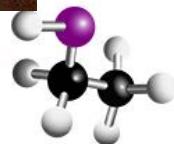


21st Century Hop Production Where Art and Science Interact



Presentation Overview



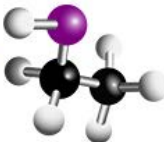
Video introduction of Virgil Gamache Farms Inc.

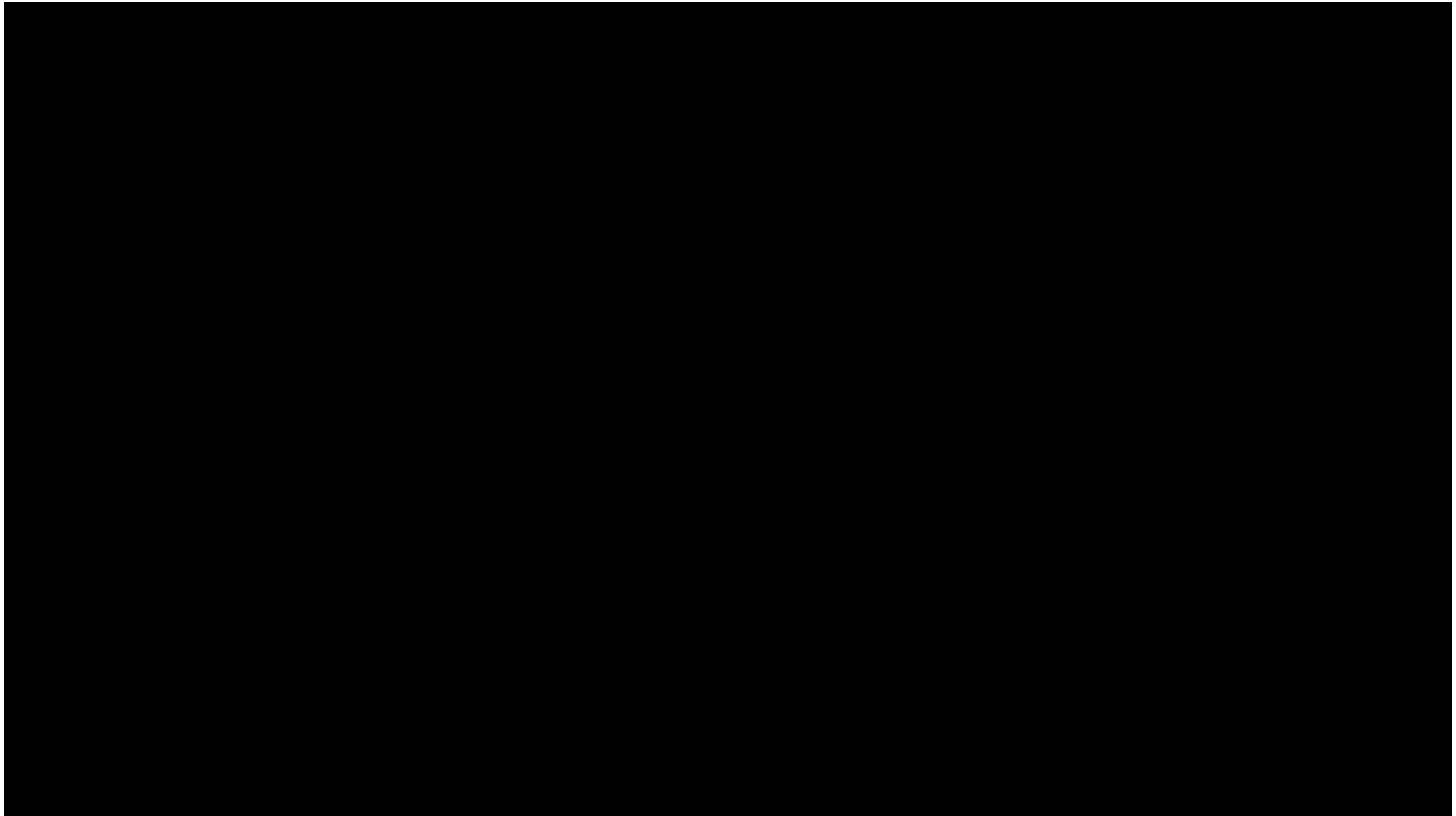
Lessons Learned

Harvesting Logistics

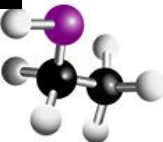
Industry Challenges

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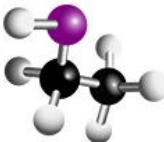


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Did we learn anything after 85 seasons?

