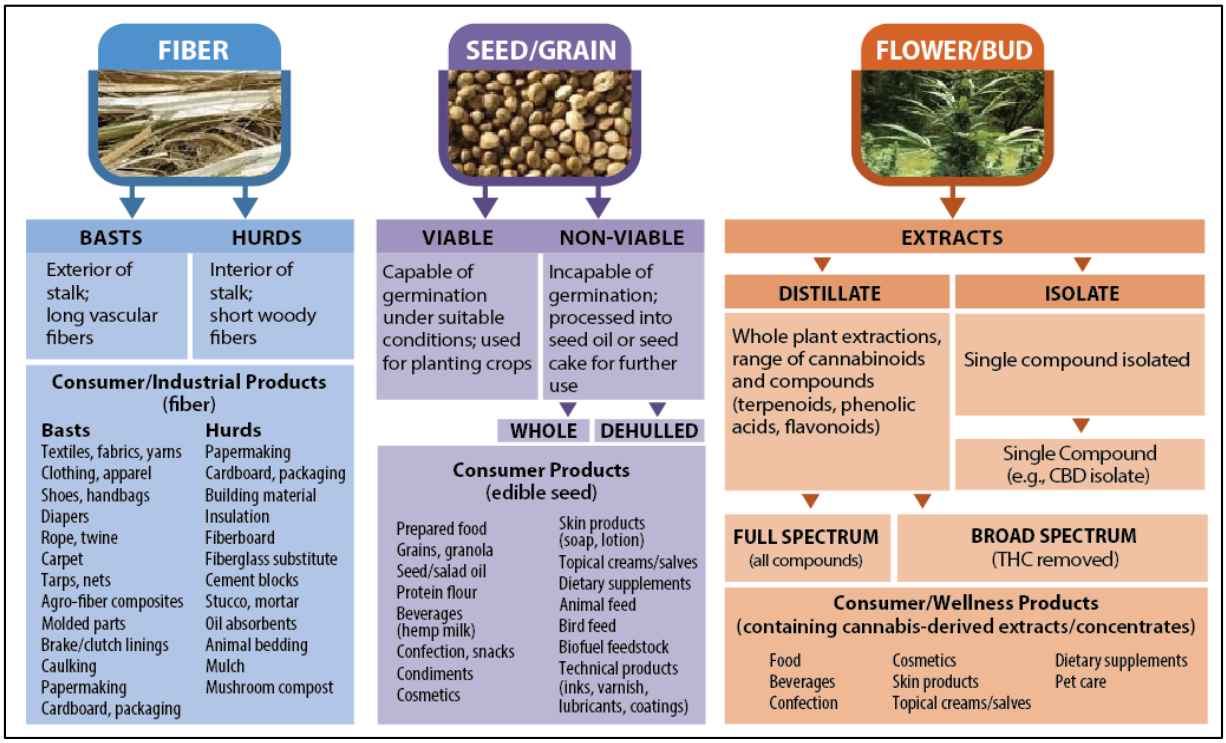
Hemp is grown for use in the production of a wide range of products, including foods and beverages, cosmetics and personal care products, nutritional supplements, fabrics and textiles, yarns and fibers, paper, construction and insulation materials, and other industrial and manufactured goods.

There are three leading markets for hemp, each based on the part of the plant used: fiber, seed/grain, and flower (**Figure 1**). Some suggest a separate, marketable category exists for the plant's extracted compounds (not shown here). Extracts and concentrates may be derived from different parts of the plant, including the flowers/buds and from trim (parts of the plant removed when the hemp flower is trimmed during the manicuring process) or from total biomass, which may include sticks and stems.

### Hemp Fibers

Hemp fibers are used in fabrics and textiles, yarns and spun fibers, paper, carpeting, home furnishings, construction and insulation materials, and biocomposites (**Figure 1**). The interior of the stalk has short, woody fibers called *hurds* (or hemp shiv/shives); the exterior portion (bark) has long *bast* fibers (**Figure 2**). Hurds are used in insulation, animal bedding, material inputs, oil absorbents, and papermaking. Bast fibers are used to make rope and fabric. Hemp fibers also are used in a range of composite products, including use as building material and concrete blocks (made from a mix of fibers, hydrated lime, and other additives), an insulating material, a fiberglass alternative (by the automotive and aviation sectors), and a biodiesel feedstock. Fiber processing involves separating the core fiber from the bark through mechanical separation (using a decorticator) or separation through a process called *retting* or some combination of the two processes. Once separated, dried, and baled, hemp fibers may be further processed through additional mechanical separation (such as being pelletized or shredded into smaller pieces).

**Figure 1. Leading Hemp Product and Marketed Uses and Applications**




**Source:** CRS. Photos by permission of Canadian Greenfield Technologies Corporation (straw), HempAlta (unhulled hemp seed), and Eric Steenstra, Vote Hemp (flower). CBD = cannabidiol; THC = tetrahydrocannabinol.

