

Hemp

*Industry Develops During Pandemic;
Plus a Look Ahead at Pennsylvania Hemp Summit*



Ag Secretary Redding
on Hemp's Bright Future

G2

Hemp Summit Schedule and
Registration Information

G3

Hemp in the Time
Of COVID-19

G4

Keeping an Eye
on Hemp Markets

G7

Cannabis Loves Community

ERIC HURLOCK
Digital Editor

Another year in hemp. And what a year. When I started making the Lancaster Farming Industrial Hemp Podcast, I wasn't sure where it would lead or how long it would last. But here it is, more than two years later, and I'm still at it.

Why?

Because I believe in this industry, and I believe in the people who are making it happen.

Hemp farmers, producers and advocates are up against so many challenges, from Mother Nature to the limitations of the policies in our state.

There's the financial burden of buying seed coupled with the risk of having the state destroy a hot crop.

There's the uncertainty around banking and insurance sitting right next to an unstable market due to the glut of CBD and the continual drop in prices.

There's the lack of infrastructure and processing capacity as well as the lingering stigma from the War on Drugs.

So why would any farmer in their right mind sign up for such an industry?

Because these farmers are visionaries who can imagine a different future. The challenges they face are not insurmountable. They show up every day and do the work. And that's how you build a thriving industry.

I don't for one moment take for granted my front-row seat on the development of this industry. Through my work at Lancaster Farming, I have come to know a whole lot of really great people. People from all different walks of life and circumstances, people with different abilities and passions. People with seemingly diametrically opposed political views. Yet, they all get together under this umbrella of industrial hemp.

Cover Photo

Top view of a White CBG plant from Wild Fox Provisions. Photo by Zoe Schaeffer, Courtesy of Wild Fox Provisions.

Hemp is the perfect nonpartisan or bipartisan ground to connect our Pennsylvania agriculture community. It's got something for everybody.

You want to make America great again? Then let's invest in the local infrastructure necessary to process hemp for fiber, grain and fuel.

Imagine the jobs and products Pennsylvania will create around a fully realized hemp industry. Local supply chains will develop. Manufacturing will return. The middle class will grow strong again and be much more inclusive this time.

You want to fight climate change or maybe just keep your plot of land healthy for future generations of farmers? Then let's invest in the infrastructure necessary to process hemp for fiber, grain and fuel.

It'll pull carbon out of the atmosphere and lock it up in the soil. Not to mention all the things we could make from hemp. Look around you. Nearly every material thing in your life could be made with hemp.

Hemp is a radically elegant solution to so many of the challenges facing our state, our nation and our world today. And it's time for us to implement that solution—locally.

Together, as farmers, processors, manufacturers, policy makers, visionaries (and, yes, even podcasters), we can do this. We can get this done.

I'm so excited for the future of the hemp industry in Pennsylvania and looking forward to connecting with you all at the 2020 Pennsylvania Hemp Summit—happening on Dec. 8 and 9.

This community of ours is coming together for the second year in a row to talk with each other, to learn from each other, to be with each other. We're all different. We have different ideas on how the world works, but together, as we build this industry, we are building a stronger community.

And cannabis loves community.

Developing Markets, Processing Key to Hemp's Future

RUSSELL REDDING

Pennsylvania Agriculture Secretary

The highly versatile hemp plant has deep roots in Pennsylvania.

When William Penn saw hemp being grown throughout the region in 1681, he considered it a natural for trade.

By 1683, Pennsylvania's young General Assembly encouraged farmers to grow hemp. We know that George Washington, John Adams and Thomas Jefferson were all hemp growers.

Using a cone-shaped stone, hemp processing mills crushed the tough stalk, working it into fiber that was used for rough and smooth fabrics and miles of rope.

From ship sails to shirt tails, hemp fields covering Pennsylvania paid off for farmers, producing the materials for many useful items.

But, like today, hemp growers had to navigate changing rules.

In 1933, then-Gov. Gifford Pinchot signed a law banning marijuana in Pennsylvania. That was four years before marijuana was federally outlawed in 1937.

Hemp and marijuana both belong to the Cannabis sativa species. The plants smell and look similar. But unlike marijuana, hemp only contains trace amounts of THC and does not cause euphoria.

It was difficult to distinguish between the two plants until the science on THC caught up in the 1960s. Early hemp farmers were forced to stop growing useful hemp.

Then in 1970, hemp unfortunately was included with marijuana under the federal Controlled Substances Act.

It never should have happened.

With hemp's heyday over, technology moved on without it.

We aren't grinding hemp with millstones anymore, and since it was no longer being grown, no one was innovating technology to support the industry.

