U.S Wholesale Hemp Price Benchmarks

December 2019

<table>
<thead>
<tr>
<th>U.S. Region Products</th>
<th>Units</th>
<th>Assessed Price</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBD Biomass (0 - 25K pounds)</td>
<td>$ / % CBD / pound</td>
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<tr>
<td>CBD Flower (Bulk)</td>
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<tr>
<td>Clones</td>
<td>$ / each</td>
<td>$3.53</td>
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</tr>
<tr>
<td>Industrial Seeds</td>
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<td>$2,100</td>
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</tr>
<tr>
<td>Distillate - Full Spectrum</td>
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<td>CBD Isolate</td>
<td>$ / kilogram</td>
<td>$2,218</td>
<td>$1,350</td>
<td>$3,500</td>
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</table>

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Hemp Benchmarks® is an independent Price Reporting Agency (PRA). Our goal is to bring price transparency to wholesale hemp markets in order to allow businesses to operate with confidence and efficiency.

We do not have physical or financial exposure to the commodities that we assess, and therefore do not profit from liquidity, volumes or price movement, avoiding the potential for any perception of conflicts of interest that could arise for marketplaces and exchanges.

Commodity market participants benefit from increased price transparency.
Price Commentary

Wholesale price erosion in the U.S. industrial hemp market persisted this month. Unlike last month, prices for larger lots declined much more steeply than rates for lots of 25,000 pounds or less. Smokable high-CBD flower also saw a significant downturn in its wholesale price after experiencing a 14% decline last month. While not directly comparable, historical data on cannabis / marijuana flower prices tracked by our sister company Cannabis Benchmarks has shown that declines for smokable flower that commence after a large fall harvest can continue well into the following year, but can sometimes begin to rebound in spring or summer if a crop was not particularly robust or the quality of the harvest is subpar.

As we expand upon below, reports of buyers backing out of purchasing contracts and farmers looking to store their crops until market conditions improve emphasize the persistence of the glut of unsold biomass that has overwhelmed current processing capacity since the autumn harvest. Unfortunately, in regard to storing biomass for sale later, degradation of CBD or other cannabinoid content could reduce the value of a crop that remains unsold for a

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<tr>
<td>CBD Biomass (100K - 1M pounds)</td>
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<td>$1.45</td>
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<tr>
<td>CBD Flower (Bulk)</td>
<td>$ / pound</td>
<td>$221</td>
<td>($53)</td>
<td>-17%</td>
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<tr>
<td>Clones</td>
<td>$ / each</td>
<td>$3.53</td>
<td>($0.91)</td>
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<td>Industrial Seeds</td>
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<td>$4.38</td>
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<td>Crude Hemp Oil</td>
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Are you looking for the full history of our pricing data to understand trends, volatility, or seasonality? Subscription & Licensing Options Coming Soon!
significant period, even if prices rebound.

The significant downturn in prices for CBD-rich hemp biomass and extracted CBD products this year could be perceived as grim news for the industry, and for those that suffered losses this year it certainly has been. However, in conversations with our analysts, numerous market participants have raised the point that elevated prices documented earlier in the year - and even the relatively depressed rates recorded more recently - have little to do with business fundamentals - namely supply, demand, and cost of production - and can be characterized as speculative. This is due in large part to the lack of definitive data on such aspects of the hemp and CBD markets, as well as the fact that those fundamentals are currently moving targets as the sector grows and develops.

On that note, prices for all types of seeds, as well as clones, also decreased in December. While we noted last month that new USDA rules could cause the seed market to tighten, particularly for certain varieties known to reliably produce compliant crops, there is not yet a clear picture of the scope of high-CBD hemp seed production in the U.S. Additionally, with many farmers experiencing difficulties and taking losses growing hemp this year, along with the perception that the USDA’s regulations will make it more difficult to bring in a compliant harvest, how much acreage will be planted in the coming year is also an open question.
Biomass Volume Discount Pricing

Volume discount pricing is a strategy that provides a financial incentive for purchasing a product or service in large amounts. In simple terms, customers purchasing more generally receive a lower price per unit.

Based on the data we have collected over the past six months, we have calculated the volume discounts that biomass purchasers received each month when doing deals larger than 1,000 pounds. Each month has shown a drastically different discount curve (as represented in the grey area) dictated by the absolute price level, season, and transactions collected. The black dotted line below shows the average of the past six monthly discount curves and represents a good proxy that buyers and sellers can use to settle trades of various sizes.

