

Craft Maltsters: Who are they & why are they doing it?

Dave Thomas

**Author of The Craft Maltsters' Handbook
& Of Mines & Beer!**

**Great Lakes Hop & Barley Conference
March, 2016**



US Department of Agriculture Jan. 14, 2015

Feed Outlook: Special Article

“Boutique Brews, Barley and the Balance Sheet –

Changes in malt barley industrial use require an updated forecasting approach.”

From 2004-2014:

- 200,000 US farms went out of business
- Today 1.1% of farms account for 45% of farm revenues, 50% corn & soy
- Total US beer sales dropped 5.4%
- 1,955 new craft breweries, volume up
- > 10% increase in domestic barley sales
- 1.3 lbs barley = 1 lb malt. 1.8lbs barley = 1 lb DME
- 68.7 lbs malt/bbl of craft beer; 16.5 lbs malt/bbl of non-craft beer
- Malt barley acreage for craft breweries will surpass that for large breweries in the next 1-2 years.

“Barley acreage in the US has declined to levels not seen in over 100 years, but the interest in growing malting barley has spread to regions in the US that have not grown the crop for many decades. The driving force behind this interest is the movement to source food locally...” Scott Heisel, American Malting Barley Association

New (renewed) malting barley acreage in Michigan, Nebraska, New York, North Carolina, Pennsylvania, Texas, Virginia and Wisconsin.

In Virginia, farmers who sell hops and grains to craft breweries will not have to pay income tax on those sales if a proposed new bill passes.

The New York State Farm Brewery Law of 2012 requires those holding a farm brewery license to purchase 60% of their ingredients for beer from suppliers within New York State in 2018, with a 90% requirement by 2024.



New York State Brewery Supply Chain Analysis report

Cornell University, Feb. 2016

- 2013 crop: 336 acres planted (244 acres 2-row & 92 acres 6-row)
35% met grade (48% of 2-row & 16% of 6-row)
- 2014 crop: 422 acres planted (274 acres 2-row & 148 acres 6-row)
44% met grade (32% of 2-row & 35% of 6-row)
- 2015 crop: 874.5 acres planted (other data n/a)
- NY state Brewer Survey: 88% prefer 2-row, 2% 6-row & 10% no preference
- NY state Maltster Survey: 100% prefer 2-row
- Malting grain quality issues in descending order: Mold & mycotoxin (DON), Plumpness, Low germination & PHS, Protein <> 9-12% range
- NY state brewers demand for specialty malt (% of total specialty): Wheat (49%), Caramel (25%), Roasted (11%), Crystal (3%), Caramalt (2%), Flaked corn, Munich, Vienna, Amber, Flaked Oats, Buckwheat, Maris Otter all $\leq 1\%$.
- Other grains grown in NY state for brewing & distilling in 2014 & 2015:
 - Rye 482 & 90 acres
 - Oats 269 & 40 acres
 - Corn 437 & 215 acres
 - Wheat 320 & 225 acres
 - Buckwheat 5 & 30 acres
 - Soybean 25 & 0 acres
- 95% of NY brewers said customers want to know which beers are NY malt & hops

