

Hemp Cultivation

A Growing Guide for Industrial Hemp Farmers

Plant Description:

Hemp (*Cannabis sativa* L.) is an annual, herbaceous plant with a slender stem, ranging in height from 4 to 15 feet and a diameter from ¼" to ¾". The innermost layer is the pith, surrounded by woody material known as hurds. Outside of this layer is the growing tissue, which develops into hurds on the inside and into the bast fibres on the outside. The stem is more or less branched, depending on the crop density. When sown thickly the stems do not branch. The leaves are of a palmate type and each leaf has 7 to 11 leaflets, with serrated edges. The strong taproot penetrates deep into the soil. However, if the soil conditions are unfavorable, the main root remains short, while lateral roots become more developed.

Soils:

Industrial hemp can be grown on a wide variety of soil types. Hemp prefers a sufficiently deep, well-aerated soil with a pH of 6 or greater, along with good moisture and nutrient holding capacity. Poorly drained soils, however, are not recommended as excess surface water after heavy rains can result in damage to the hemp crop. Hemp is extremely sensitive to flooding and soil compaction.

Soil Preparation:

A fine, firm seedbed is required for fast, uniform germination of hemp seed. Conventional seedbed preparation and drilling are probably ideal. The seedlings will not emerge uniformly if the seed is placed at a depth greater than 2 inches. "No-till systems" can also be used with good results, but may be more vulnerable to erratic emergence depending on the growing season.

Nutrition:

To achieve an optimum hemp yield, twice as much nutrient must be available to the crop as will finally be removed from the soil at harvest. A hemp field produces a very large bulk of plant material in a short vegetative period. The nitrogen uptake is most intensive the first 6 to 8 weeks, while potassium and in particular phosphorous are needed more during flowering and seed formation. Industrial hemp requires 80 to 100 lbs/ac (90 to 112 kg/ha) nitrogen, 35 to 50 lbs/ac (39 to 56 kg/ha) phosphate and 52 to 70 lbs/ac (60 to 80 kg/ha) potash.

Growing Conditions:

Hemp prefers a mild climate, humid atmosphere, and a rainfall of at least 25-30 inches per year. Good soil moisture is required for seed germination and until the young plants are well established.

Weed Control:

Industrial hemp is an extremely efficient weed suppressor. No chemicals are needed for growing this crop. Industrial hemp is a low maintenance crop. There are no registered chemicals for weed control in hemp. A normal stand of 200 to 300 plants per square meter shades out the weeds, leaving the fields weed-free at harvest.

Time of Seeding:

The best time to seed hemp should be dictated by the weather and soil conditions, rather than the date on the calendar. Hemp can be seeded as early as two weeks prior to corn provided that soil conditions are optimum. However, seeding should not begin until soil temperatures have reached a minimum of 42 - 46 °F (6 - 8°C).

Hemp seed germinates within 24 to 48 hours, and emerges in 5 to 7 days with good moisture and warm temperature. Hemp grown for fibre should be seeded as early as possible while hemp for grain should be seeded later to minimize the height of the stalk.

Plant Population:

High yields of high quality fibre can be achieved with proper plant density. Seeding rates of 250 to 400 viable seeds per square meter (50 - 60 lbs/acre) are probably ideal, depending on soil type, soil fertility and cultivars. The seed or grain production will require lower seeding rates in the 35-to-45 lbs/acre ranges. Crops grown with 15 to 20 lbs/acre of seed may be at risk with regards to weed infestation.

Breeding Characteristics:

Generally, hemp is a dioecious plant. However, there are three classifications of varieties:

1. Monoecious varieties - when male and female flowers develop on the same plant;
2. Dioecious varieties - with distinct male and female plants;
3. Female predominant varieties, obtained by pollinating dioecious females with monoecious pollen.

Cultivar Types: There are two types of industrial hemp based on their use:

1. Fibre cultivars - with long stalks and little branching,
2. Seed cultivars - with shorter stalks, larger seed heads and may have numerous branches (seed contains 30 - 35% oil).

Both types have low THC content, of less than 0.3%.

Rotation:

Hemp can be grown on the same land for several years in succession but rotation with other crops is desirable. Hemp responds well to most preceding crops. It is also possible that introduction of hemp in a crop rotation might improve the soil health. Our observation in 1996 showed that hemp might significantly reduce the population of soybean cyst nematodes. We need at least 3 years of evaluations for this data to be conclusive.

Harvest:

Harvesting of hemp for high quality fibre occurs as soon as the last pollen is shed. Harvesting for seed occurs 4 to 6 weeks later, when 60% of the seed has ripened. Fibre hemp is normally ready to harvest in 70 to 90 days after seeding. The end use of the product may have a significantly impact on the harvesting method. Kenex Ltd (USA) is developing a harvesting system that will be compatible with the new processing technology. For fibre production the crop will be cut, dew retted in the field, baled and stored, or processed.

Retting:

The best fibres are obtained by retting - a microbial decay of pectin, the substance that glues the fibre to the woody core of hemp stem together. Retting is carried out in the field and depending on the weather it takes 14 to 21 days to be completed. During retting, the stems need to be turned one or two times in order to allow for even retting, since the stems close to the ground will remain green while the top ones are retted and turn brown. Retting is complete when the fibres turn golden or greyish colour and separate easily from wood in finer fibres.

Yield:

Based on yield data from 1995, 1996 and 1997 yield expectations are between 3 to 4 tons of baled hemp stalks per acre on well-drained loamy soils.

Storage:

For storage, the moisture content of hemp stalks should not exceed 15%. The bales can be stored for a long time in dry places, which could include storage sheds, barns or any other covered storage.

The information provided above is based on 1995, 1996 and 1997 research data that was collected from test plots at Ridgetown College and the Kenex Ltd pre-commercial field trials in Pain Court (USA).