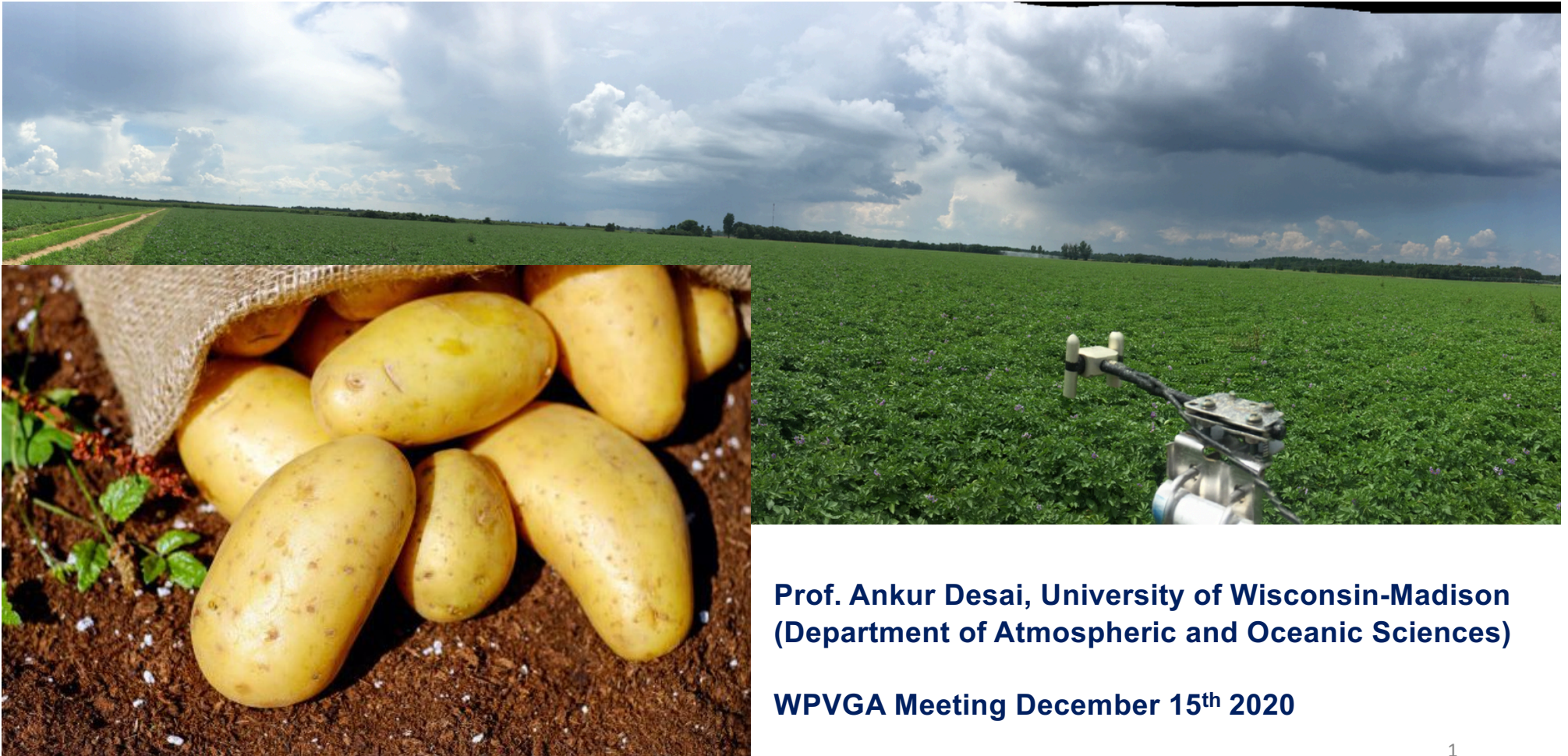


Water Use by Crops and Pines in Central Sands Wisconsin



**Prof. Ankur Desai, University of Wisconsin-Madison
(Department of Atmospheric and Oceanic Sciences)**

WPVGA Meeting December 15th 2020

Study Site



Heartland Farm Study Sites



Data/Analysis Updates

Tower Installed on June
29th 2018

~7 feet Tall

Tri County Forest Site

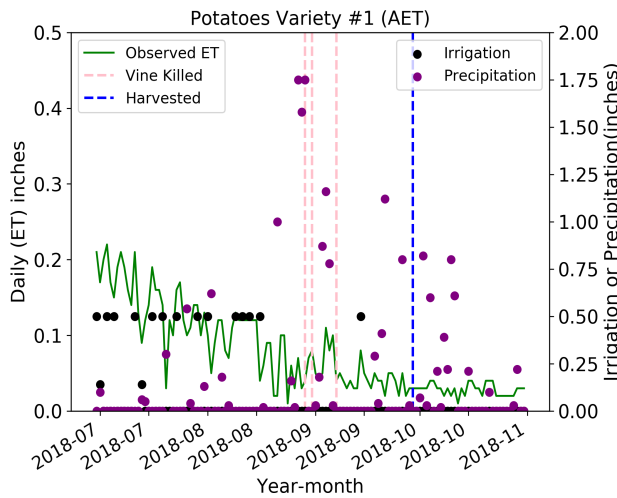


Located at Tri-County Area
School District School Forest
About 25 miles from Plover
river and 5 miles from
Heartland Farm

- ~100 feet Tall
- 20 times a second
- H₂O, Co₂, vertical winds,
and associated
meteorology (temperature,
humidity, winds,
longwave/solar radiation).