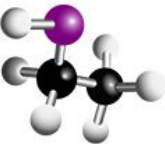
- Plant Vigor generally equates to crop yield
- Primary Influences on Plant Vigor
 - Water
 - Heat Units
 - Time
 - Fertilizer
- Points to Consider
 - MRL Assignments (End User Shipping Logistics)
 - Flavor Repeatability Requires a Technical Focus (Brand Management i.e.: Amarillo®, Sonnet®)
 - Resource Management



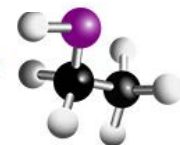
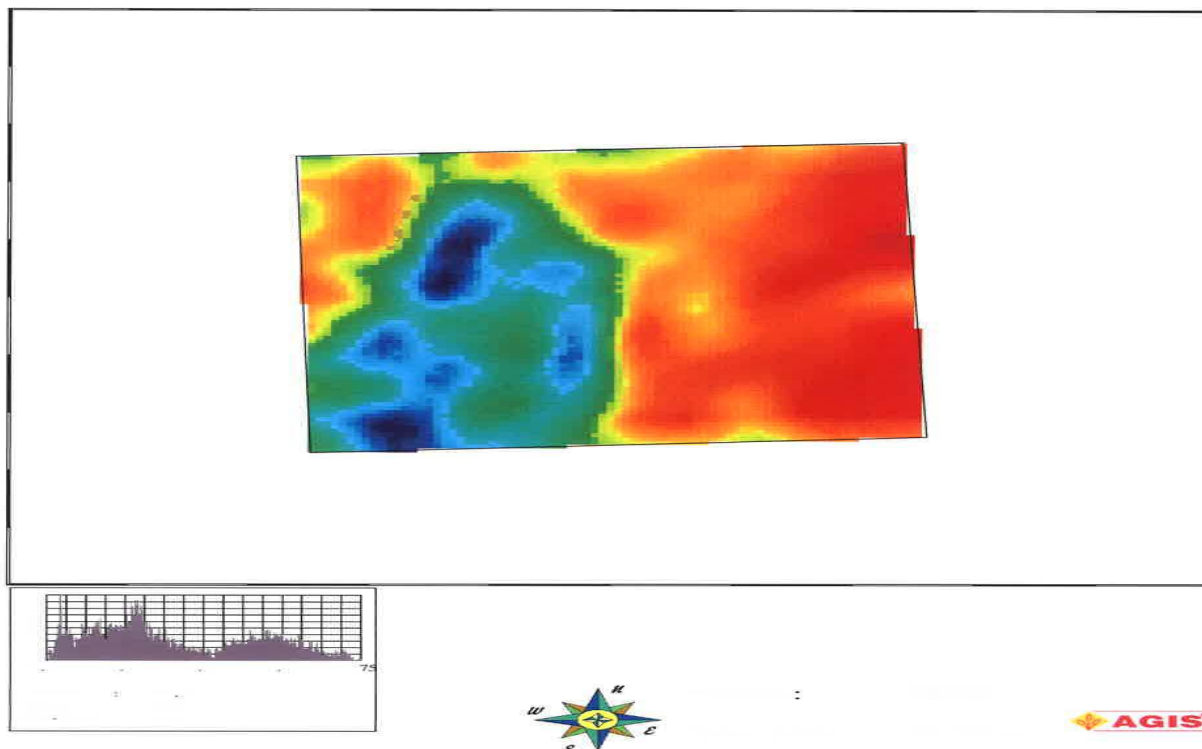
Yakima