This changed in 2016 when Gov. Tom Wolf

signed Act 92, designed to help ensure Pennsylvania fully reclaimed its rightful place as a leading hemp producer.

Pennsylvania's first modern hemp crop was harvested in 2017 in a research program established under the 2014 federal Farm Bill. The 2017 program totaled 36 experimental acres grown through 16 growing permits.

In 2018 that jumped to 35 growing permits for 580 acres. For 2019, the Department of Agriculture issued 324 growing permits and farmers grew hemp on 4,195 acres.

The 2020 acres grown are not tabulated yet, but this year the department issued 510 growing permits and 68 processing permits.

Four years in, we've made a lot of progress, and it's clear we must continue to encourage the development of a complete supply chain, including growing, processing and marketing.

Growers need more markets and processors.

Hemp carries a mystique that intrigues some consumers and is not understood by others. We must educate the public about hemp's versatility and identify which markets will be most lucrative.

Currently growers face a processing bottleneck.

Those growing hemp fiber and hurd have a hard time finding processing facilities, so they are selling their materials into lower-value applications.

That works, but hemp has so much more potential—paper, cardboard, textiles and beyond.

A lack of specialized processing facilities means growers cannot participate in providing raw materials for the production of higher-value products such as composite material and bioplastics that can be the base of countless sustainable items.

Investment in processing would expand the possibilities for hemp. I believe this will be part of the conversation in the coming year, and whenever you hear about it, consider it a sign that hemp's future is bright.

More **FUTURE**, page G4



Leading the way
in hemp.

Hemp—the next frontier in agriculture—is here and New Holland is ready to help you grow, harvest and process it. We're partnering with researchers, engineers and farmers to build reliable equipment solutions. We're allied with the National Hemp Association to swiftly return hemp crops onto farmland. And we're working hard to solve the unique challenges of hemp production. With decades of innovation in agriculture, New Holland can help you capitalize on this new frontier. Now that's the pioneering spirit.

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December 8 & 9, 2020
Interactive Virtual
Summit



THE PENNSYLVANIA HEMP SUMMIT

SPONSORED BY:



Tuesday, December 8, 2020

8:30 - 9:15 am MEET & GREET NETWORKING SESSION

9:15 - 9:30 am WELCOME REMARKS

Secretary Russell Redding, PA Department of Agriculture

9:30 - 10:20 am PLENARY: A Win-Win for Environment and Economy: How Hemp is Good for the Planet

Michael Roth, PA Department of Agriculture; Dr. Fatemah Etemadi, Rodale Institute; Casey Lapham, Rodale Institute; David Arscott, PhD, Stroud Water Research Center; Cynthia Petrone-Hudock, Hemp Alternative

SESSIONS

FARM - Hemp: From Seed to Sale

Eric Hurlock, Lancaster Farming Industrial Hemp Podcast; Chet Lapp, Farmer; Steve Groff, Hemp Innovators; Peter Hughes, Red Barn Consulting

BUSINESS - Looking Outside the Industry: How to Make Hemp a Centerpiece of the PA Economy

Phil Stober, Ag Business Development Center, PA Department of Agriculture; Henry Valles, US Hemp Building Alliance; Heidi Barr, Textile Artist

INVESTOR - Exploring Emerging Technologies, Research, and Product Development Opportunities

Mark Gignac, Institute for Advanced Learning and Research; Timothy D. Lebrecht, Air Products; Michael Himes, Lead Cryogenic Development Engineer, Air Products; Dozie Mbonu, Janerette's Eco-Friendly Fungi; Sairam V. Rudrabhatla, Ph.D., Penn State Harrisburg

12:00 - 12:50 pm LUNCH BREAK: MEET THE SPONSORS & NETWORKING

1:00 - 1:50 pm KEYNOTE PANEL: Hemp for All: Building a Socially Inclusive and Just System

Stephon Fitzpatrick, Minorities in Agriculture, Natural Resources, and Related Sciences (MANRRS); Senator Sharif Street (invited); Dr. Jamie Green, National Institute for Inclusive Competitiveness; Erica McBride Stark, PA Hemp Industry Council

SESSIONS

FARM - Research Outcomes: A Conversation with Hemp Specialists and Agronomists

Dr. Alyssa Collins, Penn State Extension and Heather Darby, University of Vermont Extension

BUSINESS - Exploring Best Business Practices: Lessons from CBD, Fiber, and Beyond

Brett Goldman, Hemp Industry Advocate; Jake Sitler, Floyds of Leadville; Mac Cheek, HempBlack; Dr. Steve Groff, Groff North America

