



# HOPE FOR HEMP

**MINNESOTA GROWER SHARES 10 LESSONS  
LEARNED AFTER YEAR ONE OF GROWING  
HEMP FOR CBD EXTRACTION.**

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In a time when there seems to be little good news in agriculture, hemp is offering hope for Leigh Barry. While the Minnesota grower's vision for growing hemp on his traditional corn, soybean, and alfalfa operation began about three years ago, 2019 marked his first season growing this new, yet old, crop for CBD.

The hemp-derived CBD market is projected to top \$23 billion by 2023, according to the Hemp Cultivation Landscape study conducted by the Brightfield Group. At the farm level, the study predicts it could mean over \$40,000 per acre in revenue, depending on quality and yield.

### PROCEED WITH CAUTION

Although there is still much uncertainty surrounding this nascent industry, the large potential return is enticing growers to give hemp a try – and many are going all in. From 2018 to 2019, the acres grown for CBD jumped from about 70 to a little over 5,600 in the state of Minnesota alone.

Originally planning to plant 40 acres (about 41,000 plants), Barry took a more cautious approach and scaled that number back to 6 acres (about 6,150 plants).

“There is a lot of manual labor involved, especially during harvest. There were long lead times when ordering equipment, and some of it wasn't going to arrive in time for harvest,” he says. “I knew I wasn't going to have enough hands to handle that many plants, so I decided to downsize. I wasn't willing to risk more than I was willing to lose.”

Starting small also allowed Barry, with help from agronomist and hemp specialist Kelsey VanOverbeke, to pay close attention to the intricate details between planting and harvest that may have been overlooked.

“I fear there is a simplicity implication that growers have to this whole grow,” says VanOverbeke, who is with Farmers Union Oil of Southern Valley in Fairmount, North Dakota. “They see the potential dollars they could be capturing, but they are not really thinking about what all goes into getting to that point.”

### TRIAL AND ERROR

As they forged ahead, Barry focused on how he was going to extract and market the hemp, while VanOverbeke spent months researching how to grow it.

“There is little to no information specific to our growing environment or research done on the manner in which we wanted to grow,” she says. “We are growing a crop we know very little about. You really have to pay attention to this plant. You can't just plant it and leave it. By far, the stakes are much higher when growing hemp than growing a traditional crop like corn or soybeans.”

To better understand what it takes to grow hemp, the first year was all about trial and error. “Whether we succeed or fail, we learn either way,” Barry says, noting that from seed choice to plant nutrition to oil extraction, there was plenty to

discover about growing this plant. “But we know more today than we did yesterday.”

“This is an entirely different crop that requires an entirely different level of management,” says Tanner Ehmke, manager of CoBank's Knowledge Exchange division. “There will be a steep learning curve across the entire industry. In the near term, I think there may be more lessons learned than profits made.”

Below are 10 of the many lessons Barry and VanOverbeke discovered in year one.

## LESSON 1:

### CHOOSE SEED WISELY.

Two feminized seed strains – Trump 2 and Hempres 2 (pictured) – were chosen for 2019.

The Trump 2 seeds cost \$1 per seed and were started by a greenhouse that charged \$3.25 per seedling to start.

“We had some challenges with the plants not being acclimated when we got them,” VanOverbeke says. “It pushed us to figure out how to perfect the seed start process ourselves, so we didn't face those issues again.”

With the arrival of the Hempres 2 seeds – which cost \$1.50 per seed – Barry and VanOverbeke started them indoors on Barry's farm. Until they were ready to be transplanted, plants were brought outdoors daily so they could acclimate.

Because they turned to trusted names in the industry for seed selection, overall quality was high. Out of 6,150 plants, only three were true males.

“When you're selecting seed, the biggest thing is networking and connecting with people who have had good experiences with seed companies and have a high

percentage of indoor feminized seed,” VanOverbeke says. “Leigh and I both had connections with people who had good experiences with the strains we selected. It is why we went with them and why we had success.”

As they look to 2020, Barry and VanOverbeke are considering other reputable strains to test in Minnesota's climate, along with the ones they grew in 2019.

## LESSON 2:

### PROPERLY PREPARE THE GROW SITE.

The four fields chosen to grow hemp had been sitting idle, so Barry had his work cut out for him in the spring to get the ground prepped. Soil types ranged from light to heavy, but pH was all within the ideal range of 6 to 7.5.

“I broke the ground just before planting and tilled it like I would a garden,” Barry says. “When dealing with sod, it doesn't move through the machine like it should. It also rained nearly every day, so it added to the struggle of getting the beds in the right condition.”