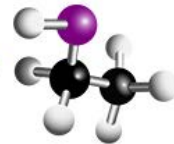
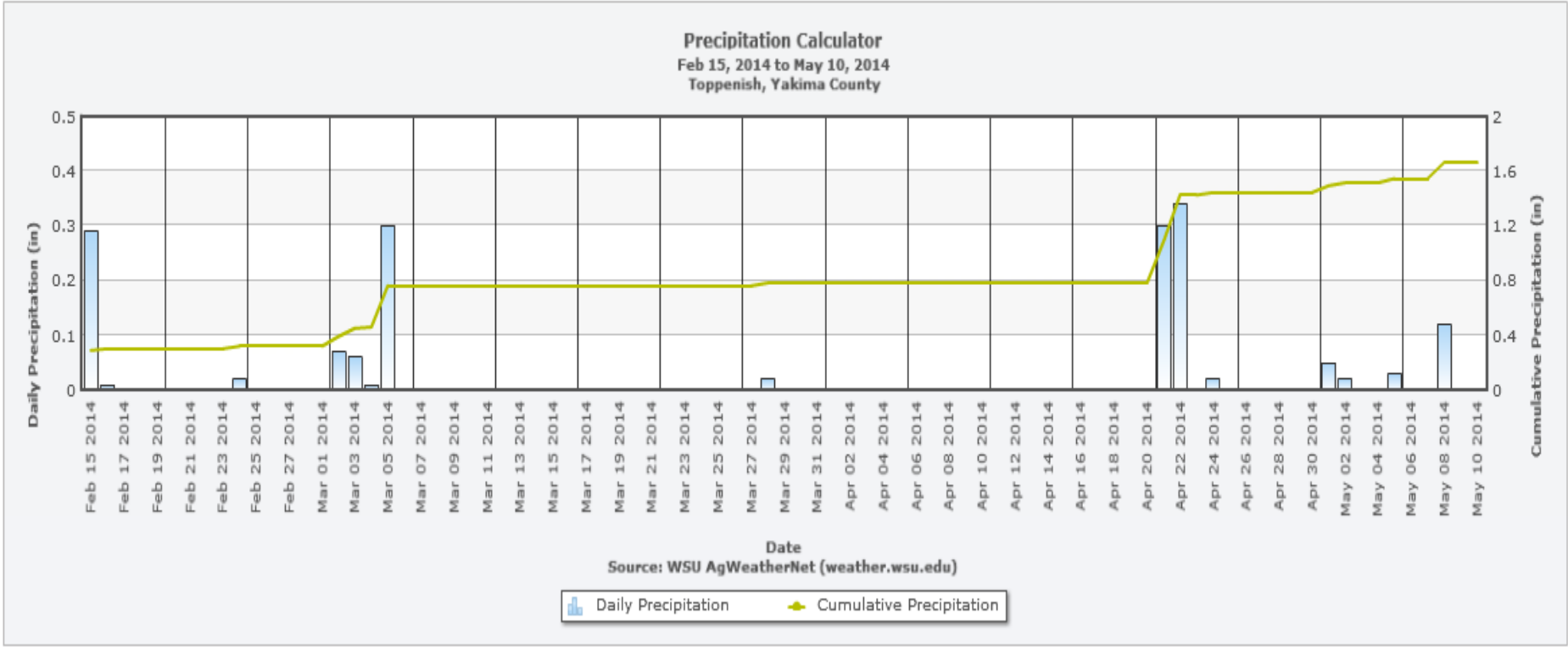
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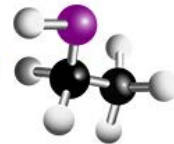
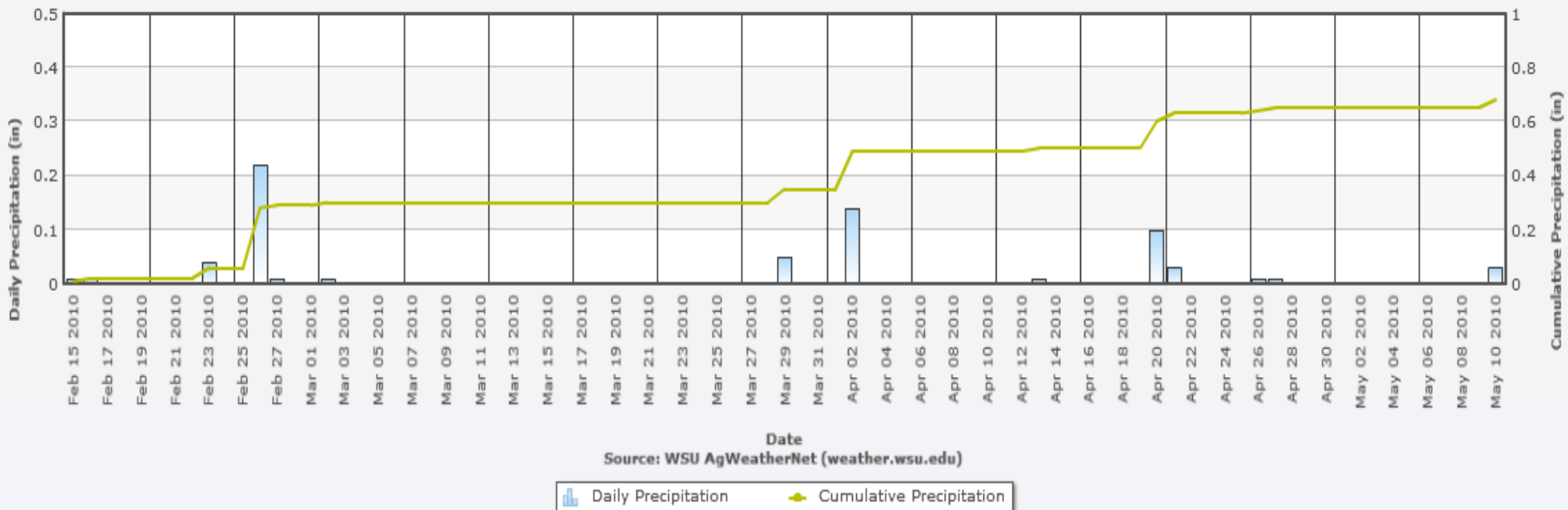
Field Mapping