U.S. Biomass Volume Purchase Discounts (% off of a 1,000-pound transaction)

<table>
<thead>
<tr>
<th>Transaction Volume Size (pounds)</th>
<th>Estimated Discount</th>
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<tr>
<td>500,000</td>
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<tr>
<td>100,000</td>
<td>17.81%</td>
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Ask us how our pricing can help negotiate your next transaction.
What does this mean?

This wholesale price correlation matrix was generated from historical Hemp Benchmarks price assessments. It shows which product prices move together, move in opposite directions, or have no relationship at all. Correlations range from 1 to -1. If two products have a perfect positive correlation coefficient of 1, then the prices for each have been observed to move in the same direction, either up or down, by the same magnitude. A perfect negative correlation of -1 means that prices for two products move in opposite directions. A correlation of 0 indicates no relationship at all.

Interpretation

The correlation matrix continues to show most product prices are positively correlated, indicating that they generally move in unison and the hemp value chain is highly interconnected. The major exception has consistently been industrial seeds, which have shown a strong negative correlation to the rest of the product categories. Even though this has been the general trend since we first started reporting hemp market prices, industrial seeds saw their prices fall this month along with other products, just not by the same magnitude.

Example:
The correlation between Refined Hemp Oil and CBD Biomass is 0.96. This means that, based on currently available data, the prices of these two products have almost always moved in the same direction by nearly the same magnitude month-to-month.
Refined Hemp Oil Pricing Trends ($ / kilo)

- Refined Hemp Oil (Aggregate): $3,051
- Distillate - THC Free: $3,677
- Distillate - Broad Spectrum: $3,073
- Distillate - Full Spectrum: $2,445

U.S. Biomass Wholesale Pricing Trends ($ / %CBD / pound)

- 0-25k pounds: $1.73
- 25k-100k pounds: $1.47
- 100k-1M pounds: $1.45
- 1M+ pounds: $1.17
December 2019: Introduction

December marked the one-year anniversary of President Trump signing the 2018 Farm Bill into law, legalizing industrial hemp. At the time, many predicted the dawn of a new era for hemp in the U.S. and a dramatic acceleration for the nation’s hemp and hemp-derived cannabidiol (CBD) sector.

Now - 12 months later, after the first federally legal hemp harvest has been brought in - it is safe to say that such predictions have come to fruition for the most part. Yet, the ride has not always gone smoothly, as many participants in the hemp sector are trying to negotiate new federal rules, to learn from mistakes made during this past harvest, and to look ahead to the next planting season. For some, efforts are ongoing to sell off this year’s crop or store it in the hope of better market conditions next year.

A survey of hemp processing businesses, undertaken in conjunction with AlmaStone, provides an overview of the operations of extractors. Viewing the survey results in conjunction with our most recent Hemp Benchmarks price assessments also illustrates how quickly the hemp-CBD market is shifting.

Finally, the hemp industry is continuing to criticize certain aspects of the Interim Final Rule (IFR), the first set of federal hemp regulations released in late October by the U.S. Department of Agriculture (USDA). We discussed the IFR and reactions to it in detail in our November report. The hemp sector is also responding with alarm and criticism to a new warning about CBD products from the federal Food and Drug Administration (FDA), but welcomed an announcement of relaxed banking rules for businesses operating in the sector.

The 2019 Hemp Harvest: A Mixed Bag

Many state departments of agriculture are still tabulating their data from the 2019 harvest. Despite extreme weather conditions that affected large parts of the nation during the summer and autumn months - along with issues with genetics, pests, labor sourcing, and post-harvest processing and storage - the 2019 crop is still expected to break records for acreage planted, as well as for actual acreage harvested.

In Colorado, the numbers for the 2019 hemp harvest show that the state leads the nation in hemp cultivation, based on currently available information. Brian Koontz, the state's Industrial Hemp Program Manager, told Hemp Benchmarks that Colorado had 1,980 registrants for hemp cultivation this season, and those registrants held 2,712 active registrations. There were 87,359 acres registered to grow hemp in the state, with 52,275 acres - or 60% of those registered - actually planted. As of mid-December, he told Hemp Benchmarks, 51,851 acres had been harvested.

However, Koontz qualified the apparently high harvest to planting ratio by stating, “there's probably a higher failure rate” than the data actually shows. He continued, “My guess is that we had a larger percentage of people who failed to report planted and harvested acres. Otherwise, I do have a hard time believing that 90-some-percent of everything that was planted was harvested.”