Because he is not busting sod this spring, Barry is light-years ahead of where he was last year in seedbed prep. ▶



Barry decided to grow the hemp in a way similar to how tobacco is grown. Using a berm maker, square-shoulder berms were created with plastic laid over the top and drip irrigation laid underneath all in one pass.

"If plants needed a little extra heat, the black plastic would help create that," he says.

On average, Barry had 1,025 plants per acre. They were spaced 51 inches apart in the row, and there was 10 feet between the rows.

"We wanted to give ourselves plenty of room so we could go through with the Ranger UTV to feed," he says. "It also helped when sexing plants, because we could drive through and easily look at the plants."

Teff grass was planted as a cover crop between the rows to choke out any weeds and to provide a sustainable environment for next year's crop rotation.

"We didn't know how well it was going to perform, but the Teff grass grew pretty well," she says. "We simply mowed the cover-cropped runways and only had to do hand-weeding at one site where the runways were left bare for a check."

## LESSON 3:

### FEED THE NEED IN SEASON AND ACCEPT THE UNIQUENESS OF EACH PLANT.

It takes 100 to 120 days for a non-autoflowering strain to reach maturity for harvest. Water, sunlight, and nutrients – in that order – are most important to hemp as it grows.

"These plants need a lot of water (roughly ½ to 1 gallon per plant per day and more at flowering time)," VanOverbeke says. "However, they do not like to have their roots sit in saturated soil."

Because the berm naturally sheds water, it, along with the loamier soils selected for the grow sites, helped reduce the risk of wet feet.

"We didn't have any automation to our watering, which is a must," Barry says. "This year, we're going to automate."

Hemp plants also love sun (heat) and should be placed where they will receive the most sunlight.

Plants were fed organic products from VanOverbeke's protocol such as fish, fish and kelp, humic acids, biologicals, and a LifeForce 3-2-2 product from Vivid Life Sciences that was brought to her attention by former colleague Theresa Bayer.

Although the pair worked tirelessly to give plants what they needed, the once-idle ground presented a number of challenges.

"One of the sites was just coming out of CRP and in a rich valley," Barry says. "The soil tests were wonderful, and it seemed like the perfect spot to plant hemp."

Since organic matter had been worked under in the spring, nutrient tie-up was a major issue, and plants struggled.

"We tried giving it more water, but it didn't



With help from agronomist and hemp specialist Kelsey VanOverbeke (right), Minnesota grower Leigh Barry (left) grew his first crop of hemp for CBD oil extraction in 2019.

seem to matter," he says. "We pretty much did everything wrong on that field, and it ended up being our worst site."

Another location, one they believe had cattle on it years ago, ended up producing one of the best crops. While it wasn't perfect, VanOverbeke feels the spot had ideal amounts of water, sunlight, and nutrition, which created a mini microclimate where the plants thrived.

Visually, it was clear which sites were excellent and which were lagging. "Even

though we didn't have parameters from industry experts to tell us where levels should be, the tissue tests done weekly reflected what we were seeing almost perfectly," she says.

Because VanOverbeke typically works with genetically modified crops, she was scouting for consistency, perfection, and replication in the hemp plants.

"I'm a traditional farmer at heart," she says. "I was constantly looking for or trying to manipulate whatever I could so each plant was uniform."

A conversation with a consultant on the West Coast made her realize that when it comes to plant genetics, these plants are as raw and wild as you're going to get.

"Once I accepted the genetics for what they were and that I was not going to get perfection, I was OK having a short, curvy lady next to a tall, skinny lady," VanOverbeke says. "It's really art by nature."

While this past year was all about plant survival, she says next year will be more about precision nutrition.

## LESSON 4:

### WATCH FOR MALES.

When the sunlight gets to be around 15 hours a day, you need to be on guard, as the resin developing from the female colas will trigger any males," VanOverbeke says.

Male pollen can travel up to 6 miles, and one male can ruin an entire acre.

"If a female has been pollinated, that is the highest CBD content that it will have," she says. "It's only downhill from there."

Based on what they saw last year, sexing plants should be on a 72-hour rotation until all females are confirmed and there are no hermaphrodite or male impostors.

## LESSON 5:

### BE MINDFUL OF THC LEVELS.

Within 30 days of harvest, each grow site was inspected and sampled by the Minnesota Department of Agriculture

## KNOW BEFORE YOU GROW

### Average Cost of Hemp Production in Minnesota for 2019

Feminized seed cost per acre:

**\$7,507**

Total production cost per acre for CBD-type hemp (4 to 10 acres):

**\$9,123**

## FEAR OF FINANCING

(MDA). The inspector randomly selected 30 plants per field, cut the top 2 inches of the female flower, and placed all 30 cuttings into a paper bag for a single, homogenized sample. Barry's highest number was 0.17%.

