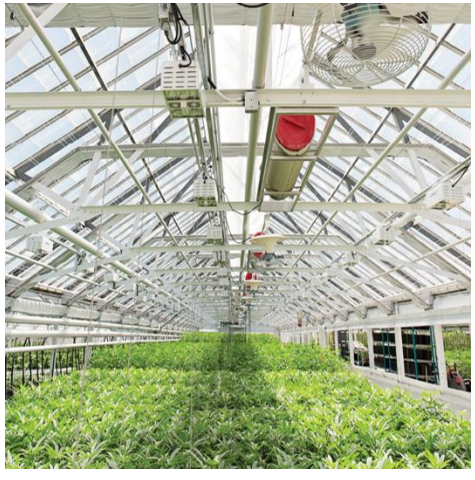
Cannabis Farming & Oil Extraction Abstract



The following abstract considers the main aspects of cannabis farming and the extraction of THC & CBD oil

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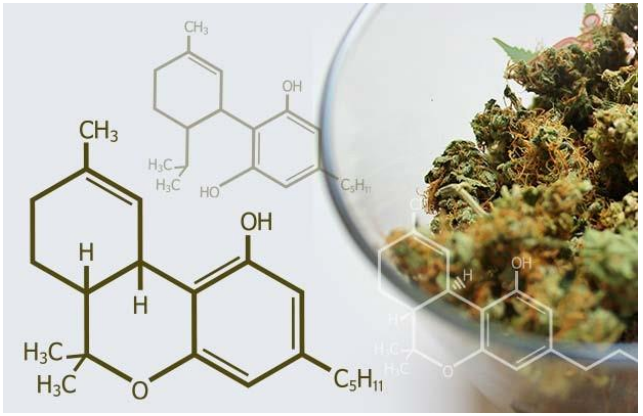
INTRODUCTION

Cannabis belongs to the family of Cannabaceae and is a frugal plant that has been cultured for over 4000 years as both crop and medical plant. Its original habitat is thought to be near the Himalaya but its spread has brought it to nearly every region on earth, except deserts and regions with arctic climate. Optimal growth conditions are a sunny and humid climate.

The use of cannabis for medicinal purposes started in China and then spread to Asia, the Middle East, Africa, and later the rest of the world.

As for the medicinal usage of Cannabis, there are over 60 different psychoactive substances, which effectively activate cannabinoid receptors, that are part of the nervous system in human and are mainly found in the brain. Nevertheless, there are different receptors that respond to different cannabinoids and can be found throughout the body. Through selective breeding it is possible to tune the cannabinoid composition in the plant material to treat desired symptoms.



Products

Dried Medical Cannabis After eight weeks of the flowering regime, predominantly *Cannabis indica* varieties will be ready to harvest. Predominantly *Cannabis sativa* varieties may take one to two weeks longer. They will dry in around 10 to 14 days. After the drying, most often a curing phase is done. The curing enhances psychoactive content and removes undesired characteristics as a green, grassy flavor of Cannabis caused by chlorophyll. For this the dried Cannabis is put in a dark and airtight container at temperature of 17° C. For a period of three weeks, the buds are left in the container opening it once a day for one hour to remove evaporated water.

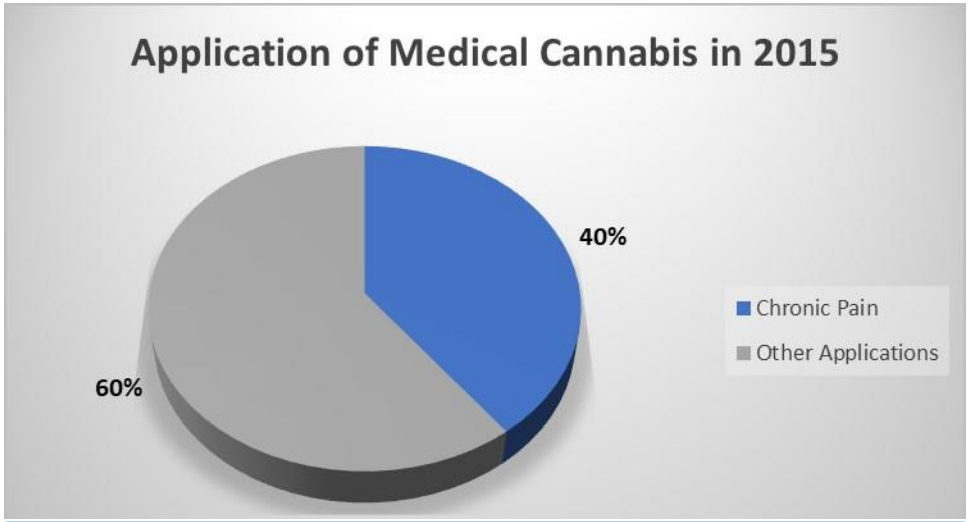
Medical THC Oil Cannabis oil is a concentrated extract obtained by solvent extraction of the buds or leaves of the cannabis plant. When extracting Cannabis, you will receive a crude oil at first, containing a variety of plant chemicals, from Cannabinoids to chlorophyll and terpenes. Depending on the cannabinoid profile, the crude oil contains more or less THC/CBD etc. When it comes to the production of medicinal THC oil with a high THC content, all the undesired compounds need to be removed to receive a fine oil, that is mostly clear and contains only cannabinoids.
The extraction of medical CBD oil can also be processed separately.