Koontz said Colorado hemp farmers are required to report within ten days of planting, but that there were a very high number of people who entered the industry late in the season who had not yet submitted planting reports.
Oregon is also one of the nation’s largest hemp-growing states, and the harvest news from there has been very sobering. A combination of wet weather, insect infestations, and a lack of processing and drying facilities have taken their toll on the state’s hemp cultivators, especially inexperienced, first-year growers.

One veteran Oregon cultivator echoed to Hemp Benchmarks accounts conveyed by local media reports that only half of the over 60,000 acres licensed for hemp production in the state were actually harvested this season. Beyond the harvest, additional crop loss occurred at the drying and storage stages, as we have recounted in previous reports. There have been some nightmarish stories reported by local media as well; a December 4 rundown from the Mail Tribune tells of some growers losing nearly all of their crops to mold, or due to a lack of proper post-harvest storage and processing. Some un-harvested hemp ended up rotting in the field, as overburdened or insolvent farmers walked away from their crops.

“That’s a horrible situation,” John Strohfus, president and founder of Minnesota Hemp Farms, told Hemp Benchmarks. “That being said, there’s a lot of farmers who went way too big, way too fast, who didn’t do enough due diligence. That’s the harsh reality.”

Information from states with smaller hemp programs also reveals both the drive to expand production and the difficulties that come along with such endeavors. For example, Nevada is now in its fourth growing season for hemp. The state’s department of agriculture reports that, as of mid-December, 215 growers applied to grow 14,113 acres during the 2019 season, compared to 115 growers and 1,880 a year earlier. However, 4,661 acres of hemp - or just a third of the total applied for - were actually planted in Nevada this season. State officials, meanwhile, tell Hemp Benchmarks that harvest data is not available at this time.

In Indiana, Don Robison, Seed Administrator with the Office of the Indiana State Chemist, stated to Hemp Benchmarks that he believes about 5,300 acres were registered for outdoor hemp production in the state, with roughly 3,000 actually planted and 1,600 harvested. Additionally, 1.5 million square feet of indoor hemp production was planned by growers in Indiana, but only 135,700 square feet - or less than 10% of the planned amount - was planted. 66,510 square feet was ultimately harvested, less than half of that planted.

Robison also provided Hemp Benchmarks with survey data from Indiana growers, which constitutes a snapshot of some of the experiences of new hemp farmers in the Midwest. A majority of growers surveyed said that they had problems planting this year due to bad weather, with overly wet conditions the main issue.

As we have reported previously, the viability of seed and clone stock was another source of issues for hemp farmers, with almost half of those that responded to the survey from Indiana officials stating they were not satisfied with the source of their hemp seed, transplants, or starts. Moving ahead to harvest, data from Robison states that of 63 separate varieties tested for THC potency, 39% had non-compliant levels. While seemingly high, he notes that failure rate is similar to other Midwest states.

Overall, about 40% of survey respondents in Indiana characterized hemp as “more risky than other crops.” Still, though, over two-thirds also stated that they plan on growing hemp next year. Information from Robison states that over 10,000 acres are
planned for 2020 by existing Indiana hemp growers, more than double the amount planned this year. On the other hand, the Mail Tribune report cited above quotes Matt Ochoa, who works with hemp and cannabis growers in Oregon, as stating, “Sixty percent of the people who planted this year won't plant next year.” He added, “A lot of people are broke.”

The two contrasting views indicate that states with smaller hemp programs this year could see greater expansion next year. New farmers in such states might have had difficulties this year, but they were on a small scale and losses may not have been catastrophic. On the other hand, states with larger, more advanced hemp programs could see some stability, or more modest expansion, in 2020.

**Producers Attempt to Navigate an Uncertain Market Post-Harvest**

The Oregon cultivator quoted above told Hemp Benchmarks that most experienced growers brought their harvests in without any major issues. But along with depressed hemp prices the big concern now, he said, are a growing number of buyers who are backing out of their contracts. “These buyers are hedging on the fact that these farmers aren't set up properly,” he noted. “The [farmers] don’t have insurance; they probably don’t have a high-paid attorney on their payroll. So for them to really go after these [buyers], I think they’re gambling.”

The contract issue is occurring in other states as well. Survey information provided by Indiana officials shows that about 13% of respondents with unsold crops stated that the reason for that is the buyer did not honor their contract. Possibly as a result of low confidence in such agreements, about 45% of respondents stated that they were unlikely to enter into a production contract next year.

