

H E M P BENCHMARKS®

U.S Wholesale Hemp Price Benchmarks

January 2020

U.S. Region Products	Units	Assessed Price	Low	High
CBD Biomass (Aggregate)	\$ / % CBD / pound	\$1.00	\$0.40	\$2.50
CBD Biomass (0 - 25K pounds)	\$ / % CBD / pound	\$1.31	\$0.70	\$2.50
CBD Biomass (25K - 100K pounds)	\$ / % CBD / pound	\$1.14	\$0.65	\$1.75
CBD Biomass (100K - 1M pounds)	\$ / % CBD / pound	\$1.01	\$0.60	\$1.30
CBD Biomass (1M+ pounds)	\$ / % CBD / pound	\$0.55	\$0.40	\$0.75
CBG Biomass	\$ / % CBG / pound	\$14.80	\$10.00	\$20.00
CBD Flower (Bulk)	\$ / pound	\$226	\$63	\$675
CBD Clones	\$ / each	\$4.25	\$3.00	\$6.00
Industrial Seeds	\$ / pound	\$4.57	\$3.72	\$8.00
CBD Seeds (Non-Feminized)	\$ / pound	\$1,435	\$475	\$4,000
CBD Seeds (Feminized)	\$ / seed	\$0.93	\$0.40	\$1.25
Crude Hemp Oil	\$ / kilogram	\$668	\$325	\$1,200
Refined Hemp Oil (Aggregate)	\$ / kilogram	\$2,528	\$750	\$5,273
Distillate - THC Free	\$ / kilogram	\$3,120	\$2,000	\$5,273
Distillate - Broad Spectrum	\$ / kilogram	\$2,858	\$1,400	\$3,954
Distillate - Full Spectrum	\$ / kilogram	\$1,791	\$750	\$2,640
CBD Isolate	\$ / kilogram	\$1,624	\$1,100	\$4,000

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.

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Price Commentary

We have in previous reports emphasized the current glut of biomass on the market, which has led to farmers being unable to move their harvests. Such market conditions continued in January, with numerous members of our Price Contributor Network reporting that relatively little buying and selling of biomass was taking place. Transactions that were reported showed high-CBD biomass prices continuing to sink, with the assessed rate for transactions of over 1 million pounds down 53% from last month.

Even the assessed price for high-CBG biomass experienced a 27% downturn. Reports from our network indicate that large volumes of biomass remain unsold, suggesting that further price erosion is possible.

Additionally this month, numerous price contributors stated that sales of extracts, specifically distillate, have been sluggish. Very few spot cash purchases are being made and inventories held by producers and processors who are taking splits or tolling fees are growing. THC Free and Broad Spectrum Distillate retained value

U.S. Region Products	Units	May-19	Jun-19	Jul-19	Aug-19	Sept-19	Oct-19	Nov-19	Dec-19	Jan-20	MoM \$Chg	MoM %Chg
CBD Biomass (Aggregate)	\$ / % CBD / pound									\$1.00	(\$0.46)	-31%
CBD Biomass (0 - 25K pounds)	\$ / % CBD / pound									\$1.31	(\$0.42)	-24%
CBD Biomass (25K - 100K pounds)	\$ / % CBD / pound									\$1.14	(\$0.33)	-22%
CBD Biomass (100K - 1M pounds)	\$ / % CBD / pound									\$1.01	(\$0.44)	-30%
CBD Biomass (1M+ pounds)	\$ / % CBD / pound									\$0.55	(\$0.62)	-53%
CBG Biomass	\$ / % CBG / pound									\$14.80	(\$5.49)	-27%
CBD Flower (Bulk)	\$ / pound									\$226	\$5	2%
CBD Clones	\$ / each									\$4.25	\$0.72	20%
Industrial Seeds	\$ / pound									\$4.57	\$0.19	4%
CBD Seeds (Non-Feminized)	\$ / pound									\$1,435	(\$532)	-27%
CBD Seeds (Feminized)	\$ / seed									\$0.93	\$0.05	6%
Crude Hemp Oil	\$ / kilogram									\$668	(\$222)	-25%
Refined Hemp Oil (Aggregate)	\$ / kilogram									\$2,528	(\$523)	-17%
Distillate - THC Free	\$ / kilogram									\$3,120	(\$557)	-15%
Distillate - Broad Spectrum	\$ / kilogram									\$2,858	(\$215)	-7%
Distillate - Full Spectrum	\$ / kilogram									\$1,791	(\$654)	-27%
CBD Isolate	\$ / kilogram									\$1,624	(\$594)	-27%

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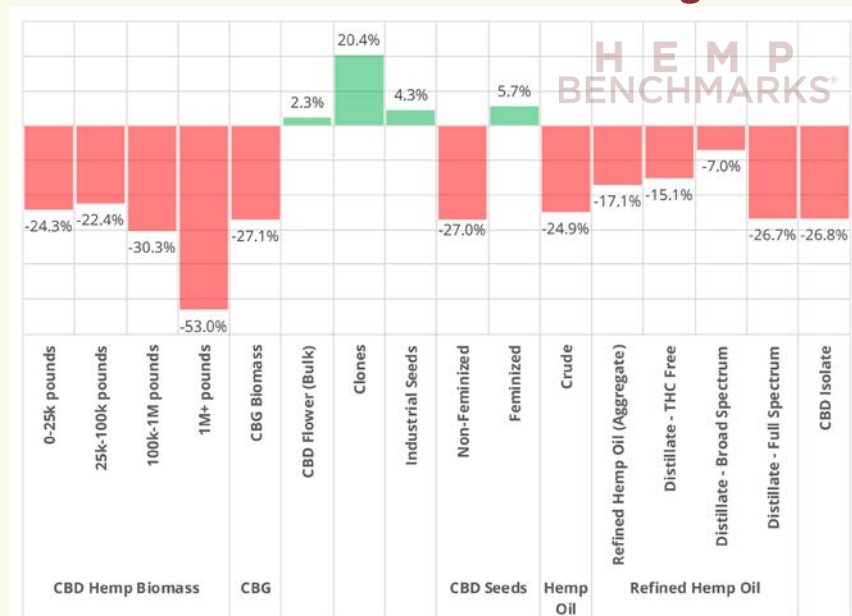
better than other hemp-CBD extracts, but still saw month-over-month declines of 15% and 7%, respectively, in their assessed rates. Meanwhile, reports indicate that existing processing capacity is being taken offline and anticipated new capacity will not be realized in some cases, as several major extractors face financial pressure for various reasons.

A big part of the problem, said an Oregon-based hemp processor with operations in Montana, is a breakdown in the hemp supply chain. "You have farmers not being paid by processors, processors that aren't being paid by brokers, brokers that aren't being paid by customers," he said. "It's trickling down. Some processors that I know have been unable to make payroll and comply with rules, because they have no income." In the current environment with prices continuing their decline, the processor continued, people are

more focused on surviving rather than creating long-term business relationships.

Still, there are some market participants reporting strong prices. This month, the highest-priced individual transaction for CBD biomass was \$2.50 / %CBD / pound. In general, we have observed that USDA-certified organic biomass commands the strongest prices. This was the case last month as well, with transactions for certified organic biomass around \$3.00 / %CBD / pound submitted by price contributors. Additionally, multiple certified organic hemp farmers have stated to our analysts that they plan to partner with certified organic extraction operations to produce crude and refined CBD oil that is also certified. Such product is reportedly rare in the industry and those operators are hoping to obtain above-market rates for said extracts.

