

CBD Price Index

Overview

As the industrial hemp industry continues to evolve in the United States, there is a growing need for economic measures to help industry participants get a baseline on the state of the industry. This is particularly true for one of industrial hemp's major products, cannabidiol (CBD). Hemp derived CBD has seen large market changes in the last few years with more growers planting CBD rich hemp and new extractors entering the market. Many producers have anecdotally reported large decreases in price over the last year; however, to date no formal analysis or tracking of the price of CBD has taken place to determine the extent of these price shifts. Many within the industry have expressed the need for an aggregate source of historical and real time pricing data when it comes to CBD in order to accurately gauge the state of the market.

A price index is a great way to track these changes. However, no such price index has yet to be constructed for hemp related products. In this report, we establish a price index for CBD is established in order to provide a baseline analysis of historical pricing trends and the current state of CBD.

Seed CX has partnered with several industry leaders in the construction of this price index and asks for continued support in the maintenance and updating of this price index. To ensure that the index accurately reflects market dynamics and to allow for further analysis, additional data providers will be needed. If you would like to become a data provider, please reach out to us at Daniel@seedcx.com.

What is a price index?

Price indices are valuable measures that allow for the tracking and analysis of price for a given good. It represents a normalized average of price of a good or service in a particular region and time period.

Price indices have several potential uses depending on their scope. There exist broader indices, like the consumer price index (CPI) which compares the cost of living across time, that can measure general economic conditions. More narrow price indices can help consumers and producers analyze their pricing strategies and provide a baseline to guide future growth and investment.

Pricing in CBD

CBD can exist in two major forms: isolate or extract. CBD isolate is a 99% pure product that comes in a white crystalline or powder. Extract can come in a variety of forms featuring various concentration of the underlying product, CBD. For example, a certain producer may sell at 10% extract, which indicates that 10% of the total mass of the extract is pure CBD, while another may choose an 80% extract. There exists a wide range of extracts and concentrations that CBD can exist in.

Despite the product coming in a variety of forms, the predominant pricing strategy is based on the total CBD content present within the product. For example, 1,000g of extract with a CBD concentration of 10% contains 100g of pure CBD, and another product with 10,000g of 1% extract also contains 100g of CBD. Both these products are priced purely on the total CBD contents, and thus will be priced the same, despite the large volume in the second product.

A more detailed report on the state of CBD pricing as well as a look into lab testing standards can be found in Seed CX's CBD contract addendum [here](#).

Developing an Index / Methodology

The CBD price index is constructed using a volume weighted average price on a monthly basis, normalized to a base period.

First a volume weighted average price (VWAP) for month t is calculated using equation (1)

$$VWAP_t = \frac{\sum_{i=1}^I (Price_{it} * Quantity_{it})}{\sum_{i=1}^I Quantity_{it}} \quad (1)$$

Where t represents the period of time, in this case monthly time periods, and i represents the individual product.

Following this calculating, the VWAP for month t is normalized to the chosen base time period t_0 ¹ and multiplied by 100 to obtain an easy to read result. Equation (2) lays out this process

$$Price\ Index_t = \frac{VWAP_t}{VWAP_{t_0}} * 100 \quad (2)$$

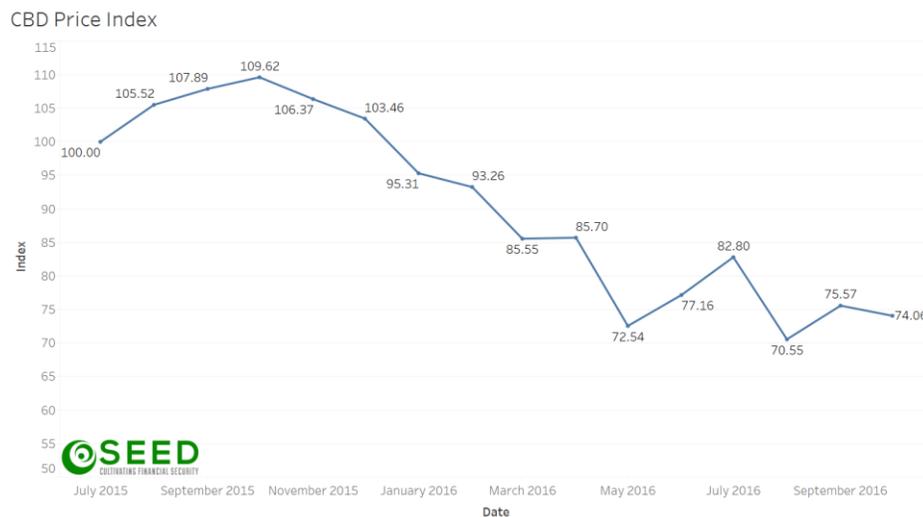
Data

Data was obtained through surveying CBD industry participants to obtain purchase orders or invoices for the purchase or sale of various CBD products.

