



THE HARVEST REPORT

vol.1

Thanks to the gradual rollback of prohibition, the cannabis industry is growing at an unprecedented pace. Still in its infancy, there is no end in sight to this hockey stick-like growth. Everybody is now trying to get in on the green rush. With that comes added competition, and those who are early adopters of new technology and early spotters of trends put themselves in

an advantageous position. We at Eteros create products for the harvest workflow, which is why we thought it was important to try to look around the corner and see what's coming our way. We've done some research for our own benefit and yours, and are happy to be able to report to you four trends that we believe are shaping the cannabis industry.

We hope this information proves interesting and valuable to you, and that it helps you make better planning decisions for your business over the next year.

1

EXTRACTIONS ARE TAKING OVER

Sales data from every state selling cannabis shows that concentrates are gaining ground very quickly. Let's look at Washington state. In April of 2015 retailers sold \$2,859,845 in concentrate products, compared to \$12,483,651 in April of 2017. The share of the total market is growing rapidly as well, from 11% to 17% during that same period [1].

This trend is occurring everywhere that cannabis is sold, and for both medical and recreational uses. It's for good reason too. Concentrates are often used in vape pens, which provide metered dosing, discreet use, and are "first-timer friendly." A lot of new cannabis users simply don't want to smoke cannabis for the same reasons they don't want to smoke tobacco. In several states, such as Minnesota and New York, this method of cannabis consumption has even been prohibited by law [2]. Both states allow concentrates but do not allow smoking cannabis. What IS news, though, is what part of the plant concentrates are being extracted from.

Ten years ago, when growers were operating mostly indoors for privacy reasons, extracts were usually made from by-product (kief or even fan leaves), whereas the flowers were harvested for smoking. Then, as legalization marched on and growers could expand their operations outdoors, things began to change. Outdoor harvests were used much more commonly for extracts, and even indoor "b grade" flowers were being taken for extracts rather than being sold intact.



Now it seems things are changing yet again. Some indoor growers producing very high-grade cannabis are now selling the entirety of their crop to processors who produce extracts (or they are doing the extraction process themselves). Indeed, some farms are now specializing in growing cannabis exclusively for extracts.

The cost to set up a basic, commercial extraction lab can be significant. Professional, high-quality CO2 extraction systems (like those from Apeks) regularly run into the hundreds of thousands of dollars. There are low bars to entry though, like using a rosin press to create a rosin-style extract. According to Bailey Sweet at Harvest Helper, “everyone wants what’s organic and natural, and rosin presses are the most natural way to create an extract. Processors can’t meet the demand at the dispensaries.” While rosin press technology has yet

to be commercialized to any meaningful scale, Sweet says it’s only a matter of time.

Other concentrate technologies seem to be popping up on a regular basis, and concentrate variations go in and out of style like clothing. But whether it’s “BHO trim run wax” or “live resin nug run” harvesters need to recognize this rapidly-changing industry dynamic. It parallels the internet shift from desktop to mobile-first when smart phones became ubiquitous. Businesses had to adjust their mindset to create content and provide information to their customers that was tailored for mobile devices first, with desktop functionality a lower priority. The same thing is now happening for cannabis cultivators. Many are now shifting their mindset to produce crops that are for extracts first, and flower second, and their harvesting processes, priorities and strategy will begin to reflect this shift.



“THE PRICE OF FULL FLOWER HAS REALLY GONE DOWN, WHEREAS THE PRICE OF EXTRACTS HAS REMAINED ABOUT THE SAME, SO CULTIVATORS ARE PROTECTING THEIR MARGINS BY BUILDING OUT THEIR OWN EXTRACTION LABS.

EITHER THAT, OR THEY ARE SELLING OFF THEIR ENTIRE CROP TO PROCESSORS WHO DON’T MIND IF A BUD IS TRIMMED PROPERLY OR CURED PERFECTLY.”

MIKE MULLIGAN

APEKS SUPERCRITICAL, A MANUFACTURER OF COMMERCIAL-SCALE CO2 EXTRACTION EQUIPMENT

2

RENEWED FOCUS ON CURING

While much attention has been given to the dry trimming vs. wet trimming debate, the curing process has largely been ignored. For the cannaseur, however, curing has far more impact on the quality of their flowers than how they are trimmed.