In Vermont, nearly a dozen farmers are calling for state officials to investigate a local CBD oil company after it allegedly reneged on their contracts. “It seems like a great economic opportunity,” one of the hemp farmers, Patrick Sullivan, told local outlet WCAX in a report published December 12. “You're just not expecting this sort of fraud to happen here, so be really careful about growing a big contract for ... a hemp business.”

With many processors not taking in inventory, buyers backing out of contracts, and a general glut of biomass on the market, the Oregon cultivator noted that another issue facing farmers is ensuring proper storage for their inventory. Many are sitting on their biomass in the hope that hemp prices will rebound. “People want to make deals but the buyers are coming in far too low,” he said. “[Farmers] think there may be some life on the other side of the harvest, come April, May, June next year, before any CBD products are online. That’s when there’s going to be some increased demand for the product.”

Similarly, in Indiana, survey results from state officials showed that almost half of respondents who had not yet sold their crops were holding on to their produce in the hope of better market conditions in the future. At this point, though, over 55% of respondents stated that they had lost money growing hemp in 2019, while roughly a third said they had turned a profit and the rest broke even. Almost 60% of those that responded to the survey from Indiana officials stated that their gross revenue from the 2019 harvest was lower than what they expected.
Hemp Benchmarks & AlmaStone Extraction Survey Results

Hemp Benchmarks, in conjunction with AlmaStone, developed a survey and circulated it to processors in the U.S. extracting CBD and other cannabinoids from hemp biomass, garnering dozens of responses. In what follows, we analyze the results of our first U.S. Hemp Extraction Survey. [Editor’s Note: The totals for some questions add up to more than 100% as respondents could select more than one option.]

Survey results show that hydrocarbon extraction - the use of butane, propane, or other related solvents - is employed by a minority of respondents. This is in contrast to the legal cannabis industry, where hydrocarbon extraction was the dominant method early on and remains extremely prevalent. Instead, most hemp processors that responded to the survey use ethanol or carbon dioxide to extract CBD and other cannabinoids from hemp.

The use of ethanol rather than hydrocarbons by a majority of survey respondents is likely due to the fact that processors extracting CBD from hemp are dealing in significantly larger throughput volumes than those extracting cannabinoids from cannabis / marijuana. Still, the survey results show that 70% of respondents have an actual monthly processing capacity of 100,000 pounds of biomass or less.

Also in regard to processing capacity, the survey results suggest that larger extractors are currently running at or near their theoretical throughput; the proportions of respondents that identified the three higher volume brackets as their actual processing capacity and theoretical processing capacity are quite comparable. However, it does appear that some respondents that are currently processing 100,000 pounds of biomass per month or less have the theoretical capacity to process up to 200,000 pounds monthly.

Of the products generated by extractors, distillate is the one produced most broadly by survey respondents, even more so than different forms of crude CBD oil, which is the initial step in making both distillates and isolate. While over 80% of respondents are making distillate, though, only about 55% stated that they are making THC-free distillate (THC-ND), suggesting that a significant portion have not made the investment in the equipment and other resources required to remove THC completely from Full or Broad Spectrum Distillate.
Other survey questions concerned approaches to bringing in biomass and prices for extracted CBD products. It is important to note that the survey was circulated in mid-October, with responses received in the weeks subsequent.

At that time, less than half of respondents were purchasing biomass outright, instead favoring offtake agreements. Based on feedback from market participants in recent months, it seems likely that the proportion of processors purchasing biomass has contracted in the wake of the harvest.

In regard to offtake arrangements, about a third of the extractors who responded to the survey stated that their tolling fee was between $20-$25 per pound of biomass. With prices for biomass and extracted products falling in the wake of the harvest, however, it is easy to see how farmers would balk at such tolling rates. Recent remarks to our analysts from market participants suggest that lower prices overall have pushed down tolling fees, with many stating that rates around $15 per pound of biomass are now more common.

Survey results examined in conjunction with more recent Hemp Benchmarks price assessments indicate that processors are seeing their margins squeezed along with farmers. December’s assessed price for winterized crude, $890 per kilogram, is at the bottom end of the lowest price bracket for such product included in the survey. Only about 15% of respondents stating that they priced their crude at or around this level, while the rest were setting prices higher at the time of the survey.