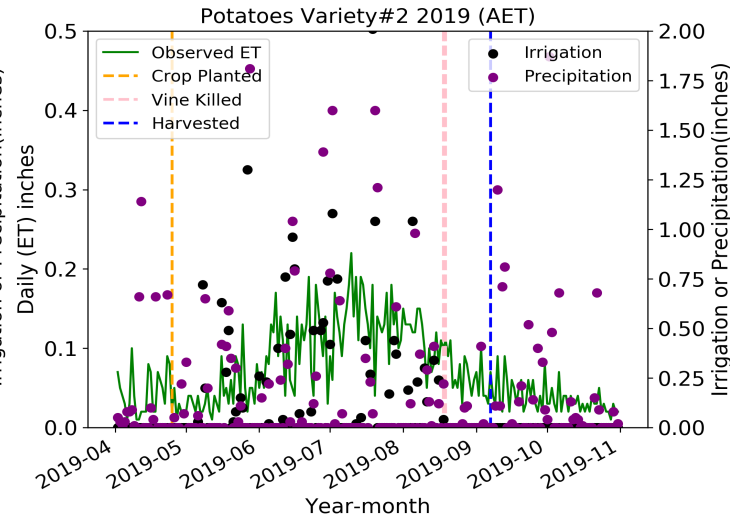
Water use by Potatoes

Warm summer, wet Aug



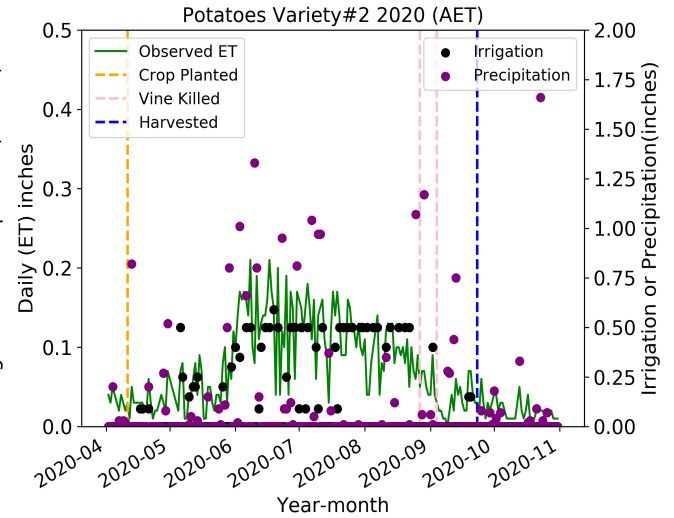
Yield: 525 cwt

Cool summer, wet July



Yield: 450 cwt