**Figure 2. Selected Hemp Fiber Products**

**Source:** Images show (left to right) hurds and bast fibers (photos by permission of Canadian Greenfield Technologies Corporation) and concrete (photo by permission of GreenJams BuildTech Pvt Ltd.).

**Figure 3. Selected Hemp Food and Ingredients**

**Source:** Images (left to right) dehulled seed (photo by permission of Ben Droz), protein powder (photo by permission of Victory Hemp Foods), and seedcake (photo by permission of Hemp Northwest).

## Seeds and Grains

Hemp seed, powder, oilcake, and oil may be used in a range of foods and beverages, including salad and cooking oil, and as an ingredient in dietary supplements, an alternative food and feed protein source, or a dairy alternative. Unrefined or refined cold press filtered hemp oil is used in body products, including soap, shampoo, lotions, bath gels, and cosmetics (**Figure 1**). Seed processing involves dehulling and separation, removing the shell from the hulled seed kernels (or the soft, edible part). The seed kernels are referred to as hemp hearts (nuts) or hempseed meal (**Figure 3**). Through further off-pressing, unrefined hemp oil may be extracted from the seed kernels, leaving solids processed as seed meal, oilcake (or seedcake), or hemp flour or powder. Equipment required for these processes may include a dehulling machine and a cold press or oil refining machine.

## Flowers and Buds

Hemp flowers are the primary source of the plant's available cannabinoids, which tend to be concentrated in the flowering head (or bud) of the plant. *Cannabinoids* are the unique chemical compounds produced in the cannabis plant. Cannabidiol (CBD) and tetrahydrocannabinol (THC) are considered to be the most abundant cannabinoids in cannabis, as well as the most medically valuable and most-researched cannabinoids due to their physiological effects. Some cannabinoids are psychoactive (e.g., THC, which is found at low levels in hemp); others, such as CBD, are not considered to be psychoactive. CBD and other known cannabinoids exist in both hemp and marijuana but in varying amounts. CBD is promoted as treatment for a range of medical conditions, despite limited scientific evidence to substantiate many of these claims.

Extracts and derivatives of the cannabis plant marketed as CBD and other cannabinoids generally differ from hemp seed oil in that they are extracted from the flowering parts and/or leaves and stems of the plant, not the seed/grain. Cannabinoids tend to be concentrated in the plant's *trichomes*—the small resin-like hairs/glands of the plant's

flowering heads. Trichomes produce other secondary substances, including terpenes, phenolic acids, and flavonoids. Cannabinoids also may cover the leaves, bracts, and stems and may be present in other parts of the plant, including the seeds, but in lower concentrations. CBD and other cannabinoids are extracted from the cannabis plant and used—either as a distillate or isolate—as an ingredient in a range of food, beverage, cosmetics and skin products, dietary supplements, pet care, and other wellness products (**Figure 1**).

Extracting cannabinoids and other compounds from cannabis can be done using a variety of methods to separate the oils and waxes from other plant material. There is no single standard extraction method. Available methods include lipid or alcohol infusions, $CO_2$ extraction, or extraction using chemical solvents, as well as solvent-free extractions across a range of mechanical processes. Most commercial applications use solvent-based extraction techniques. Extraction may involve heat decarboxylation, referring to the application of heat to cannabis plant material to activate certain compounds in the plant. The type of extraction method used depends on a range of production factors. These include the purpose for which the plant material is to be used (hemp or marijuana); the part of the plant being used (flower, trim, or total biomass); the product being produced (e.g., edible/digestible product or topical application); whether an isolate or distillate is being produced; the scale of the commercial operation and any cost constraints; and requirements of the state where the business is located.

## Considerations for Congress

Some Members of Congress continue to introduce legislation involving hemp. In the 117th Congress, S. 1005 would modify the statutory definition of hemp and would relax certain regulatory requirements governing USDA's oversight of hemp cultivation. Legislation introduced in the 116th Congress would have amended the U.S. tax code to establish Hemp Opportunity Zones and supported development in the sector (H.R. 8131); another bill would have expanded federal research and program support for hemp and hemp-derived products (H.R. 3652).

FDA continues to restrict the marketing of food or dietary supplements containing added CBD—regardless of whether it is derived from hemp—and continues to evaluate the scientific research related to such consumer products. Legislation has been introduced in the 117th Congress that would allow the use of hemp and hemp-derived CBD in dietary supplements (H.R. 841/S. 1698) or as a food and beverage additive (S. 1698). Meanwhile, the House Committee on Appropriations expressed concern about the "proliferation of foods and dietary supplements" marketed in violation of FFDCA and about noncompliant products that "continue to pose potential health and safety risks to consumers through unsubstantiated and misleading claims" (H.Rept. 116-446). In addition, some U.S. states have imposed restrictions on certain ingestible and smokable forms of hemp and hemp-derived consumer products.

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