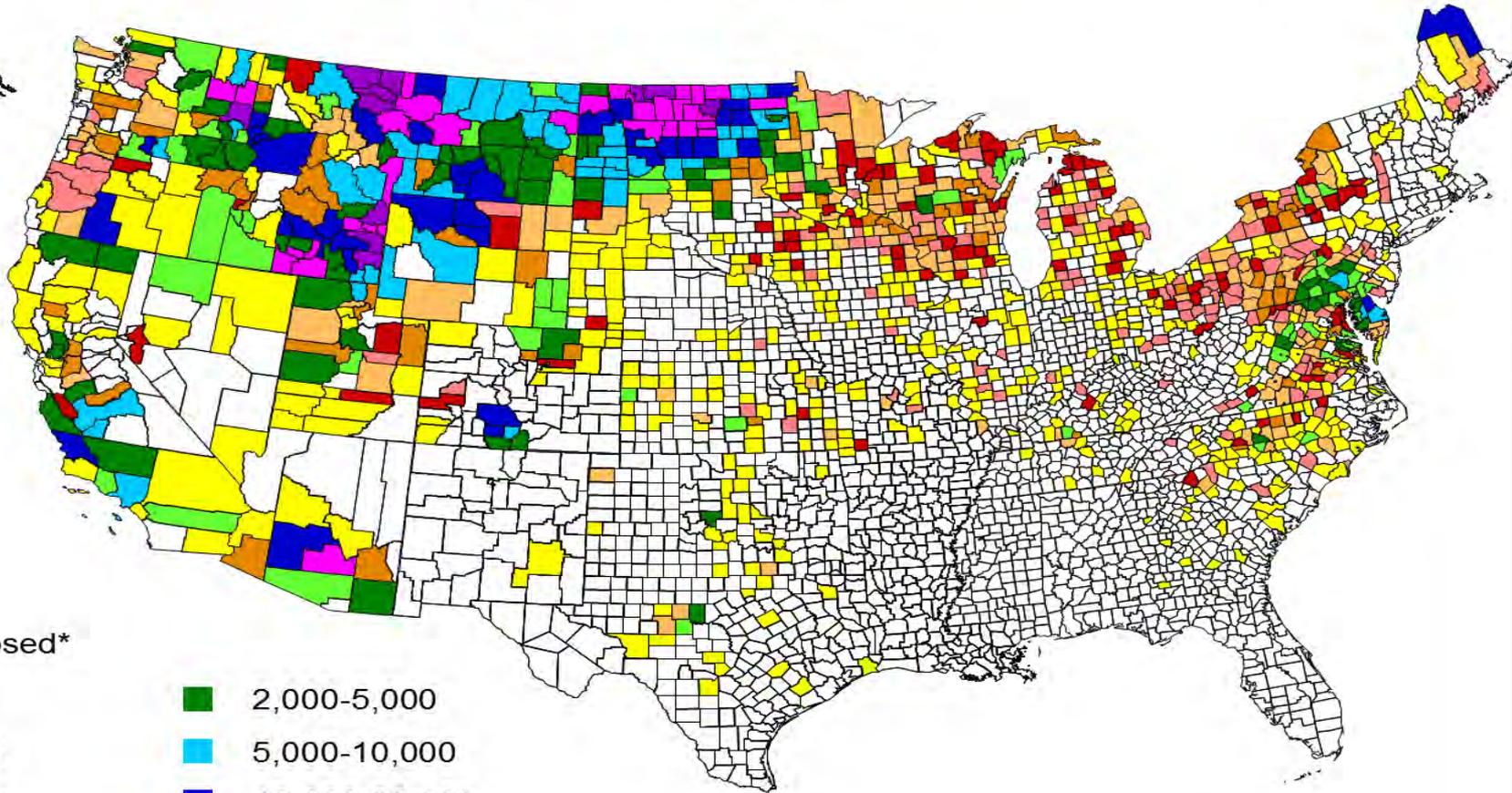


2015 Barley Crop (notes from Ian Ward, President Brewers Supply Group, BA Power Hour)

- US barley planting up 17% and harvested acreage up 24.5%
- WA, CA, MT & SD down a little in yield and quality
- ID, CO, WY, MN & ND up in yield and quality
- 2015 better than 2014
- Canada 2015 a little better than 2014 but expect higher protein & beta-glucan along with some pre-harvest sprouting and weather staining due to rain and hail at harvest.
- Canadian variety Meredith up a little in acreage but he predicts it will go down because some craft brewers don't like the malt flavor. Will be replaced by Synergy.
- Canadian Harrington virtually gone.
- North American malthouses supply & demand are balanced.

2012 Harvested Barley Acres By County

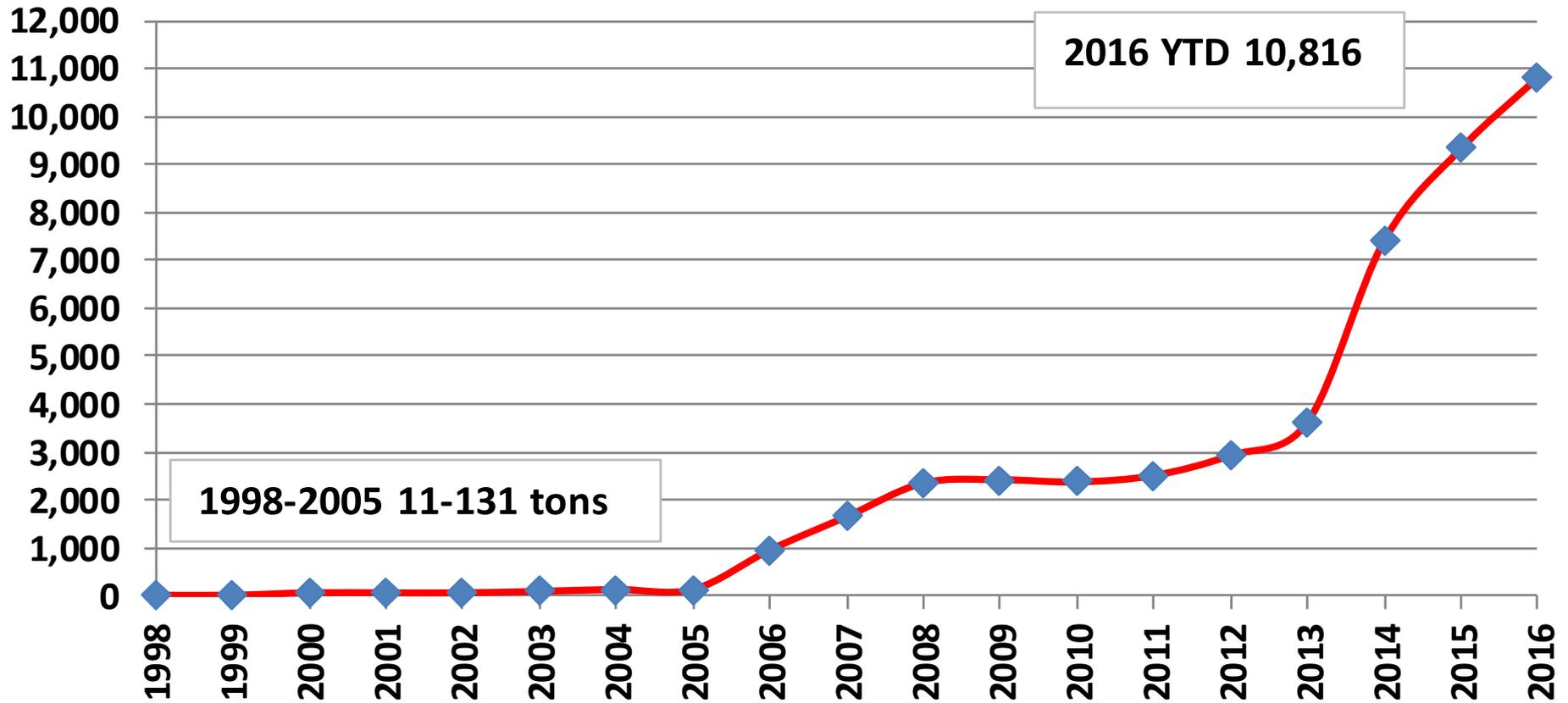
2012 USDA Census of Agriculture



- | | |
|--------------|---------------|
| Undisclosed* | 2,000-5,000 |
| 1-100 | 5,000-10,000 |
| 100-200 | 10,000-20,000 |
| 200-500 | 20,000-50,000 |
| 500-1,000 | > 50,000 |
| 1,000-2,000 | |

*Data not disclosed to avoid identifying an individual operation. Typically means only a single barley farm in the county.