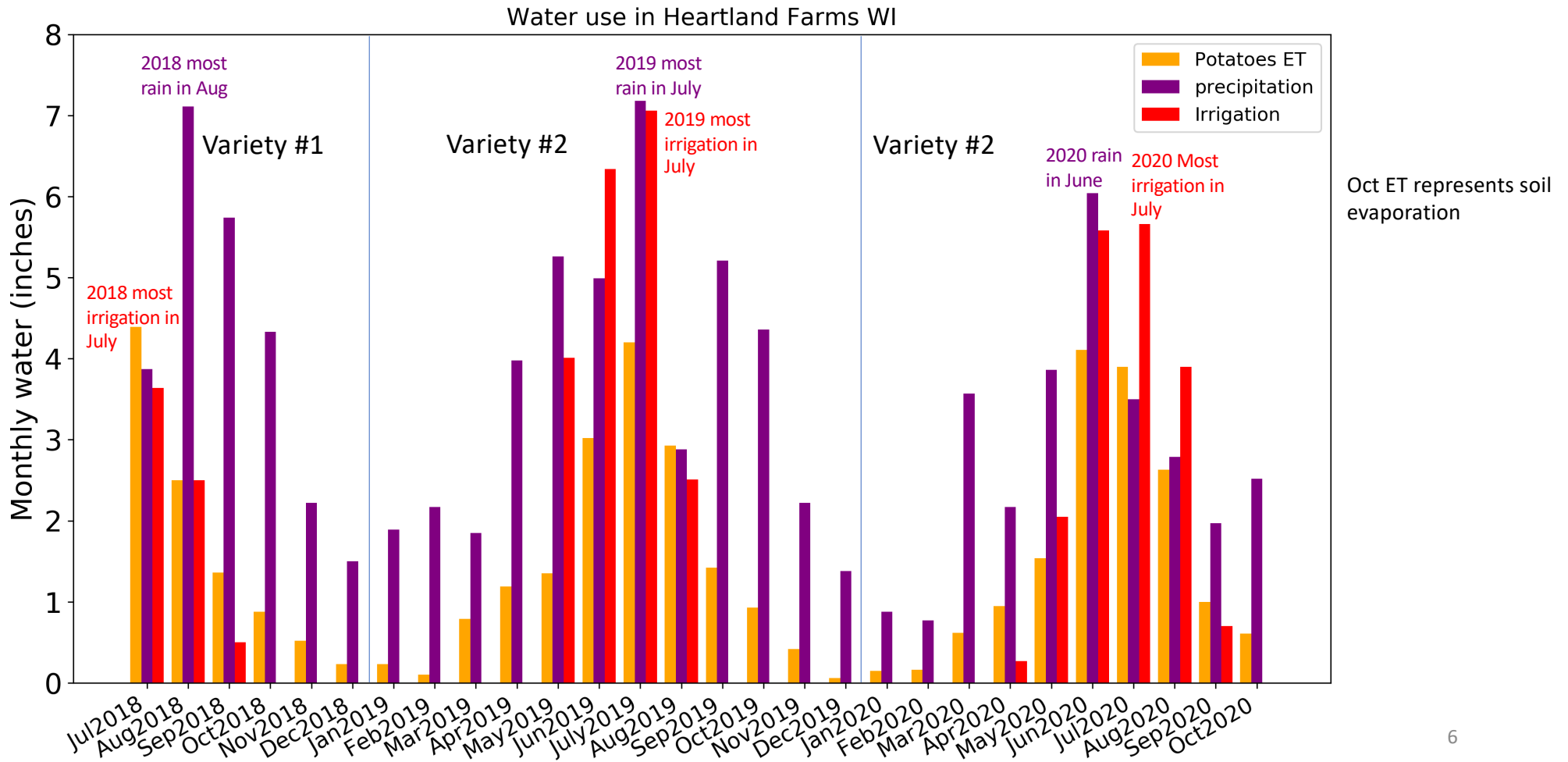
Avg/warm summer, wet June



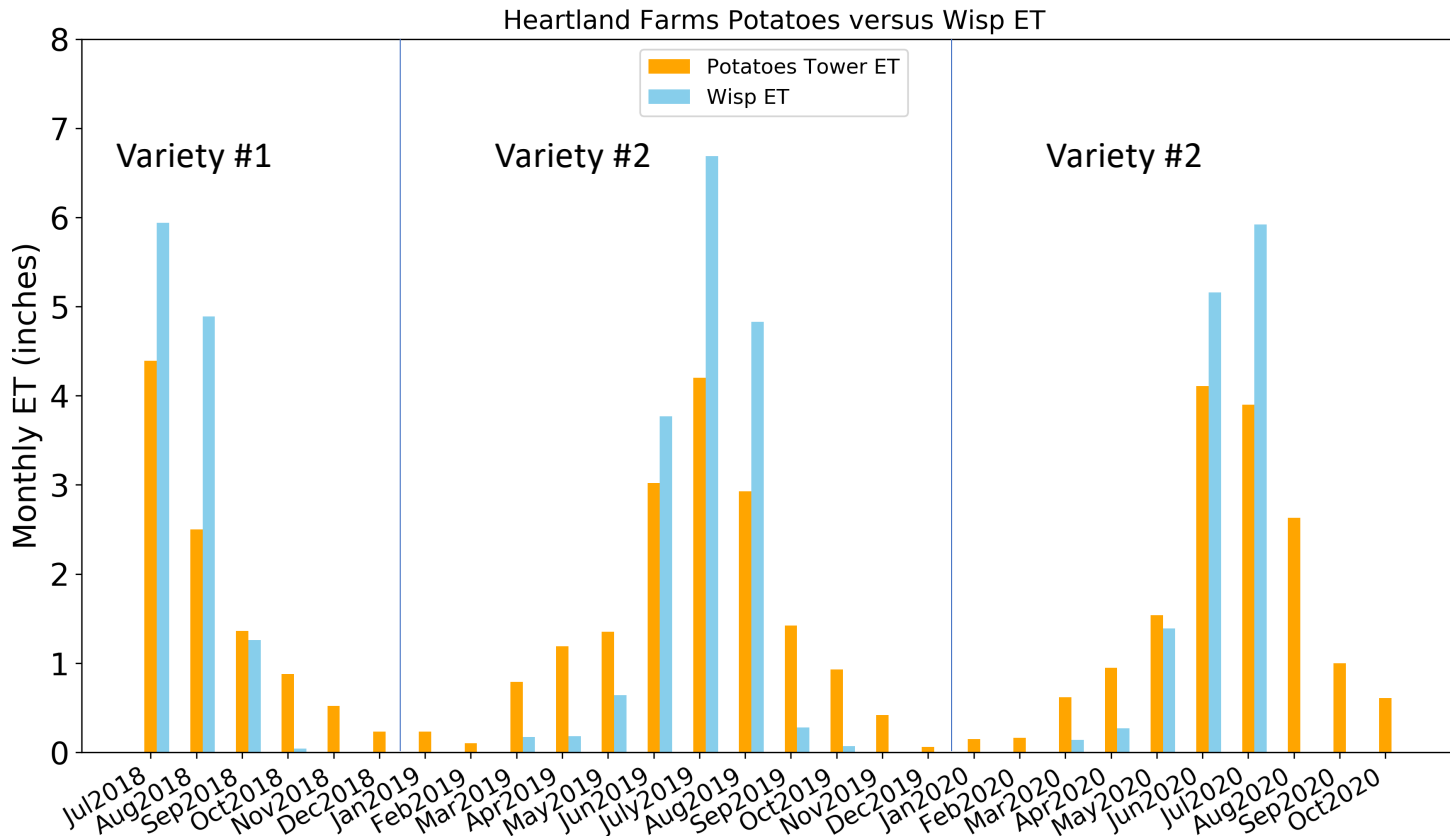
Location	Plantation date	vine kill	vine kill	vine kill	Harvest date
Potatoes Variety#1	5/18/2018	8/29/2018	8/31/2018	9/7/2018	9/29/2018
Potatoes Variety#2	4/25/2019	8/18/2019	8/19/2019		9/7/2019
Potatoes Variety#2	4/11/2020	8/27/2020	9/4/2020		9/23/2020

