

## HOPS INSIDER

# SOLUBLE HOP PRODUCTS: DISRUPTIVE TECHNOLOGY?

As we zoom in on hop products that weren't available to 20th-century brewers, **STAN HIERONYMUS** examines a few of the many flowable alternatives that may boost the bottom line as well as help ensure aroma and flavor quality.

**FIRST, JIM BOYD POPS THE CAP** on a bottle of Pacifico.

He pours a couple of ounces into a cup. "That's the base," he says. It is bright, light bodied, and it has little aroma.

He squeezes a few drops from a vial. "How much mouthfeel do you want?" he asks. This addition certainly adds texture.

He pours another, adding drops from a second vial. This sample is hazy.

Once again, he fills a cup, adding a few drops from a third vial. The result smells and tastes of New World hops.

Then he combines the three pours. The blend doesn't taste like Other Half HDHC Dense, but compared to Pacifico, it is a good-sized step in that direction.

Sometimes Boyd pours Pacifico; other times Bud Light or whatever might be available in the brewery he is visiting. He is VP of brewery products for SōRSE Technology, a supplier of water-soluble CBD, hemp, and terpene emulsions, and the company recently began selling hop-based products. He previously spent almost 20 years working at Hop Union and Roy Farms, and he started back before craft brewers would consider using any form of hops beyond cones or pellets in their beer—or, in fact, before they would package beer in cans.

"I remember when brewers would say metal will never touch my lips," says Phil Chou, director of brewing solutions at

John I. Haas. These days, cans of craft beer might even advertise the advanced hop products they are using—such as Salvo Sultana or Incognito Mosaic.

"A decade ago, that never would have happened," says Colin Wilson, managing director at Totally Natural Solutions (TNS), based in England's historic Kent hop-growing region. Brewers who used products that were labeled "downstream" kept that information to themselves. "It was a dirty little secret," Wilson says.

### WHY, AND WHY NOT

There is a long list of advanced hop products that are of little interest to many smaller breweries. Yet there are a few that are, and they offer multiple advantages over cones and T-90 pellets:

- A pound of hop pellets will absorb about 1.2 gallons of beer (10 liters per kilogram). In a beer dry hopped with five pounds per barrel, that may amount to a loss in beer volume of almost 20 percent.
- Reducing or eliminating the vegetative material reduces or eliminates the chances of hop creep because the enzymes that trigger it are in that material. (For more about hop creep, see "Brewing with Hops: Don't Be Creeped Out," [beerandbrewing.com](http://beerandbrewing.com).)
- Reduction of "hop burn."
- Reduction of nitrates and pesticide residue.
- Greater environmental sustainability.
- More consistency.
- Lower shipping and storage costs.
- Safer to use.

Nonetheless, advanced hop products are not for everyone. Not every brewer agrees that cone/T-90 alternatives produce aroma and flavor equal to the originals. Others may associate them with industrial brewing or consider them a form of cheating, something to fix poorly made beers.

Wilson says he understands: "We never tell the brewer what to use. They will define what success looks like to them. We call this the emotional hurdle."

**DRY HOPPING WITH PELLETS IS EVEN MORE INEFFICIENT THAN MOST BREWERS REALIZE. NOT ONLY IS BEER LOST WHEN THE PELLETS ABSORB IT, BUT ... MUCH OF WHAT BREWERS VALUE IN HOPS REMAINS IN THOSE PELLETS AFTER DRY HOPPING.**

## SEEKING SUSTAINABILITY

Wilson describes striking a deal two years ago with NZ Hops, the New Zealand hop growers' cooperative, as a watershed moment because the partnership has focused on sustainability. "It legitimized [advanced] hop products, not just TNS," he says.

Dry hopping with pellets is even more inefficient than most brewers realize. Not only is beer lost when the pellets absorb it, but a study at Oregon State University (OSU) reveals that much of what brewers value in hops *remains* in those pellets after dry hopping. Researchers at OSU who examined multiple lots of Amarillo, Cascade, and Centennial hops found that, on average, spent hops retain 77 percent of alpha acids and 51 percent of total oil.

Although more than half the oil remains, the percentage of individual compounds changes, making it hard to place a value on the oil. Alpha remains alpha and always has value, although it can fluctuate widely based on demand. Letting it go to waste has additional environmental consequences.

The goal at TNS is to use the complete hop. A range of different propriety processes extracts and fractionates all the aroma/flavor and bittering (alpha) compounds within a hop from pellets. That differs from the standard industry model, in which lupulin is extracted using carbon dioxide and aroma/flavor compounds are separated from that—a process during which volatile compounds will be lost. TNS packages true-to-type oil for the variety from which it was extracted. They may also fractionate the oil using their patented methodology and blend those resulting compounds with others to create custom products, some of which are tailored for specific customers.

