

Growing Industrial Hemp (*Cannabis sativa*) in Southern Western Australia

24 May 2022



Industrial hemp has been an important part of agriculture in many countries around the world for thousands of years, supplying food and fibre for clothing, housing, ship sails and ropes. However, during the mid-20th century, hemp fell from favour in the western world due to innovations such as plastics and the popularisation of drugs such as THC (tetrahydrocannabinol) brought bans on growing and consuming hemp and its products.

Industrial hemp in Western Australia is defined as *Cannabis sativa* where the leaves, stems and flowering parts do not contain more than 1.0% tetrahydrocannabinol (THC). Industrial hemp does not have the psychoactive effect normally associated with prohibited or marijuana varieties.

In the last decade the regulations regarding cultivation of Industrial Hemp have eased in all states of Australia making it possible to grow industrial hemp once again.

Industrial hemp has many uses and opportunities exist to produce hemp seed products such as hemp flour, roasted kernels, oil, and fibre for textiles, building products, and potentially as an animal fodder.

Industrial hemp varieties are broadly classified into the following:

- **Seed varieties** for human use and consumption. These varieties grow no higher than 1.5 meters in the 6 to 8 weeks prior to flowering which is normally initiated by long days beginning to shorten.
- **Fibre varieties** often grow to over 3 metres tall. The whole plant is harvested by cutting it to ground level. The plant is often harvested before flowering.
- **Dual purpose varieties** for seed and fibre.
- **Varieties for high biomass production for livestock** (currently under investigation).
- **Varieties for CBD production** (regulated through other legislation and not covered in this series)

Hemp Variety Selection considerations

Before planning to grow a hemp crop consider the following: -

1. What product is most profitable and suits the farm production cycle.
2. Select the appropriate variety to suit the location and farming practices.
3. Variety selection is dependent on adaptation to tropical or temperate conditions, the length of the

Before planning to grow industrial hemp, growers need to plan their marketing strategy. Will they sell the product at 'farm gate' prices or potentially be more profitable by processing and marketing the seed, fibre, or oil product either by the growers themselves or in a company or partnership with other producers.

Licences for Growing Industrial Hemp

Before committing to growing hemp in WA, a [licence](#) to grow, harvest, transport, and/or process hemp should be obtained.

Obtaining seed

The new grower should obtain seed from a reputable seed retailer. All seed purchased should come with a seed germination and purity test. These are critical to getting the correct seeding rate. Growers should consult further documents in this series regarding seeding rates and varieties.

As hemp flowers are open-pollinated and may collect pollen from other hemp plants many kilometres away, maintaining a consistent variety is difficult. Do not keep seed for the next season in case it is contaminated with high THC pollen.

NOTE: Seed is likely to rapidly lose its germination and viability unless stored correctly. Ensure the seed supplier has kept seed at less than 4°C to ensure best quality. The grower intending to keep seed for several months should also consider storing seed in a chiller.

Which Variety?

A comparison of varietal characteristics will provide guidance to identify an appropriate variety. Ensure that the information supplied is confirmed for your local conditions - seek local trial data from the Department of Primary Industry and Regional Development's or other organisations evaluating a range of varieties for their adaptation to local conditions.

As the recommended varieties may change as new varieties are made available, the DPIRD publishes its variety data under separate articles. Growers should obtain the latest test results from DPIRD.

Sowing date

Current research from DPIRD industrial hemp trials at the Manjimup Research Facility confirms sowing hemp seed should occur late October to early December to allow the crop to flower in the new year and be harvested late summer to early autumn.

Critical Daylength & Hemp Production

The **Critical Daylength** requirement of a plant is the length of daily sunlight that induces a plant to commence flowering.

Some varieties may not be primed to flower by the summer day length in the tropics, and other varieties may exhibit an independence from daylength and be productive in the shorter tropical summer.

Finding the right situation

Successful industrial hemp production needs well drained soils, fertiliser, water (rain and most likely irrigation), pest and weed management and the machinery to sow, maintain and harvest the crop. We look at each of these in turn.

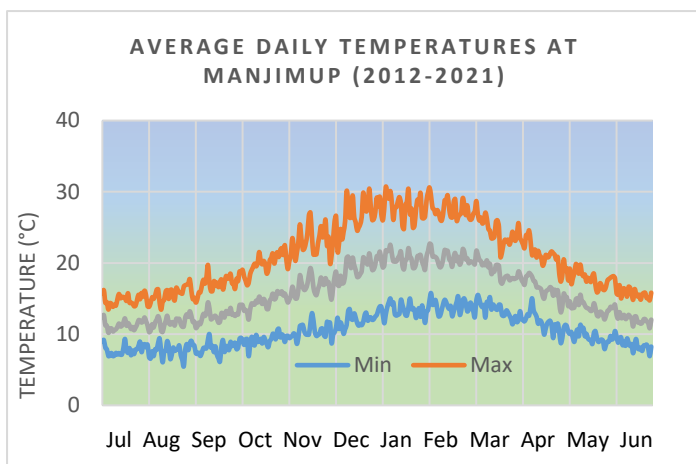


Figure 1 Daily Air Temperatures at Manjimup

The photoperiod response of a variety will determine the planting date so that the crop is in vegetative phase for at least 60 days before the start of flowering for maximum grain and fibre yield. Daylength begins to shorten after December 22. After this date the onset of flowering is likely to occur in many varieties.

