WSU and Gold Rush Malt 2019 Experimental Variety Malting Trials

Batch Number: 123118
Weight lbs: 4500
Variety: Copeland

Steeping

Date	Time	Process	H2O Set Temp ºF	Grain Moisture %	Grain Bed Temp
12/31/2018	13:00	Steep In	65	N/A	N/A
	21:00	Air Rest	N/A	N/A	N/A
01/01/2019	09:00	Steep	65	32.29	46.00
	21:00	Air Rest	N/A	NA	60.10
01/02/2019	11:30	Steep	65	40.75	51.80
	16:00	Steep Out	N/A	42.78	61.50

Germination

Date	Time	Process	Temp Set [1]	Humidity Set [2]	Grain Moisture %	Grain Bed Front Temp ºF	Grain Bed Rear Temp ºF	Grain Bed Avg. Temp ºF
01/02/2019	17:20	Begin Germ	90/100	10/20	42.78	65.10	63.90	64.50
01/03/2019	06:40	2 Turns	95/105	10/20	N/A	60.60	60.50	60.55
	16:00	2 Turns	95/105	10/20	43.41	N/A	N/A	N/A
01/04/2019	06:30	2 Turns	95/105	10/10	42.15	65.00	63.50	64.25
	15:30	2 Turns	95/105	10/10	42.10	65.90	64.30	65.10
01/05/2019	07:00	2 Turns	93/103	10/10	38.97	65.80	64.00	64.90
	16:00	2 Turns	93/103	20/10	38.70	64.80	64.00	64.40

WSU and Gold Rush Malt 2019 Experimental Variety Malting Trials

Kilning

Date	Time	Kilning Stage	Temp Set ºF	Blower Set Hz	Off Air Temp ºF	Off Air RH %	Grain Bed Avg. Temp ºF
01/06/19	07:15	1 (Dry)	130	45	N/A	100.0	65.35
01/07/19	02:46	2 (Cure)	140	45	104.2	17.5	124.00
	04:22	3	160	45	116.0	9.9	134.00
	05:48	4	180	40	130.2	6.0	149.00
	09:12	5	200	35	161.0	1.0	169.00
	11:03	End Cure	Off	Off	175.0	0.1	182.00

Final Moisture %: 3.97
Friability %: 83.3
Yield lbs.: 3626.45
Malting Loss %: 19.4

Notes: N/A: Data not available or applicable
[1] Temp Set is **Burner temp/Cooler temp** settings
[2] Humidity Set is **minutes on/minutes off** of misting system in incoming air

WSU and Gold Rush Malt 2019 Experimental Variety Malting Trials

Batch Number: 10719
Weight lbs: 4106
Variety: 12WA-120.14

Steeping

Date	Time	Process	H2O Set Temp ºF	Grain Moisture %	Grain Bed Temp
01/07/2019	13:00	Steep In	65	N/A	N/A
	21:00	Air Rest	N/A	N/A	63.20
01/08/2019	07:00	Steep	65	31.6	N/A
	20:30	Air Rest	N/A	NA	61.30
01/09/2019	07:00	Steep	65	39.39	53.00
	15:00	Steep Out	N/A	42.58	62.00

Germination

Date	Time	Process	Temp Set [1]	Humidity Set [2]	Grain Moisture %	Grain Bed Front Temp ºF	Grain Bed Rear Temp ºF	Grain Bed Avg. Temp ºF
01/09/2019	17:00	Begin Germ	90/100	10/20	42.58	65.00	64.70	64.85
01/10/2019	06:30	2 Turns	85/95	10/20	44.53	67.10	67.70	67.40
	15:45	2 Turns	80/90	20/10	44.20	67.00	67.70	67.35
01/11/2019	06:45	2 Turns	80/90	20/10	41.46	N/A	N/A	N/A
	16:00	2 Turns	75/85	20/10	43.33	66.40	63.60	65.00
01/12/2019	06:37	2 Turns	80/90	20/10	42.66	N/A	N/A	N/A
	16:15	2 Turns	80/90	20/5	41.81	62.20	60.60	61.40
01/13/2019	07:10	2 Turns	87/97	20/5	40.88	61.90	60.90	61.40
	16:16	2 Turns	85/95	20/5	41.19	66.70	63.90	65.30
01/14/2019	06:45	2 Turns	70/80	20/5	41.10	69.20	65.80	67.50