Meanwhile, distillate prices have held up better, with even Full Spectrum Distillate, which contains THC, seeing an assessed price of $2,920 per kilogram in November. Only about 30% of survey respondents stated that they were pricing their distillate around or above that level, with the rest answering that they set their distillate prices at $2,750 per kilogram or lower. This month, however, rates for Full Spectrum Distillate declined to $2,445 per kilogram, more in line with the survey responses.
FEDERAL REGULATORY UPDATE
**USDA: Additional Reactions to New Hemp Rules**

As was mentioned in last month’s report, hundreds of public comments were submitted following the release of the USDA’s Interim Final Rule (IFR), in late October. Originally, a public comment period on the IFR was set to conclude at the end of this month. However, on December 17, USDA announced that it “is extending the comment period for the U.S. Domestic Hemp Production Program interim final rule until Jan. 29, 2020, to allow stakeholders additional time to provide feedback.”

Some hemp cultivators, meanwhile, have been scathingly critical of the new regulations. “The USDA rules will destroy the hemp industry unless they change,” said Minnesota Hemp Farms’ John Strohfus. “It’s like a bomb in a china cabinet.”

Specifically, Strohfus told Hemp Benchmarks that the IFR’s requirement that hemp crops be tested for THC concentration within 15 days of harvest is unrealistic and will lead to people gaming the system. “No state is going to be able to execute that plan,” he said. “No state has the resources to do sampling 15 days ahead of harvest. They couldn’t even do it with a 30-day window. Who’s going to make sure the grower actually harvests 15 days ahead?”

Strohfus speculated, “What’s going to happen is growers are going to call [their] department of agriculture…. They’ll say we’ll be harvesting in 15 days, but the reality is they won’t harvest until 45 days later. And nobody is going to be able to check in on them. They might spot check and catch a few. But they don’t have the resources, so what’s the point of having [the 15-day requirement]?”

Supporting some of Strohfus’ assertions are statements from Brian Koontz, of Colorado’s Industrial Hemp Program. Koontz told Hemp Benchmarks that, when it came time to screen this year’s crop for THC concentrations, the state was overwhelmed with the sheer volume of new hemp growers. “We collected 600 regulatory samples [for THC testing] this year from commercial grows, which is three times as many as we’ve ever done before,” he said. “That created a backlog at the lab. It took three weeks, 21 days from the time the sample was collected to the time the registrant got the results back.” Notably, Colorado has one of the more developed hemp programs in the country, indicating that other states with newer programs and less lab capacity could struggle to screen the large volume of samples that will come in ahead of the harvest next year.

Some states have been attempting to work with the 15-day rule, with mixed results. Hawaii, which has a limited research pilot program, saw its hemp growers forced to destroy more than half of their crops this season due to high THC levels, according to an August 27 report from the Associated Press. “We anticipated 15 days would be the requirement set by USDA since USDA was working closely with Kentucky in drafting its regulations and Kentucky has a 15 day requirement,” Shelley Choy, Hemp Program Coordinator for Hawaii’s Department of Agriculture, said in an email to Hemp Benchmarks.

How much the 15-day requirement contributed to crops testing “hot” and how much was attributable to other factors is difficult to determine definitively, however. Choy added that, due to Hawaii’s unique climate, genetics that might typically result in compliant crops when grown in the continental U.S. were testing over the legal THC limit.
Still, Choy said, “We schedule sampling with the 15 day requirement in mind as we believe it is important for growers to experience what it will take both agronomically and financially to produce a hemp crop under USDA’s established requirements. We hope the experience gained by growers under the pilot program will position them for success under a future USDA approved program.”

While some state officials are working to conform with USDA rules, two federal lawmakers joined the hemp industry in pushing back against certain aspects of the IFR. In late November, Oregon’s two U.S. senators, Ron Wyden and Jeff Merkley, sent a letter to U.S. Agriculture Secretary Sonny Perdue, raising concerns about “the unintended and potentially harmful effects this interim final rule would have on hemp production in Oregon and across the country.”

Among the several issues they had with the IFR, the senators pointed to the 15-day testing rule, calling it, “an impossible obstacle for growers to overcome, [that] does not provide enough time before harvest to test, submit testing, and receive a response, particularly if there are a limited number of registered laboratories with sufficient expertise to perform the necessary tests.”

The federal government itself has conceded that a significant minority of hemp crops will likely test “hot” under the new regulations. As part of its solicitation for public comments on the IFR, published in the Federal Register in late October, the USDA’s Agricultural Marketing Service (AMS) noted that, “based on discussions with States that have a hemp program under the 2014 Farm Bill, AMS estimates that 20 percent of lots per year will produce cannabis that tests high for THC content.”