“CURING IS ONE WAY FOR AN EXPERIENCED GROWER TO SHINE. PROPER CURING CAN BE THE DIFFERENCE BETWEEN EXCEPTIONAL, TOP-SHELF BUD, OR A COMPLETELY RUINED CROP. DON’T UNDERESTIMATE THE POWER OF CURING.”

ROBIN DODD
Canngro Hydroponics

The curing process is complex. A grower must systematically and gradually remove moisture over time to enhance the terpene profile of their product, preserve shelf life, and increase potency. It’s difficult to perfect. One wrong move and you can ruin an entire harvest. Adding to the complexity is that different strains grown in different conditions all need different curing “recipes.” It’s very surprising, then, that while the rest of the industry has teched-up on everything from sensors to grow lights to software, the curing process has stayed pretty much the same as it was 20 years ago. Cannabis farmers are

currently using a variety of makeshift curing solutions. On the small scale, turkey bags or buckets are often used. On the commercial scale, improvised rooms with no automated controls are common. Worse, many growers simply skip the curing process and consider their product “done” after drying for a week. Finally, that is now changing. San Diego-based company Autocure has developed curing solutions that are built for large-scale growers. Their automated curing containers remove the guesswork and provide insurance that your product will be cured properly (and consistently) every time.

To our knowledge, Autocure is the only company building custom-room curing solutions (although we expect competitors like Yofumo to follow soon), and business is starting to boom. “When we launched a year ago, growers started buying our smaller units. Now we’re getting demand for large-scale custom-built rooms,” says Joe Ducey, CEO of Autocure. The benefits of properly curing are significant, and a well-cured product will see a potency increase of 3-4 points vs. the same strain from the same harvest, cured under non-optimal conditions.

Additionally, there are safety concerns at play. While Ducey does not go so far as to say that Autocure can completely prevent mold, it does drastically reduce the probability of it developing. He says, “our product is set to automatically vent at the user-defined relative humidity level, so the flowers aren’t sitting in a damp environment long enough to develop mold.”

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JOE DUCEY
Autocure CEO



photo credit: The Globe and Mail [1]

Then, of course, there are the issues of product consistency and standardization. Here at Eteros we’ve addressed this in blog posts because it is one of the most important issues in our industry. When a grower determines the desired characteristics for a product or strain, being able to churn out that same product consistently is key. If a consumer is expecting a terpene profile, level of potency, or style of trim and they don’t get it, they will likely move on to another product. With technology like Autocure you are relying on data to keep your products consistent, and can use the same “curing formula” each time you process a new batch of a particular strain.

