Effect of Pasteurization on Bright and Hazy IPAs

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The Pasteurization Debate

Beneficial

- Decrease in aging precursors
- Microbial, physical, and enzymatic stability

Detrimental

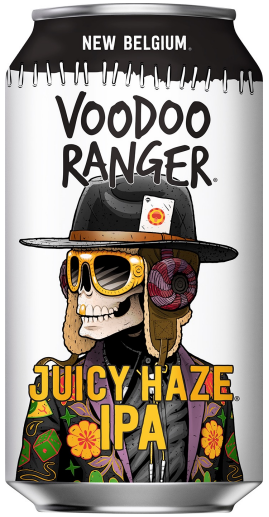
- Increase in aged marker compounds and decrease in fresh compounds
- “Pasteurization flavor”

Adding to the conversation

Bright & Hazy IPAs

Analytical Chemistry & Sensory

Methodology



Samples

- Voodoo Ranger IPA (25 PU) vs. unpasteurized
- Voodoo Ranger Juicy Haze (100 PU) vs. unpasteurized
- Flash pasteurization

Study Length and Frequency

- Measurements at fresh and every month for six months
- 4°C storage (one set stored at 20°C for 6 months)

Analytical Chemistry

- Hop esters, yeast and hop volatiles, organic acids, total humulinones, total iso-α-acids, total α-acids, vicinal diketones, fermentable carbohydrates, and trace metals

Methodology

Sensory

- 2AFC (paired preference)
  - *Which sample has more of attribute X?*
  - Average N=52 at each timepoint
  - An attribute is significant if p value ≤ 0.01 *and* d' ≥ 1.0

Haze

- Beers poured into 16oz vials and refrigerated overnight at each timepoint
- Photos taken the following day to capture haze and sedimentation changes

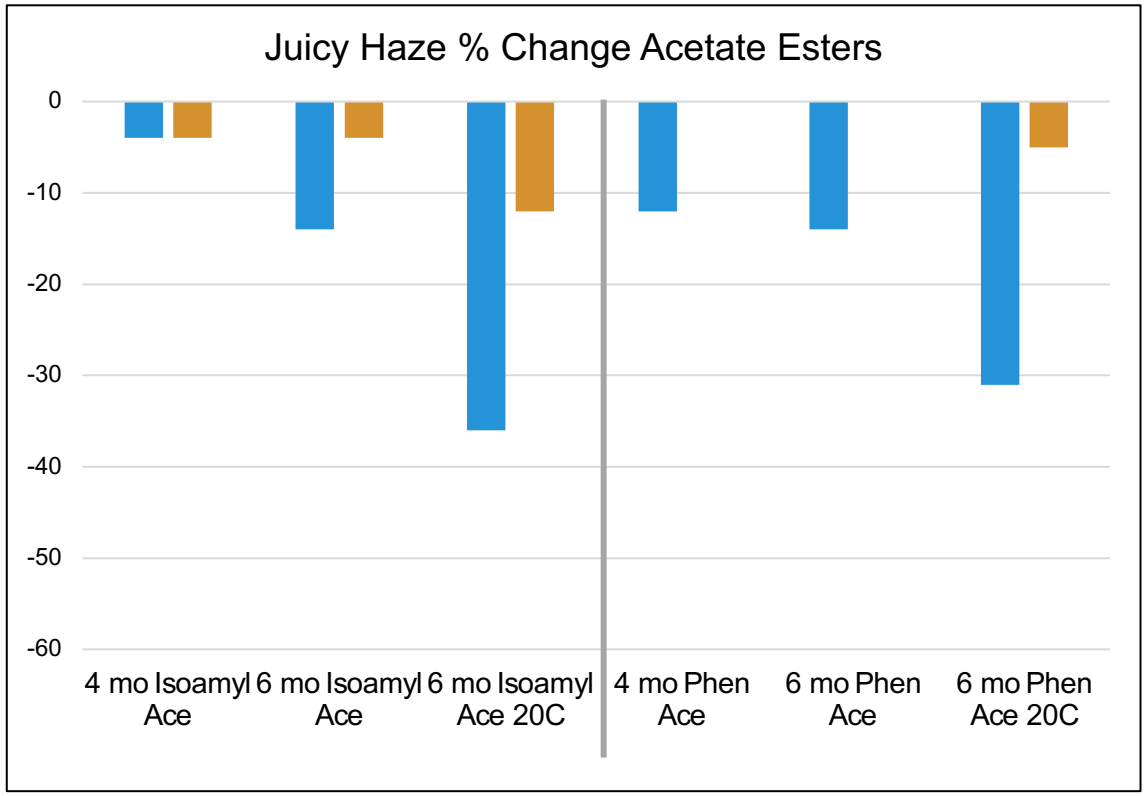
2AFC Attributes	
IPA	*Juicy Haze*
Onion	Herbal
Myrcene	
Tropical	
Citrus	
Catty	
Sherry/Raisin	
Damascenone	
Papery	
Overall Age	
Sweet	
Bitter	