While Barry attributes his low numbers to a late and cool growing season, the majority of growers across the state averaged 0.29%. Of the 581 samples collected by MDA, 13% were over the 0.3% threshold.

Seed selection, water, and nitrogen are all key factors in managing THC levels.

### LESSON 6: WATCH OUT FOR PESTS AND DISEASE.

The same pests VanOverbeke deals with in soybeans were also present in the hemp plants.

"When I was seeing aphids, green cloverworm, or thistle caterpillar in soybeans, a lot of that carried over into the hemp fields if a host crop of soybeans was near," she says.

VanOverbeke also saw a small amount of budworm at one site. To control pests, she used an organic insecticide, Neem oil, that worked well.

"I'll be watching for all of them next year as they start to come into our area," VanOverbeke says.

### LESSON 7: HANDLE PLANTS WITH CARE.

Anything done on the Barry farm is driven by being efficient, sustainable, and profitable.

"Naturally, that also applies to hemp, and we tried to make the process more efficient by mechanizing it more," VanOverbeke says. "However, with the technology and equipment that is currently available for harvesting hemp buds and biomass for CBD, you can only mechanize it to a certain point before you start losing quality, which is frustrating."

The harvest process, which began on September 19, was tweaked from wet bucking on-site to cutting down plants to hang-dry and buck-dry as harvest progressed, and they figured out what was most efficient.

"Until we got the right equipment in the

The lack of synergy and absence of completed regulations has caused concerns among financial service providers, as growers and processors look to lenders for backing.

"With any developing industry, there is a lot of opportunity, but there is also a lot of risk," says Tanner Ehmke, manager of CoBank's Knowledge Exchange division.

In January 2019, Idaho State police confiscated industrial hemp being shipped from Oregon to Colorado. Since the USDA had not yet approved Oregon's production plan, the citation noted it wasn't protected under the interstate commerce provisions of the 2018 Farm Bill. In a similar case in South Dakota, a load of hemp traveling from Colorado to Minnesota was seized in August 2019.

If you're a lender, that's a big problem. Rumors of a bottleneck in processing also raised a red flag.

"Big banks wouldn't support infrastructure investments because they heard the word *cannabis* even though hemp is federally legal to grow," says Roger Cockroft, CEO of Delta Separations. "There wasn't enough processing equipment installed to handle 90% of the 2019 harvest."

"Farmers were hoping hemp was going to be a new, profitable way to diversify," Ehmke says. "Instead, they had nowhere to take it."

As the hemp industry continues to move forward, keeping meticulous records will be paramount.

"The Farm Credit System, which CoBank is a member of, is advising its lenders to get as much documentation as possible like the grower's license, Certificate of Analysis, the source of seed, and proof that THC levels are no more than 0.3%," Ehmke says. "If you're on the production side, you should also know who you're selling your crop to before a single seed goes in the ground." •

right place, harvest started off slow and jerky. We were only doing a couple hundred plants a day," Barry says.

Two pieces of equipment used in the harvest process were from the Triminimator product line (thetriminator.com).

"The flower is very sensitive. We lost a lot of yield by processing it in a harsher way, so we went back to the slower process," Barry says. "Every drop of oil we can gather will make the difference on whether we make money or not."

Similar to corn, a key component of processing the flower is pulling moisture out.

"We don't take corn into the elevator at 30% moisture," VanOverbeke says. "The same applies to hemp, so you have to have some sort of method of drying it. We put our material in a dehumidification room to take the moisture down slower without heat and to preserve the product for extraction. Many growers weren't prepared for that part of the process."

In 2020, they plan to wet buck the primary buds off the plants in the field and bring them back to the farm to dry. They will then use the Kirpy CBD Harvester, which cuts the plant at the base and conveys it onto a trailer to then hang-dry.

"I strongly suggest having a place to hang your crop to dry, because it really relieved our harvest pressure," she says.

### MN HEMP STATS

2016	2019
<b>Licensed Growers</b>	
6	350
<b>Outdoor Acres Planted</b>	
38	7,353
<b>Indoor Square Footage Planted</b>	
0	403,304
<b>Varieties Planted</b>	
6	136
<b>% Acres Planted for CBD</b>	
0%	74.4%

### LESSON 8: INVEST IN AN EXTRACTOR.

Soon after I decided I was going to plant hemp, I had to figure out where and how I was going to get this product to market," Barry says.