INVESTOR - Securing Capital and Protecting Assets in a Volatile Market

Ryan Unger, Team Pennsylvania; Tony Capaldi, Customers Bank; Scott Johnson, Ben Franklin Technology Partners

5:00 - 6:00 pm HAPPY HOUR - BYOB and BYOVBC (virtual business cards)

Wednesday, December 9, 2020

9:00 - 9:30 am NETWORKING ON THE NET

9:30 - 10:20 am PLENARY: An International Perspective: What We Can Learn from Industrial Hemp Abroad

SESSIONS

FARM - The "Gateway Crop": Guidance and Resources for New & Beginning Farmers

Ben Davies, WildFox Farm; Benbruno Nkabpela, Fiction Formulations and Services; Clarendon "Cee" Stanley-Anderson, Green Heffa Farms

BUSINESS - Grow Local, Process Local, Buy Local - Building Our Supply Chains

Dr. Ron Kander, Thomas Jefferson University, Chair of PA Hemp Steering Committee Judy Wicks, All Together Now; Peggy Fogarty, Keystone Development Company; Eric White, The Hempstead

INVESTOR - The Hemp Legal Review: Updates, Advice, and Live Q&A with the Experts

Protecting the future of your investments depends on having an acute legal acumen. Hear from lawyers and professionals who deal with the legal ins and outs of hemp on a daily basis and ask all of your questions about investor liabilities in the age of COVID-19.

EmmaRose Boyle, Barley Snyder and Bill Rourke, HRMM & L

12:00 - 12:50 pm LUNCH BREAK: MEET THE SPONSORS & NETWORKING

1:00 - 1:50 pm KEYNOTE PANEL: Navigating Rules and Regulations: An Update from Federal and State Leaders

Erica McBride Stark, PA Hemp Industry Council; Deputy Secretary Fred Strathmeyer, PA Department of Agriculture; Bill Richmond, USDA-AMS; Sean Mitchel, DEA; Zach Gihorski, NASDA

SESSIONS

FARM - Pennsylvania's Potential for Hemp-fed Animals

Hunter Buffington, Hemp Feed Coalition; Erin Bubb, PA Department of Agriculture; Dr. Joseph Bender, UPenn

BUSINESS - Marketing and Branding: Proven Strategies to Navigate an Emerging Market in a Time of Crisis

Claudia Post, MOST Cannabis Consulting Group

INVESTOR - Filling Processing Needs and Building Lasting Agricultural Infrastructure

Aaron Delong, Pasa Sustainable Agriculture; Josh Leidecker, Susquehanna Mills; Cameron McIntosh, Americhanvre LLC

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2020 a Year to Forget for Many in Hemp Industry

TOM VENESKY

Northeastern Pennsylvania
Correspondent

Nathan and Heather Kreider saw their accounts with the spa and resort industry crash.

Lloyd Huyett experienced a delay with his permit, and his entire season was set back.

Taylor Fritz had no large-scale field days to market his seed products to potential buyers.

And then there was Daniel Summa, who found himself battling hand sanitizer makers over ethanol, and later couldn't even find plastic buckets to store his product.

Needless to say, the COVID-19 pandemic has had a wide array of effects on Pennsylvania's hemp industry. Things have returned to normal, for now, but those in the industry remain nervous over what might happen next.

When the pandemic surfaced in March, followed by a government-ordered shutdown of nonessential businesses, the Kreiders watched their wholesale accounts with luxury resorts and spas dry up for three straight months.

Their business, Hempfield Botanicals in Lancaster, manufactures hemp-based CBD products.

The Kreiders were uncertain how the shutdown would impact their business over the long term, so they decided to act.

"It was scary for our bottom line and our team," Heather said. "We applied for every type of funding we could as soon as it was available."

The Kreiders also focused on the other half of their business — retail. The pandemic left people dealing with anxiety, lack of sleep and other stress-related ailments, Heather said. As a result, online sales began to boom.

"Some of our products specialize in those areas, and hemp is a fantastic solution," Heather said, adding that the increase in sales came mainly from women over the age of 35, elderly people and patients who were referred by neurologists.

"The pandemic opened more minds to hemp," Heather said. "Our retail sales increased, and having multiple streams of revenue profited our business and saved us for sure."

Shannon Powers, press secretary for the Pennsylvania Department of Agriculture, said some retail sellers experienced a lull in sales in mid-summer, but that seems to have recovered. Those businesses with an established e-commerce outlet set up before the pandemic, like Hempfield Botanicals, were best situated to survive and grow, she added.

But the cancellation of most festivals, fairs and other live-promotions events, not to mention a decline in in-store sales, affected many in the industry.