CURING

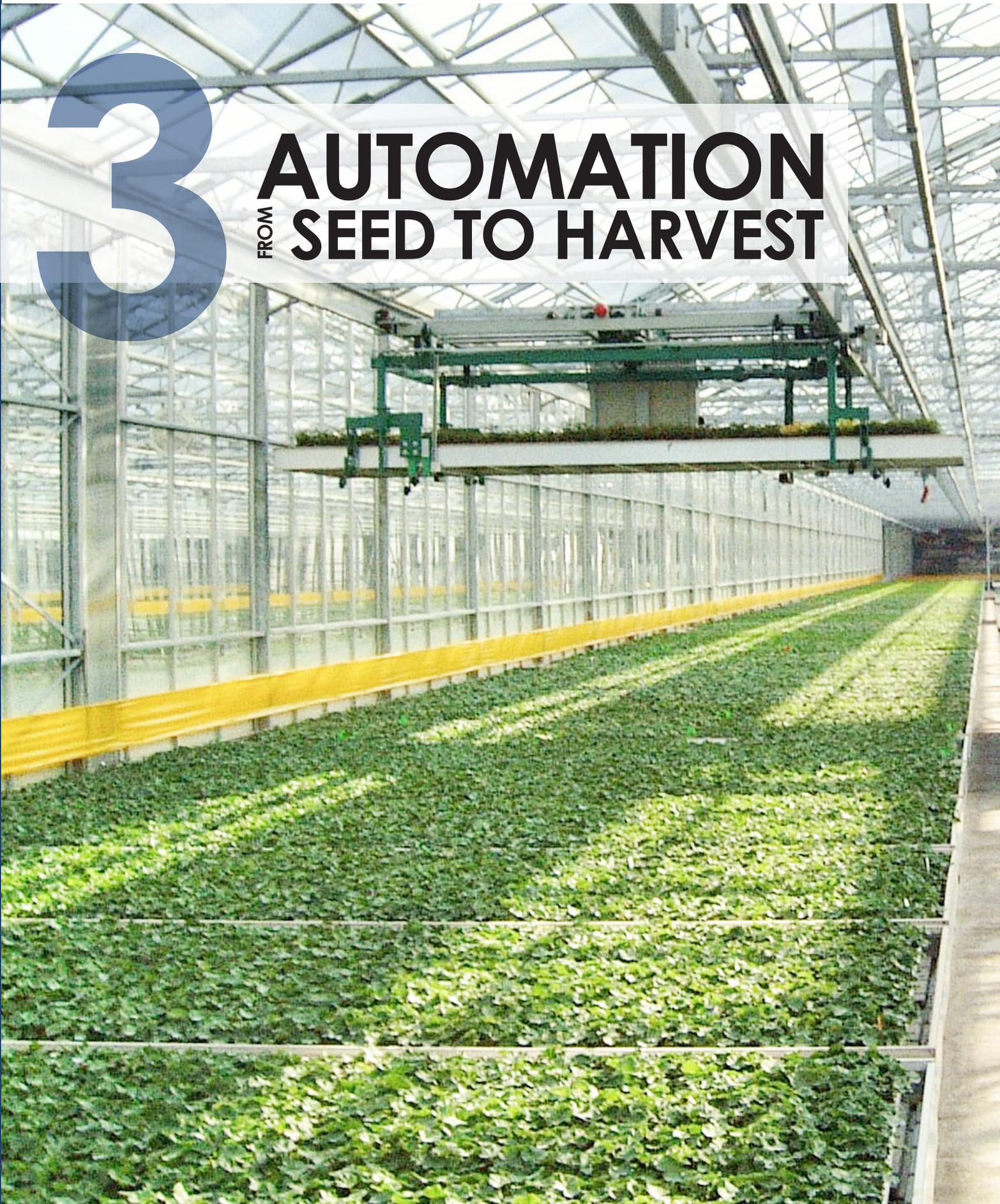
Curing is an extension of the drying process in which the harvested buds are placed in a temperature and humidity - controlled environment for up to 2 months to gradually reduce the moisture content and allow bacteria to breakdown remaining chlorophyll. Cannabis buds that are cured properly will have a longer shelf life, have increased potency, smell better, and taste better and smoother when smoked.

For business owners who aren’t considering using some type of product like Autocure in their harvest process, keep in mind that they will likely end up competing against growers that do, especially as more begin to scale-up. We see Autocure as first-movers on a trend that is just in its infancy, but will ramp up fast because of the unrealized demand for curing solutions in the post-harvest workflow.

[SEE APPENDIX A FOR EXAMPLES OF 3RD PARTY LAB REPORTS.]

3

AUTOMATION FROM SEED TO HARVEST





Let's take a walk through the cannabis cultivation facility of the future. It's in a large greenhouse, at least an acre. Cannabis plants in varying stages of growth are spread in groups throughout the facility. They are on large metal trays 10x20 feet long, sitting on wheeled, waist-high scaffolding. Small, flat carts on rails are zipping around the facility, picking up benches of plants and carrying them off towards the opposite corner. What we're witnessing is the transition from the veg room to the flowering room. In another area we see water automatically flood a bench and then begin to drain off. A drone passes overhead, methodically, moving row by row. It has an infrared camera and is checking the crop for disease. Sensors are everywhere, constantly monitoring everything that can possibly be monitored: water content, light levels, air temperature, humidity, and more. The environment is pre-programmed to maintain optimum levels, but should something stray, the system automatically adjusts and sends an alert to a greenhouse worker that it has done so. (For example, if light levels dip below pre-set tolerances, the supplementary lights will kick on by themselves.) One thing you'll notice is a lot less people than you're used to seeing at a typical cannabis facility. The workers that you do see are controlling most operations via tablets or even smartphones.

