

Opportunities for Advanced Instrumentation in Malt Labs

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BREWING SUMMIT 2022

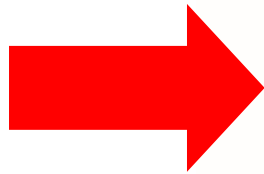
Providence, Rhode Island | August 14-16



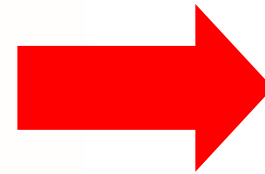
Mass spectrometry is a tool to help us measure the chemical variation in malt and beer



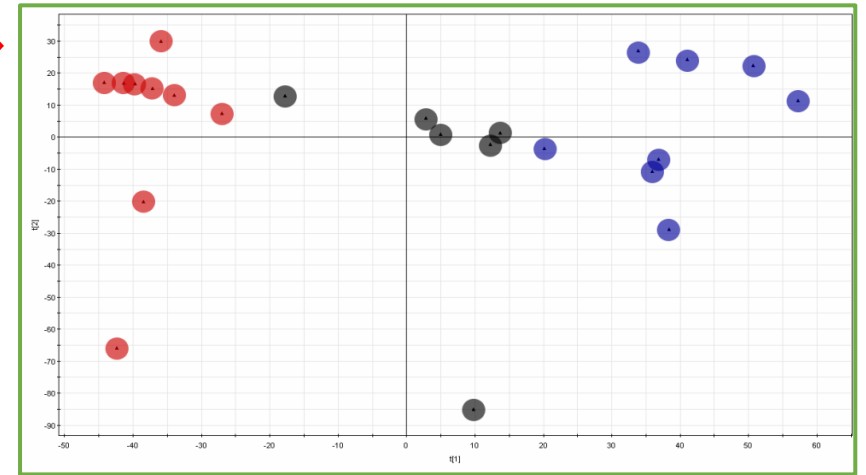
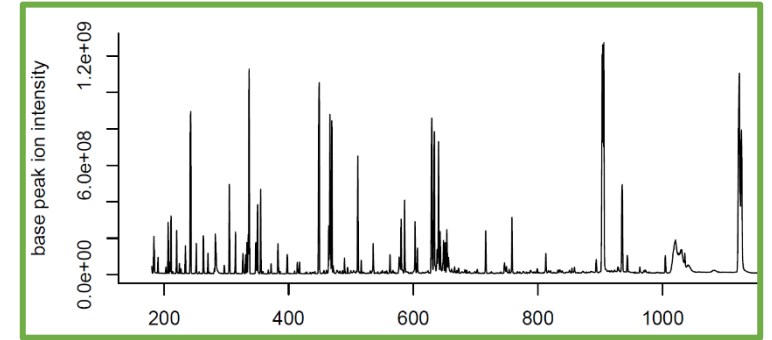
Plant extracts



Mass spectrometer



Masses

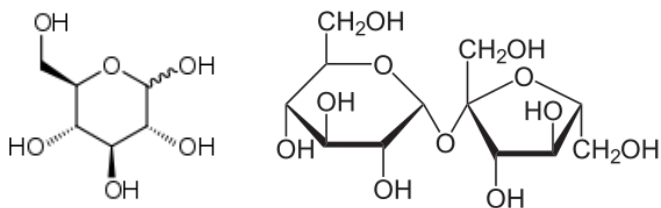


Statistics and Information!