Total Craft Malt Capacity, tons by year



<u>US Malthouse capacities</u>	<u>location</u>	<u>tons/year</u>	<u>% of total</u>
Cargill Malt	Spiritwood, ND	440,000	16.8%
Rahr Malting	Shakopee, MN	407,000	15.5%
Busch Agricultural Resources	Idaho Falls, ID	352,000	13.4%
MillerCoors	Golden, CO	286,000	10.9%
MaltEurop	Milwaukee, WI	242,000	9.2%
MaltEurop	Great Falls, MT	220,000	8.4%
Great Western Malting	Vancouver, WA	132,000	5.0%
MaltEurop	Winona, MN	126,500	4.8%
Great Western Malting	Pocatello, ID	110,000	4.2%
InteGrow Malt	Idaho Falls, ID	110,000	4.2%
Busch Agricultural Resources	Moorhead, MN	101,200	3.9%
Briess Malt & Ingredients Co.	Waterloo, WI	33,000	1.3%
Cargill Malt	Sheboygan, WI	33,000	1.3%
Briess Malt & Ingredients Co.	Chilton, WI	16,500	0.6%
all operating craft maltsters	US	10,816	0.4%
Skagitt Valley Malting Co.	Mt Vernon, WA	3,000	0.1%
Colorado Malting Co.	Alamosa, CO	600	0.02%
Valley Malt	Hadley, MA	300	0.01%
Pilot Malt House	Byron Center, MI	200	0.008%
Michigan Malt	Shepherd, MI	50	0.002%
<u>Eckert Malting & Brewing Co.</u>	<u>Chico, CA</u>	<u>20</u>	<u>0.001%</u>
		2,624,186	

MICHIGAN MALTHOUSES

Map updated March 2016



1. U.P. Malt Company
Bill Weisinger
bweising@yahoo.com
(906) 202-2128

2. Superior Malt
Clem Geiger
cgeiger@hotmail.com
(906) 399-9966

3. Artisan Malts
Ruthanne Stark
artisanmalt@gmail.com
(906) 440-5757

4. Empire Malting Co.
Alison Babb
empiremalting@yahoo.com
(352) 226-1644

5. Great Lakes Malting Co.
Jeff Malkiewicz
jeff@greatlakemalting.com
(231) 714-4551

6. Michigan Malt
Wendell Banks
wendell@michiganmalt.com
(989) 954-5962

7. Fedora Malthouse
Julie Baker
fedorabaker1ja@gmail.com
(989) 289-5135

8. Pilot Malt House
Ryan Hamilton
ryan@pilotmalthouse.com
(616) 209-8388

9. Emergent Malt
Ross Slagh
ross@toplineinc.net
(616) 886-2830

10. Mitten State Malt
Larry Judge
larry.judge1@gmail.com
(517) 490-5245

11. Motorcity Malt
Tom Laboda
tlaboda@motorcitymalt.com
(248) 425-9402

12. Arrowhead Malt
David Burdick
david@arrowheadmalts.com
(517) 474-0447

13. Macon Creek Malt
Megan Goldenberg
megan@maconcreekmalt.com
(906) 869-0372

*To be listed on this map,
contact Ashley McFarland
ashleymc@anr.msu.edu or
(906) 439-5176*

Maintained by:
MSU Upper Peninsula Research and Extension Center
Chatham, Michigan
soilbioresearch.msu.edu/centers/uprc/malting_barley



North American Craft Maltsters Guild:

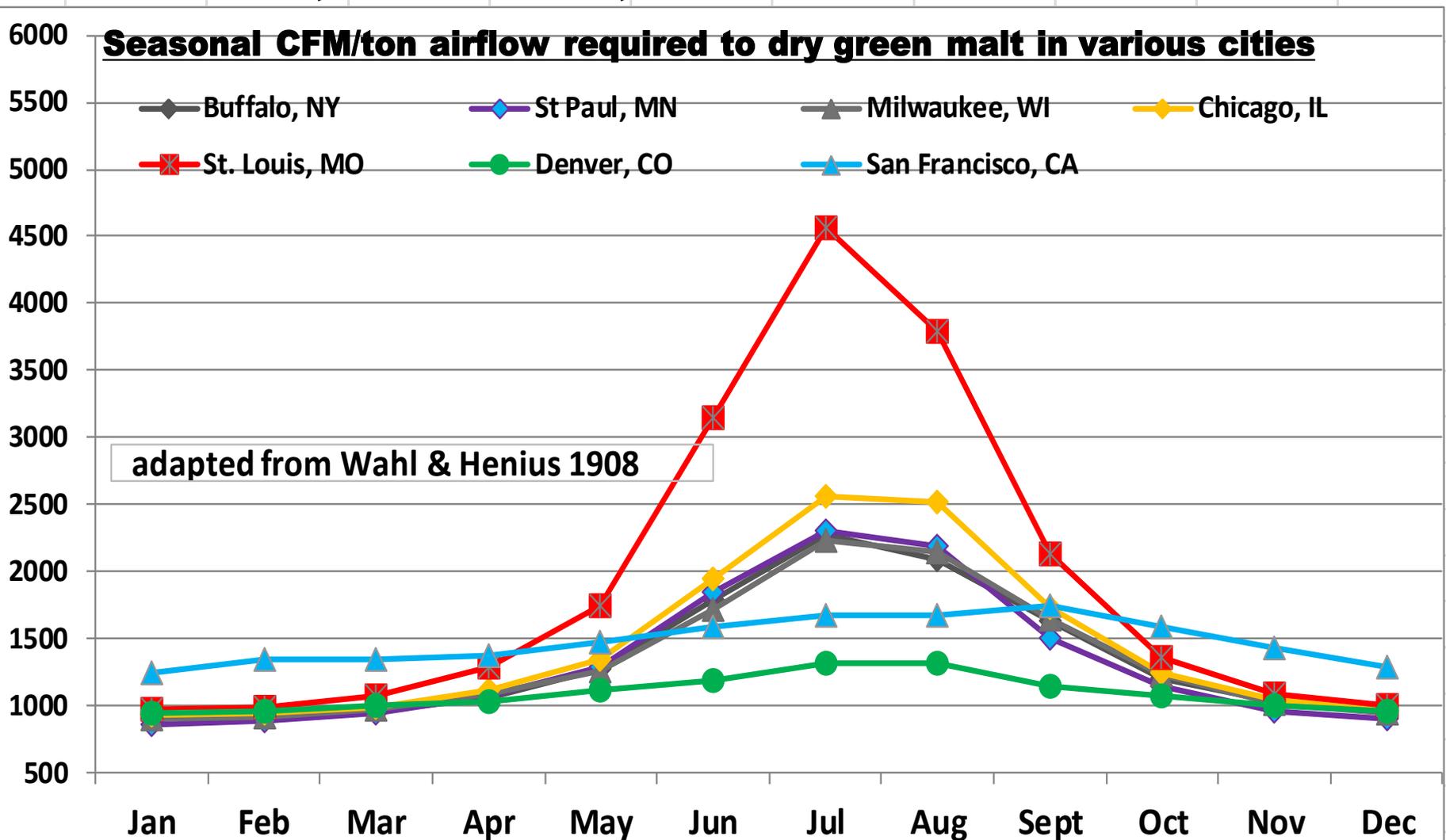
To promote and sustain the tradition of craft malting in North America, provide services and resources to the Association's members, and uphold the highest quality and safety standards for Craft Malt.