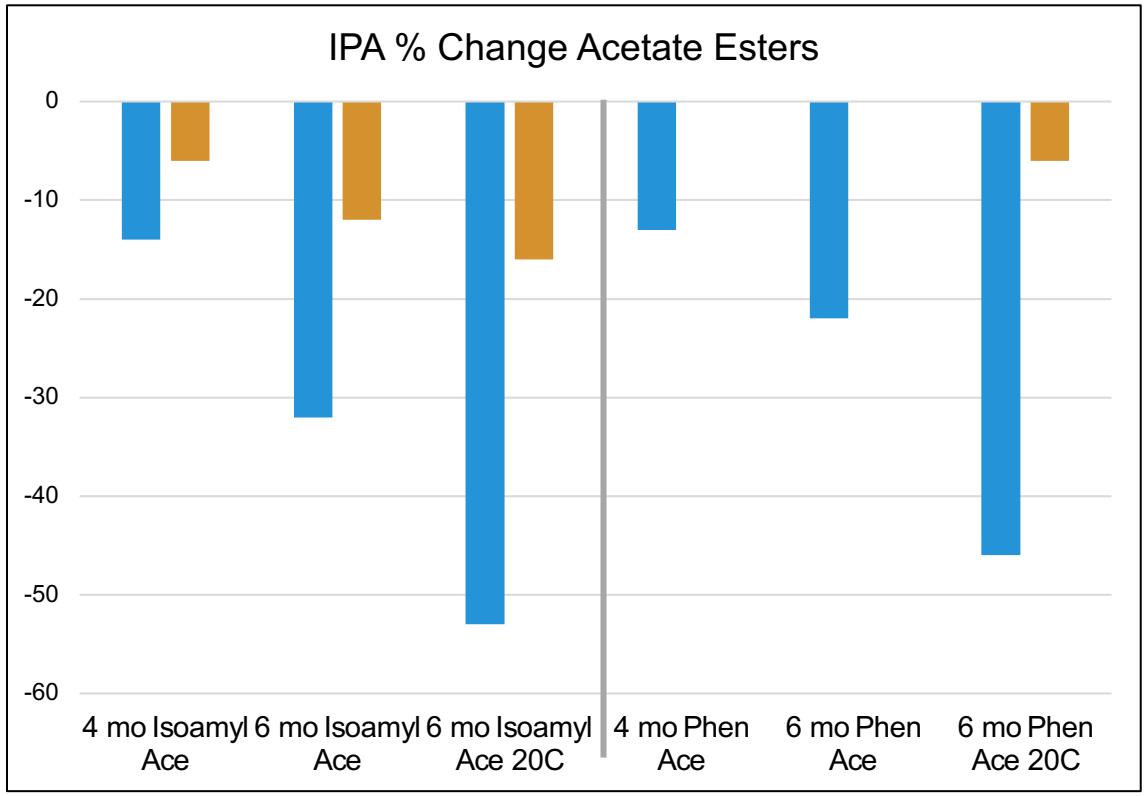
Results

Analytical Results

No significant differences overall

Trends in acetate esters: unpasteurized samples show a greater decrease

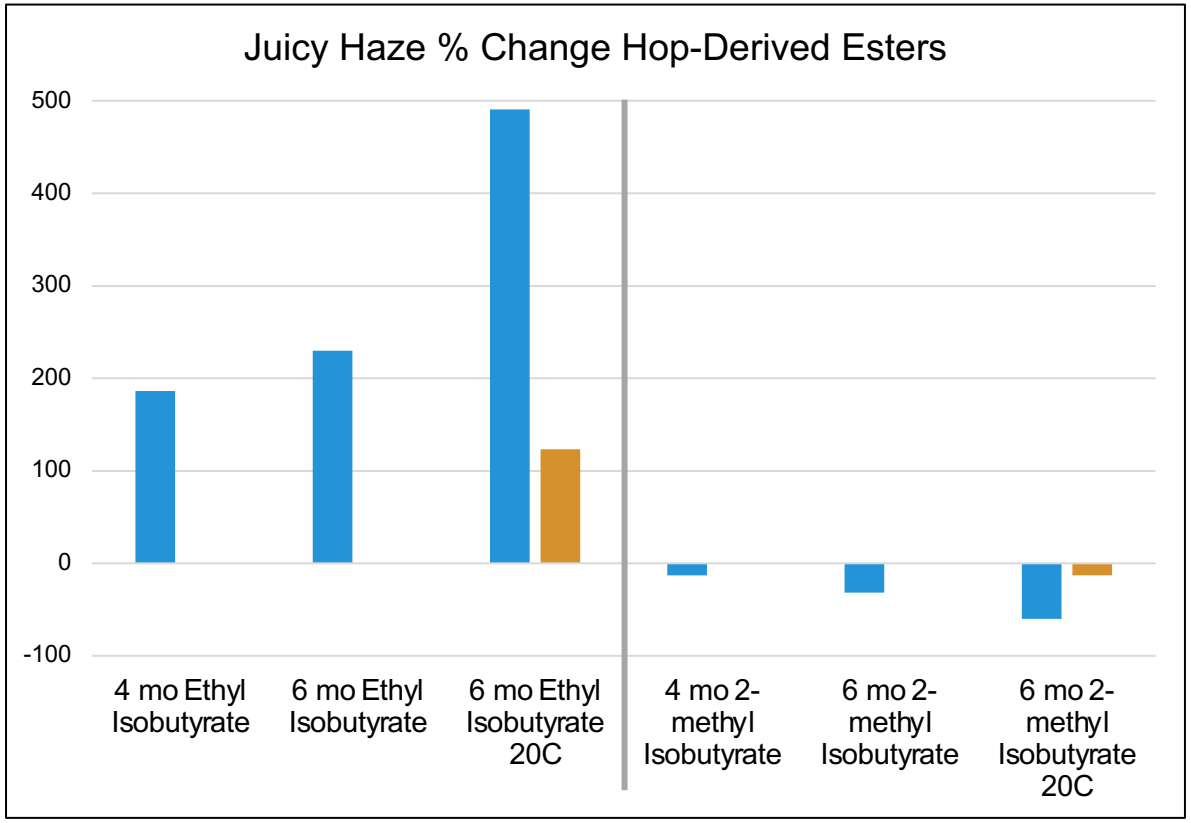