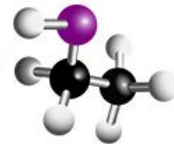
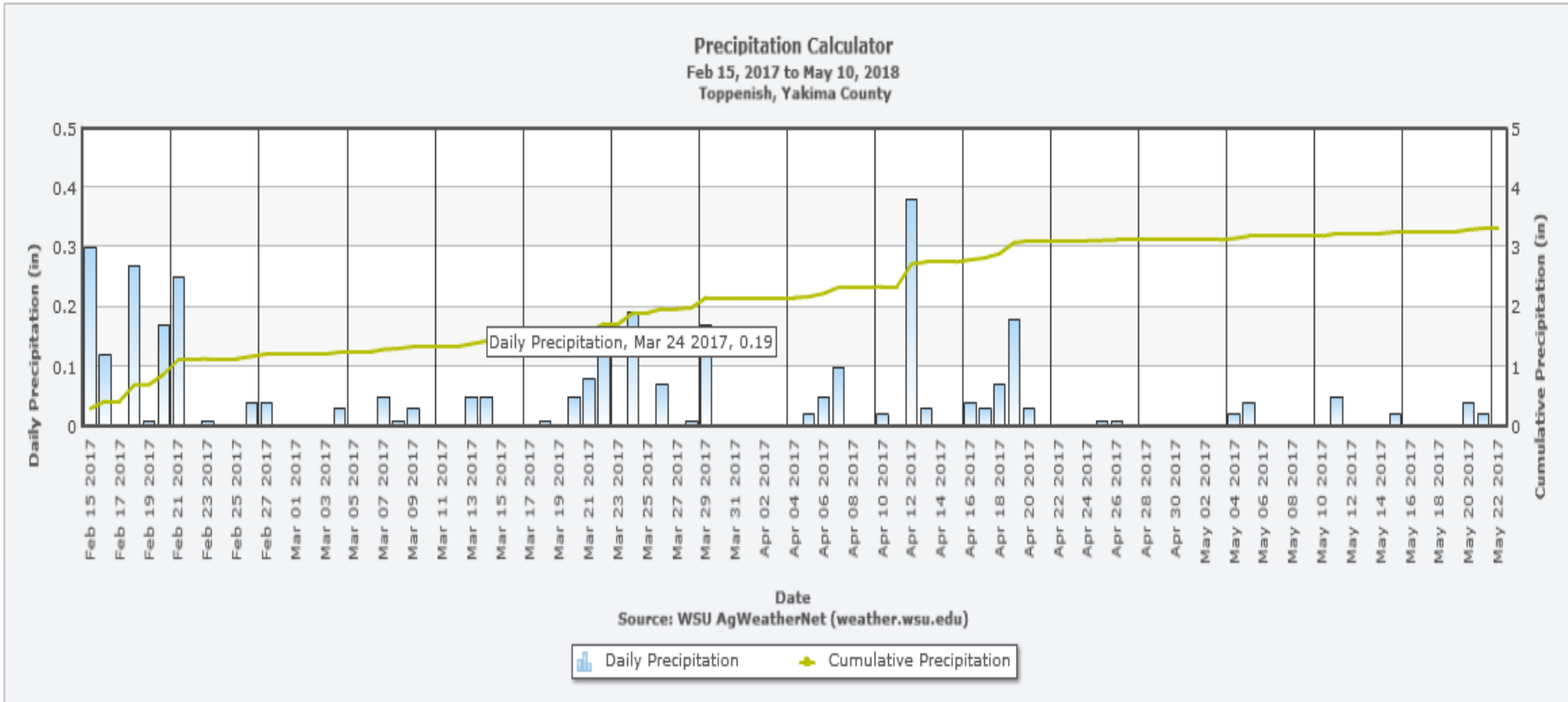
Toppenish, Yakima County, Washington
 February 15, 2014 through May 10, 2014