The chemical profile of malt is complex

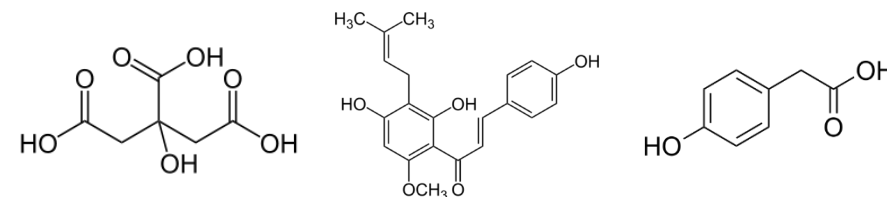
MALT SACCHARIDES

monosaccharides, disaccharides, trisaccharides, sugar acids, sugar alcohols



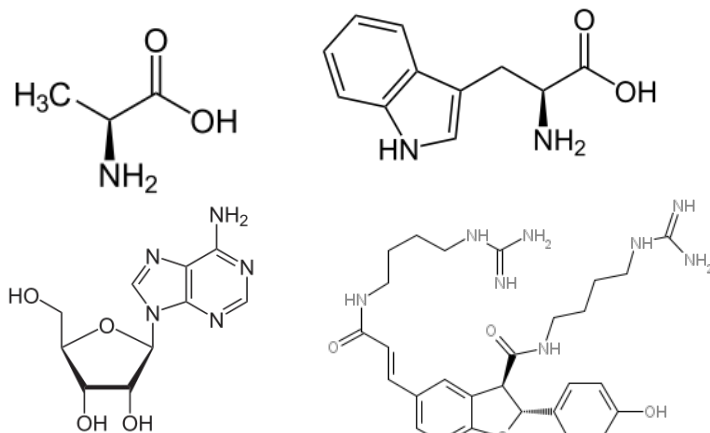
MALT ORGANIC ACIDS

acetic, malic, citric, ferulic



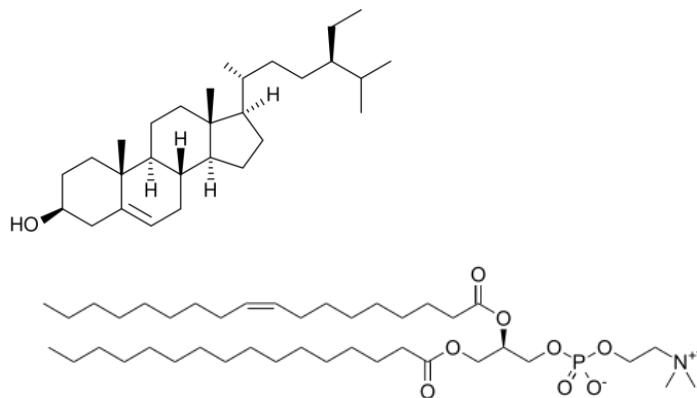
MALT NITROGEN

amino acids, amines, polyamines, alkaloids, purines, small peptides



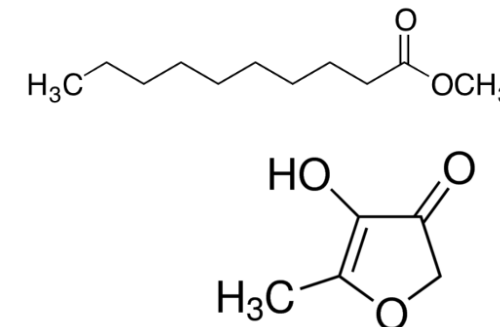
MALT LIPIDS

phospholipids, sterols, carotenoids



MALT VOLATILES & PIGMENTS

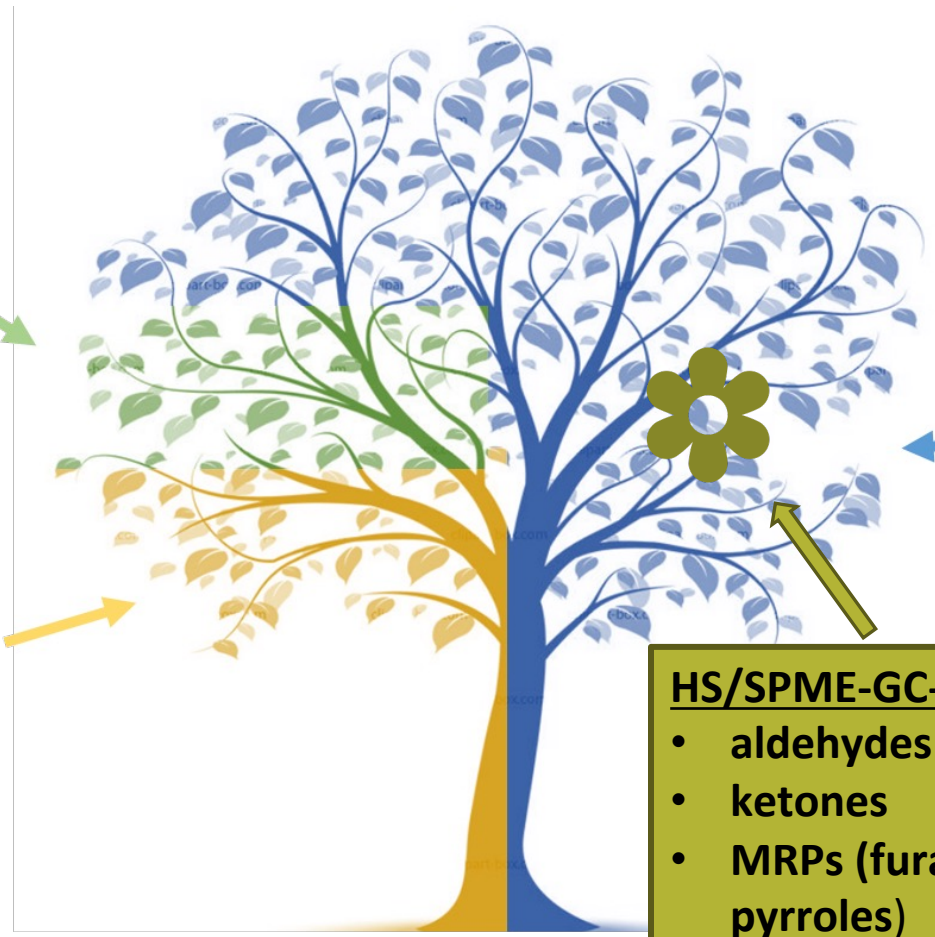
fatty acid esters & alcohols, furans, ketones, aldehydes, alkanes, benzenoids



We can use two MS platforms to explore the chemistry of malt and beer

Overlap GC/LC
a few organic acids
a few amino acids
a few sterols