The alpha is sold as HopAlpha NISO, a natural, water-soluble, iso-alpha-acid bittering compound. TNS offers a range of functional extracts from the remaining fractions. These include HopZero Body (for mouthfeel) and HopGain Haze (for stable haze)—both products that are useful in nonalcoholic beers as well as hazy IPAs.

Sales at TNS—which ships 80 percent of its products outside of Britain—increased 44 percent in 2021 from 2020. However, Wilson says the U.S. market remains mostly untapped. Brewers who once mainly used oils in one-off batches to broaden their portfolios have begun to make them part of core brands.

"They want to take the cost out and not wreck the brand," Wilson says. Thinking in terms of aromas instead of varieties is

## A RANGE OF DIFFERENT PROPRIETY PROCESSES EXTRACTS AND FRACTIONATES ALL THE AROMA/FLAVOR AND BITTERING COMPOUNDS WITHIN A HOP FROM PELLETS. THAT DIFFERS FROM THE STANDARD INDUSTRY MODEL, IN WHICH LUPULIN IS EXTRACTED USING CARBON DIOXIDE AND AROMA/FLAVOR COMPOUNDS ARE SEPARATED FROM THAT—A PROCESS DURING WHICH VOLATILE COMPOUNDS WILL BE LOST.

part of the conversation. "If they give me 'citrus and tropical' rather than Amarillo ...," he says. "That they are willing to decode the core brand is a massive change."

## DISRUPTIVE TECHNOLOGY

Founded in 2016, SōRSE is a food technology company that quickly established itself as a market leader in CBD- and THC-infused products by developing a proprietary, water-soluble emulsification process for any oil-based ingredient.

"The technology is a classic micellar structure in the emulsion world," says Michael Flemmens, SōRSE's executive VP of research and technical business development. "It physically looks like an M&M. The chocolate is our payload, our input material. Where we started in the cannabis world, that was THC, CBD. Now it can be used to deliver aroma, extracts, any other compound the brewer is interested in."

On the candy-coated shell, "we have built a net positive charge. Those droplets act like north pole magnets," he says. "When they come into proximity to each other, they sort of repel each other and effectively self-mix. They are in constant agitation."

The results are easiest to see, literally, with their Haze Addition. "There is a suspension of particles," he says, describing how other systems are built. "It's essentially a house of cards. All you are waiting for is a kinetic event, whether it is shipping or heat cycling, whatever." Brewers who make hazy wheat beers—and who may ship kegs upside down or include instructions on the label about agitating a bottle—know that gravity usually wins in the end.

"We flipped the switch," Flemmens says. "Instead of looking for what you'd define as a classically stable system, we've essentially built a highly chaotic system. It's ... this chaos of motion inside the beer ... that's what's keeping all of these things uniformly suspended. And the charge in suspension will last 18 months."

The compounds for Haze Addition, Mouthfeel, and Hop Topper are basically secondary products taken from the CO<sub>2</sub>

extract stream after the alpha acids are removed. Hop Topper can be customized. "We start with a big bucket," Boyd says. "Citrus, floral, resinous. We can dial that down. For citrus, it might be lime-centric, grapefruit-centric."

SōRSE is still refining the process, and interested brewers have only begun their own trials. "Tell us the flavor you want. We'll build it," Boyd says. Each of the products can be added directly to a serving vessel, which—Boyd points out—means a brewer may create multiple brands from a single beer stream.

## PLEASE READ INSTRUCTIONS BEFORE ASSEMBLY

Many of the advanced hop products introduced over the past three years are aimed at ease of use. John I. Haas added to the list in July, introducing its own post-filtration haze product, HopHaze. Ease of use doesn't mean each of these products should be considered a turnkey solution. For instance, Haas produced a white paper about how to use Spectrum, their liquid solution for dry hopping.

"We have found that it is useful to initially only partially replace the pellet load with Spectrum," the Haas instructions say. "This allows you to understand the flavor impact that Spectrum is having and adjust both the replacement ratio and the dosing rate to get the best results."

At TNS, Wilson is fond of pointing out that these products are not a silver bullet. "The case is there, these can be good," he says. "Behind that case, it's not a five-minute fix. You need to refine the process, three or six or 10 iterations."

He resists any suggestion that oils might fully replace pellets. "I would never say 'dry hopping without hops.' We emphasize the botanical [connection]," he says. "This is not a mythical thing made in a lab. That [brewing] process itself extracts things we haven't identified."

He holds up his right hand. "It still takes a bit of this," he says, lowering the right and raising his left. "And a bit of that." 