- Education & Resources for maltsters, farmers, brewers, distillers and more
- Research to improve varieties of malting grain for the craft malt industry
- Malt Analysis – expanding access to equipment and labs to ensure quality and safe product
- Community of folks passionate about their malt (beer, whiskey...)



- Join today! www.craftmalting.com

Location, location, location...



“Summer malts are higher in color (0.5°L) and lower in DP (15DP) with more flavor (more sweet, malty, fuller body with less green, grassy notes .) Summer malt simulates a ‘mini-Munich’ malt with flavor impacts of higher melanoidin precursor formation.” Joe Hertrich, One Brewer’s Observation on Malt Flavor, Barley Improvement Conference, San Diego, 2015.

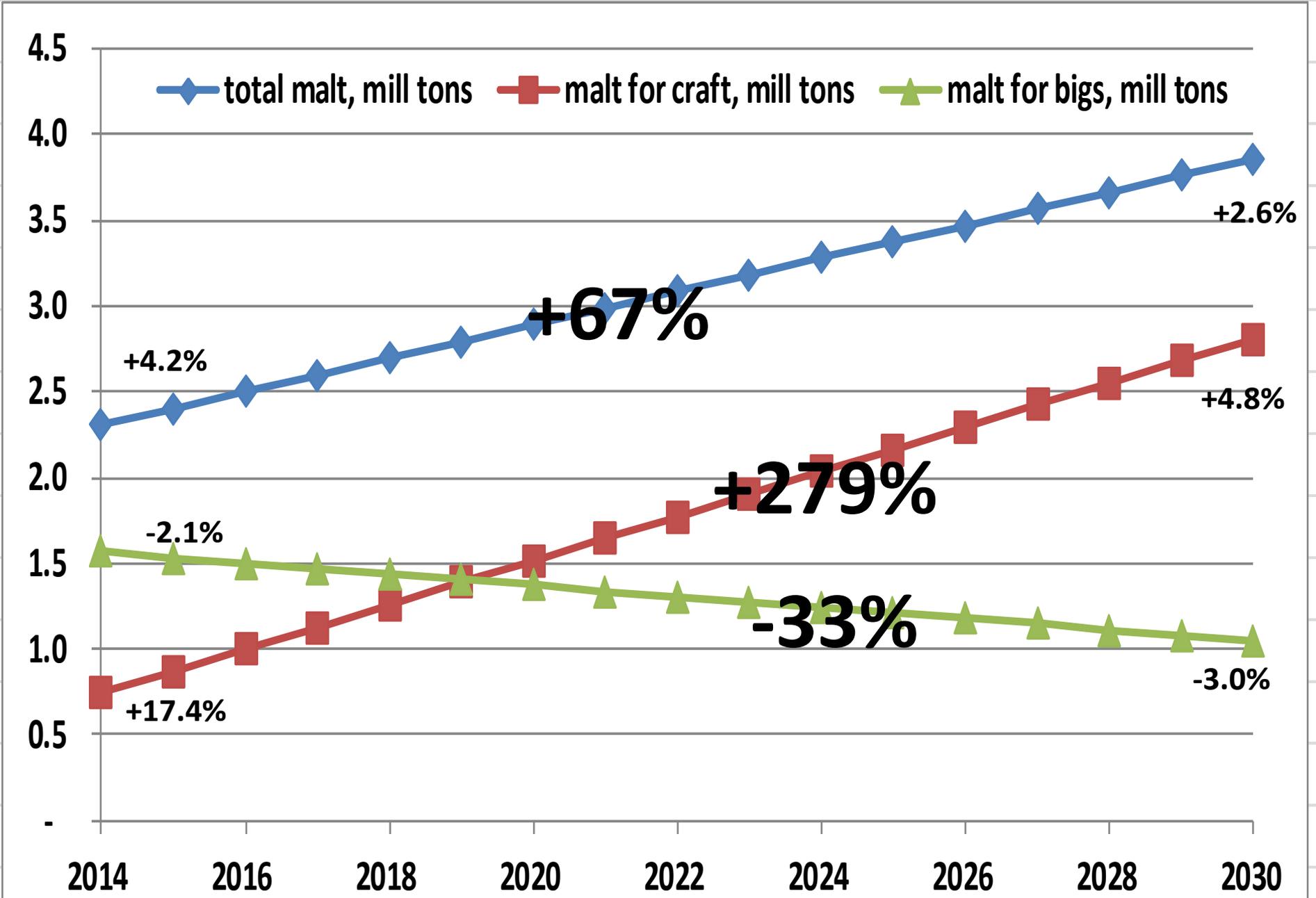
"Millennials don't respond to the same tactics that separated their parents and grandparents from their money. They desire 'personality' in their products." Boston Consulting Group