The surprising part about all this: it's already happening in other types of plant cultivation greenhouses, and it's finally starting to trickle down to the cannabis industry.

"The cannabis industry is a bit behind, but finally some of the large cultivators are getting into the fast lane. They are realizing they are doing things they don't need to do and wasting enormous amounts of money. With competition getting tougher and the price of cannabis dropping, they are now finally turning to automation."

EDWIN HOENDERDOS

President of Hove International

Hove International has been supplying automation solutions to other types of plant growers for 30 years. They've adapted their technology to fit the needs of the cannabis industry and cultivators are seeing excellent results.

"Normally, somebody growing flowers might take 4-5 years to recoup the cost of our systems, depending on what level of automation they would like, but we've seen some cannabis producers recoup the costs in as little as a year."

Hove's automation solutions mostly deal with physically moving plants around the greenhouse, (one of the most labor-intensive processes that gets more difficult as you scale), as well as irrigation.

Other companies such as Argus Controls and Smart Bee have focused on sensors and environmental controls such as those mentioned above. The argument against this type of environment is that it is too manufactured, somehow less "organic." People like the narrative of a farmer admiring their crop on their scenic farm. Potting their plants by hand with trowels and shovels. Walking around with a watering can, while an old sheepdog wanders between the plants. It's charming, but that's not how cultivators of any crop operate these days. Now that the cannabis industry is finally growing up, it won't either.

Increased automation of all processes from the growth cycle through harvesting allows producers to create a more consistent, higher-quality product at a much lower cost. This is one trend that will likely become an industry-wide standard. The charming old farmer from the valley will continue to exist, but expect to pay three times as much for his product when you buy it at your local farmer's market.

4

HAND-TRIMMING FINALLY LOSES



“Craft” is now a buzzword in the cannabis industry, just as it became one in the beer industry 7-8 years back. Growers use it as a marketing bullet point, and consumers tend to think that it indicates a superior product. Although there is no universal definition for craft cannabis, most growers that use that label tend to hand-trim their product. The story is compelling; the flower you’re smoking was actually held in a trimmer’s hands as they used scissors to trim it to perfection, just as a diamond cutter takes a rough diamond and cuts it to its ideal form. However, there is growing evidence that this style of production will become untenable.

According to Marijuana Business Daily, “the marijuana industry faces falling product prices and increasing regulations that will shrink margins and force cultivation executives to rethink how they will grow in the future” [1-2]. In Washington state, for example, the wholesale spot price per gram fell from \$9 in August of 2014 to \$2.77 in May of 2017 [3]. It’s a reflection of both the growing competition in the marketplace, as well as the ongoing commoditization of cannabis. This downward pressure on profit margins has growers everywhere scrambling to find ways to reduce their costs. An obvious cost savings is switching from hand-trimming harvesting methods machine-trimming methods. Simple labor costs can be reduced by as much as 90% or more when introducing trimming machines to a harvesting workflow [4-5].

The reasons to reduce or eliminate hand-trimming from your operation are not purely labor cost savings, there are also issues of product consistency. Hand-trimming, by nature, involves a very high-level of human interaction with the product. Every worker may trim slightly differently, resulting in variations. Unless rigid QA is in place during the trimming process, end-users may get drastically different products depending on where and when they buy it. Product consistency is an on-going problem in the cannabis industry and will continue to be until human touches and handling are drastically reduced [6].

Eventually, growers will be left with a single choice: either switch to machine trimming or drastically increase the price of anything they produce with hand-trimming labor. The price gap between hand-trimmed and machine-trimmed cannabis will continue to grow, making hand-trimmed product a “niche” that will be unfavorable for most cannabis consumers. Further, cannabis cultivators that are using hand-trimming methods will no longer be able to meet the high-bar of standardization and sterility regulations as the marketplace, (and industry), continues to develop professional standards, all while demand steadily increases.