a few phenolics

- GC-MS
- organic acids
 - amino acids
 - free fatty acids
 - sterols
 - saccharides
 - phenolics
 - polar alkaloids



- HS/SPME-GC-MS
- aldehydes
 - ketones
 - MRPs (furans, pyrroles)
 - alcohols

- LC-MS
- terpenes
 - membrane lipids
 - polyphenolics
 - alkaloids
 - peptides

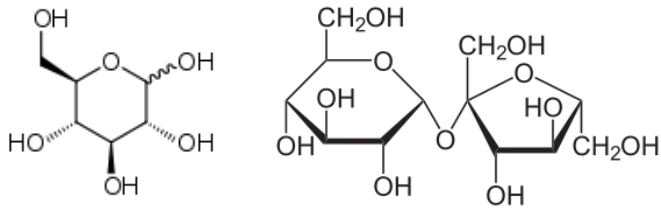


Sweet! But why?

The ability to be able to quantify compounds in conjunction with sensory or malt quality can contribute to our overall consideration of how to use the malt, consistency of malt.

MALT SACCHARIDES

monosaccharides, disaccharides, trisaccharides, sugar acids, sugar alcohols



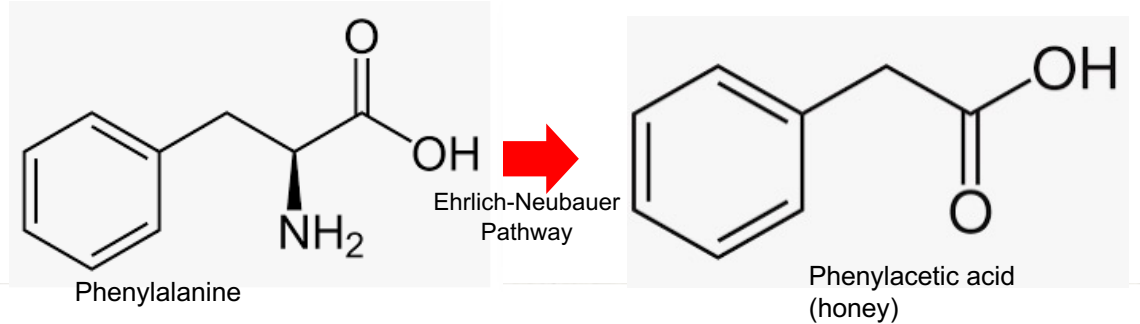
Anecdotally, concentrations of mono-saccharides, di-saccharides for NA beer production can be helpful to brewers.