"On-farm educational opportu-



Photos provided by Heather Kreider

Hemp business owners Nathan and Heather Kreider, facing the camera, shifted their marketing strategy toward online sales during the pandemic. Having more than one revenue stream helped the business remain profitable.

nities, which have been especially crucial in a new industry, have been somewhat hindered," Powers said. "But for those able to connect online, virtual opportunities have increased."

Fritz, who is the assistant marketing manager at King's Agri-Seeds, relies on educational events such as field days to exhibit seed products and meet customers. With those events canceled during the pandemic, Fritz focused more on online marketing.

But it wasn't the same.

"You can't replace the face-to-face interaction," he said. "We'll continue attempting to work through digital means, and we did have four small field days, which allowed us to have discussion and show our hemp plots. We'll likely do more small events with fewer people in the future. We'll have to hold more of them and keep them small."

Huyett, who owns Helping Hands Hemp in Morgantown, just wrapped up his third year as a grower and said the season was a challenge because of the pandemic.

The shutdown delayed issuance of Huyett's grower's permit by a month. The delay had a ripple effect, as Huyett was late purchasing his seed, planting the crop and harvesting, which didn't occur until Oct. 30.

"We typically harvest in early October," he said. "We started plants in the greenhouse, then it got dry in the summer and half of them died. The rest stayed kind of small but the flavors turned out nice."

"If we see more restrictions

again, I don't know what we can do differently."

Powers said the Ag Department was faced with several challenges early in the pandemic, including federal regulations that were changed late in the game. The new federal rules were issued after Pennsylvania's program opened for 2020, she said, and the department had to hurriedly review and interpret volumes of information to prevent permit delays for growers.

But that wasn't the only hurdle.

"When the pandemic hit, many FBI fingerprinting sites were temporarily closed, so applicants could not initially meet USDA's background-check requirements. Lease agreements for fields required travel and face-to-face meetings to obtain signatures for many," Powers said.

She also pointed to an alleged temporary slowdown in postal delivery as an impediment to department staff processing applications from home.

The agency did issue conditional permits for those who faced delays with FBI background checks, and considered late applications for growers who had difficulty obtaining documentation such as property maps and leases.

In the end, 46 applicants didn't complete the application process, and some who withdrew cited pandemic-related issues, Powers said.

Still, the pandemic challenges weren't limited to growers.

Summa, who is a partner in AgriHemp Industries in Mayfield, Lackawanna County, said the

biggest disruption he faced was a shortage of ethanol needed for processing.

The business, which also grows hemp, uses the coal-ethanol process for the processing end. Summa said he obtains an allotment of eight drums per month from a large ethanol supplier, but in March he didn't get anything.

"Our allotment of ethanol was reallocated to produce hand sanitizer," he said. "We had to petition to get it back, and we got two drums, then up to four in the summer. We petitioned again in October and got it back up to eight."

When the ethanol allotment dropped, Summa's business remained open, but the rate at which it could extract dropped significantly.

"I never thought we'd have to

compete with hand sanitizer," he said. "Now we're prepared if the pandemic becomes an issue again. Our ethanol allocations are locked in, and we sourced ethanol from a second source to stockpile."

The effect wasn't limited to ethanol, Summa added.

The food-grade plastic buckets that are used to store CBD crude oil also became hard to find, he said. The business did locate a supply of buckets online, but had to pay a much higher price than normal.

Another problem Summa witnessed in 2020 is a glut of hemp material left over from 2019 that contributed to a price collapse across the board. Plantings are also down in 2020, he added, and some growers didn't even bother to harvest their crop.

While the pandemic was a factor with the price drop, the uncertainty and delay with federal rules didn't help business either, according to Summa.

"COVID-19 brought uncertainty and a lot of stores were closing. People needed to raise cash, and they just put things out on the market. It created a glut and lowered prices," he said. "Now we're open for business and processing, and things seem relatively stable going into winter."

One sign of normalcy for the industry is the approaching 2020 Pennsylvania Hemp Summit, to be held Dec. 8-9 at the Lancaster County Convention Center. The event is organized by the Ag Department and Team Pennsylvania, and it serves as a major networking event for everyone in the industry.

Powers said the summit allows producers to stay on top of trends and research emerging in the new industry, but it remains to be seen how the disruptions from the pandemic will be felt in the future.

"We would anticipate the long-term impacts on the hemp industry being similar to those on every agriculture sector," she said. "How businesses fare will depend largely on how they adjust to market ups and downs, and how agile they are in reacting to trends."



Heather Kreider is an owner of Hempfield Botanicals in Lancaster, Pa.

Future

Continued from G2

Anything that promises more uses for your crop is a good sign.