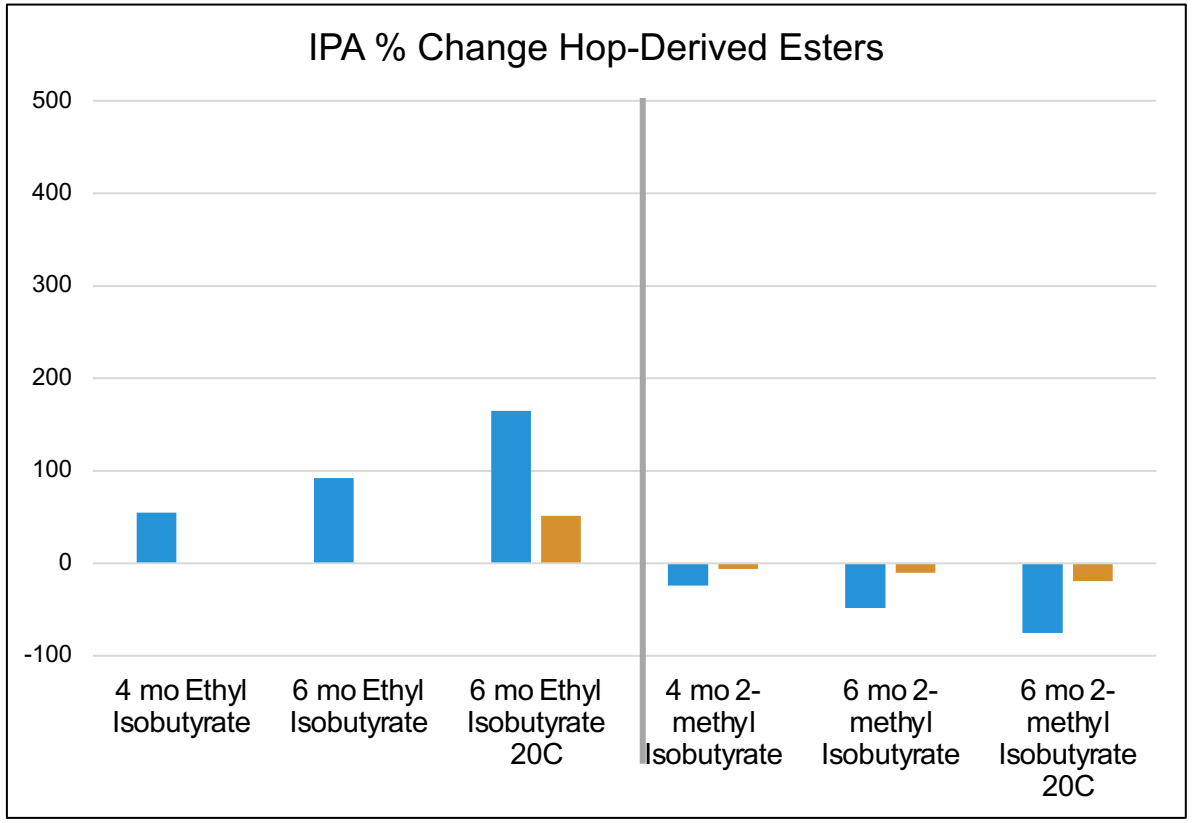


Unpasteurized Pasteurized

Analytical Results

Trends in hop-derived esters: unpasteurized samples show a greater increase for ethyl isobutyrate and a