BLOSSOM BUDS

THC DISTILLATE

CANNABIS APPLICATION

Evidence and studies have suggested that cannabinoids in cannabis can be used to treat many medical conditions. In fact, Cannabinoids are also produced in the body and have many important roles in memory, concentration and thinking, awareness of time, body movement, pain, appetite, and the senses. Currently, THC and CBD are the two main cannabinoids that are found to have medical importance. It has been observed that THC increases appetite and reduces nausea, and it also helps with muscle-control problems. CBD also decreases inflammation and pain and can reduce epileptic seizures; it can be used to treat addictions and mental illness.

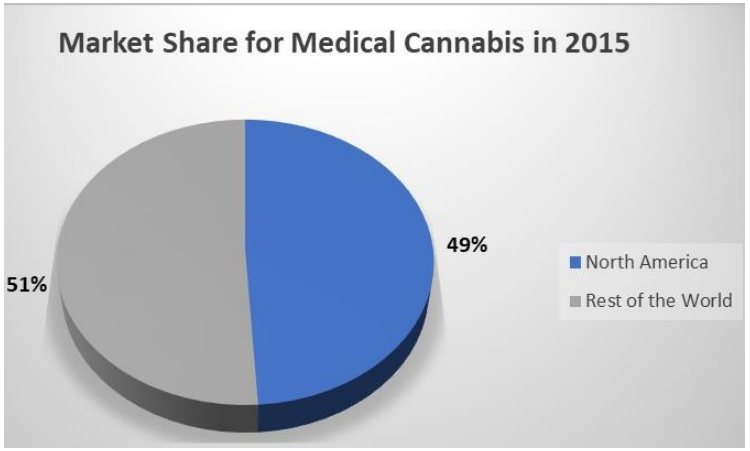


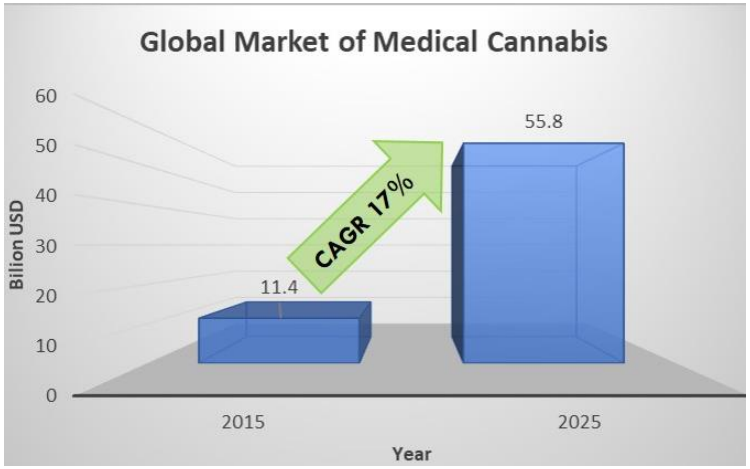
Medical application of Cannabis	
Osteoarthritis	Headache and migraine
Insomnia	post traumatic stress disorder
Rheumatoid arthritis	Post-operative pain
Fibromyalgia	Multiple sclerosis
Osteoporosis	Amyotrophic lateral sclerosis
Neuropathic pain or chronic non-cancer pain	Spinal cord injury (or spinal cord disease)
Cancer pain	To stimulate appetite and produce
Weight gain in cancer patients	weight gain in AIDS patients
Anorexia nervosa	To stimulate appetite and produce

CANNABIS MARKET

The U.S. cannabis industry has quickly become a major job generator, employing 165,000-230,000 full- and part-time workers, according to estimates in the newly released Marijuana Business Factbook 2017. North American cannabis industry is experiencing 30-40% annual growth rates. So, the North American cannabis market is estimated to reach 20 billion USD by 2021, while the whole US cannabis industry producing cannabis and cannabis related products is estimated to reach 24-44 billion USD in 2020 already.