WSU and Gold Rush Malt 2019 Experimental Variety Malting Trials

Kilning

Date	Time	Kilning Stage	Temp Set ºF	Blower Set Hz	Off Air Temp ºF	Off Air RH %	Grain Bed Avg. Temp ºF
01/14/19	16:30	1 (Dry)	130	45	N/A	100.0	64.10
01/15/19	12:04	2 (Cure)	140	45	105.2	17.6	121.00
	13:23	3	160	45	126.2	13.6	125.00
	15:28	4	180	40	130.2	5.9	147.00
	17:39	5	200	35	161.0	1.0	168.00
	11:03	End Cure	Off	Off	175.0	0.1	183.00

Final Moisture %: 3.6
Friability %: N/A
Yield lbs.: 3369.1
Malting Loss %: 17.9

Notes: N/A: Data not available or applicable
[1] Temp Set is **Burner temp/Cooler temp** settings
[2] Humidity Set is **minutes on/minutes off** of misting system in incoming air

WSU and Gold Rush Malt 2019 Experimental Variety Malting Trials

Batch Number: 11419
Weight lbs: 4036
Variety: 12WA-120.17

Steeping

Date	Time	Process	H2O Set Temp ºF	Grain Moisture %	Grain Bed Temp
01/14/2019	11:15	Steep In	65	N/A	63.50
	19:15	Air Rest	N/A	N/A	63.90
01/15/2019	08:00	Steep	65	32.24	51.20
	20:00	Air Rest	N/A	NA	61.00
01/16/2019	07:00	Steep	65	40.28	49.80
	15:15	Steep Out	N/A	42.63	62.80

Germination

Date	Time	Process	Temp Set [1]	Humidity Set [2]	Grain Moisture %	Grain Bed Front Temp ºF	Grain Bed Rear Temp ºF	Grain Bed Avg. Temp ºF
01/16/2019	16:35	Begin Germ	85/95	10/20	42.63	64.20	64.60	64.40
01/17/2019	06:50	2 Turns	87/97	10/10	44.59	63.90	64.00	63.95
	15:30	2 Turns	82/92	15/10	43.20	64.70	64.20	64.45
01/18/2019	07:20	2 Turns	70/80	15/10	43.38	71.40	68.20	69.80
	15:30	2 Turns	65/75	20/10	42.68	66.60	67.30	66.95
01/19/2019	06:30	2 Turns	62/72	20/5	41.24	63.70	61.90	62.80
	15:45	2 Turns	60/70	20/5	40.73	65.90	63.20	64.55
01/20/2019	07:20	2 Turns	60/70	20/5	N/A	63.90	62.40	63.15
	13:51	2 Turns	65/75	20/5	42.70	63.20	62.50	62.85
01/21/2019	07:00	2 Turns	65/75	20/5	42.70	63.20	62.50	62.85
	14:30	2 Turns	65/75	20/5	43.52	67.50	64.60	66.05

WSU and Gold Rush Malt 2019 Experimental Variety Malting Trials

Kilning

Date	Time	Kilning Stage	Temp Set ºF	Blower Set Hz	Off Air Temp ºF	Off Air RH %	Grain Bed Avg. Temp ºF
01/21/19	18:00	1 (Dry)	130	45	N/A	100.0	N/A
01/22/19	14:36	2 (Cure)	140	45	105.5	17.6	122.00
	15:58	3	160	45	116.0	11.8	132.00
	17:56	4	180	40	130.2	5.7	142.00
	20:12	5	200	35	161.0	0.6	166.00
	21:59	End Cure	Off	Off	175.0	0.1	180.00

Final Moisture %: 4.28
Friability %: N/A
Yield lbs.: 3315.53
Malting Loss %: 18

Notes: N/A: Data not available or applicable
[1] Temp Set is **Burner temp/Cooler temp** settings
[2] Humidity Set is **minutes on/minutes off** of misting system in incoming air

WSU and Gold Rush Malt 2019 Experimental Variety Malting Trials

Batch Number: 1012119
Weight lbs: 4246
Variety: 10WA-117.17

Steeping

Date	Time	Process	H2O Set Temp ºF	Grain Moisture %	Grain Bed Temp
01/21/2019	10:30	Steep In	65	N/A	N/A
	18:30	Air Rest	N/A	N/A	N/A
01/22/2019	08:00	Steep	65	33.79	52.50
	20:00	Air Rest	N/A	NA	63.50
01/23/2019	07:00	Steep	65	41.15	62.70
	15:00	Steep Out	N/A	44.1	N/A