"I've brewed with it [Motor City Malt] quite a few times. It's a great product," he said. "We're almost to the point now where you can use 100% all Michigan-based beer ingredients."
Andy Moore, Cap 'n' Cork Home Brewing Supplies in Macomb Township, MI.

"Overall a malt house is feasible with a relatively high chance of success. There is clearly a market for locally produced malt, and the craft beer and distilling industry in the state continues to grow... Craft brewers may be willing to pay a somewhat higher premium for malt but the quality of the malt has to justify the higher price. One advantage a small maltster may have over a large one is by offering limited runs of custom malt to meet the specific needs of a brewer interested in producing a unique or limited run of beer."
Study Assessing the Feasibility of Michigan Malt Houses, W. Knudsen, MSU, 2014

"As we open our east coast home in Asheville this spring, making a beer with roots in both homes led us right back to RyePA," said New Belgium Brewer Matty Gilliland. "Using malt from Riverbend Malt House [Asheville, NC] and Colorado Malting [Alamosa, CO] allowed us to source hyper-locally, brewing some essence of both places into the beer and growing our existing relationships with awesome craft partners."

Total US Malt usage if craft bbls increase & total beer bbls held at 2014 levels (3.8M & 206M bbls)



What's next? as demand goes, so goes supply

Malthouse construction plans ETA 2017 (+10% of total)

- Great Western 132,000 tons in Pocatello, Idaho (+5%)
- Rahr 77,000 tons in Shakopee, MN (+3%)
- Briess expansion into pale malt production
- Proximity Malt in San Luis Valley, CO and Laurel, DE -
50,000 tons (+2%, Proximity principals being sued by former employer MaltEurop)
- Sunoco Ethanol plant in Volney, NY now being converted to
2,000 ton barley malting facility (+0.1%)

What's next?

New flavors from new barley varieties?

- AMBA is working to collaboratively test agronomics & malting quality of new varieties. Craft malthouse members include: Big Sky Malts, Blacklands Malt, Blue Ox Malthouse, C'N'C Malting, Colorado Malting, Deer Creek Malthouse, Double Eagle Malt, Epiphany Craft Malt, Farm Boy Farms, Gold Rush Malt, Malterie Frontenac, Penns Mault, Pilot Malt House, Riverbend Malt House, Rogue Ales, Skagit Valley Malting, Valley Malt
- While hop dealers can only damage hop quality, (with one exception), maltsters can create completely new flavors from the same barley varieties. Exploit this potential fully before you put all your barley varieties in one basket!

Does barley variety make a difference in malt and beer flavor?

“Possibly, I simply do not know. If they exist, variety driven flavor differences are very small. Wort tasting indicates malt plants have a signature, not varieties... As long as barley variety flavor traits are theory, the knowledge of malt plant processing must prevail as practice in the search for malt flavor.”

Joe Hertrich, One Brewer’s Observations on Malt Flavor, Barley Improvement Conference, San Diego, 2015.

Growing area differences have been shown to carry through to final beer flavor in isolated brewing trials.

“Craft brewers, in their search for deeper malt flavors in their beers, are showing a particular interest in ‘heirloom’ barley varieties. As the topic of barley varietal flavor comes to the forefront, there is hope that barley breeders may yet develop efficient but flavorful crosses from older varieties.”
Colin J. West, Oxford Companion to Beer, G. Oliver, ed. 2012.

Full Pint is a semi-dwarf barley released by OSU as a stripe rust, leaf rust and scald-resistant variety in the NW. It is now being touted as having new, unique, craft flavors. One of Full Pint’s parents, Galena, was developed by Coors in 1993!

Today's malts have been described by some craft brewers as "flavor neutral, lacking distinctiveness, with low flavor impression and complexity" (BA member survey).

What about these aromas & flavors described by craft brewers about their current specialty malts?

"Bready, malty, milk chocolate, dark chocolate, chocolate milk, cake, pound cake, roasted, toasted, biscuit, caramel, coffee, toffee, cacao, smoky, kola, almond, hazelnut, raisins, prunes, figs, banana, beans, vanilla, clove, honey, marmalade, jam, peanut butter, cinnamon, sour, sweet, bitter, sharp, spicy, creamy, grassy, earthy, mesquite, candy, bran flakes, sour dough, graham crackers, Grape Nuts, toasted marshmallow and woody..."

What's next? Uniform Eastern Spring Malting Barley Nursery (UESMBN)

- Agrifoods Canada PEI, Cornell, Michigan State, Ohio State, Purdue, Semican (Quebec), Univ of Maine, Umass (Amherst), Univ of Vermont.
- 2-row varieties: AAC Synergy, AC Metcalfe, Bentley, CDC Copeland, CDC Meredith, Cerveza, Conlon, Full Pint, Harrington, Klages, ND Genesis, Newdale, Pinnacle, Scarlett.
- 6-row varieties: Innovation, Lacey, ND22421, Quest, Robust, Tradition.