According to Grand View Research, the global cannabis market was estimated at $11.4 billion in 2015 and is expected to grow at a CAGR of around 17% and reach $55.8 billion by 2025. Chronic pain was the largest segment of medical cannabis applications in 2015 and accounted for 39.6% of revenue. The highest growth in applications, however, is expected to come from the cancer segment, with a CAGR of 18.2% over 2015-2025, mostly from North America and Europe.





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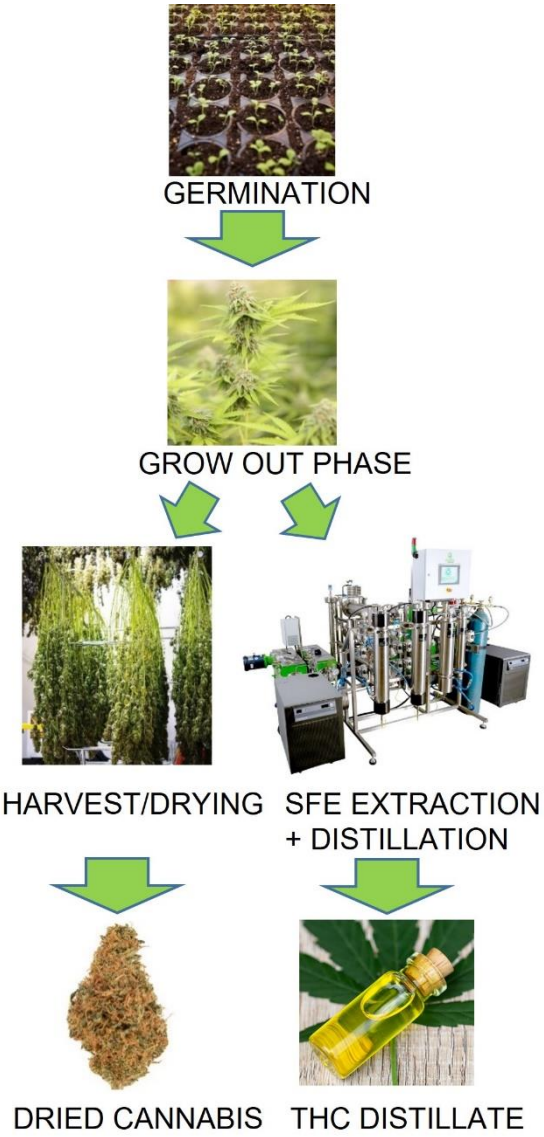
CANNABIS PRODUCTION PROCESS

Independent from the cultivated strain and cultivation method, Cannabis plants require the same basic needs. That is nutrients and pH in the correct balance, humidity and temperature within the correct range, lots of light, water and well circulated air for photosynthesis. After the growth and flowering phase, the buds can be harvested. The buds should be sticky and covered with translucent resin, and 50% of the white pistils should have turned brown. After cutting the plants are dried for 10 to 14 days. If you are making oil there is no requirement to wait this long for the plants to dry. The state-of-the-art extraction process for many plant extracts and products like THC is supercritical fluid extraction (SFE). Carbon dioxide (CO_2) is the most used supercritical fluid, sometimes modified by co-solvents such as ethanol or methanol. The mild extraction conditions are suitable for THC as it may be destroyed by other, harsh extraction methods. When extracting Cannabis, you will receive a crude oil at first, containing a variety of plant chemicals. When it comes to produce medicinal THC oil with a high THC content, all the undesired compounds need to be removed to receive a fine oil, that is mostly clear and contains only cannabinoids. The refinement is done through distillation or chromatographic methods; resulting in a THC distillate. A similar extraction process is used for the CBD oil production.



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CANNABIS BY-PRODUCTS

Selecting and processing cannabis buds for oil extraction leaves a substantious amount of plant cutting and extraction residues at the local production site. Due to legislative regulations this waste cannot be treated as household waste as it may contain psychoactive substances. To deposit cannabis cuttings in landfills it is necessary to mix it with other waste in a 50:50 ratio, to make it inconsumable. However, it is unfavourable to enlarge the amount of waste just to make it inconsumable.

Another way of handling the cuttings is to compost plant material by cutting into small bits and composting on site. By doing this, the newly composted material can be used to fertilize the Cannabis cultivation. By doing this, the newly composted material can be used to fertilize the Cannabis cultivation.

A newer approach is to feed Cannabis cutting to livestock e.g. pigs, cows or poultry as secondary feedstock. Beside the sustainable method of transforming waste in to feedstock, it could be shown that by feeding pigs with Cannabis, they gained a bigger amount of meat than regularly fed pig.

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