Germination

Date	Time	Process	Temp Set [1]	Humidity Set [2]	Grain Moisture %	Grain Bed Front Temp ºF	Grain Bed Rear Temp ºF	Grain Bed Avg. Temp ºF
01/23/2019	16:40	Begin Germ	85/95	10/20	44.10	65.70	66.40	66.05
01/24/2019	06:15	2 Turns	82/92	10/20/19	45.90	67.90	68.50	68.20
	15:50	2 Turns	70/80	15/20	44.09	67.10	67.20	67.15
01/25/2019	06:30	2 Turns	85/95	20/10	43.29	54.70	54.80	54.75
	16:45	2 Turns	70/80	20/10	42.07	61.50	55.60	58.55
01/26/2019	06:15	2 Turns	60/70	20/5	42.36	65.30	64.30	64.80
	16:20	2 Turns	60/70	20/5	41.09	65.00	63.40	64.20
01/27/2019	07:14	2 Turns	60/70	30/5	41.11	64.30	63.50	63.90
	16:15	2 Turns	60/70	30/5	40.25	66.50	63.80	65.15
01/28/2019	07:20	2 Turns	60/70	30/5	39.17	65.20	62.10	63.65
	14:48	2 Turns	65/75	Off	38.66	64.60	61.10	62.85

WSU and Gold Rush Malt 2019 Experimental Variety Malting Trials

Kilning

Date	Time	Kilning Stage	Temp Set ºF	Blower Set Hz	Off Air Temp ºF	Off Air RH %	Grain Bed Avg. Temp ºF
01/28/19	18:06	1 (Dry)	130	45	58.8	100.0	51.00
01/29/19	13:43	2 (Cure)	140	45	106.5	17.5	125.00
	14:43	3	160	45	125.4	13.5	128.00
	16:39	4	180	40	130.2	5.9	143.00
	18:58	5	200	35	161.0	0.4	166.00
	20:49	End Cure	Off	Off	175.0	0.1	181.00

Final Moisture %: 3.59
Friability %: N/A
Yield lbs.: 3459.68
Malting Loss %: 18.5

Notes: N/A: Data not available or applicable
[1] Temp Set is **Burner temp/Cooler temp** settings
[2] Humidity Set is **minutes on/minutes off** of misting system in incoming air

Malting Remarks Made by Tom Hutchison (Owner, Gold Rush Malt) to Stephen Bramwell

Really tough to get hydrated

Tough to control germination temp, take off on heat, then too cold

Not easiest varieties to work with.

Aaron Macleod (Hartwick Center for Craft Food and Beverage): he thinks variation in reps; due to protein levels in Rep 1.

At end germ, acospires full length slightly more, so stop germ, start kiln, but some halfway. Uneven germ. Because why? Hydration is high. Longest germination I've done, over 5 day.

Work with some more, hard to say, feeling a large Malthouse not happy with long germ time. Copeland not so much, should have left go another day. Under-modified, treated like other standard varieties. Germ 1 more day. Not best parameters. 12.5 protein, too high upper limit. Higher protein, harder to hydrate. Getting water into the kernel. Experienced that with Full Pint, hard to keep protein down on that variety. It's short, and N efficient [in the field/accumulates protein readily].

Very plump varieties, bucket that catches over top screen, 2x bucket, 3x bucket in one batch. Only 1x typically. Was on top screen on seed cleaner, clean malt at end. Only straw typically. Malting loss higher than normal, high moisture content starting point. As high as 12%; seemed a bit of thins, and rye. Lot of rye, in there. Last: 117.17 seemed to malt a little easier, not as plump a kernel. Plump can make it harder to hydrate.

Link between starting barley protein, carry through, see in Soluble (S/T) Ask Aaron about this.

If non-uniform protein, modification lead to higher beta glucan, lower friability.

Scaling up from small micro-maltster; doesn't scale particularly well (in Tom's opinion). Whole bunch more mass of grain to try control temperature on. Keep uniform. results don't' scale as well as wish, he thought.