Month-on-Month % Price Change



With the quality of significant portions of 2019's crop impacted by poor weather, pests, and issues with harvesting and drying, those able to produce high-grade biomass and extracts may be able to differentiate themselves and obtain higher prices for their wares even in the current buyer's market.

Finally, a couple price contributors mentioned this month that they believe a market will arise for hemp-derived terpenes. A Colorado farmer stated that the varieties he grew were very high in terpene content and he extracted the aromatic compounds, not wanting them to go to waste. Although he noted that there was not much of a market for terpenes right now, he said he expects that there could be in the future and that the biggest buyers of terpenes currently are vape cartridge manufacturers. Similarly, a Colorado-based seed producer stated that he believes demand for terpenes will increase going forward, due in part to the federal ban on flavored nicotine vape products that was announced early this year.

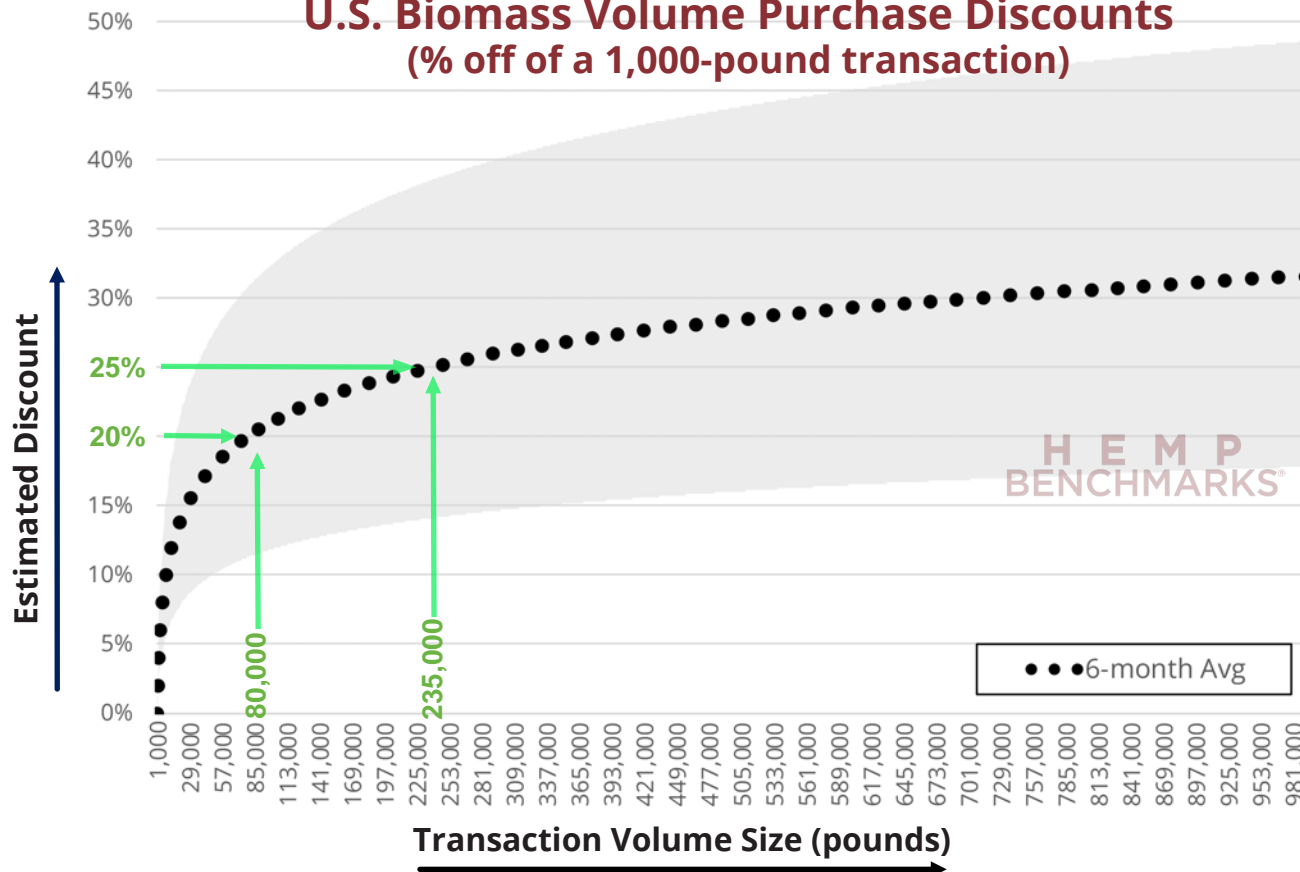
Biomass Volume Discount Pricing

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)



**Ask us how our pricing
can help
negotiate your next
transaction**

Wholesale Prices - Correlation Matrix April 2019 to January 2020 Data

	CBD Biomass	CBD Flower (Bulk)	Clones	Industrial Seeds	CBD Seeds (Non-Feminized)	CBD Seeds (Feminized)	Crude Hemp Oil	Refined Hemp Oil (Aggregate)	CBD Isolate
CBD Biomass		0.76	0.86	-0.12	0.81	0.87	0.82	0.97	0.98
CBD Flower (Bulk)	0.76		0.51	0.45	0.36	0.87	0.50	0.68	0.66
Clones	0.86	0.51		-0.43	0.88	0.79	0.82	0.89	0.89
Industrial Seeds	-0.12	0.45	-0.43		-0.47	0.16	-0.27	-0.18	-0.21
CBD Seeds (Non-Feminized)	0.81	0.36	0.88	-0.47		0.68	0.94	0.88	0.88
CBD Seeds (Feminized)	0.87	0.87	0.79	0.16	0.68		0.72	0.82	0.81
Crude Hemp Oil	0.82	0.50	0.82	-0.27	0.94	0.72		0.91	0.90
Refined Hemp Oil (Aggregate)	0.97	0.68	0.89	-0.18	0.88	0.82	0.91		1.00
CBD Isolate	0.98	0.66	0.89	-0.21	0.88	0.81	0.90	1.00	

Example:

The correlation between Refined Hemp Oil and CBD Biomass is 0.97. 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.



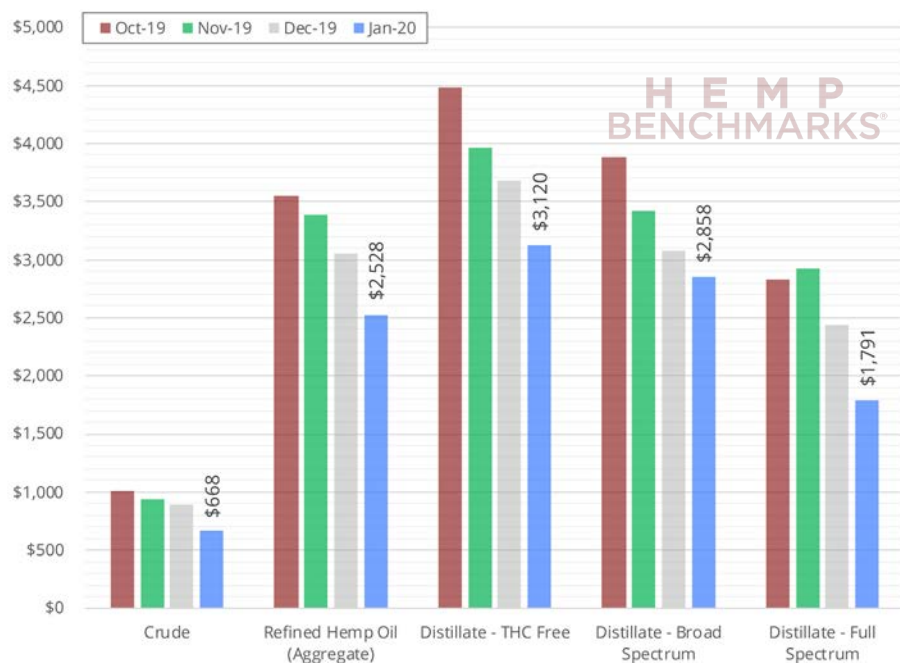
What does this mean?