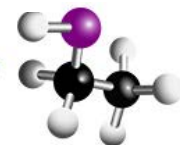
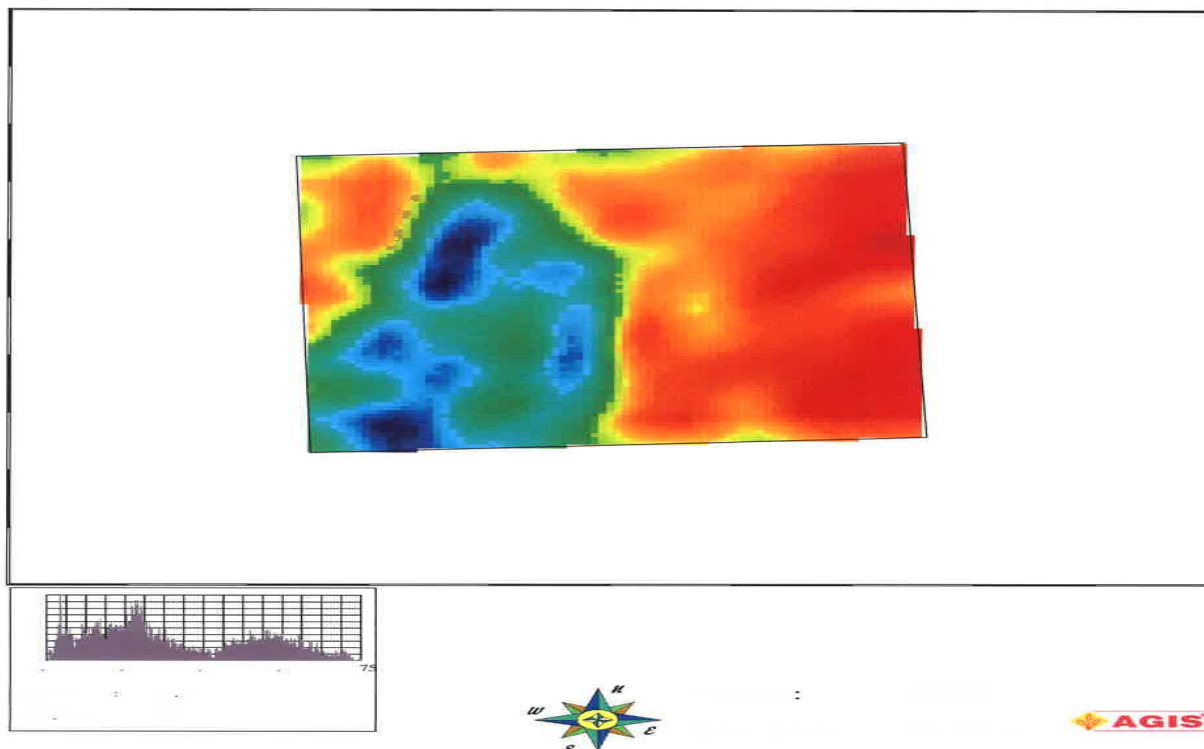
Precipitation Calculator
Feb 15, 2010 to May 10, 2010
Toppenish, Yakima County



Toppenish, Yakima County, Washington
 February 15, 2017 through May 10, 2018



Field Mapping



Western Laboratories.com

211 Highway 95 • P.O. Box 1020 • Parma, ID 83660

800-658-3858 • FAX 208-722-6550

<http://www.westernlaboratories.com>

Methods: www.westernlaboratories.com/methods.

PAP-Accredited



Dealer: 1-310 Andy

Reported: 7-12-2016

Test #: 1

Grower: VGF Farms

Field ID: Sinner 40 Z-1

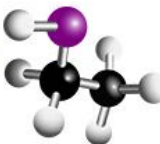
Lab #:

33233

AGRICULTURAL SOIL REPORT

ELEMENT	ANSWER	INTERP	SHOULD BE	ELEMENT	ANSWER	INTERP	SHOULD BE
pH-Soil	6.7	Neutral Soil		Sulfur-ppm	39	Optimum	20 +
pH-SMP				Calcium-ppm	2112	Optimum	1,800 +
Soluble Salts	0.56	Optimum	< 1.5	Magnesium-ppm	415	Optimum	250 +
% Lime	0	No lime		Sodium-ppm	64	Optimum	< 225
% Organic Matter	4.59	Medium		Zinc-ppm	5.9	Very High	1.0 - 3.0
Nitrates-ppm	133	Very High	10 - 35	Copper-ppm	1.3	Optimum	0.8 - 2.5
Ammonium-ppm	3	Low	5 +	Manganese-ppm	7	Optimum	6 - 30
Phosphorus-ppm	120	Very High	25 - 40	Iron-ppm	21	Medium	25 +
Phos-ppm-Bray			50 - 100	Boron-ppm	0.7	Low	0.7 - 1.5
Potassium-ppm	777	Very High	300 +	TBS%	0		
Texture	Loam		Water Holding Capacity/foot	2.14	Bulk Density	1.4	
Cation Exchange Capacity - CEC	17		P Index	Fertilizer Suggestions in Pounds per Acre for the whole season			
Percent Base Saturation	89						
BASES	IDEAL	YOURS		NO3 ppm	NH4 ppm	Crop	
Calcium-% of CEC	65-80	58	1 Ft	133	3	Yield Goal	
Magnesium-% of CEC	10-20	19	2 Ft			Past Crop	
Potassium-% of CEC	2-6	11	3 Ft			Acres	
Sodium-% of CEC (ESP)	< 5	2	Total N PPM		136	Nitrogen	
Hydrogen-% of CEC	< 15	11	Lbs N / Acre		408	Phosphate	

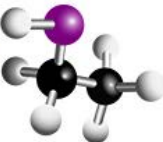
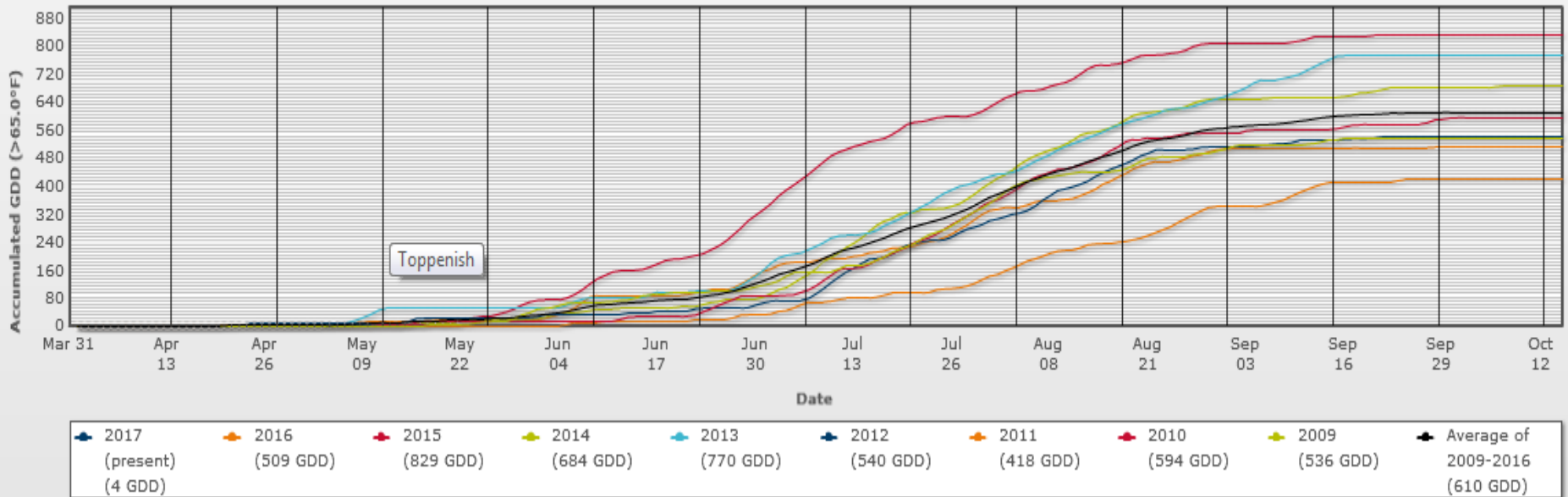
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Annual Heat Units

Growing Degree Days
Toppenish, Yakima county...

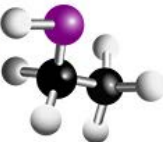
Source: WSU AgWeatherNet



May 22



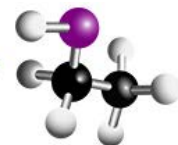
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June 24th



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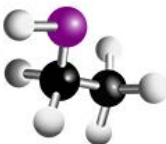


Mid Season Management



Petiole Data for Virgil Gamache Farms, Inc.