Carbohydrate composition profile for malts for brewing use.

Glucose, maltose, maltotriose, dextrin levels in malts to compare ratios for each malt and help inform brewers of attributes of each malt and how it would affect fermentability and body.



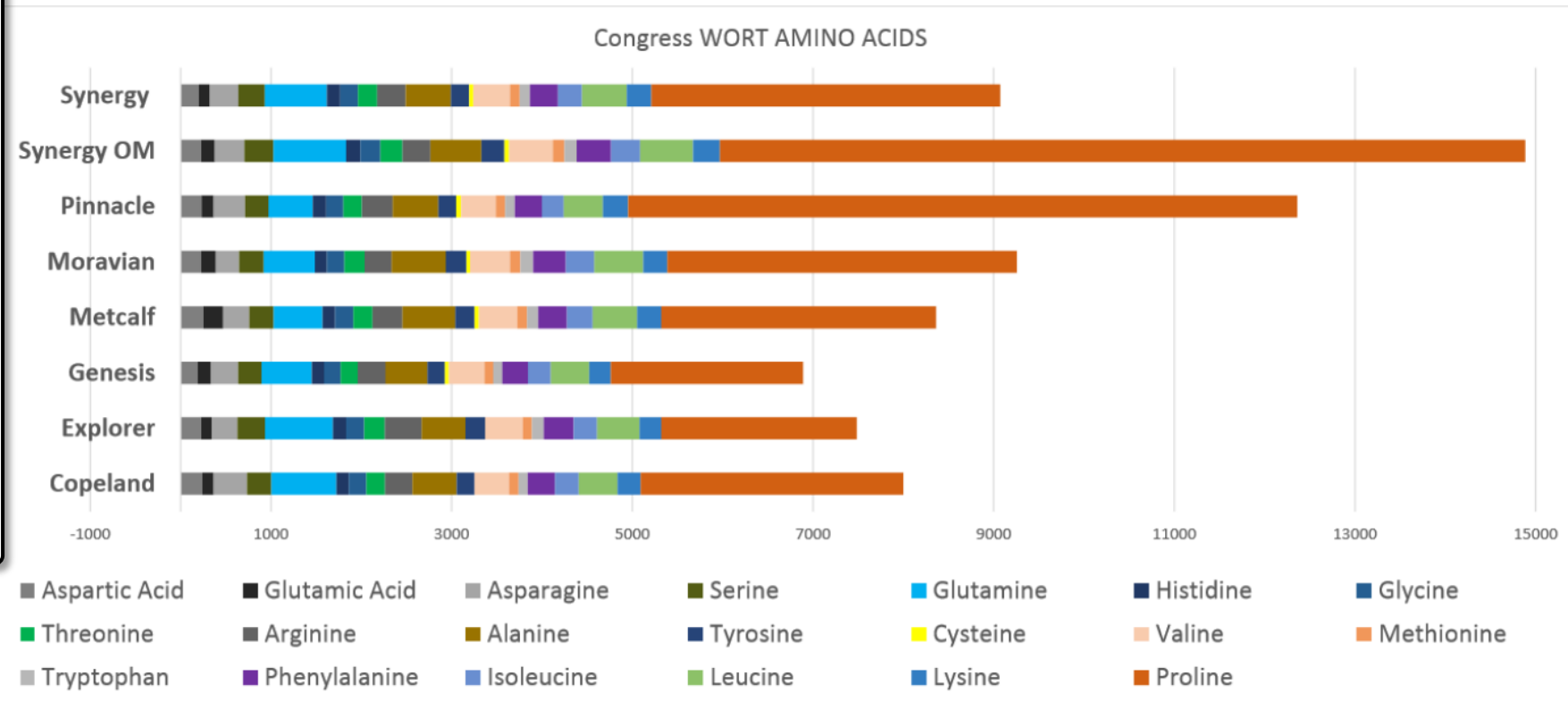
Free the Amino Nitrogens!



Congress Wort Amino Acid by Variety

MALT NITROGEN

amino acids, amines, polyamines, alkaloids, purines, small peptides



Aron and Yin, CBC 2019

Thank you!



Please reach out with any questions or to chat!

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