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.

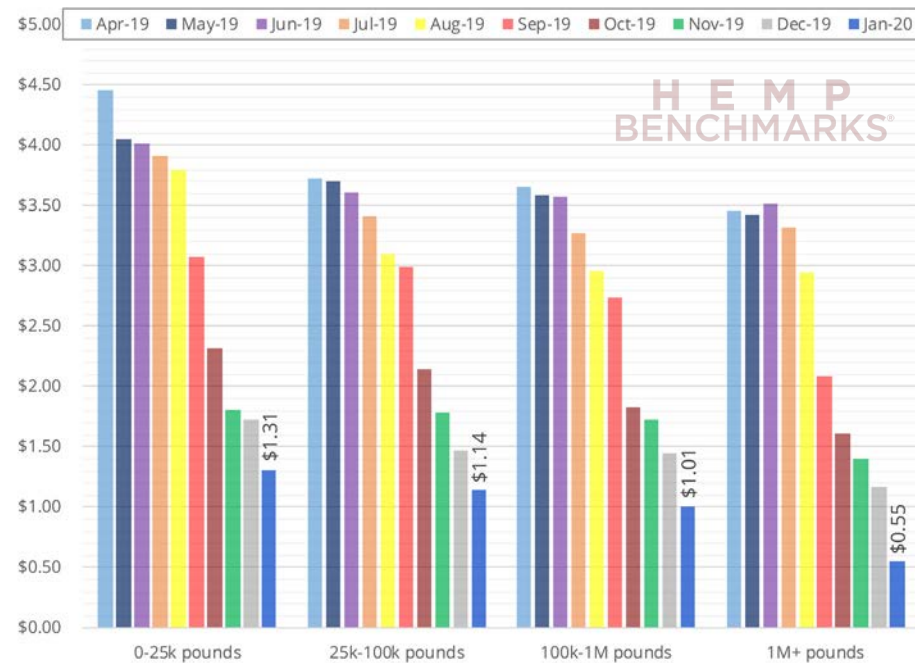
Interpretation -

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. This month, however, industrial seeds and feminized CBD seeds began to show some correlation, as both saw price rises with the 2020 growing season approaching.

Refined Hemp Oil Pricing Trends (\$ / kilo)



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



January 2020: Introduction

2020 began with hemp growers and processors across the country assessing the lessons learned from the 2019 harvest, while considering the start of this year's growing season. Concerns about the compliance of existing hemp genetics are at the forefront for many farmers, given new, effectively more stringent federal standards for allowable THC concentration. Still, prices for seeds and clones of CBD-rich cultivars have been falling, a trend that some expect to continue even as the time for planting approaches.

Despite many farmers and processors experiencing numerous challenges in 2019, the U.S. hemp sector seems set to expand again in 2020. Yet quantifying supply and demand remains difficult, with official data on production scarce. Available information points to relatively low planting and harvest rates compared to the number of acres licensed for production in 2019, while difficulties with harvest and drying equipment resulted in additional crop loss.

Finally, even as the federal regulatory structure continues to come together, apprehensions about the viability of the hemp industry as it exists currently are prompting some states to put off implementing the U.S. Department of Agriculture's (USDA's) new regulations. On the other hand, some states and Native American tribes have already received USDA approval for their production plans. Consequently, U.S. hemp production in 2020 will continue to occur under a regulatory patchwork.

Prices for CBD Seeds & Clones Falling Despite Approaching Growing Season

With farmers making preparations for the upcoming growing season, we examine the market landscape of high-CBD seed and

clone stock.

In the wake of the release of the USDA's regulations for hemp production, published at the end of October, some market participants speculated that prices for seeds and clones would rise. This is because the USDA's regulations, known formally as its Interim Final Rule (IFR), deemed that industrial hemp plant material must have a total THC concentration of 0.3% or less in order to be compliant, taking into account levels of both delta-9 THC and THCA. Previously, most state departments of agriculture had been screening crops for only delta-9 THC. (We explained the issues around measuring for only delta-9 versus total THC in detail in our November 2019 report.)

Price increases for CBD clones and feminized seeds were observed this month. Overall, though, rates for seed and clone stock have trended downward in recent months, and remain down compared to prices around the time the USDA's IFR was published on October 31. The data contained in the table below shows that assessed prices continued to trend downward in November and December 2019, as they had in the months prior to the release of the new federal regulations.

U.S. Region Products	Units	Sept-19	Oct-19	Nov-19	Dec-19	Jan-20
CBD Clones	\$ / each	\$4.47	\$4.58	\$4.44	\$3.53	\$4.25
CBD Seeds (Non-Feminized)	\$ / pound	\$2,450	\$2,333	\$2,360	\$1,967	\$1,435
CBD Seeds (Feminized)	\$ / seed	\$1.08	\$1.05	\$1.00	\$0.88	\$0.93

Even the assessed price for feminized CBD seeds dropped by about 16% from October to December.

So, why are prices for CBD seed and clone stock falling even as the 2020 growing season approaches?

One reason seems to be that informed market participants are aware that most high-CBD varieties could conceivably result in a “hot” crop; reputable seed sellers are being cautious and generally not guaranteeing that their genetics will definitely be compliant under the USDA’s IFR. Even prior to the IFR being released, numerous experienced growers stated to Hemp Benchmarks that many high-CBD cultivars would be non-compliant under the Total THC standard, a sentiment echoed in public comments submitted in regard to the IFR.

This month, a breeder and seed producer with operations in Colorado and Illinois stated in an email to Hemp Benchmarks, “Anyone who guarantees they have USDA compliant high CBD (12+%) hemp genetics is misleading farmers because the nature of the beast for high CBD genetics is that they CAN go hot.” He added that the production of THCA is part of the hemp plant’s immune system response. As a result, stressors from environmental factors, fertilization issues, and pests, among other pressures, can cause THCA levels to spike and make a crop non-compliant.

Given the above, it does not appear that any particular CBD-rich varieties available currently have been distinguished as reliably compliant under the IFR’s Total THC standard. With a lack of assurances on that front, those buying seed are not willing to pay high rates for genetics that may grow into a crop that has to be destroyed come autumn.

Another reason for falling seed prices may be that the supply of seed stock is relatively easy to scale up. The seed breeder mentioned above stated to Hemp Benchmarks that his company estimated that over 2 million of their seeds were planted in the U.S. in 2019. For 2020, he expects that around 100 million seeds and clones from his company will be planted, a roughly 50-fold increase in just one year.

The ability to increase production so dramatically in such a short period of time can be attributed at least in part to the fact that growing for seeds requires relatively little space and labor compared to cultivating hemp for biomass or smokable flower. The breeder said that between 5,000 and 10,000 seeds can be harvested from just 30 square feet of indoor canopy area, depending on genetic and environmental factors. With the ability to achieve about four cycles annually growing indoors, a significant number of seeds can be generated in a short time within a fairly small facility. Of course, this assumes that the breeder has stable, marketable cultivars already, which is the case in regard to the relatively long-standing operation that is referenced in this discussion.