Pennsylvania's Hemp Steering Committee is leading these types of conversations. The committee hears directly from researchers, processors and hemp farmers and is focused on helping the department structure our hemp program and navigate federal regulations to support the expansion of Pennsylvania's hemp industry.

We sometimes hear from growers and processors frustrated with federal regulations regarding testing for THC levels.

While it is not within our power to

change federal laws, the federal government has asked for feedback.

In response to the USDA's Interim Final Rule, which currently defines the U.S. Domestic Hemp Production Program, I provided comments and recommendations in January to U.S. Ag Secretary Sonny Perdue based on feedback from Pennsylvania's hemp industry.

In September, the USDA asked for more public comments on the Interim Final Rule. USDA is expected to publish a summary of its responses to all comments when it publishes the Final Rule, anticipated in the first part of 2021.

We are eager for change and interested in changes that help our hemp industry grow.

No matter what, hemp will march forward.

All industries have been tested in 2020, but the hemp industry has the added challenge of being new and underdeveloped in many ways.

In the short time since the restart of hemp production, we've come a long way. And have yet to realize hemp's full potential.

The innovative and the adaptable who hang on through any bumps will continue to drive the industry.

Hemp's future may look a lot like the vision William Penn had: one of abundance, where hemp will supply our needs and even be a valuable trade asset.



Commonwealth Media Services photo by Natalie Kolb
Russell Redding

Steering the Growth of Pennsylvania Hemp

RONALD KANDER

Leadership Team Chairman,
Pennsylvania Hemp Steering Committee

Throughout history, the hemp plant has been recognized as a sustainable, renewable source of raw material with a host of industrial and consumer applications.

Currently, it's underutilized as a raw material due to decades of laws and policies prohibiting, or severely limiting, its industrial use.

As these laws and policies change, the use of hemp as an industrial raw material will continue to increase due to interest in sustainable, high-value consumer and industrial products made from domestic renewable resources.

In Pennsylvania, expanding interest in hemp is evident from the number of permits the commonwealth has issued. The number of growing permits has increased from 16 in 2017 to 324 in 2019.

This year, 510 growing permits were issued and, for the first time, 68 processing permits were approved. More than 100 of the growing permits were specifically granted for growing fiber varieties.

Clearly, there is strong interest in expanding and diversifying the hemp industry in Pennsylvania. The challenge is to support this expanding agricultural and manufacturing industry by developing:

- A basic material science understanding of the hemp plant as an industrial raw material.
- Engineering processes to transform hemp biomass into new material forms with unique mechanical and physical properties.
- New high-value products with well-defined markets that utilize hemp-derived materials.
- Business models and supply chain simulations for hemp-de-



Submitted photo

Ronald Kander is the chairman of the Pennsylvania Hemp Steering Committee's leadership team.

rived product businesses.

• A systems-level understanding of the sustainability of the hemp industry (technically, environmentally, economically and socially).

• The infrastructure necessary to support an expanding, sustainable hemp industry.

Academic institutions, government agencies and the hemp industry must work together to develop an integrated system of new materials, processes, products and business models necessary to grow and sustain a robust hemp industry.

In addition, the education, training and workforce development infrastructure necessary to grow the human capital needed to support the hemp industry must be incorporated into the integrated system.

To facilitate these collaborations, I am currently chairing the Pennsylvania Hemp Steering

Committee, a group of more than 60 stakeholders from industry, academia and government.

The mission of this steering committee is to advance the hemp industry in Pennsylvania and provide counsel and guidance to the Pennsylvania Department of Agriculture on this important emerging opportunity for the commonwealth.

The steering committee is managed by a leadership team made up of two co-chairs from each of four subcommittees, namely Farmer and Processor Education and Outreach, Supply Chain and Market Development, Research Opportunities and Needs, and Policy and Regulation.

The leadership team also has representation from the Department of Agriculture to facilitate communication between the department and the steering committee.

Recently, the steering committee responded to the USDA Interim Final Rule during the open comment period to advocate changing policies and procedures around issues such as full-plant composite sampling and testing protocols, national processing permits to better establish chain of custody, measurement of uncertainty and negligence levels in testing, the time window between sampling and harvest, and policies for removing materials from a farm (for drying, processing, disposal etc.).

The steering committee is also advising the Ag Department as it develops its 2021 permitting policies and procedures.

If anyone wants to participate in or provide feedback to the steering committee, please contact me directly and I will make sure you are added to our distribution list and your concerns are directed to the appropriate subcommittee or directly to the Ag Department.

In the coming months, the steering committee will be establishing a website to facilitate communication with all of the stakeholders in the state's hemp supply chain.