Pricing sheets were avoided. While they provide useful information regarding the general state of prices they do not provide precise representations of market interactions. Pricing sheets often offer a range of prices based on bulk discounts. Some of these prices ranged by as much as 50% for larger volumes. It would be impossible to determine where a majority of transactions were taking place along the range in order to get an accurate price average. Purchase order and invoices did not have the same problems, as they represent precise market interactions between buys and sellers.

Ideally a random sampling of these purchase orders and invoices would be utilized in order to get unbiased averages; however, due to the nascent nature of the hemp industry and CBD in particular, there exists a lack of data. Considering these shortcomings, data from all providers was utilized.

Results



¹ Base period set to July 2015 as it represents the earliest period that data was available.

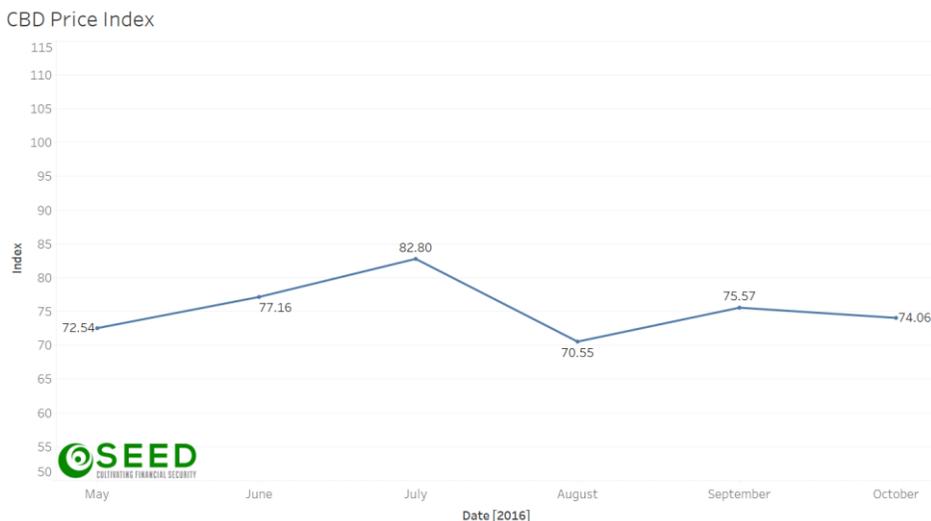
Analysis

Many anecdotes exist within the CBD industry describing large price decreases in the last year and the data appears to support these claims. The price of CBD has decreased by 26% from July of last year; however, not before a slight increase in price. Last Fall price increased nearly 10% from July to harvest season in October. Since October 2015, the price has seen a steady decrease of 33% over the last year.

A simple linear trend line² shows a significant downward trajectory (p-value < 0.0001) during the last year.



While a significant decrease has been observed over the last year, in recent months, prices have stabilized relative to the previous year. In fact, over the past three months, prices have risen by 5% and 2% over the previous six.



While some level of relative price stability has been observed in the CBD market in that past few months, it may be unreasonable to assume this will continue due to several factors. Hemp is typically harvested and processed in early fall. As a result, the 2016 harvest may affect the current price trends.

² Linear trend line was calculated using least squares regression with full equation shown in the graph

Going Forward

While the CBD concentration does represent the predominant driver of price, several other characteristics may lead to small premiums. This index combines all forms of CBD into one index that is driven purely by CBD concentration. However, we have observed small premiums (or “basis”) for additional stages of processing that are not accounted for in this aggregate number. This is in part due to the relative small effect these characteristics have on price, as reported by industry participants, as well as the small data set. In order to obtain a robust calculation and analysis, products featuring these small premiums that stem from additional stages of processing we all treated the same in the index.

With a more robust data set, premiums for each additional stage of processing can be established and new, more granular price indices can be constructed featuring specific characteristics of the various CBD products. A more robust data set would also allow for analysis of these premiums over time as well as looking to premiums for different extraction methods (i.e. CO₂ vs. ethanol).

Seed CX will continue to release updates to this index on its website as more data becoming available.

Conclusion

The price index construct in this report represents the first tracking and analysis of price trends within the CBD industry. This construction and analysis has shown a significant decrease in CBD prices over the last year. This price index can help industry participants get a baseline understanding from which to base individual business decisions around.

Seed CX asks for continued support in improving this price index and data going forward. A more robust data set will allow for the expansion of this basis price index and more complex analysis. Please contact us at Daniel@seedcx.com to set up a data partnership and improve this index going forward.