Another speculation regarding the market for hemp genetics this year was that growers would turn increasingly to high-CBG varieties. At this point, there does not seem to be a massive shift toward growing such cultivars instead of high-CBD ones, though some hemp seed companies and processors have been touting the relatively unknown cannabinoid since the release of the USDA’s rules.

The appeal of high-CBG varieties currently - such as it is - seems rooted mainly in the fact that some have been shown to have very small THC concentrations - well below the legal limit even when

total THC is tested for - in addition to the high prices for CBG-rich biomass relative to rates for CBD plant material. In other words, much of the current “demand” for high-CBG cultivars is originating from the production side of the hemp industry.

Less clear is whether significant consumer demand for CBG products exists, or can be generated, as well as whether prices for CBG biomass and extracts will hold up. Right now, the relative rarity of such plant material contributes greatly to its elevated prices. Of course, high prices also discourage consumers, suppressing demand in the absence of compelling evidence - whether anecdotal or scientific - that ingesting CBG will bring discernible benefits.

As the growing season draws closer, demand for seeds and clones will increase, and not just from the U.S. industry, which still appears set to expand in 2020 even after many farmers experienced a tough season in 2019. Additional demand could come from overseas. The breeder mentioned above stated that he was in conversations with Chinese entities who were looking to cultivate high-CBD hemp at scales significantly larger than much of what is being undertaken in America. Whether such international efforts will get off the ground this year remains to be seen. However, in the case of China, operators in various sectors of the country's Communist Party-run economy have been able to scale up extremely rapidly with the backing of the state.

Overall, though, the breeder expects that prices for seeds of high-CBD cultivars will decline over the course of the coming months, while rates for seeds of high-CBG or CBC varieties will maintain their value better. We are working to collect transaction data on seeds of high-CBG cultivars and will publish price assessments for them once a statistically significant sample is achieved.

2019 Harvest Assessment Still Hazy

Hard data on planting and harvest rates from state agriculture departments remains sparse at the moment. Many of the agriculture departments contacted by Hemp Benchmarks say they are still tabulating their 2019 hemp production figures. Some states have yet to start officially monitoring hemp production in terms of acreage grown and harvested.

However, eight states provided information on planted acreage:

- Colorado: 52,275 acres planted (60% of amount licensed)
- Indiana: 3,000 acres planted (57% of amount licensed)
- Kentucky: 26,000 acres planted (43% of the amount licensed)
- Kansas: 2,600 acres planted (45% of amount licensed)
- Minnesota: 7,278 acres planted (52% of amount licensed)
- Nevada: 4,661 acres planted (33% of amount licensed)
- New York: 4,541 acres planted (22% of amount licensed)
- West Virginia: 641 acres planted (25% of amount licensed)
- Wisconsin: 5,000 acres planted (29% of amount licensed)

Six of the nine states that provided planting information to Hemp Benchmarks saw less than half of the acreage licensed for hemp production actually planted. Colorado and Kentucky are the only major hemp producing states among the group, with the former boasting the highest planting rate of the states that were able to provide data at this time.

Definitive data on harvest rates is even more scarce, with only three states able to provide harvested acreage to Hemp Benchmarks by our publication deadline this month.

- Colorado: 51,851 acres harvested (99% of planted; 59% of licensed)
- Indiana: 1,600 acres harvested (53% of planted; 30% of licensed)
- Kansas: 1,427 acres harvested (55% of planted; 25% of licensed)

As we noted in our December 2019 report, Colorado officials qualified the high harvest rate, stating that some farmers had not yet reported and they believed crop failure rates were higher. Anecdotal reports out of other major hemp-producing states suggests that crop failure was widespread even amongst experienced growers.

“We’re talking about a 30% pull,” one veteran cultivator in Oregon told Hemp Benchmarks, referring to the amount of hemp successfully harvested in his state. Most hemp farmers there, he said, lost up to 70% of their crops to “sun bake, late harvest, and mold issues.”

An Oregon-based processor with years of experience in both growing and processing, and who has recently expanded his work into Montana, told Hemp Benchmarks he was concerned about the amount of hemp he saw left in the fields in both states during late autumn and early winter.

The data that has been gathered by Hemp Benchmarks is not sufficient to prompt substantial revisions to our assumptions regarding the size of 2019’s hemp crop. Based on updated figures for licensed acreage received since our October report, however, we estimate that a bit under 90,000 acres of biomass were harvested and dried successfully from about 570,000 that were licensed, yielding roughly 90 million pounds of CBD-rich biomass suitable for extraction.

We will continue to attempt to refine our assessment of 2019’s crop, as being able to do so with some degree of certainty will be valuable to stakeholders attempting to size the market and evaluate supply-demand dynamics. As things stand, what can be said in regard to 2019’s production is that even with significant amounts of licensed acreage not planted, as well as large proportions of planted crops lost for various reasons, both before and after harvest, farmers generated enough CBD-rich biomass to overwhelm current processing capacity and create the glut that we have documented in recent months. If weather conditions had been more favorable, or harvesting and drying methods and equipment more efficient and effective, significantly more biomass suitable for extraction would have been brought in, exacerbating the current buyer’s market.

Become a Member of our Price Contributor Network

Members of our Price Contributor Network are our partners, and together we bring transparency and efficiencies to the U.S. and international hemp markets. Our partners provide Hemp Benchmarks with wholesale market data and receive discounted subscriptions, complimentary special reports, and exclusive wholesale market analysis in return. If you are a cultivator, extractor, processor or manufacturer, contact us and let’s start working together.

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State Spotlight: Wisconsin

While only a handful of states have been able to provide planting and harvest data for the 2019 season, an exception to the general dearth of definitive information on U.S. hemp production was the Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP). Wisconsin officials provided Hemp Benchmarks with a detailed accounting of hemp production and processing in the state over the last several months.

In Wisconsin in 2019, 1,247 grower registrations were issued, with all registered growing locations totaling 16,958 acres. 5,000 acres were reported to have been planted, or 30% of the total registered.

As of late January 2020, Wisconsin officials told Hemp Benchmarks that two-thirds of the state's growers had submitted their final reports for 2019, allowing DATCP to provide a "preliminary final report" on last year's growing season in the state.

- 96% of the returned reports indicate CBD as the intended crop use.
- 3,390,464 pounds were reported as harvested.
- 640 acres of hemp were reported as destroyed. DATCP did not indicate the reason(s) for these crops being destroyed. However, in October, DATCP stated to Hemp Benchmarks that 291 of 2,037 samples tested for THC - or 14% - were above the 0.3% limit. 640 acres constitutes almost 13% of the 5,000 acres that were planted.
- Of the final reports submitted, licensees indicated that, on average, they had sold about 6% of their total harvest. Many indicated that they intend to sell in early 2020.

Wisconsin also licensed 556 hemp processors for 2019. As of late

January, just under two-thirds (64%) had returned their final reports to DATCP.

- Of the returned reports, just under half (48%) indicated that they processed hemp in 2019, while the others did not. Consequently, about 170 processors have at this point been confirmed as operational in Wisconsin last year.
- 1,119,831 pounds of hemp was reported as processed. In DATCP's reporting, "processing" can entail numerous actions:
 - ◇ 25% of returned reports indicate hemp was processed by drying.
 - ◇ 26% of returned reports indicate hemp was processed by storing.
 - ◇ 18% of returned reports indicate hemp was processed by extraction for CBD.
 - ◇ 1% of returned reports indicate hemp was processed by passing for seed oil.
 - ◇ 2% of returned reports indicate hemp was processed by grain cleaning.
 - ◇ 20% of returned reports indicate hemp was processed by another method. The majority of these methods indicate that the licensee intended to prepare hemp for the CBD or smokable flower markets.