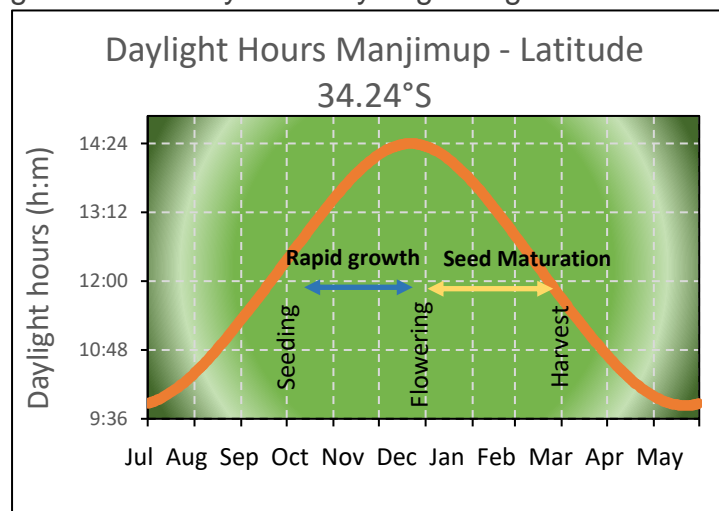


Figure 2 Day Length is important to induce flowering

soils as these reduce yields and may add to waterlogging. Soils with pH of more than 6 are preferred. Salinity and soil acidity are likely to reduce crop yields.

Satisfying Crop Needs

Crop Nutrition

It is recommended that a series of soil tests are undertaken when selecting a paddock. Commercial soil tests should give information on availability of the major nutrients, Nitrogen, Phosphorous and Potassium, the micronutrients such as trace elements, soil acidity (pH) and buffering capacity. An appropriate advisory service will determine

Temperature

Hemp is a warm weather crop, but seed will not germinate well if the soil is too cool. Optimum soil temperature for seed germination and emergence is above 20°C. However, optimum growth occurs when temperatures are between 25°C and 30°C. The warm weather from mid-September to mid-May at the south of Western Australia is suitable for growing hemp.

Photoperiod

The photoperiod response of a variety will determine the planting date so that the crop is in vegetative phase for at least 60 days before the start of flowering for maximum grain and fibre yield. Daylength begins to shorten after December 22. After this date the onset of flowering is likely to occur in many varieties.

Soils

Industrial hemp grows well on light-to medium-textured soils from sandy to light clay loams.

Drainage is one of the most important factors to consider when selecting a site. Hemp plants do not tolerate waterlogging conditions. Using raised beds on clay soils can reduce the risk of waterlogging.

Growers should avoid compacted soils as these reduce yields and may add to waterlogging. Soils with pH of more than 6 are preferred. Salinity and soil acidity are likely to reduce crop yields.

optimum levels of nutrient application with expected biomass (kg dry matter per ha), growth and nutrient removal at harvest, possible nutrient deficiencies & residual soil nutrient levels.

Hemp grows best with good levels of nitrogen especially when it is young and actively growing. Trials have shown yield responses with 120-150 kg/ha of N. Likewise, it likes high levels of potassium (120 kg/ha K) and Phosphate (40 kg/ha P).

Fibre crops that grow over 3 meters in 3 months and produce over 10t/ha dry matter, require high N, P, and K which should be supplied by fertilizer if the soil tests show residual soil levels do not match these crop requirements.

Seed or grain crops extract less N, but more P and K from the soil. Therefore seed/grain crops should be fertilised with higher levels of P and K depending on the soil tests.

To Water or Not

Industrial hemp is sensitive to dry conditions and needs an adequate supply of water. Grain yield losses may not be evident during growth due to the robust abilities of the established plant; yields are reflected in adequate soil moisture. Without rainfall, the crop may require 5–7 megalitres (ML) of irrigation water per hectare.