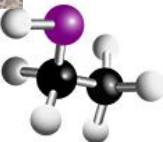
Field	Date	Percent							ppm					
		N (dris)	P (dris)	K (dris)	S (dris)	Ca	Mg	Na	Zn	B	Mn	Fe	Cu	NO ₃
22 Acre	8/15/2014		0.13	1.60	0.09	3.91	2.35	0.08	30	30	79	283	6	6,900
25 Acre	8/15/2014		0.15	3.20	0.14	3.37	1.71	0.09	52	28	55	185	11	5,720
28 Acre Amarillo	8/15/2014		0.13	2.30	0.10	4.46	2.24	0.14	37	30	84	273	7	9,300
28 Acre Challeng	8/15/2014		0.16	3.10	0.09	3.94	2.05	0.11	38	29	75	201	7	8,440
Bachmier	8/15/2014		0.19	5.30	0.09	3.59	2.02	0.13	31	29	60	349	9	5,520
Campbell North	8/15/2014		0.16	4.40	0.14	3.00	1.54	0.08	25	29	66	121	9	6,400
Campbell South	8/15/2014		0.16	4.30	0.16	3.08	1.59	0.05	24	30	88	153	9	8,600
Carver	8/15/2014		0.16	5.10	0.12	3.65	1.57	0.14	27	29	61	174	9	7,960
Isaakson	8/15/2014		0.17	3.80	0.08	1.80	1.53	0.08	33	27	103	113	9	8,820
Jerry's	8/15/2014		0.14	2.70	0.11	3.88	2.22	0.06	39	29	70	220	3	6,260
Jones Road	8/15/2014		0.13	3.50	0.12	3.58	1.69	0.08	33	31	89	224	6	8,000



July 8th



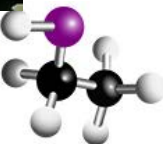
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August 28

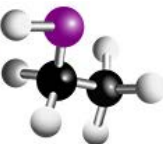


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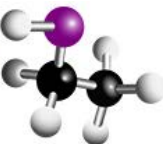




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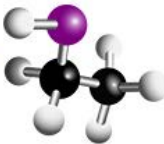
To Pick or Not to Pick?



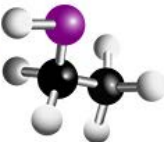
Amarillo®

VGXP01 c.v.

- 3 Distinct harvest windows
 - Early
 - Lemon
 - Candy like
 - Mid
 - Less candy
 - Little cheesy
 - Grapefruit and Orange notes become distinguishable
 - Late
 - Grapefruit and Orange become less upfront
 - Cheesy
 - No candy
 - Garlic and onion

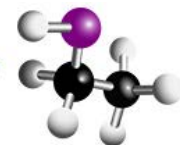


Time to Harvest?



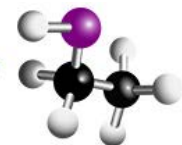
Gas Chromatograph Mass Spectrometry with SCD