Although Wisconsin's information is not complete, it is far and away the most extensive data set able to be obtained from any state to this point. The information provides a glimpse at one state's initial season of commercial hemp production. In general, the proportion of farmers and processors that were actually able to get up and running after registering with the state was relatively small. As expected, producing CBD-rich hemp and processing it into extracts

or smokable flower were the primary goals of almost all Wisconsin hemp businesses. However, the fact that, on average, farmers had only been able to sell 6% of their production by the time final reports were due at the end of 2019 highlights the tough market landscape faced by producers.

Improved Harvesting & Drying Equipment Necessary for Production to Scale

Reports from the field this month continued to emphasize the lack of proper harvesting and processing equipment available to hemp growers. According to Bonny Jo Peterson, executive director of the Industrial Hemp Association of Washington, nearly every hemp farm in her state had issues with their current equipment, including binding or breaking down, due to the fibrous and sticky nature of the plant. "People used a combination of everything from bean and corn harvester combines to chippers to hand harvesting," Peterson told Hemp Benchmarks. "So every single issue you can imagine with harvesting and harvesting equipment happened."

The Oregon-based processor quoted above, in the opening Price Commentary, noted that both a lack of proper machinery and infrastructure are creating unnecessary bottlenecks for hemp operations nationwide. Hemp processors, he said, "are using machines that aren't designed to decorticate hemp. And these machines are being developed, there's people working on them, I've seen them, but they're not there yet and they're not at scale. They're processing hundreds or maybe 1,000 pounds an hour whereas they need to be at the 10,000 pounds an hour range to be able to compete in the fiber market."

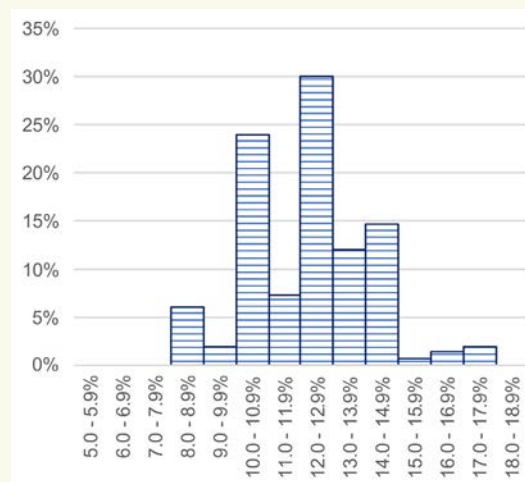
While there is Canadian and European hemp extraction and processing equipment coming online in the U.S., its availability is

still limited and it often has a one or two-year waiting period.

Another obstacle to a successful harvest in 2019, said Peterson, was not having proper post-harvest drying spaces and equipment. "People didn't put in the cost of the 'R-and-D' needed for the air and heat driers for hemp," she said, "or the space to properly hang-dry. Not everyone found the space needed, not everything turned out well." Peterson estimated that nearly every farmer in her state lost at least a quarter of their crop during the 2019 season due to improper drying practices or the lack of a proper post-harvest drying plan.

Similar accounts from across the country, noted above and in previous reports, indicate significant crop loss occurred during the harvest and drying stages. With U.S. hemp production likely to expand in 2020 compared to last year, such losses could persist and even be amplified if solutions are not developed to address last season's difficulties on these fronts.

Hemp Biomass CBD% Distribution Frequency

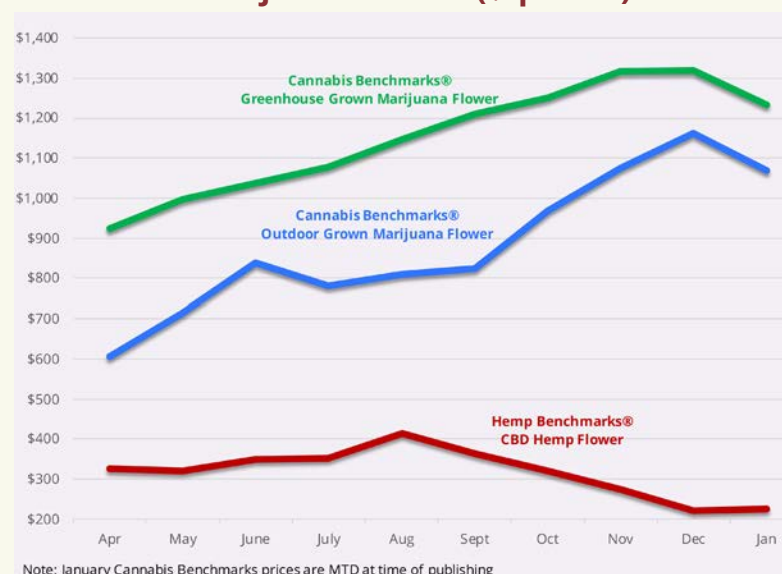


Nielsen Projects 2020 Hemp-CBD Market Will Grow Significantly

In spite of the hard realities in the field, financial analysts remain optimistic about hemp's future as a commodity. In December, the data information group Nielsen projected the U.S. hemp-CBD market could reach between \$2.25 and \$2.75 billion in 2020. "These conservative projections already account for hampered FDA rulings and other possible speed bumps in the hemp-CBD marketplace," company vice president Rich Maturo wrote in a blog post.

In our November 2019 report, we reviewed available information in an attempt to assess the size of the U.S. hemp-CBD market last year. Hemp Benchmarks estimated that the retail market for hemp-derived CBD products reached about \$1.1 billion in 2019, based on financial disclosures from leading public companies in the space and other factors. If Nielsen's "conservative projections" come to fruition, then the retail market for consumer CBD products will increase in 2020 by a factor of between about two and two-and-a-half relative to our estimate of the market size last year.

U.S. Spot Price Comparison - Hemp Flower vs. Marijuana Flower (\$/pound)



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FEDERAL REGULATORY UPDATE



USDA Rules Continue to Cause Anxiety, Some States to Forego Immediate Implementation

There have been persistent concerns across the legal hemp sector regarding the IFR, the regulations released at the end of October by the USDA. The USDA extended its comment period on the IFR for an extra month, until January 29, to allow stakeholders additional time to provide feedback. Close to 2,000 comments were posted by mid-January, with many of them critical of the new regulations. The primary points of contention remain the ones that we identified and discussed in our November 2019 report: the adoption of the Total THC standard; the requirement that crops be sampled for THC testing within 15 days of harvest; and the mandate that testing labs must be registered with the Drug Enforcement Agency (DEA).

In regard to the latter requirement, a USDA directory of labs eligible currently to test hemp for THC indicates there are around 45 DEA-registered laboratories nationwide as of this writing. The eligible labs are distributed across roughly 20 different states.

The Oregon cultivator quoted above told Hemp Benchmarks that many state agriculture departments, as well as many hemp cultivators, are alarmed by this shortage of DEA-registered labs for hemp testing. Even if current state agriculture department labs were made qualified under the federal rules, he said, those facilities have “indicated in the past that they don’t have the ability and manpower to test samples from customers. They can barely keep up with the demand to test what state regulators bring them for investigations on criminal matters.”