What's next?

- New malting processes that can deliver desired and unique malt flavors and performance.
- Effect of climate change on crops? Modern vs landrace varieties? +1°C causes 5% yield loss. Crop premiums, growing area diversity and crop insurance. Now growing barley in Orkney, Iceland, the Faroes & northern Norway, above the Arctic Circle.
- Franchising, extensions, mergers, consolidations & buyouts of successful craft malt & beer operations.
- More discussion on relative impacts of barley variety vs. malting on final beer flavor.
- Increased malting of other non-barley/wheat cereals & pseudo-cereals for health benefits & new, largely undiscovered flavors.

Alternative cereals for malting:

Amaranth – gluten-free, bomb-proof beer foam

Buckwheat – gluten-free, malts well

Debittered black malt – black color, less bitter flavor

Millett – gluten-free, nutty, sweet flavors

Milo – gluten-free, high enzymes, strong flavor

Oats – high beta-glucan, improved mouthfeel & foam

Quinoa – gluten-free, nutty flavors

Rice – gluten-free, smooth, light flavors

Rye – unique, spicy toffee flavors

Smoked or peated malt – unique smoky flavors

Sunflower – gluten-free, mild flavor, huge head retention

Wheat – creamy mouthfeel and foam

What's next? Understanding malt impact on PYF

- Insufficient pale malt aging before milling.
- Uneven airflow & hot spots in steeping.
- Fungal infection on malt husk during malting.
- High malt moisture (14%) & high temp (77-95°F) malt storage.
- High-MW acidic polysaccharides (arabinose, xylose, galactose, rhamnase and galacturonic acid containing N) extracted from husk during mashing.
- Breakdown of the malt husk arabinoxylan by fungal enzymes forms HMW PYF factors, further breakdown of the PYF factors by these enzymes to LMW results in loss of PYF activity.

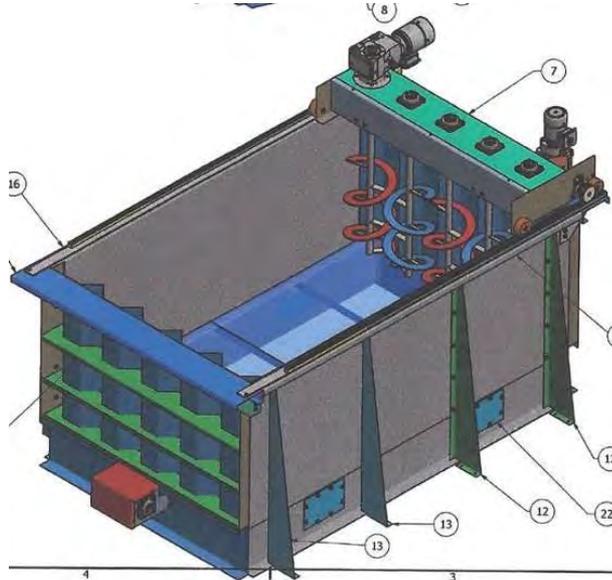
What's next?

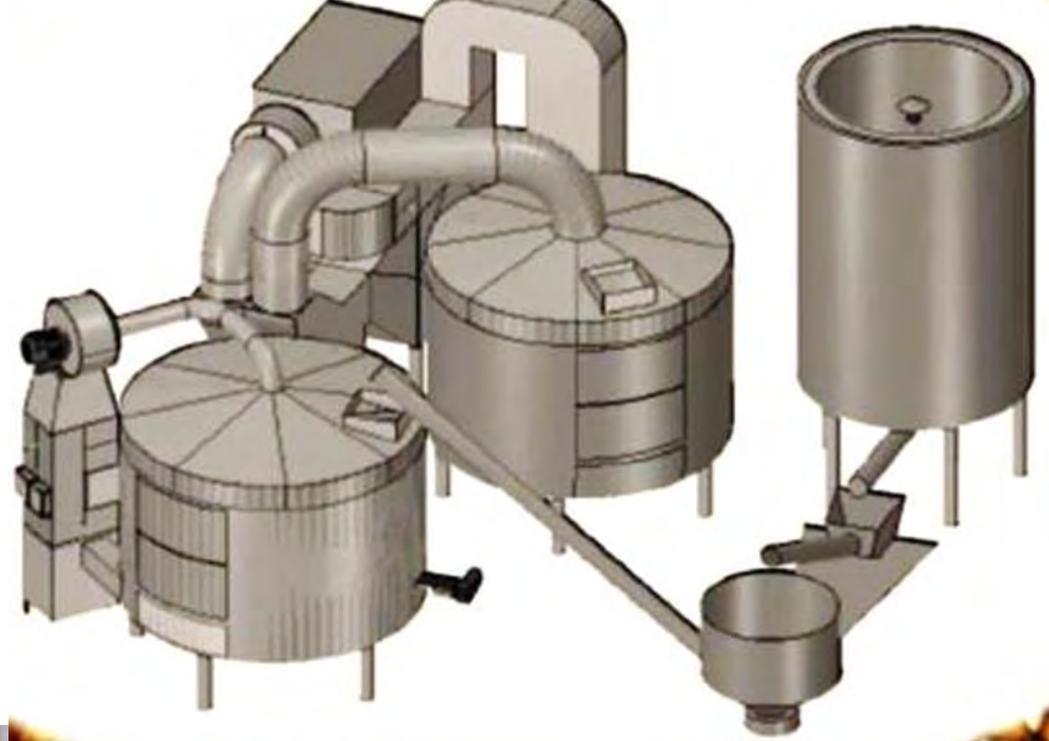
- More choice in affordable malt analysis labs, methods, etc. i.e. Hartwick college Center for Craft Food & Beverage.
- More contract grain acreage and malting.
- More personal identification of crops and stories
- More affordable turnkey craft malthouse equipment