Pennsylvania companies currently make oils, textiles, CBD, and even construction and insulation materials from hemp, just to name a few products. Pennsylvania is uniquely positioned to develop robust local supply chains within the commonwealth that will be able to capture much of the value in these emerging industries.

I believe by working together we will be able to position Pennsylvania as an industry leader in local supply chain development. In fact, I will be moderating a panel discussion entitled "Grow Local, Process Local, Buy Local — Building Our Supply Chains" at the 2020 Pennsylvania Hemp Summit, which will be held virtually Dec. 8-9.

This panel will be at 10:30 a.m. Dec. 9, and you are all invited to register for the summit and attend this interesting panel discussion to learn more about capitalizing on these local economic opportunities, sharing information across the state, and building partnerships with diverse business owners.

As you can see, I feel the exciting future of the hemp industry in the commonwealth is bright. However, we all need to work together to broaden and enhance the growth of this industry and ensure that value is captured by everyone involved in the supply chain, from the farmer to the processor to the product designer and manufacturer.

I believe that, together, we can make Pennsylvania a hemp industry leader in the United States.

Dr. Ronald Kander is the associate provost for applied research at Thomas Jefferson University. He is a member of All Together Now's Hemp Coalition and the Pennsylvania Department of Agriculture's Industrial Hemp Steering Committee.

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King's AgriSeeds variety screening plots
Christiana PA

Healthy Hemp Needs Healthy Soil!

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Pre-introduction CBD hemp variety trials in late July at King's AgriSeeds research farm in Christiana, Pa. With F1 hybrids, more promising varieties are in the breeder pipeline.

CBD Variety Trials Show Upgrades

SARAH MITCHELL

Hemp Specialist, King's AgriSeeds

Hemp breeders are rapidly improving CBD hemp product quality and striving to reduce risk for growers.

The pre-introduction trials we conducted at King's AgriSeeds showed significant upgrades over this season's commercial varieties.

For 2021, day-neutral varieties are even more efficient to grow with higher yield per acre.

New photosensitive varieties are stocky plants that have nearly 10% more biomass than the commercial varieties we tested.

Both types have higher cannabinoids and safer CBD-to-THC ratios.

Since 1993, King's AgriSeeds has independently researched varieties and crop culture on our farm in Christiana, Pennsylvania. This local work gives Northeast and Mid-Atlantic growers confidence when choosing competitive seed varieties and planning best cultural practices.

This past summer, we conducted pre-

introduction trials with Phylos Biosciences, a leading industrial hemp breeder.

Fifteen never-seen-before varieties were evaluated for field performance, yield, CBD rates and flower quality. Field performance included seedling emergence, plant vigor, growth habit and uniformity.

The day-neutral (autoflower) varieties from Phylos were direct-sown on June 10. Growing conditions were ideal for the next seven days, with adequate rainfall and temperatures averaging 72 degrees. Seedlings emerged within a week.

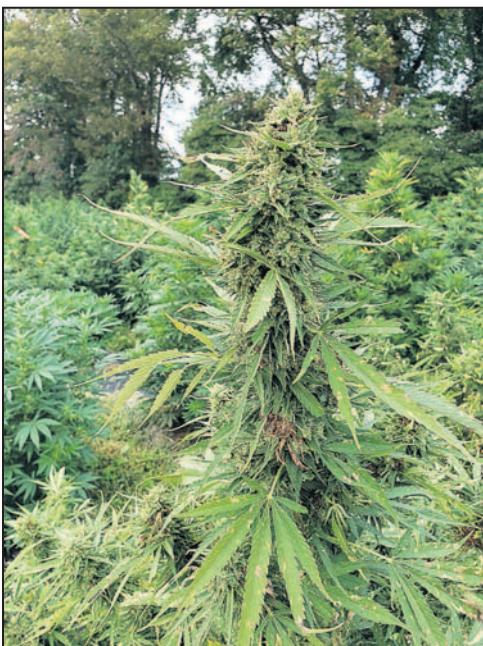
The crop was irrigated three times during the season. Strong taproots ultimately grew 10 inches deep in our healthy, organic matter-rich soil. Granular fertilizer was applied preplant and during the crop cycle. The varieties matured waist-high between 60 and 75 days.

Photosensitive varieties from Phylos were grown from 21-day-old transplants on raised beds. The crop was irrigated and fertilized through a drip system each week. At harvest in mid-October, plants varied from 4 to 7 feet

More **TRIALS**, page G7



Currently available AutoCBD NBS CBD-1, at right, is compared to two potential introductions for 2021 next to a 48-inch measuring stick.