Objections over the IFR are such that many state agriculture departments are sending formal letters to the USDA asking for changes to the rules. On January 21, Kentucky announced it would

continue with its hemp research pilot program for another growing season, rather than transitioning in 2020 to a commercial hemp program. Essentially, Kentucky officials have delayed implementing the IFR’s requirements, allowing hemp operators in the state to continue doing business as they have in 2019 and prior years.

“Wisely, Congress also gave state departments of agriculture the option to operate state pilot programs for another year before submitting new plans to the [USDA],” Kentucky Agriculture Commissioner Ryan Quarles said in a press release. “The industry has changed dramatically, but the national hemp marketplace is experiencing some real challenges. After much discussion with industry stakeholders in Kentucky, I determined our state will operate our current hemp program for another year as we responsibly make plans to take Kentucky’s hemp industry into the next phase in 2021 and beyond.”

Kentucky is a major hemp producer. The state had been preparing to transition in 2020 from its previous research pilot program to fully commercial production under a USDA-approved state plan. However, the Kentucky Hemp Industries Association (KYHIA) recently sent a position paper to the state’s agriculture department, expressing concerns over the IFR.

KYHIA also recommended that the hemp sector be given more time to improve hemp genetics. “Genetics bringing in 4% or lower CBD levels are currently unmarketable to growers within this state and beyond,” it wrote. “Currently, there are very limited (and unproven) genetics that guarantee the new mark of 0.30% THC.”

Eight other states - Arkansas, Maine, Maryland, Minnesota, Missouri, New Mexico, Vermont, and Wisconsin - have also decided

to continue their pilot programs until that option ends in October 2020, according to a review of USDA information updated on January 21.

Other state officials, such as South Carolina Agriculture Commissioner Hugh Weathers, called on the federal government to revise the IFR. "We believe that several provisions in the interim final rule lack the flexibility necessary for our farmers to be profitable and for SCDA (South Carolina Department of Agriculture) to be able to implement a successful hemp program," Weathers said in a letter sent to USDA Secretary Sonny Perdue in late December.

Weathers recommended several changes to the IFR, mainly around requirements for sampling crops and screening for THC concentrations. Similar to other comments on the IFR from stakeholders and state officials, Weathers' letter worries that sampling and testing could become a bottleneck, particularly with the requirements that samples be taken within 15 days of harvest and processed by a DEA-registered lab. The letter also recommends that only delta-9 THC be tested for, rather than using the Total THC standard.

In light of the significant criticisms of the IFR and requests from numerous state officials for specific changes, Hemp Benchmarks submitted an inquiry to USDA asking whether altering the IFR ahead of the release of the final rules is even possible. A USDA spokesperson provided the following response: "the interim final rule stated that USDA will issue a final rule within two years. The USDA is providing this timeframe to not only gather comments ... , but also to allow for a full season of planting to gather as much information as possible to finalize the rule."

USDA Approves First Batch of State and Tribal Hemp Plans

Despite many expressing worries in regard to some of the requirements mandated by the IFR, numerous states and Native American tribes are forging ahead and submitting industrial hemp production plans to the USDA for approval.

In late December, USDA approved the first set of plans submitted by states and Native American tribes under the U.S. Domestic Hemp Production Program. USDA approved plans submitted by the states of Louisiana, New Jersey, and Ohio, and those of the following tribes: the Flandreau Santee Sioux, Santa Rosa Cahuilla, and La Jolla Band of Luiseno.

This month, the USDA approved hemp production plans for the states of Delaware, Nebraska, and Texas. Hemp production plans submitted by the Colorado River Tribes, the Fort Belknap Indian Community, the Iowa Tribe of Kansas and Nebraska, and the Yurok Tribe were also approved.

As of this writing, the USDA was reviewing hemp production plans for about 10 other tribes and around a dozen states.

In order to legally produce hemp, growers need to be licensed or authorized under a state, tribal, or USDA production program. If a state or tribe does not have a plan and does not intend to put one in place, growers can apply for a license from the USDA itself.

USDA Announces Hemp Crop Insurance Program

In late December, the USDA's Risk Management Agency (RMA) announced a new crop insurance option for hemp growers in certain counties of 21 states, starting this year.

According to a press release, the pilot insurance program will provide Actual Production History (APH) coverage for eligible producers under 508(h) Multi-Peril Crop Insurance (MPCI) for select counties in: Alabama, California, Colorado, Illinois, Indiana, Kansas, Kentucky, Maine, Michigan, Minnesota, Montana, New Mexico, New York, North Carolina, North Dakota, Oklahoma, Oregon, Pennsylvania, Tennessee, Virginia, and Wisconsin.

The MPCI coverage is for hemp grown for fiber, grain, or CBD oil for the 2020 crop year. It is in addition to the Whole-Farm Revenue Protection coverage available to hemp growers announced last year.

EPA Approves Pesticides for Hemp

Another sign that industrial hemp is maturing into an accepted agricultural commodity occurred in late December 2019. The federal Environmental Protection Agency (EPA) announced its approval of 10 pesticides for use on industrial hemp. Nine of those products are biopesticides and the remaining one is a conventional pesticide, according to the EPA's press release.

FDA, CBD, and Hemp

In early January, a federal judge in Florida put a hold on a lawsuit against a local CBD manufacturer until the U.S. Food and Drug Administration (FDA) finishes its long-anticipated review on CBD

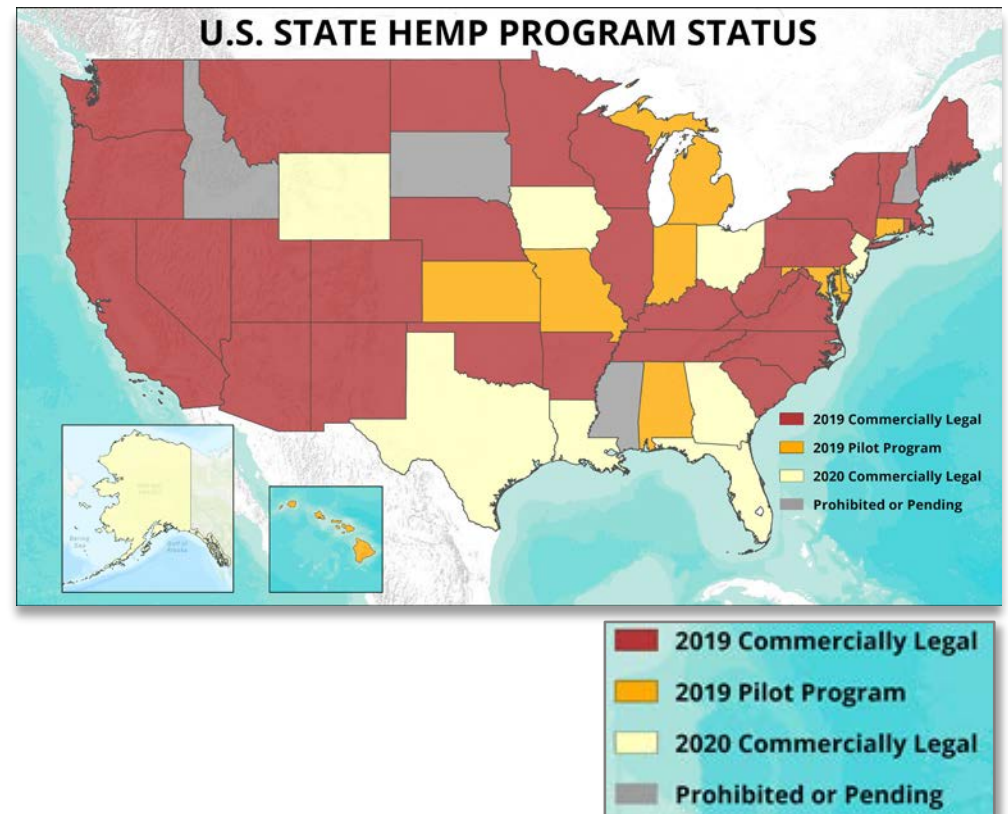
policy. While hemp and its byproducts were legalized by the 2018 Farm Bill, the FDA is still grappling with whether and how CBD may be used in food or nutritional supplements. The current stance of the FDA in regard to CBD is that the compound is a drug ingredient by virtue of its approval as the active ingredient of the prescription medication Epidiolex. Drug ingredients are typically not permitted to be marketed as dietary supplements or added to the food supply, though agency rulemaking or legislation could create a pathway to do so for CBD.