2019 and 2020 same Potatoes variety, But 2020 crop was harvested later in September (longer season)

Water demand versus water supply for Heartland Farms

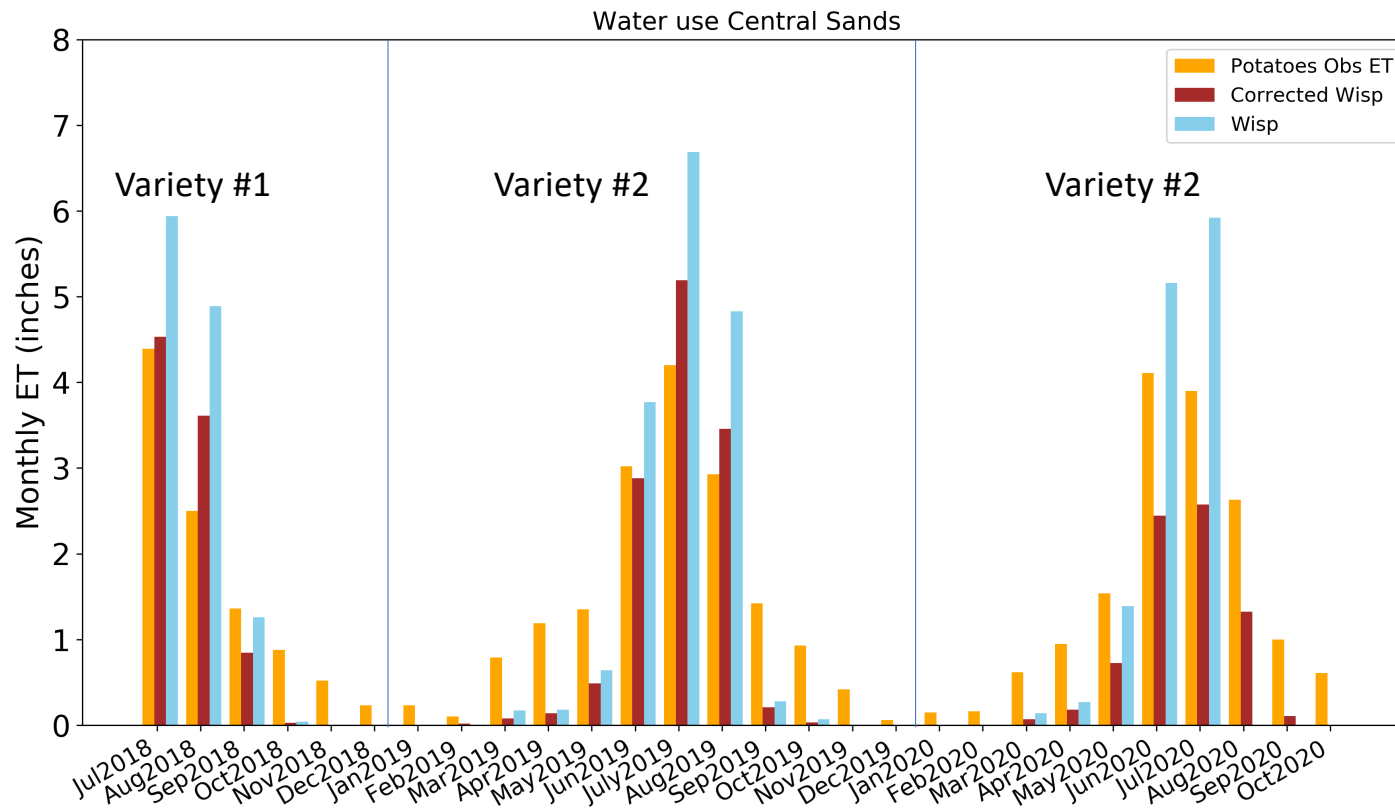


Observed and Model Total Monthly ET comparison



- WISP overestimate ET and can not capture soil evaporation during shoulder months
- Most of the total ET is in June and July
- July 2018 ET was a bit higher than July 2019 and July 2020
- 2018: Variety#1
- 2019,2020: Variety#2