For more than a month, he looked at different processes and procedures. Rather than sell the biomass, he converted the crop into a product that would be more marketable.

"I invested in a solvent-free, CO<sub>2</sub> extractor, and I process the biomass into a full-spectrum crude form," Barry says.

It was a wise investment, as the hemp industry struggles with the lack of infrastructure it needs to convert the raw hemp plants into raw extracts and refined products.



“Because there was a lack of financing into hemp processing, it created a bottleneck,” Ehmke says. “In Colorado, there were hemp processors that wanted to expand but couldn’t get the financing. It had to be through their own cash. We realized there would be a lot of farmers in a five-state region with nowhere to take their hemp except to Colorado.”

Converting it into crude oil also bought Barry more time.

“Some growers are still sitting on a product that is in the raw biomass form. Others have decided to get it converted into an oil form, because the shelf life is longer.

Because we’re heading into another planting season, that’s where most are headed right now,” he says, adding that if you’re hanging on to a raw product, it’s important to store it in a cool, dry facility.

“The biggest concern is humidity,” Barry says. “We had an extremely humid winter in Minnesota. We know what the summers bring. If you’re going to try to store it, make sure your space is conditioned.”

## LESSON 9: WATCH THE MARKETS; THEY’RE MOVING TARGETS.

Marketing product has been a slow process, and there’s a lot of adjusting going on in the market.

“Oil prices are a lot lower this year than they were last year,” Barry says. “Prices were above \$3 per gram; now they have dipped to below \$1 per gram.”

There are many dynamics that contribute to the price point, he says, including extraction method, whether the product is refined or not, and quality of profile.

“Buyers are starting to inquire about oil. Now that we know quantity, quality, and consistency of our product, we are better equipped to have those conversations,” he says. “Oil that is just OK is no longer acceptable. Buyers want a clean extraction method that leads to high quality, and ultimately, a more premium-priced extract.”

## LESSON 10: DOCUMENT YOUR JOURNEY.

From the very beginning, VanOverbeke documented every step of their hemp-growing journey.

“When you’re living the discussion and decisions daily, you



**Water, sunlight, and nutrients are most important to hemp – in that order. Pictured is a Trump 2 plant.**

think you’re never going to forget it,” she says. “However, when you are trying to remember a specific detail like when an application was made and at what rate, it all starts to run together.”

It’s also why she filled a 3-inch binder with virtually everything she learned through books, online sources, and from connecting with people in the industry. Ultimately, that information helped VanOverbeke create her own indoor and outdoor protocol, which

covers the entire grow season up to extraction.

She also developed an online file, so they could share a journal of what went right, what went wrong, and what to take note of for next year. “There are tens of thousands of pictures and notes to go along with those pictures that document everything we were seeing,” VanOverbeke says. “We also sent one another screen shots of different things we were researching.”

At the end of their first year, they had an invaluable resource. “It has benefited not only us, but also a lot of other people we shared that information with,” she says.

### SHOP LOCAL

Because of the interest at the local level, Barry and VanOverbeke, along with other growers in their area, have launched **B.Good**. The venture will give businesses in the community the opportunity to carry a locally and organically grown line of CBD products. It is just



one example of where the oil that the Minnesota growers are producing will end up.

Whether it’s creating a market for his CBD oil or sharing information on how to grow hemp, “We’re all better together than we are apart,” Barry says. 

## MACHINE HELPS HARVEST HEMP

**A**s a new crop, hemp requires specialized knowledge and equipment to grow and process it efficiently.

“It is really important that farmers think not only about the growing stage but also about the harvesting and drying stages,” says Dana Mosman, Trinator CEO and cofounder. “We saw a lot of farmers who struggled to harvest and dry their product last year.”

Involved in the cannabis market since 2010, Trinator offers a complete line of harvest, drying, and processing solutions. Combining its expertise with Kirpy, a French company that manufactures specialized equipment, the Kirpy tobacco harvester was reengineered to meet the unique demands of the hemp plant.

“We were seeing widespread adoption of hemp across the country, and growers needed cost-effective solutions to help them harvest,” Mosman says. “We reached out to Kirpy about two years ago and began working on the project.”

The result is the Kirpy CBD Harvester. Introduced in 2019, the machine is an automatic, whole-plant harvester for cutting, notching, and loading the entire CBD hemp plant. It is capable of processing up to 5 acres per day.

“The demand has been incredible,” he says.

The Kirpy CBD Harvester lists for \$36,000. •



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