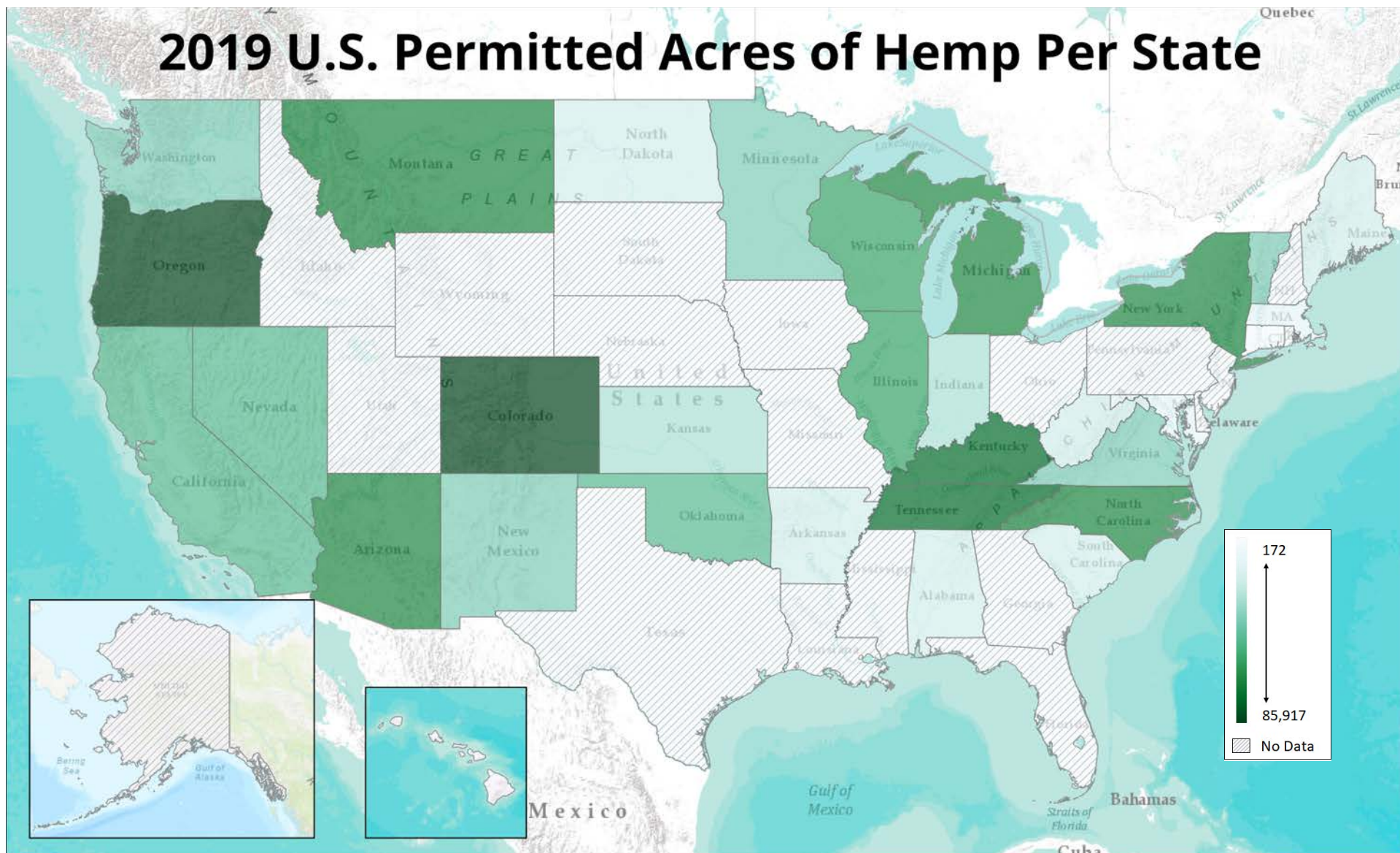
According to a Hemp Industry Daily report from January 13, U.S. District Judge Ursula Ungaro pointed out in her ruling that FDA regulations "currently provide little guidance with respect to whether CBD ingestibles, in all their variations are food supplements, nutrients or additives and what labeling standards are applicable to each iteration." She added that while Florida law addresses the issue of CBD product labeling, "the Court would benefit greatly from the FDA's regulatory framework."

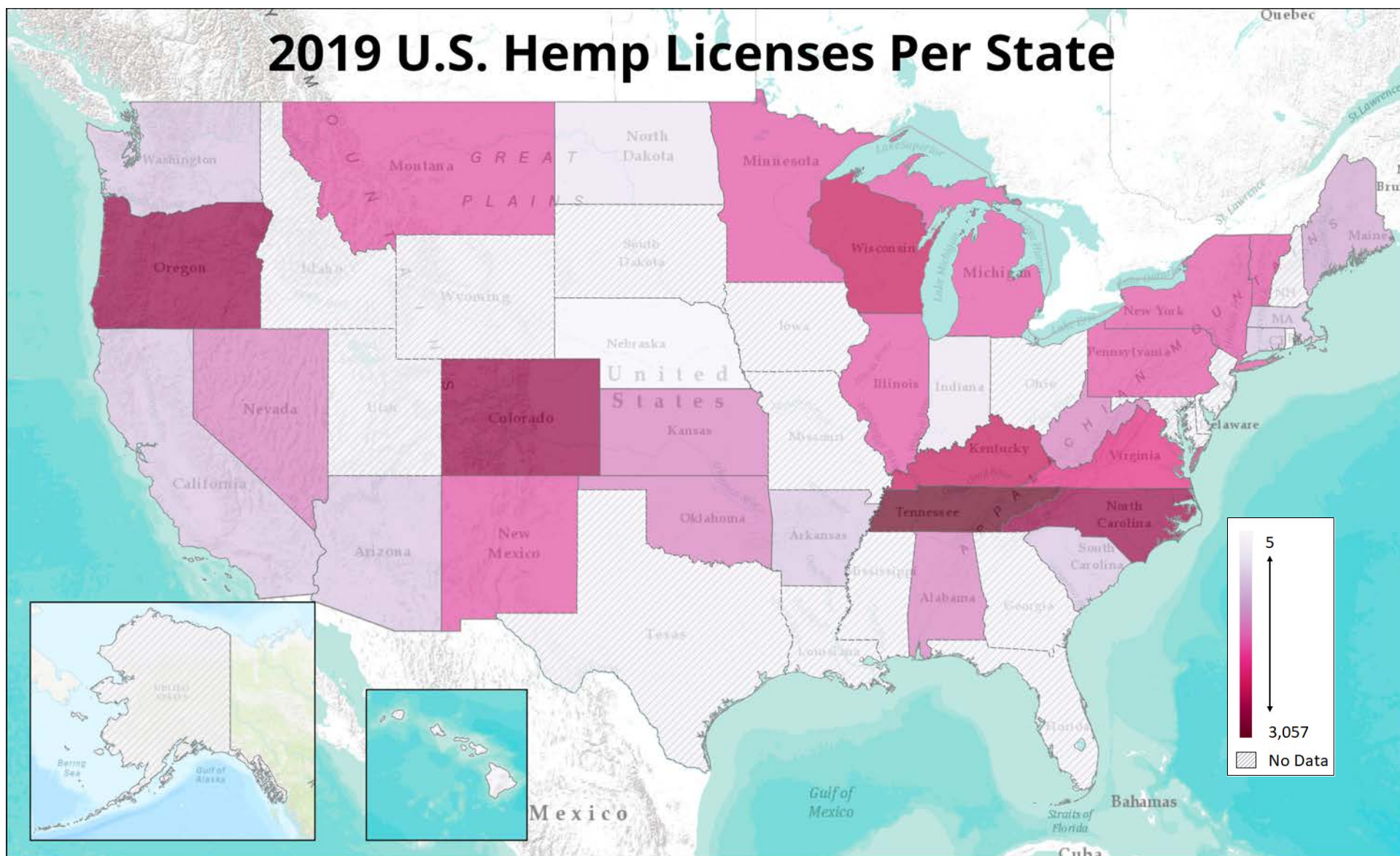
Later in January, a bill was introduced in the U.S. House of Representatives that would let hemp-derived CBD be marketed legally as a dietary supplement. The measure would also require a study and report from the USDA, which oversees hemp production.