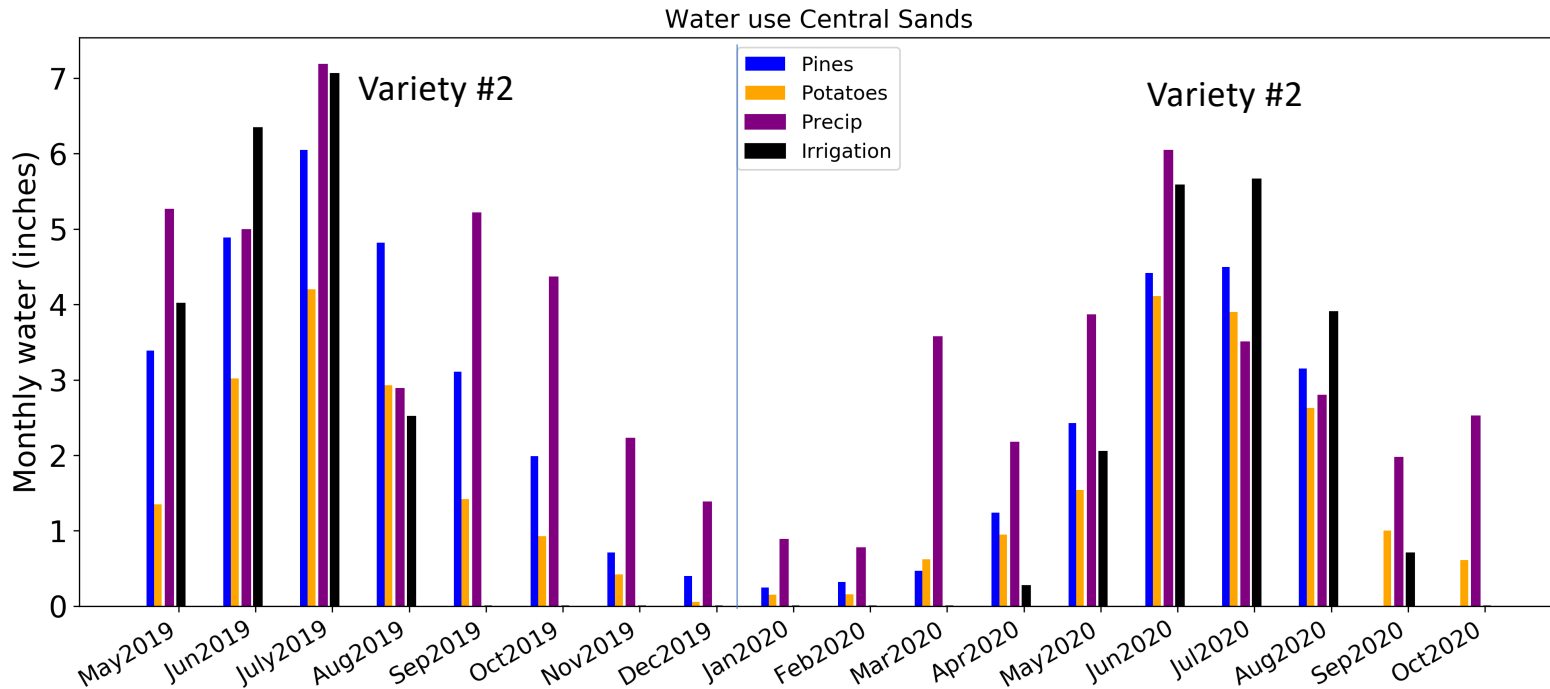
Effect of WISP ET correction



Corrected WISP ET is closer to observed ET

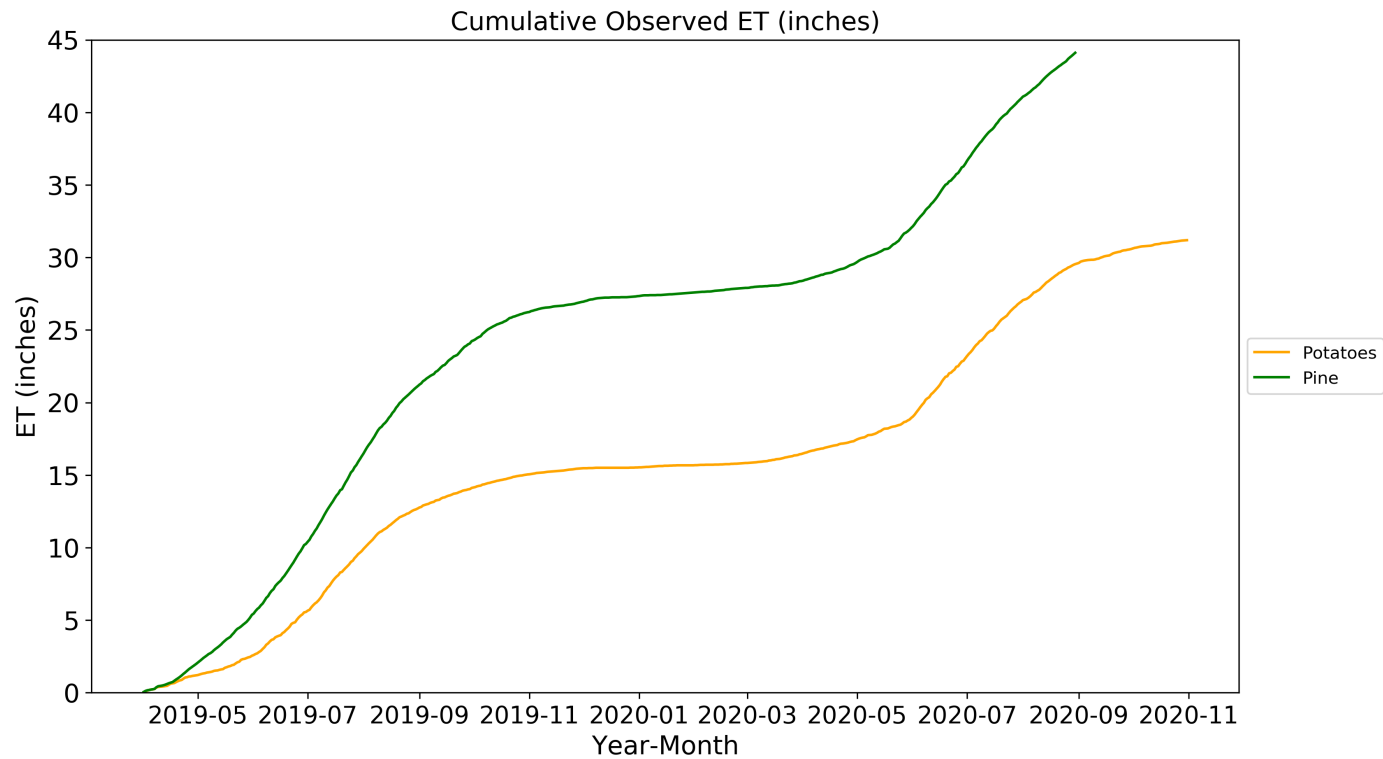
Comparison between Pines and Potatoes ET

- July 2020 ET comparable between Pines and Potatoes
- Pines Total June 2020 ET: (4.4 inches)
- Potatoes Total June 2020 ET: (4.1 inches)



Difference between Potatoes and pine ET was higher in 2019 compared to difference in 2020