An aspect of the IFR welcomed by the hemp industry was its affirmation that industrial hemp was expressly permitted to be shipped across state lines without interference from state or local authorities. Previously, seizures of hemp shipments by state law enforcement occurred on several occasions this year. This aspect of the IFR was put to the test in November, when New York City police seized what they thought was over 100 pounds of cannabis, but which was actually hemp grown legally in Vermont and destined for a CBD shop in Brooklyn. Earlier this month, prosecutors dropped charges against the Brooklyn store owner, according to a December 10 report from CBS New York.

In the future, more sophisticated regulatory infrastructure may be employed to avoid such issues. A late November report from IEG Policy noted that a USDA attorney, speaking at a Food and Drug Institute conference, floated the idea of creating an information-sharing platform with the U.S. Department of Justice. The proposed database would supply law enforcement with information that would verify legal hemp shipments. The concept, according to attorney Mai Dinh, is to allow law enforcement “to tap into the system in real time … and be able to match up whatever certificate is with the shipment with the information that is in the database.”

**FDA: Agency Doubles Down on Warnings to CBD Businesses, Consumers**

In late November, the U.S. Food and Drug Administration (FDA) issued another set of warning letters, this time to 15 companies across the nation that the agency said were selling CBD products in ways that violate the Federal Food, Drug and Cosmetic Act (FD&C Act). “Based on the lack of scientific information supporting the safety of CBD in food,” the letter continued, “the FDA is also
indicating today that it cannot conclude that CBD is generally recognized as safe (GRAS) among qualified experts for its use in human or animal food.”

The letter also quoted FDA Principal Deputy Commissioner Amy Abernethy, who said the agency remains concerned “that some people wrongly think that the myriad of CBD products on the market, many of which are illegal, have been evaluated by the FDA and determined to be safe, or that trying CBD ‘can’t hurt.’”

One part of the letter that particularly alarmed many in the hemp industry referred to the FDA's Consumer Update, revised in late November, which outlines specific safety concerns related to CBD products. The revised update warned consumers, “CBD has the potential to harm you, and harm can happen even before you become aware of it.” The update said CBD can cause liver injury and affect the body’s metabolism of other drugs, “causing serious side effects.”

John Strohfus, whose Minnesota Hemp Farms is the largest U.S.-based hemp foods company and which also produces CBD, said the FDA warning affects anyone involved with CBD marketing. “They're creating a fear with the consumer base that I think is completely unfounded,” he said. Strohfus went on to question why CBD-rich varieties of hemp were allowed to be grown and processed into CBD products if they are in fact illegal.

At this point, the FDA has approved a single CBD formulation, Epidiolex, a drug available only by prescription and indicated for rare forms of childhood epilepsy. Other information on alleged benefits of CBD is anecdotal or based on preliminary studies that have not yet been verified fully in clinical trials.

**Banking Rules Relaxed for Hemp Businesses**

An important victory for the hemp industry was announced on December 3. Four federal agencies, along with state banking regulators, clarified the legal status of hemp-related businesses and eased off on monitoring those operations for possible criminal activity.

According to the statement, issued by the Federal Reserve Board, the Federal Deposit Insurance Corporation, the Financial Crimes Enforcement Network, the Office of the Comptroller of the Currency, and the Conference of State Bank Supervisors, banks “are no longer required to file suspicious activity reports (SAR) for customers solely because they are engaged in the growth or cultivation of hemp in accordance with applicable laws and regulations.”

There are only a handful of banks that will currently work with hemp companies, and financial analysts believe this change in the banking landscape could make a big difference for the hemp sector. “When you look at other financial services like payment processing and accepting credit cards, that’s really been off limits for hemp companies and the only way to get access to payment processing is to pay crazy high fees,” Castetter Sustainability Group CEO Kaelan Castetter said during an interview with Spectrum News.
STATE UPDATES
U.S. Permitted Acres of Hemp Per State
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State Updates

Below are updates on developments in industrial hemp and CBD production, market formation, legislation, and regulation at the state level.

State Agriculture Departments Look Ahead to 2020

States with hemp programs are looking ahead to next year. Hemp program directors have begun to network, both formally and informally, with their counterparts in other states to share information and strategies as they work to get their hemp sectors functioning successfully.

Holly Bell, Director of Cannabis with Florida’s Department of Agriculture and Consumer Services says Doris Hamilton, director of Kentucky’s Industrial Hemp Program, has been organizing monthly conference calls with state hemp program directors. “We do talk and collaborate,” Bell told Hemp Benchmarks. “In the last month I’ve been on panels with three of my peers.”