decrease in 2-methyl-isobutyrate.





Unpasteurized Pasteurized

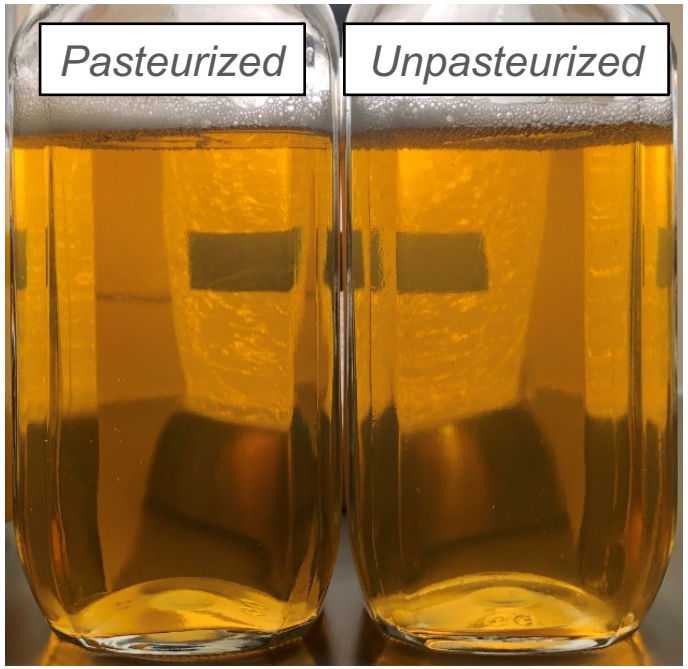
Sensory Results

Recall that for overall significance on each attribute p value ≤ 0.01 and d' ≥ 1.0