Harvest timing varied from early September to late October in the photosensitive variety trial. These photos were taken Sept. 28.

Hemp Farming for Survival

DOUG FINE

Funky Butte Ranch, New Mexico

I farm hemp as though my family's life depends on it. As are we all, I'm a soil farmer now. In fact, researching and writing my new book "American Hemp Farmer" has taught me that in all facets of my life, carbon sequestration and healthy ecosystem nurturing is my primary job. Toward that end, here's what drew me to cultivate hemp.

The following is an excerpt from Fine's book, reprinted with permission:

Six years ago, a bear fleeing a wildfire in our New Mexico backyard killed nearly all of my family's goats in front of our eyes. It wasn't the bear's fault; he was a climate refugee. It was June of 2013, and drought had weakened the ponderosa pines and Douglas firs surrounding our remote Funky Butte Ranch. Beetles took advantage, and all of southern New Mexico was a tinderbox. Ho hum, just another climate event that until recently would have been called a "millennial" fire.

The blaze cut a 130,000-acre swath that year, poisoning the air before the monsoon finally arrived about half a day before we would've had to evacuate. But it was too late for the large juvenile black bear, who'd lost his home and his mind. He didn't even really eat most of the goats. We lost all but one of the animals that provided our milk, yogurt and ice cream.

Baby Taylor Swift survived, but Bette Midler, Stevie Nicks and Natalie Merchant (who loved meditating with me of a morning) perished, as did the bear several weeks later (care of a Game & Fish marksman) upon going after a dozen of our neighbor's sheep. (All our Funky Butte Ranch goats are named after singers we like, but whose voices might tend toward the caprine.)

Ever since, my sweetheart and I have had to keep a constant eye on our human and goat kids. We react like a frenzied SWAT team to any unusual noise up in the eponymous buttes

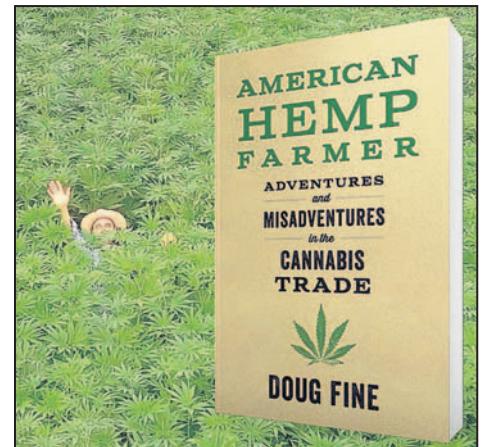
above our small adobe ranch house. We've had our climate change Pearl Harbor — the event that shifted us into a single-minded new normal. If you haven't had yours yet, you probably soon will.

This is the paramount reason I'm an overworked employee of the hemp plant: The people I care about most are one blaze away from joining the world's 20 million climate refugees. At least I get the pleasure of putting "goat sitter" under occupation on my tax form.

There's nothing like wildfire-fleeing bears attacking your livestock before breakfast to hammer home the fact that humanity is in the bottom of the ninth inning with two outs. The conflagration convinced me that I had to do something, personally, to work on this climate change problem.

After some research about carbon sequestration through soil building, it became clear that planting as much hemp as possible was the best way to actively mitigate climate change and help restore normal rainfall cycles to our ecosystem.

Doug Fine is a writer and solar-powered goat herder. His latest book is "American Hemp Farmer: Adventures and Misadventures in the Cannabis Trade" (Chelsea Green Publishing, April 2020). He has cultivated hemp for food, farm-to-table products and seed-building in four U.S. states.





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Keeping an Eye on Hemp Markets

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Harvest is wrapping up in most areas for this second season of national hemp production.

Our balance sheets show over 90 million pounds of hemp biomass are being produced in the U.S. this year for cannabinoids, compared to well over 125 million pounds in 2019.

The underlying assumptions to these estimates are comprehensive supply and demand balance sheets that track production at a high level.

These assumptions are conservative, using yield averages, and planted and harvested acreage that reflect actual production.

As with all of the ag commodities in our portfolio, these balance sheets inform our hemp pricing forecasts.

There is no presumption of anything remotely near to 90 million pounds of demand for CBD biomass currently.

Overall supply and demand will have varying effects, depending on a producer's connections to markets, geographically or otherwise.

Regardless, there is little biomass trading hands relative to processing. Much of that is being tolled on splits, or cash tolls, which are much preferred by extractors eager to cash flow their operations.

Of course, much of the material is produced by vertically integrated operations that do not intend to market biomass. Some of these operations have extraction capacity, but others contract the processing.