In talking to her counterparts, Bell said she has seen how different various state hemp programs can be. “In Florida and Utah we have the entire programs, from growing to retailing and everything in the middle, under one department,” she said, “and one department writes the rules, issues the permits, enforces and oversees the program. I think when you do that you’re going to get more consistency and you’re going to get a better thought-out program.”

In contrast, she noted, many other state departments of agriculture focus mostly on hemp cultivation. Since Florida is beginning its hemp program next spring, she said, “I’m really focusing on making sure I’ve got the processors in place, licensed and ready to go. Because that build-out is a lot more costly in time. So I’ve got to have that in place for my first harvest.”

Arizona

Some state and local lawmakers and Arizona’s medical cannabis industry are at odds over the issue of instituting “buffer zones” between hemp and marijuana farms, according to a December 6 report from Tucson.com. The report notes that medical cannabis producers have been pushing to enact five to 10 mile buffer zones between their existing facilities and any new hemp production operations.

Such efforts are a result of concerns from medical cannabis cultivators, who say that cross-pollination from nearby hemp farms threatens to impact their cannabis crops negatively. One local government has already instituted a buffer, the report notes. However, a state lawmaker has introduced a bill that would take away the ability of municipal governments to regulate industrial hemp sites.

Colorado

The Colorado Department of Agriculture (CDA) has approved four new industrial hemp seed varieties, bringing the total number of approved industrial hemp seed varieties in Colorado to 17.

Following a year-long, statewide THC validation and observation trial period, the newly approved industrial hemp seeds are now eligible to be grown by members of the Colorado Seed Growers Association (CSGA) for production of CDA Approved Certified Seed, according to a December 11 press release from the department.
CDA held field trials throughout 2019 on the four varieties of hemp across Colorado’s diverse growing conditions in the Northeast region, Arkansas Valley, Front Range, the San Luis Valley, and on the Western Slope. The trials validated growth viability and whether plants test at or below 0.3% THC concentration on a dry weight basis.

**Illinois**
On December 17, the Illinois Department of Agriculture (IDA) hosted a first of its kind Hemp Summit at the State Fairgrounds in Springfield. Billed as an opportunity to “join Department staff, NGO’s, growers, and processors to discuss the 2019 growing season, best practices, lessons learned, and the future hemp industry in Illinois,” the event was widely praised by attendees. The standing-room only crowd listened to sessions covering a broad range of topics, including USDA and IDA regulations, challenges and successes of the 2019 grow season, updates on extraction and processing, as well as banking and national market pricing trends.

By a show of hands, Illinois’ 644 licensed growers were well represented (attendance was dominated by farmers), of which about half acknowledged having unsold biomass. About two dozen indicated that they had received crude hemp oil or distillate from extractors as payment-in-kind instead of cash. More than a dozen extractors (some vertically integrated) were in attendance. The state has 195 registered processors, of which 10% are estimated to be operational.

When asked about the summit by Hemp Benchmarks, Jeffrey G. Cox, JD, Bureau Chief of Medicinal Plants with IDA said, “We knew there would be great interest in a program like this, but to have over 700 people in attendance far exceeded our expectations. It was great to put growers and processors in the same room so they could network, learn from each other, and learn about many other parts of the hemp industry. We’re already planning for the second Annual Illinois Hemp Summit.”

During networking breaks, growers and extractors - who wore different colored badges - explored transaction opportunities. By the end of the day, a couple dozen attendees had met potential counterparties. Illinois’ hemp production program is operating under the 2014 Farm Bill and will continue to employ the delta-9 only THC standard through October 2020, at which point the state will switch to the Total THC standard mandated by the USDA’s rules.

**Montana**
Although Montana is one of the country’s leaders in acreage licensed for hemp cultivation, the state’s first hemp processing license was only recently issued to a business in Ronan, according to a November 19 report from Valley Journal. Green Ridge Biosolutions moved into a 15,000 square-foot building in September. Green Ridge intends to manufacture its line of CBD products and wholesale them across the U.S.

**New York**
On December 9, Governor Andrew Cuomo signed legislation that establishes a regulatory framework for the production and sale of hemp and hemp extract in New York State. According to a press release, the measure also requires the hemp industry to test and label their products.

“The hemp industry in New York is exploding and with that growth comes a responsibility to regulate the industry in a way that helps
ensure its long-term viability and protects consumers,” Cuomo said. “By establishing a regulatory framework for producing and selling hemp and hemp extract we can set the industry on a path to continued growth in a smart, safe way that empowers both farmers and consumers.”