Rep. Collin Peterson, chairman of the House Agriculture Committee, filed the bill. "The last two Farm Bills were landmark successes for hemp, but we are still very early in this process, and growers need regulatory certainty," Peterson said in a press release. "This bill will allow FDA to regulate CBD that comes from hemp as a dietary supplement, providing a pathway forward for hemp-derived products. It would also identify barriers to success for hemp farmers, informing growers and policy makers of the challenges facing this new industry."

STATE UPDATES







STATE	# of Licenses	Permitted Outdoor Acres	Permitted Greenhouse Sq Ft	STATE	# of Licenses	Permitted Outdoor Acres	Permitted Greenhouse Sq Ft	STATE	# of Licenses	Permitted Outdoor Acres	Permitted Greenhouse Sq Ft
Alabama	157	2,000		Louisiana				Ohio			
Alaska				Maine	162	3,000		Oklahoma	225	9,606	
Arizona		37,000		Maryland		1,400		Oregon	1,883	63,000	10,156,834
Arkansas	101	3,200		Massachusetts	102	730	147,000	Pennsylvania	323		
California	114	8,862		Michigan	541	32,243		Rhode Island	5		
Colorado	1,980	87,359	13,800,000	Minnesota	343	13,867	1,200,000	South Carolina	113	3,300	
Connecticut	82	294		Mississippi				South Dakota			
Delaware				Missouri				Tennessee	3,057	45,480	123,704,591
Georgia				Montana	277	45,000		Texas			
Florida				Nebraska	10			Utah			
Hawaii	30	172		Nevada	215	14,113		Vermont	570	7,800	
Idaho				New Hampshire				Virginia	1,304	7,000	
Illinois	644	21,023		New Jersey				Washington	133	7,000	
Indiana	140	5,300	1,500,000	New Mexico	408	7,540	8,334,424	West Virginia	178	2,531	
Iowa				New York	267	20,727		Wisconsin	1,247	16,958	
Kansas	196	5,732		North Carolina	1,523	33,908	10,076,710	Wyoming			
Kentucky	1,047	60,000		North Dakota	56	3,212		TOTAL	17,433	569,357	168,919,559

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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.

Arizona

The Arizona Plant Services Division, the part of the state's Department of Agriculture that oversees Arizona's hemp program, says around 41% of hemp plants harvested in 2019 came in "hot," or containing THC concentrations in excess of 0.3%, according to a January 19 Associated Press report.

"At 40%, that's off the charts," Sully Sullivan, executive director of the Hemp Industry Trade Association of Arizona, told the AP. However, a Plant Services Division official said the high failure rate was not unexpected, "based on anecdotal information from around the country regarding variable seed quality and genetic expression, for THC content, between the varieties planted."

California

In early January, supervisors in Sonoma County agreed they will treat hemp like any other crop and allow the plant to be grown in agriculturally-zoned areas. According to the Press Democrat, county supervisors are expected to cast a final vote on the rules by April, ending a temporary moratorium on hemp cultivation they enacted in April 2018.

Georgia

Georgia Agriculture Commissioner Gary Black said he will ask state lawmakers for \$800,000 a year for the next two years, in order to operate the state's hemp program. According to a January 15 report from the Atlanta Journal-Constitution, no funding was

appropriated last year, when Georgia lawmakers voted to allow hemp farming in the state.

If the \$1.6 million in funding is approved this spring, Georgia farmers could plant their first hemp crops in time for the 2020 growing season, the report states. Additionally, Black said the USDA has already reviewed Georgia's proposed hemp plan and could approve it within days of the General Assembly appropriating money.

Maine

Hemp farmers in Maine are concerned that a new state rule requiring testing for total THC could destroy their livelihoods. The Portland Press Herald reports that state horticulturalist Gary Fish, who runs Maine's hemp program, said the proposed change is meant to ease Maine's hemp farmers into compliance with the new federal rules. Under the proposed regulations, 27% of Maine's hemp farmers would have grown "hot" hemp in 2019 and would have been required to destroy their crops, the Press Herald report states.

Although Maine will continue to operate its hemp program according to the standards of the 2014 Farm Bill, the state's proposed rules, which in their current form include adopting the Total THC standard, are expected to be finalized in early February, according to the state Department of Agriculture. Once the state's rules are adopted, license applications for growers will be released.

Nebraska

Nebraska's Department of Agriculture submitted its proposed hemp regulations to the USDA on December 19. If approved, the state could have a working hemp regulatory framework by the end of February. State documents reviewed by local outlet KETV suggest

Nebraska could issue around 400 hemp cultivation and 50 processing licenses for the 2020 growing season.

Virginia

The Virginia Department of Agriculture and Consumer Services provided the following information to Hemp Benchmarks:

“As of January 13, 2020, the Virginia Industrial Hemp Program has issued 1,304 industrial hemp grower registrations; 319 industrial hemp processor registrations; and 158 industrial hemp dealer registrations.

The Virginia Industrial Hemp Program does not utilize a harvest report form, and, at this time, we do not have any data to provide concerning the amount of hemp harvested in Virginia or the average yield per acre. Based on the information provided by growers on planting reports, approximately 99% of hemp grown in Virginia in 2019 was a floral variety.

Some registered industrial hemp growers who grew floral varieties of industrial hemp and who did not have a contract at the beginning of the growing season have experienced difficulties in locating a processing facility to purchase their industrial hemp. Other than the number of registrations issued, VDACS does not have any additional data concerning processing capacity in the state.

Virginia does not currently require the use of certified seed and is not considering the use of certified seed at this time. For compliance in Virginia, the post-decarboxylation delta-9 THC (total THC) concentration of hemp may be no greater than 0.3%. This has been Virginia’s practice since the Virginia Industrial Hemp Law was enacted in 2015.”

PRODUCT DEFINITIONS

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.

CBD FLOWER (BULK)

CBD 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.

CBD 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.