US Craft Malting Equipment engineering & manufacturing

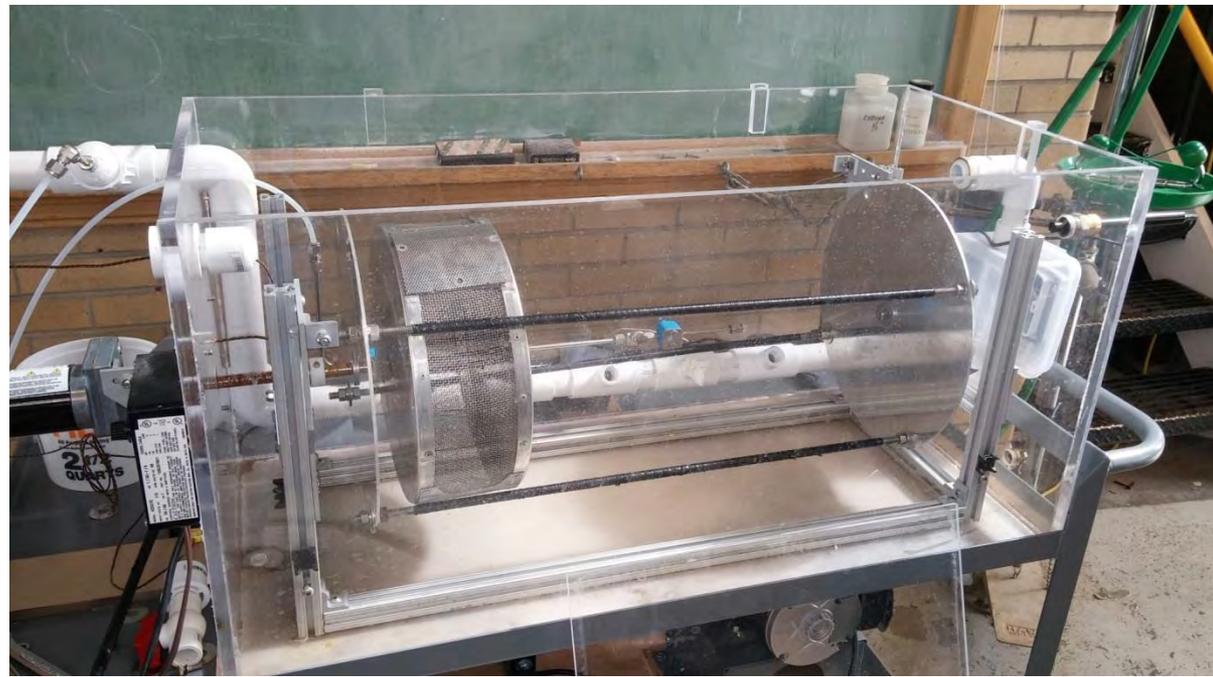
- **Awn Engineering & Equipment**, Hadley, MA – christian@valleymalt.com
- **Buhler Pargem Container Malting**, Plymouth, MN – mark.larson@buellergroup.com
- **Colorado Malting Co**, Alamosa, CO – coloradomalting@hotmail.com
- **GEM Equipment of Oregon**, Portland, Oregon - Dbaker@gemequipment.com
- **IPEC (Integrated Process Engineers & Constructors)**, Fort Atkinson, WI – sales@ipec-inc.com
- **Moore & More LLC**, Denver, CO – wayne@mooreandmorestuff.com
- **New York Craft Malt LLC**, Batavia, NY – ted@newyorkcraftmalt.com
- **Western Feedstock Technologies**, Bozeman, MT – blake@montana.edu





What's next?

Hands-on malting in brewing science programs.



Brewing science programs in the US

1. Appalachian State University - Short Course – Boone, NC
2. Auburn University - Graduate Certificate – Auburn, AL
3. California State Polytechnic University - Certificate – Pomona, CA
4. **Central Michigan University - Certificate – Mount Pleasant, MI**
5. Central Washington University – Ellensburg, WA
6. Colorado School of Mines – Golden, CO
7. Colorado State University – Fort Collins, CO
8. **Grand Rapids Community College – Certificate - Grand Rapids, MI**
9. **Kalamazoo Valley Community College Associates Degree – Kalamazoo, MI**
10. Master Brewers Association of the Americas – Madison, WI
11. Metropolitan State University of Denver – BSc Degree – Denver, CO
12. Oregon State University – BSc Degree - Corvallis, OR
13. Portland State University – Portland, OR
14. Regis University – Certificate - Denver, CO
15. San Diego State University – San Diego, CA
16. Siebel Institute of Technology – Chicago, IL
17. University of California – BSC Degree - Davis, CA
18. University of California – Certificate - La Jolla, CA
19. University of the Sciences – Certificate – Philadelphia, PA
20. University of Vermont – Burlington, VT - online certificate -
21. University of Wisconsin – Microbiology - Steven Points, WI
22. Western Kentucky University – Certificate – Bowling Green, KY
23. **Western Michigan University – BSc Degree – Kalamazoo, MI**



Andrea and Christian Stanley

Valley Malt, Hadley, Massachusetts

Started malting 2010: 1 ton batch: 300 tons/yr

“Grow local, choose organic, craft tradition”

“We learned most malts going into craft beers are produced on a massive scale by a handful of mega-malthouses on the other side of the country or across the world.

This shocking revelation seemed like a great opportunity. Could we start a business that would turn a faceless commodity into a locally grown product? Really, how hard could that be?”