- d': no significant differences between pasteurized and unpasteurized samples for any attributes in either brand at any timepoints
- p values: no significant differences for any attributes in either brand at any timepoint, with two exceptions:
  1. At 1 month in IPA damascenone was significantly higher in the pasteurized sample
  2. At 5 months in Juicy Haze herbal was significantly higher in the unpasteurized sample.
  - These results are not persuasive
    - d' was not significant (so overall significance was not achieved)
    - No further differences or trends were observed with these attributes

Haze Results: IPA

1 Month



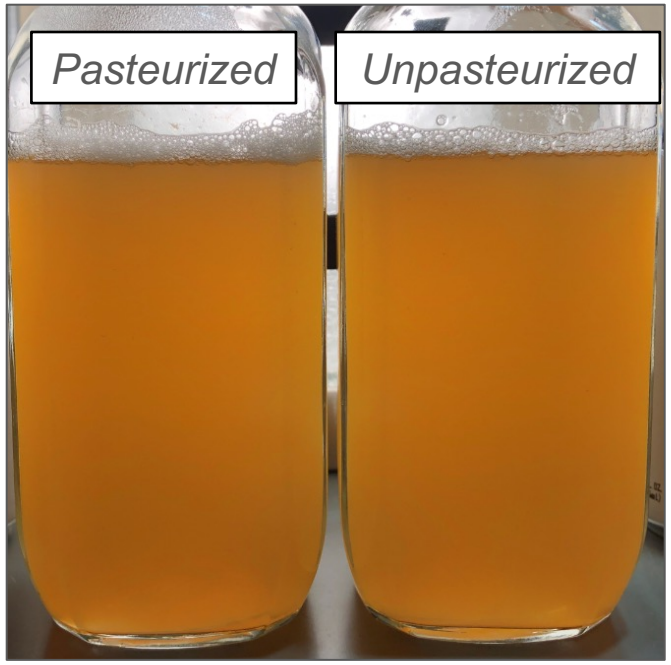
3 Months

6 Months

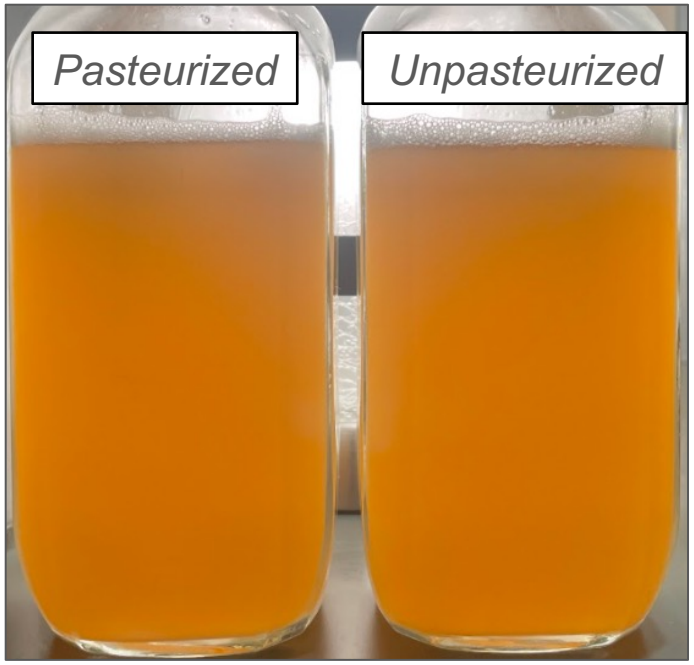
At three months a light haze developed and increased through six months. There were no differences between pasteurized and unpasteurized samples at any timepoint.

Haze Results: Juicy Haze

1 Month



6 Months



No differences in haze amount and no sedimentation within or across timepoints.

Conclusions

When studying pasteurization, it's important to perform both analytical chemistry and sensory analyses.

- Analytically there were some trends over time between pasteurized and unpasteurized samples.
- However, no flavor differences were found sensorially, indicating the analytical chemistry results were not perceptible.

Our research shows pasteurization does not harm beer flavor, even with heat-sensitive styles like bright and hazy IPAs and at high PUs.

This, combined with the physical, enzymatic, and microbial stability that it confers, demonstrates flash pasteurization is beneficial to beer.

Cheers to that!

Acknowledgements

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New Belgium Taste Panel