**Texas**

Dallas-based Panda Biotech announced plans to build an industrial hemp processing facility in Lubbock County, according to a December 10 report from local outlet KCBD. The 255,000 square foot facility is expected to be the largest hemp decortication center in the United States, and one of the largest worldwide.

Also in December, the state’s Department of Agriculture (TDA) submitted an outline of the Texas Hemp Program to the USDA for approval. The USDA must approve and finalize the program before the TDA can grant licenses for the legal cultivation of hemp in the state.

**Wyoming**

The General Council of the Eastern Shoshone Tribe has approved a resolution to examine legalizing medical cannabis and hemp production, according to a December 11 report from the Casper Star Tribune. Advocates say hemp and cannabis-related businesses and cultivation would help diversify the tribe’s economy, while creating an option for treating some medical conditions.
**CBD BIOMASS**
Dried hemp plant materials including the stalks and leaves that may include flowers/buds and/or seeds that have been harvested. Free of mold, grit, minimal (< 0.1%) non-hemp organic matter, and at least 80% dry. An industry-wide acceptable moisture content is necessary to establish uniform pricing for hemp biomass. Any hemp biomass material that is above the standard moisture content will result in decreased value and an adjusted sale price to reflect a lower volume of the end product to account for further water evaporation. Biomass can also be milled, ground or pressed into pellets.

**CBG BIOMASS**
Dried hemp plant materials from cultivars that primarily produce cannabigerol (CBG) with the same specifications described above in regard to CBD Biomass.

**DRIED CBD FLOWER**
Dry flower is the dried flower and bud fraction of a hemp plant that has been removed from the stalks and contains minimal stems. Flower is suitable for smoking and for use in pre-rolled joints.

**CLONES**
A clone refers to a plant that is an exact reproduction of an original parent plant, known as a mother plant, through asexual propagation. A clone is made by taking a stem cutting (or tissue culture) from a mother plant and placing the cutting into media to facilitate root growth. Once the roots begin to grow, the clone is transplanted into a field or cultivation facility.

**INDUSTRIAL SEEDS**
Industrial hemp seeds comprise a broad range of hemp cultivars used to grow hemp biomass, hemp seed and grain for food oils and food products, and fiber for woven and non-woven applications.

**CBD SEEDS (Non-Feminized)**
Hemp plants that are pollinated naturally or with traditional breeding techniques produce both male or female seeds. These are known as regular, or non-feminized, seeds and generally result in an even split between the two sexes.

**CBD SEEDS (Feminized)**
Feminized seeds are seeds that have been modified to produce almost 100% female plants. There are a few techniques that can produce reliably feminized seeds. Feminized hemp seeds can be genetically modified to produce only female plants by eliminating the X chromosome. A non-genetic technique is to stress a healthy female plant by interrupting its light cycle during flowering. Another common and controlled method is to spray female plants with a colloidal silver or silver thiosulphate solution.

**CRUDE HEMP OIL**
Crude hemp oil is extracted from the hemp plant and contains all of the cannabinoids, terpenes and other plant compounds found in the biomass. Processors use a number of different methods to extract crude oil from hemp. Supercritical CO2 extraction uses pressurized carbon dioxide (CO2) to pull CBD (and other phytochemicals) from the plant. Solvent extraction uses ethanol or hydrocarbons, such as butane or propane, to process hemp biomass into crude oil. Other processes use olive oil or water as a solvent. Crude hemp oil is often “winterized.” Crude oil is winterized to remove organic plant compounds, such as lipids, waxes and chlorophyll, that increases the potency of the oil and creates a more transparent distillate.

**REFINED HEMP OIL**
Crude hemp oil is further refined through distillation to produce refined hemp oil, which includes full spectrum oil, broad spectrum oil, and THC Free Distillate.

**CBD full spectrum oil distillate** is refined hemp oil extract that contains all the compounds found naturally occurring in the plant, including all the cannabinoids, terpenes and essential oils.

**CBD broad spectrum oil distillate** is refined hemp oil extract with various plant material, cannabinoids or terpenes that have been partially or fully removed.

**THC Free Distillate** is a broad spectrum oil distillate that has had all THC components removed using advanced techniques such as chromatography.

**CBD ISOLATE**
CBD isolate is the purest form of CBD, which is produced by removing all other compounds found in the plant including terpene, flavonoids, plant parts and other cannabinoids. CBD isolate comes in a granular or powder form and is odorless and tasteless. The end product contains 0% THC and is made up of 96% to 99.9% CBD.