Comparison between Cumulative Pines and Potatoes ET

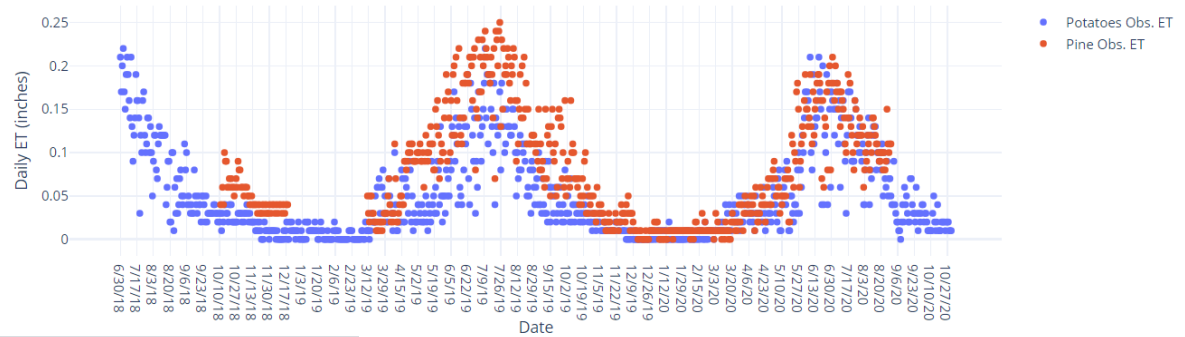


From May 2019 to July 2020. Winters included.

Links to the data website

- <https://flux.aos.wisc.edu/potato>

[http://co2.aos.wisc.edu/data/potato/realtime.](http://co2.aos.wisc.edu/data/potato/realtime)



US-CS4 Heartland Farms Potato Realtime Sun Dec 13 03:00:05 2020

Date	Potato ET (inches)	Air Temp (mean F)	Air Temp (max F)	Air Temp (min F)
2020-12-03	0.01	34.1	40.4	28.8
2020-12-04	0.00	32.3	40.6	25.1
2020-12-05	0.00	25.1	30.7	15.8
2020-12-06	0.00	27.0	33.1	16.3
2020-12-07	0.00	29.7	30.4	29.2
2020-12-08	0.00	29.5	33.0	27.3
2020-12-09	0.00	35.9	49.0	27.2
2020-12-10	0.00	37.4	53.3	25.1
2020-12-11	0.00	33.3	36.2	29.8
2020-12-12	0.01	28.4	31.1	23.4

visp_ET_inches	Potato_ET_inches	airtempF_potatoes	Pine_ET_inches	airtempF_pines	wisp_AETIdso_corr
0.21		79.43			0.225970568
0.17		72.35			0.132605884
0.2		71.3			0.205590082
0.22		74.52			0.200763101
0.17		78.13			0.190450648
0.15		72.11			0.13958545
0.19		66.49			0.185673463
0.21		67.55			0.179380988
0.19		78.53			0.191171467
0.16		74.13			0.162543834
0.14		71.66			0.156475974
0.21		72.71			0.17658321
0.13		74.01			0.107251563
0.09		73.94			0.115724576
0.12		75.38			0.148059785
0.14		76.84			0.146265859
0.19		72.46			0.197130872
0.16		67.38			0.170450513

Plans

- Two manuscripts being prepared for peer-reviewed publication – one on pine and potato ET (+ WISP model correction), and one on modeling/forecasting crop ET
- Continued collaboration with Dom Ciruzzi/Steve Loheide on pine water groundwater use, Malika Nocco and Logan Ebert on mapping ET, Jingyi Huang on soil moisture mapping, Yi Wang and John Panuska on yield models/WISP
- New collaboration funded by UW SSEC Jason Otkin, Paul Stoy, and Martha Anderson on new satellite ET model and drought forecasts (ALEXI)
- Article submitted to Common Tater for fall publication
- Continued update of web site and submission of data to repository
- Ammara Talib continuing dissertation and PhD – construct regional ET budget
- WPVGA WTF funding expires June 2021 – discussion on future plans
 - Currently 8K over budget, will be 15K over budget by June, can mitigate some but not all of this

Acknowledgements

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- John Panuska, Biological Systems Engineering Dept. UW Madison
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- Freihoefer, Adam T - DNR

- Jeremie Pavelski, Heartland Farms
- Joe Raboin, Tri-County School Forest

- Ameriflux

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- Wisconsin Potatoes and Vegetable Growers Associations (WPVGA) Water Task Force
- State of Wisconsin DNR