31 Brewery customers:

15 MA, 10 NY, 2 ME, 2 NH, 1 CT, 1 RI

6 Distillery customers:

4 NY, 1 MA, 1 VT

3 Homebrew supply shops

4 Farmer partners

Projects:

Malt of the Month, Farmer Brewer, Brewer

Supported Agriculture, Slow Tractor Farm, Craft

Maltsters Guild

“Lots of questions kept us up at night. Will we find farmers willing to grow barley? Can we grow malting barley in New England? Can we figure out how to make good malt? Will anyone even want to buy our malt? If they do, will the beer taste good? The answers to all these questions: YES!”

Grouse Malting & Roasting Co., Wellington, CO – Twila Henley

Began malting March, 2013, 1 ton floor malt batch, 100 tons annual capacity,
certified gluten-free

Buckwheat, Millet, Maize, Gluten-free oats,



“In 2009, when studying food science and food safety at CSU, I took a brewing science course and quickly fell in love with the art and science of craft brewing. As a student, I analyzed the feasibility of craft malting. I reached out to local farmers growing gluten-free grains, visited craft maltsters across the country, attended a course at CMBTC, and worked with craft brewers to learn the fine trade of making great tasting beer... Ultimately, I founded Grouse Malting and Roasting Co., a craft malt house in Northern Colorado dedicated to producing gluten-free malts and roasted grains. I also made the decision to become totally gluten-free, which changed my life forever, curing an autoimmune disease I'd struggled with for over a decade.”

“Back in February 2012 Brandon woke up with an idea. Actually, he woke up with a funny word in his head "Wunderbarley" (an amalgamation of the German word for wonderful and barley)... There has been so much focus on the ‘beer side’ of the craft beer industry for the past decade that few have given any thought to the supply chain side of beer. And who's to blame? Craft beer is exciting, independent, and tasty, and brewing it is downright sexy.”

Samantha Ade, Blacklands Malt



Brandon Ade shoveling malt at Blacklands Malt

Blacklands Malt LLC, Leander, Texas (on Old Farm to Market Road 2243, NW of Austin)
Started malting 2013, 2 ton batch size , 107 ton annual capacity

“Officially: I wanted to stress out my poor wife by throwing our life savings into a low margin, high risk food manufacturing business.

Unofficially: With how large and established our agriculture is in Texas, and how quickly and robustly our craft beer industry is growing, I wasn't going to wait around for someone else to figure out we should be making beer with Texas malt.” Brandon Ade



Microwave for rapid moisture method

Filter & Imhoff cone rack

Magnetic stir plate for extracts

Manual coarse grind mill

Food and water for malthouse dog!

Motomco 919 moisture meter

Moisture meter

Analytical balance

Fine-grind coffee mill

Seedburo barley pearler



Colorado Malting Company, Alamosa, Colorado

Started malting 2008, 2.5 ton batch size, 600 tons annual capacity
30 Brewery customers, 6 distillery customers, 6 homebrew shops
60+ malt products, grow their own barley and fabricate their own equipment

“Family farms are disappearing at a rapid rate. Sadly, so was ours. We knew just about everything there was to know about raising the world finest 2-row malting barley, so we started looking into malting it on a small scale. We hoped by malting we could add value to a product we were already producing. We had stainless dairy tanks waiting in the family's old dairy barn, so we put them to good use. We did this by designing our all-in-one malt systems that make the world's finest craft malt. In 2009 we sold 36,000 lbs. In 2015 we'll sell 1.2 million pounds.” Jason Cody, President Colorado Malting Co.

Colorado Malting Company enters European markets in collaboration with Viking Malt (Finland)

Press release – Alamosa, Colorado / Lahti, Helsinki, USA (September 24, 2015)

The new collaboration between Colorado Malting Company (CM) and Northern European Viking Malt opens up the European markets to the American craft malt pioneer. Starting in spring 2016 Colorado Malting Company will also start offering various Viking Malt malts to its American customers. Denver warehouse March, 2016. The craft beer boom that has taken Europe by storm has always been greatly influenced by the beer culture from the US. However, until now, the availability of American craft malts has been limited in Europe.





Maine Malt House



Mad Fritz Beer malt equipment



Skagit Valley malt unloading barley



And finally...just when you thought malt was the latest craft...sound familiar?

- “Traditionally, people have had no idea where their _____ comes from.”
- “Customers are willing to pay top dollar for artisanal _____ with specific characteristics of taste, potency or sustainability.”
- “The industry is really competitive because people understand what quality is.”
- “I think the millennial generation may be part of the growth, they just care more about what is going into their bodies.”
- “I prefer to support small businesses, I think of artisanal _____ as more pure, and grown from the heart.”
- “Larger producers may have a lot more equipment and higher yields, but operating on a smaller scale enables you to pay more attention to each individual plant.”
- “We’re looking at our soil in the same way they’re looking at where their hops are coming from or their barley. Connoisseur-grade _____ straight from our farm to your home.”

Can you guess the product?

HEAT and AIR

GRAIN

WATER

GRAIN RECEIVING

QUALITY CHECKS

CLEANING

CHAFF & DUST

ANIMAL FEED

GRADING

BY KERNEL SIZE AND/OR %PROTEIN

STEEPING

COOLING AIR/WATER

STEEP WATER

CHILL & RECIRC.

HEAT & CO₂

WASTEWATER

EXHAUST

WASTE TREATMENT

ALTERNATIVE USE

"CHIT" MALT

GERMINATION

CONDITIONED AIR
COOLING SPRAYS

SPRAY WATER

HEAT & CO₂

"GREEN" MALT

KILNING

HOT, DRY AIR

WATER VAPOR

EXHAUST

HEAT RECOVERY SYSTEM

CURED MALT

CLEANING

ROOTLETS & ACROSPIRES

MALT AGING

ANIMAL FEED

BLENDING

FINISHED MALT

Thanks!!!

Any questions???