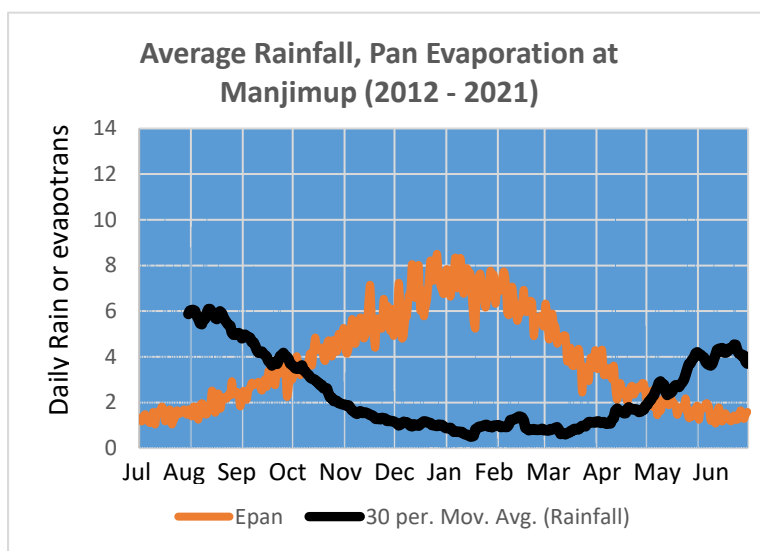


Figure 3 Irrigation is critical to ensure a productive crop

yields, adequate moisture during active growth is required. This is particularly important during the first six to eight weeks of crop establishment to ensure maximum early canopy closure and effective suppression of weeds.

A wilted crop loses yield potential. Growers are encouraged to install soil moisture meters in their crops for early warning of soil water shortage.

At Manjimup, the average total rainfall during the growing period (Oct – Apr) is about 200 mm. However, the total pan evaporation values are about 1000 mm, which suggest a large deficit of water to the crop. Therefore, between October and April irrigation water must be supplied to protect the crop from dry conditions and to achieve economical yields.

Following seeding irrigation is recommended to keep the surface soil moist. To avoid plant stress and obtain viable

Pests and Diseases

Weeds

By far the largest early challenge for a successful hemp crop will be weeds. A clean seed bed is important to ensure good establishment of the crop. Weeds rob the hemp crop of water, nutrients and sunlight and reduce the yield significantly if not eliminated. Later in the crop cycle the crop will shade out weeds.

Herbicides such as glyphosate or diquat are commonly used to control weeds prior to seeding as part of a control strategy that may include soil disturbance by cultivation. Minor use permits are available for herbicides used for controlling either the broadleaf or the grass weeds.

Insect Pests

Insects noted in hemp crops include *Nezaria viridula* (Green veggie bug), *Helicoverpa spp.* (Heliothis), and *Sminthuris viridis* (Lucerne Flea). Growers should obtain advice on the pest and recommended control measures. One simple way that this may be done is to download and use the MyPestGuide Reporter app on mobile phones. Photographs and descriptions of symptoms are sent to experts, and they will send reports to the person submitting the report.

Sowing the crop

Seed bed preparation

A fine, firm, well-prepared flat seedbed is required for fast, uniform germination of hemp seed. Weed control at this point is critical as the small emerging hemp seedlings may not compete with weeds.

Sowing rate/depth

Grain crops usually require between 60-80 plants per square meter at maturity. For fibre production, higher plant density is generally recommended, for example 80-100 seedlings per square meter. Seed should be placed at 10 to 15 mm depth, with good seed - soil contact for best results. Sowing with light soil compaction behind the seeder will assist in germination and establishment. Seed sown too deep will have difficulty evenly germinating, and if it is sown too shallow will risk not germinating at all.

The crop can be planted through conventional seeders or air seeders at the required sowing rate. As the seed is generally soft it should be handled carefully, and the sowing gear set up to reduce crushed or damaged grain. If using air seeders, ensure the air pressure is low as this will reduce the damage caused to the soft seed.

Fertiliser

All the proposed phosphorous (P) and potassium (K) fertiliser should be sown at the same time as the seed, ideally to one side of the seed. Also, half of the nitrogen (N) should be sown with the seed. The other half (approximately 100kg) of nitrogen should be broadcast on the crop three to four weeks later.

Planning for harvest

Fibre Crops

Good yields of a quality fibre stem product will be achieved if harvest starts when 50% of male plants are flowering (or when female plants have just started flowering).

Grain Crops

Seed heads mature from the bottom of the flower, upwards, and the seed is mature once the seed coat has hardened. When maturation has reached 60-70% (over half of the seed coats have commenced hardening), harvest should be undertaken.

Hemp seed needs to be harvested with some moisture in the grain otherwise grain may be lost through shattering. Seed is harvested at around 20% moisture and must be dried immediately after harvest to ensure germination is not affected.

As the seed is soft it is easily damaged by incorrectly operating harvest machinery. Due to the bulk of whole hemp plant, only the seed head should be harvested, and cutting should be as high as possible on the plant.

Many of the above topics are covered in more detail in further information bulletins on www.agric.wa.gov.au. Alternatively, you may also contact the authors.

Contact

Don Telfer - Project Leader Industrial Hemp

Important disclaimer

The Chief Executive Officer of the Department of Primary Industries and Regional Development and the State of Western Australia accept no liability whatsoever by reason of negligence or otherwise arising from the use or release of this information or any part of it.

Copyright © Department of Primary Industries and Regional Development, 2022