Buyers have continued to consume wholesale extracts, in part because they are building inventory amid new product introductions.

The retail demand for CBD isn't clear yet, but unless it increases

significantly, wholesale demand is likely to founder later in 2021.

The numbers just don't support sustained pricing levels, and as new product introductions taper off, pricing floors will be pressured.

Vertically integrated operators are insulated from commodity hemp markets, but this space is highly saturated, with several thousand brands.

If local food markets are any indicator for this market, there is ample room for savvy operators to thrive, though margins will look more like typical agricultural margins.

Many of these hemp operations are not the sole income source for growers. Off-farm work, retirement funds, and investment income have in part enabled this sector to absorb far more loss than the typical small business. The industry is very diverse, though, with lots of scrappy, undercapitalized operators, contrasted with startups with vast amounts in capital expenditures.

Policy is the key caveat for hemp markets and hemp prices. Policy developments in hemp have the potential to unearth significant latent demand.

There are many corporations waiting for a regulatory green light that could bring dietary supplements or beverages to market quickly.

The regulatory vacuum has also enabled companies to learn more about the markets they're entering, while science, technology and consumer demand are also swiftly evolving.

Manufacturers are now looking at much lower input costs for cannabinoid products, only increasing the appeal of the market.

Flower markets continue to show healthy demand and continued growth. U.S. hemp farmers will pro-



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duce millions of pounds of flower this year, with increasing production from indoor or greenhouse facilities.

This will shape trade flows as some markets shift to regional or local production. There is already substantial market activity in the Southeast from greenhouse-grown material.

Flower is steadily losing value as the 2020 crop comes to market, but demand for flower has proven resilient and continues to grow, despite policy setbacks in mega-markets like New York, where flower was recently banned.

We expect hemp flower pricing to continue seeing seasonal oscillations, typical for agricultural commodities.

Overall production numbers do not support sustained pricing levels, but the amount of premium, craft flower is limited by many factors, and that niche market will likely see price strengthening again, as stocks dwindle in the second and third quarters of 2021.

Hempseed production and processing is fairly consolidated compared to the CBD segment, with a handful of crushers in Montana, North Dakota, Colorado, Kentucky

and Pennsylvania.

The Jacobsen estimates production is over 20,000 acres in 2020, based on contracted production. Production of hempseed in 2020 is projected to exceed 12,000 tons.

Approval of hempseed for animal feeds will help drive future production, but there is no guarantee that this will occur in 2021.

Hempseed oil markets have seen steady growth, but the byproduct — hempseed meal — has mostly languished, with no officially sanctioned markets. The ability to capitalize on the entire hempseed product complex will help to buoy hempseed prices and operator profitability.

Hemp fiber production is limited to small acreages, and operators running modest decorticators like Formation Ag's Fiber Track 660. This activity has been key to developing agronomic practices for fiber hemp and provides university researchers and textile companies material for R&D or research.

Raw hemp fiber prices have not experienced the volatility of the CBD segment, ranging between 6 and 12 cents per pound. Kentucky-based HempWood, which doesn't require decortication, is the major buyer of raw hemp fiber in the U.S. currently, but significant capital has been raised by a number of entities looking for a play in fiber.

More decortication capacity will come online in 2021, and we'll eagerly track the expansion of this segment.

Chase Hubbard reports on hemp markets in the Jacobsen's Hemp Bulletin. The Jacobsen is a price reporting agency covering commodities markets, including hemp. Learn more at thejacobsen.com

Trials

Continued from G6

tall and 4 to 6 feet wide.

Result: The future is bright for autoflower varieties!

The differences between autoflower F1 hybrids and selected varieties were striking. The hybrids boasted much higher vigor and stockier plant architecture, heavy with dense flower buds.

At less than 15% of overall weight, stems and branches were a fraction of the biomass for big returns with little waste. The CBD-to-THC ratios for Phylos' 2021 autoflower varieties range from 26-to-1 to 30-to-1, a respectable improvement.

Pre-introduction photosensitive hybrids showed wide variability in plant architecture and bud density. Flower buds were more compressed and larger on pyramidal plants, while flowers were evenly distributed crown to base on round bushes.

These characteristics are important to know before planning population density and harvest method. There were no hermaphrodites in the pre-introduction varieties.

Flower quality ranged from prolific, somewhat loose buds to dense, long clusters suitable for smokable flower.

Interestingly, varieties with fewer branches and longer colas yielded the highest bucked biomass compared to stem and stalk, about 72% of overall wet weight. Harvest timing for these photoperiod varieties was late summer to the end of October.

Phylos Biosciences is still analyzing trial data before announcing new varieties for 2021. Stay tuned!

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