

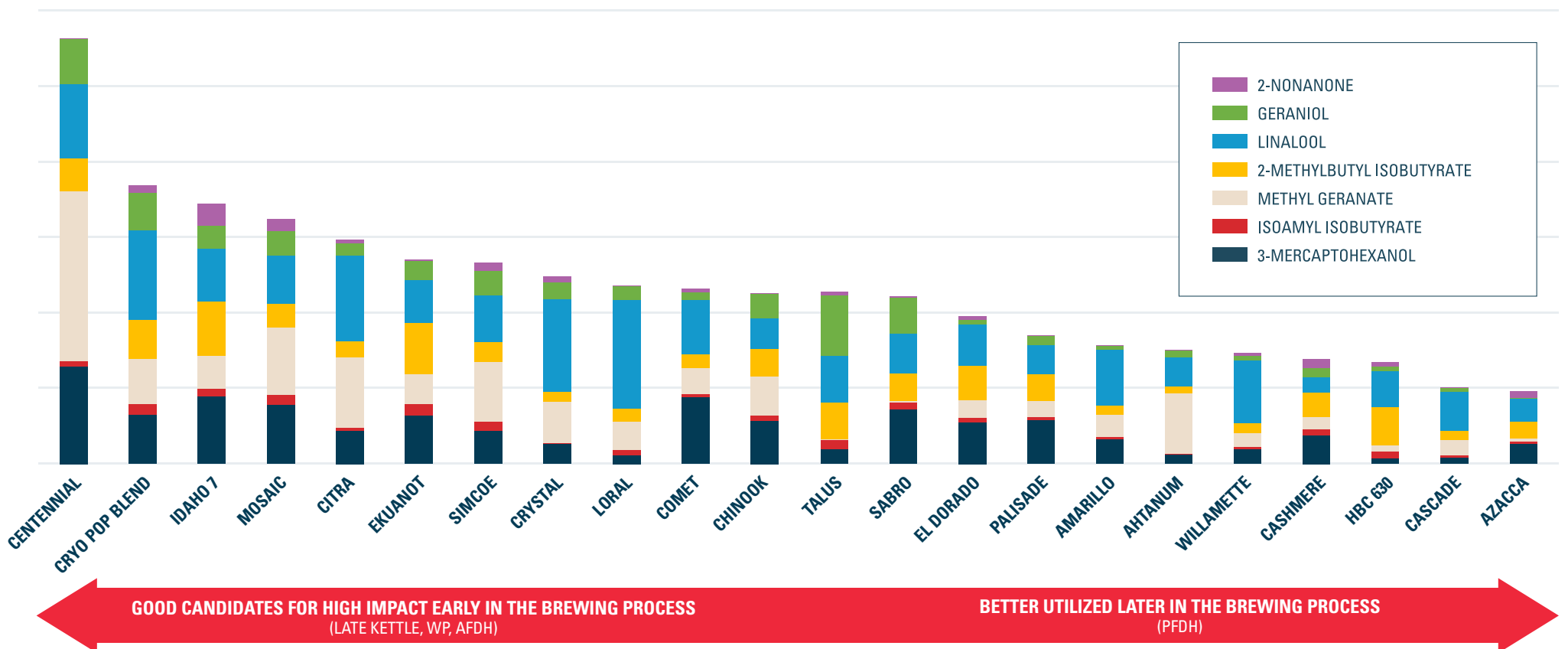
SURVIVABLE COMPOUNDS

Yakima Chief Hops has pioneered the use of cutting-edge hop lab analysis techniques to further unlock the maximum potential of aroma hops. The YCH R&D facility houses one of the only labs in the world with the capability to analyze hops via GC-QTOF and GC-SCD technology and study previously undetectable aromatic components. This technology allows us to explore the aroma potential of novel hop compounds—specifically beer-soluble compounds that survive the brewing process.

GC-QTOF and GC-SCD technology unlocks the potential to identify hop compounds that work synergistically and have greater potential of surviving into finished beer. Much historical attention has been paid to components that do not tend to make an impact in finished beer aroma, leaving brewers grasping to understand how to better translate raw hop aroma into the final product. Utilizing GC-QTOF and GC-SCD

technology, the Yakima Chief Hops R&D Team is able to quantify concentrations of beer-soluble compounds within hop varieties, creating a framework that helps brewers utilize hop varieties to their maximum effect. This research provides a massively important link in answering questions such as:

- **What variety should I use?**
- **Where in the process should I use it?**
- **Which hops work together in combination?**
- **How can I use a variety to its maximum effect?**
- **How can I have more control over the aroma characteristics in my finished beers?**



1. USE HIGH SURVIVABLES HOPS EARLY (OR LATE)

Hops with higher concentrations of survivable compounds have a better likelihood of being successful when used earlier in the brewing process than hops with low concentrations of these same compounds. Early additions include late kettle, whirlpool, and active fermentation dry hopping (AFDH).

EXAMPLE

Idaho 7[®] is likely a better choice for high-impact whirlpool hopping than Cascade.

This is because Idaho 7[®] contains higher concentrations of beer-soluble compounds that can survive heat and fermentation activity.

3. BLEND HOPS TO MAXIMIZE BENEFICIAL CONCENTRATIONS

Focus on balancing high concentrations when creating blends.

EXAMPLE

Because Loral[®] is high in linalool and Talus[™] is high in geraniol, the two of them are likely to work well in concert. Loral[®] and Crystal are both high in linalool and would therefore likely create a less dynamic and more one-dimensional blend.

2. USE LOW SURVIVABLES HOPS LATE

Similarly, we can say that hops with lower concentrations are likely to find better success and a more positive impact in beer when used later in the process, such as post fermentation dry hopping (PFDH).

EXAMPLE

Cashmere will likely make a higher impact in finished beer if used later in the brewing process.

This is because Cashmere contains smaller concentrations of beer-soluble compounds that can survive heat and fermentation activity.

4. LOAD WORT STREAMS WITH SURVIVABLES EARLY

High concentrations of survivables in whirlpool and active fermentation dry hopping can create conditions necessary for beneficial biotransformation.

EXAMPLE

A whirlpool addition of Idaho 7[®] combined with an active fermentation dry hopping addition of Sabro[®] and Simcoe[®] is likely to yield huge flavor impact because it loads the wort stream with a diverse array of "raw materials" needed to favor biotransformation.



YAKIMA CHIEF HOPS[®]