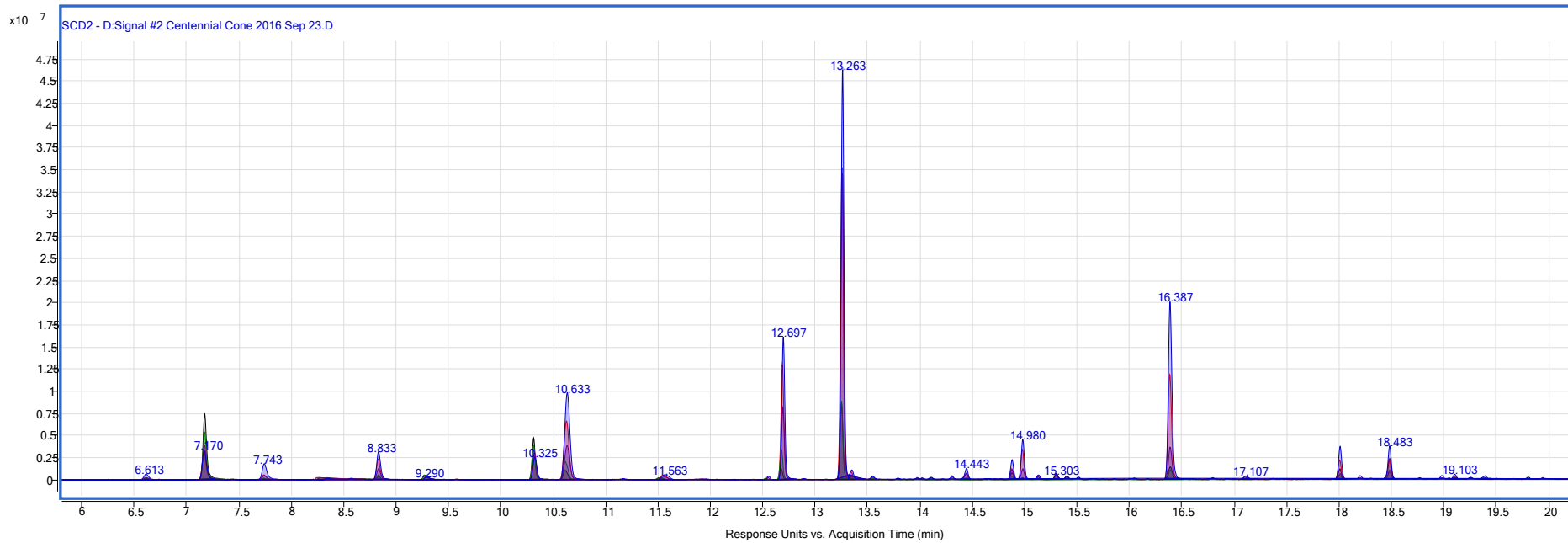
GCMS/SCD



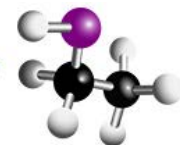
Harvest Order Selection

- Using in-house GC to determine which fields to harvest first
- Able to predict what profile a field is in based on GC
- Extend harvest window for fields into a larger timeline



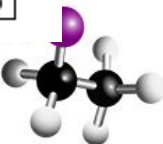


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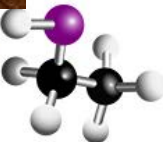


Harvest Order Report

Pick Order	Field Name	Variety	Acreage	Dry Matter	Field Health	MRL	Harvest Aroma	Last Date Sampled
1	Niesz SE	Styrian-Golding	8.88	22.15%	5.00	Global	Ready	8/21/2016
2	Roth	Challenger	7.07	23.72%	5.00	Global	Ready	8/22/2016
3	Niesz West	Amarillo	37.79	29.07%	5.00	Global	Early	8/29/2016
4	Carver East	Amarillo	47.64	25.42%	5.00	Global	Early	8/29/2016
5	Carver West	Amarillo	27.01	24.81%	5.00	Global	Early	8/29/2016
6	Bachmier East	Amarillo	34.06	23.55%	5.00	Global	Early Mid	9/4/2016
7	Bachmier West	Amarillo	36.01	24.66%	5.00	Global	Early Mid	9/4/2016
8	Canaday South	Amarillo	46.36	27.33%	4.00	Domestic	Early	9/4/2016
9	Canaday North	Amarillo	26.39	27.01%	4.00	Domestic	Early	9/4/2016
10	28 Acres (1)	Challenger	8.69	23.93%	5.00	Global	Ready	9/3/2016
11	Yost East & Triangle	Amarillo	42.21	24.66%	5.00	Global	Early Mid	9/5/2016
12	Yost West	Amarillo	22.48	25.68%	5.00	Global	Early	9/5/2016
13	Locust North	Amarillo	34.36	26.90%	5.00	Global	Early	9/5/2016
14	Locust South	Amarillo	31.57	26.37%	5.00	Global	Early	9/5/2016
15	Harvey 19B	Amarillo	29.75	23.21%	5.00	Global	Mid	9/3/2016
Wildcard	Hopkins	Amarillo	32.64	27.55%	3.00	Global	Early	9/4/2016
Wildcard	Weijohn	Amarillo	68.33	27.09%	4.00	Global	Early	9/5/2016
Wildcard	Moe (1)	Amarillo	43.68	25.42%	4.00	Global	Early	9/5/2016



Field Ops



The Picker



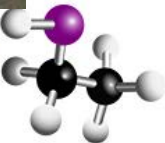
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The Kiln



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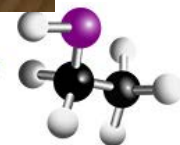


Cooling Room





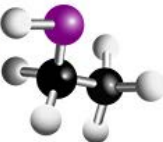
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Shipping

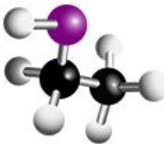


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Industry Challenges

- Industrializing of Agricultural Regulations
- The Noise and Chaos of Craft
- Lacking an alternative use
- Labor



Thank You



- Please follow us on our face book page for current events and light comedy

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