But machine trimming still has it's problems. When Ryan Hall invented the first trimming machine back in the late 1990s, it represented a big step forward for cannabis harvesting, even though it was built largely from off-the-shelf lawnmower parts and wasn't exactly gentle on the product. Other competitors and knock-offs quickly entered the market to compete with his original



photo credit: James Macdonald / Bloomberg Media

machine, the Centurion. Despite the many issues with these machines, they still were the best [and only] option available for large-scale growers. Fast-forward 20 years and the trimming machines on the market today are all minor variations of the same design by Hall. They are the same lawnmower-style as the original machine, and despite improvement, still have most of the major pain points:

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|---------------------------------|------------------------------------|---|--|---|---|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Tend to be rough on the product | Don't trim closely or consistently | Require near-constant tuning and adjustment | Make a large mess on trimming room floor | Cleaning is very difficult and time-consuming | Safety issues with uncovered spinning parts | Large footprint due to external components |

As we move through 2018, commercial-scale cultivators will need to leave the lawnmower-style trimmer behind. When a single operation must buy 10 (or in some cases many more) trimming machines at once, that means that the currently available products are no longer meeting the needs of the marketplace. That's why we at Eteros created the Mobius Trimmer M108. It's the first trimming machine purpose-built for today's largest-scale cultivators, and the biggest step forward in trimming technology in over 20 years. "There really wasn't anything serving the needs of the big commercial-scale growers, and nobody had addressed the pain points of the current machines," says Eteros CEO Aaron McKellar. The M108 boasts an impressive list of features, but there are three major advancements that really set it apart.



AirThread™ Tension Tumbler

Each 36" long AirThread Tension Tumbler is formed with 300 feet of stainless-steel aircraft-grade steel cable, allowing for 50% increased flower access to the blades (compared to a traditional perforated sheet-metal tumbler). This means the flowers need less time in the tumbler, minimizing the impact on the product. And because the tumbler has less surface area making contact with the flowers, there is less resin/trichome loss. The strength and shape of the AirThread Tension Tumbler is held in place by air pressure, resulting in a perfectly cylindrical and extremely durable tumbler. It's not only rust-proof but dent-proof too, so there's never any need to try to hammer dents out with a mallet.



TriFlex™ Blade Cartridge

Next is the TriFlex Blade System. Rather than having a single, large, lawnmower-reel style blade, the TriFlex incorporates three 36" helical blade and bedknife pairs that add up to 108 inches of total cut length. The flexible bedknives "walk" along the helical blades, mimicking the action of scissors. Because the blade cartridges are set side-by-side, there is 3x the cut area available to flowers with each pass in the tumbler. There is no adjusting or tuning necessary. EVER.

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AARON MCKELLAR
Eteros CEO



Finally, there's the mic-drop feature: the Integrated Separation System. There is no longer a need for any external components, hoses, or attachments. The Mobius Trimmer M108 has a trim separator integrated directly into the body of the machine. When cut by the blade cartridges, the trimmed leaves ride along a cushion of air until they are deposited in a removable container. The leaves never touch an impeller, and so they retain 100% viability for use in extracts.

Additionally, the entire machine and all moving parts are enclosed, and the vacuum is integrated into the machine. The M108 was designed to fit into a GMP-certified workflow, and with a feed rate of 66 to 120 lbs/hr when trimming wet (22-44 lbs/hr when trimming dry), it's the most powerful trimming machine ever designed, by far. "We went through the pain points we'd heard from users of older trimmers and addressed them with custom-designed parts and world-class engineering," according to McKellar "It trims faster, makes less mess, produces a superior product, is safer, takes up less room, is gentler on the trim, offers more control and customizability to the user, and needs less people to operate it. We are very confident that this is the best automated trimming machine ever created, and the only legitimate trimming solution for today's commercial-scale cultivators."

CONCLUSIONS

Now that adult-use is legal in California, with Canada and many other U.S. states soon to follow, 2018 is shaping up to be another landmark year for cannabis-centered businesses. But as the marketplace grows, so will the competitive environment, particularly for cultivators. Wholesale cannabis prices will likely continue to fall, but the opportunities will still be there for early adopters of new technology and trend-spotters with an eye on the horizon. The team at Mobius Trimmer hopes that this report is valuable to you, and look forward to supporting your harvesting goals over the next year.

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