Physical evidence of cannabis consumption dates back farther than 2000 BC. The practice of Cannabis for medical and psychoactive activities are well-documented among First Nations communities and pre-colonial settlements.

The spread of cannabis in North America by Europeans predominantly occurred in the 1600s; mainly for the textile applications of hemp fibres. After its ban in 1937, growers needed to become both more discreet and creative with their methods. Over this time period, methods of growing and reproducing cannabis has changed greatly and new methods continue to surface.

Growing cannabis is not limited to a classic outdoor garden setup. The propagation and selection of specific cultivars of cannabis has resulted in many techniques in recent years. The relative quantities of cannabinoids, such as THC and CBD, are commonly selected and manipulated for or against when cultivating a strain for medical or recreational use.

Strains are created via selective breeding. Specific plants, usually female, which contain a vast quantity of cannabinoids, flavonoids and terpenes, can be relatively adjusted and altered through such breeding. The process is fairly slow and may take many generations of breeding and cloning for seedlings to fully create a new variety. The process influences the cannabinoids and thus: the evolution of the plant.

When a desirable strain is generated, every single plant bred from the original will differ slightly from its lineage and therefore, will be different from the original parent (often called a mother). This process occurs naturally, leading to genetic variation among offspring. In order to prevent this, cloning of the parent plant is the best viable option to maintain the selected traits with minimal deviation. Cloning produces an exact genetic copy, essentially an identical twin.

As the name may suggest, micropropagation allows plant cloning on a smaller physical scale. Using only a small cut of a node or stem, multiple plants can be produced with the careful use of specific growing media. Micropropagation is best performed in a laboratory environment where risk of contamination and plant disease is minimal. The lab also allows stable temperatures and humidity for the newly cloned plants to safely grow while they are in the fragile initial stages.

This method also allows for a large amount of plants to be grown from a very small initial sample of the mother. One cutting can become a new shoot which can be cut again into several other plants allowing those to be cut into more and so on.

**The Process**

It begins with a small cutting of a node
from a stem that is disinfected and placed along with other cuttings into sterile petri plates. These plates contain a base medium that specifically promotes the growth of the stem/shoot tissues. The original cutting will begin to grow a small stem which can be cut into smaller pieces and carefully transplanted to new plates where the medium will promote the growth of roots. Once large enough, each new rooted clipping can be transplanted to soil or a medium of choice to continue its vegetative phase.

Using micropropagation to clone cannabis has several benefits. Cloning allows for an exact genetic copy of the mother plant. However, micropropagation requires much less original plant matter to be used for each new clone. A 1-cm cutting of a new node sliced into ten 1-mm cuttings can produce 10 new shoots. Each of these new shoots can be cut again five times and rooted. This makes a theoretical total of fifty new plantlets. The sterile laboratory environment also serves to keep the sensitive clones safe while in the crucial initial stages of growth.

**Challenges**

Being a more sophisticated process, micropropagation requires a large amount of time and effort to be completed. Companies employing the use of micropropagation are most likely focused on large-scale harvest or scientific research, and wish to keep the valuable traits of their selected cultivars. The additional transplantations added to the process also add to the time commitment of the procedure.

While a sterile, temperature controlled environment may seem to purely benefit a cultivator; it also requires additional time. If grown in a sterile and controlled environment, the new plantlets will need to be gradually exposed to their new conditions in order for a proper protective cuticle layer to form. Contamination is always a threat when using tissue culture methods as it can ruin a whole plate’s worth of new cuttings that can eventually become new plants. When using this procedure, it is absolutely crucial to prevent contamination at all times.

Surely, over the years, a lot has changed since the beginning of cannabis cultivation. New methods emerged and micropropagation has become one of the commonly used techniques in recent years. This method has helped to modernize the cultivation capabilities of the cannabis industry and will further help in maintaining existing and new strains. The use of this technique can certainly help further large or small-scale cultivators that wish to preserve and/or propagate their plant lines.

**Production**

**Investigating the relative performance of HPS and LED lights**

Continued from page 14

measure the DLI at the canopy level. Because the HPS plot was receiving considerably more spillover light from neighboring tables, the average DLI for the HPS treatment was only about 18 per cent lower than that for the HB LED treatment. The tables were movable, and the spillover value was not continuous. It is estimated over the entire grow cycle, based on the schedule of table movement that the HPS light intensity in terms of photosynthetically active radiation (PAR) was about 25 per cent lower than the LED.

**Initial results**

All the plants were vegged under HID lights for one week and then moved into the flowering room for nine weeks. At harvest, the plants grown under the HB LEDs had more narrow internodes and were on average two inches shorter than the HPS treatment. Moreover, the HB LED treatment resulted in buds that were markedly denser and reached maturity five days before the HPS treatment group.

We decided to harvest all plants when the HPS plants were ready. The dry flower weight of the HB LED treatment was about 15 per cent higher than the HPS treatment. That 15 per cent does not account for the fact that we could have harvested the HB LED treatment five days sooner. Nonetheless, we do not know how much weight was added to the plants during those five extra days. Finally, THC levels were higher for the HB LED treatment: 26.12 per cent compared to 25.19 per cent. These yield differences were statistically significant at a 95 per cent level.

**Conclusion**

The results provide initial evidence that an off-the-shelf, broad-spectrum, high-bay LED performs at least as well as a double-ended 1000w HPS fixture. This is important since the high-bay lights would cost less to operate than the HPS light. The LED fixtures cost about twice the cost of HPS on a Watt basis, but HPS bulbs need to be changed about once every 18 months whereas the LEDs should last at least eight years. Since LED lights can be placed closer to the canopy without causing bleaching, LEDs offer the potential to produce more yield for the same Watt input. The ability to increase yield rapidly makes up even a significant increase in light cost.

These results are not conclusive since there is always random variation in experiments like these, which is why we plan to replicate the test several times over the next months. Lastly, the Voltserver technology significantly reduced the speed and complexity of installing the lighting, and it operated well during the experiment. In a cannabis production facility even small increases in speed to market are highly valuable.