

# Agricultural Engineering and Agronomy Farm Summary

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## Farm Comments

**Field days and tours.** The farm hosted 450 visitors during the year. The Ag Engineering and Agronomy Research Farm (AEA) hosted the National Association of Plant Breeders in August as part of their annual convention held in Ames. Plant breeders attending the convention were invited to the farm to view demonstration plots exhibited by the corn, soybean, and sorghum breeding groups. The demonstration plots exhibited current and historical work accomplished at Iowa State University and was well received by all attendees. Other field days included an ag leadership tour group from northwest Iowa, and smaller field day events in association with the forage and sustainable ag research groups at Iowa State.

**Developments.** Research efforts at the farm were at field capacity with many continuing long-term projects and research activities related to breeding programs, weed, disease, insect, and crop fertility. Water quality studies continue to be one of the focus areas of research. There are five water quality studies evaluating water quality entering tile lines in the agricultural landscape of Iowa. Tile lines running underneath replicated plots, are routed to underground sump basins, where water samples are taken on a regular basis. Nitrate, nutrient leaching, basic waterflow according to crop rotation, and other factors related to crop production are monitored.

Two saturated buffers are being evaluated at the Boyd and Burkey farms, monitoring water flow and nitrate retention in the buffers.

**Facilities and equipment.** A broadband tower was installed north of the main headquarters building. The tower will be used to transmit broadband signals across Iowa State farms in Story and Boone County. The project is led by Hongwei Zhang of the electrical and computer engineering department. The signal generated by the towers will be utilized by research groups working in field plots to facilitate transmission of data back to campus and provide connectivity to digital ag components in agricultural field equipment.

## Crop Season Comments

Oat seeding was started and completed April 11. Oats were harvested in mid-July, with an average yield of 65 to 150 bushels/acre, depending on fertility protocols of the harvested fields.

Corn planting started May 19 and was completed June 14. Planting was delayed due to saturated soil moisture levels from October rainfall in 2021 and spring rainfall events in April and May. Harvest began October 14 and was completed by November 11. Average yields were in the 200 bushel/acre range. Rainfall events throughout the summer contributed to respectable yields across the farm.

Soybean planting began June 1 and was completed June 20. Timely planting was delayed by spring rains in May and June. Harvest began October 11 and was completed by October 20. The whole-farm average was 45 bushels/acre.



## Weather Comments

**Winter.** Total snowfall for January, February, and March was 16.7 in., with rainfall equivalent and rainfall total of 4.34 in.

**Spring.** A rainfall total of 17.49 in. was recorded for the months of April, May, and June (Table 1), with 8.98 in. of that total in June. The three-month total was 5.04 in. above average. The high rainfall rates led to a saturated soil profile, which contributed to late planting conditions in the Ames area. The last killing frost was April 19, with a low temperature of 23° F. June was warm, averaging 4.77° F above normal. There were nine days of 90°F or above in June.

**Summer.** A total of 10.16 in. of rain fell during the summer months of July through September. July recorded 10 days with temperatures 90°F or above.

**Fall.** A total of 3.37 in. of rain was recorded for the months of October through December. The first killing frost of 25 degrees was October 15. October was dry with only 0.52 in. of rainfall, which led to good harvest conditions. A total of 3.3 in. of snow fell in mid-November and 9.3 in. of snow fell during the last half of December.

A total of 35.36 in. of rain was recorded for 2022, 3.09 in. above normal.

## Acknowledgements

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**Table 1. Monthly rainfall and average temperatures—2022 growing season.**

Month	Rainfall, inches	Deviation from normal	Temperature °F	Deviation from normal	Days 90° or above
March	3.52	1.70	40	3.98	0
April	4.45	1.25	46	-3.67	0
May	4.06	-0.38	64	3.11	5
June	8.98	4.17	75	4.77	9
July	3.20	0.47	76	1.63	10
August	5.08	1.10	74	1.95	5
September	1.88	-1.72	67	2.56	2
October	0.52	-1.94	53	0.46	0
Total	31.69	3.71			31

**Table 2. 11-year summary of monthly precipitation.**

Month	NR1	ANR2	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
January	0.79	0.79	1.17	0.70	0.26	0.41	0.10	0.19	0.60	1.85	1.31	0.54	0.76
February	0.94	1.73	0.75	1.06	1.74	0.73	1.15	0.94	0.68	1.20	1.16	1.70	.050
March	1.79	3.52	2.07	0.79	2.49	1.48	1.00	0.21	1.48	3.11	2.49	1.50	2.65
April	3.23	6.75	3.66	4.41	4.79	5.81	4.75	3.45	4.09	3.06	1.27	1.94	1.49
May	4.41	11.16	3.64	4.62	2.46	7.09	4.26	4.57	4.28	6.16	3.98	8.32	5.28
June	4.83	15.99	11.17	5.05	2.94	3.01	8.86	6.90	0.97	1.73	11.10	3.97	1.57
July	3.68	19.67	6.74	3.90	1.47	1.01	2.88	5.96	5.85	0.99	4.21	4.61	2.79
August	4.02	23.69	11.21	3.58	2.98	2.18	5.70	8.26	8.23	3.34	8.41	1.30	1.02
September	3.62	27.31	6.57	2.02	1.85	1.19	5.55	5.05	7.90	1.80	6.75	4.56	3.19
October	2.43	29.74	0.38	0.86	2.34	2.50	3.75	1.27	0.59	6.07	4.85	5.24	1.07
November	1.53	31.27	2.23	2.72	0.90	1.40	0.71	2.75	1.74	0.26	1.62	1.33	1.95
December	1.05	32.32	0.80	2.23	1.02	0.32	1.15	5.05	1.17	0.17	2.62	1.08	0.79
Total	32.32		50.39	31.94	25.24	27.13	39.86	44.60	37.58	29.74	49.77	36.09	22.61
Departure from normal			18.07	-0.38	-7.08	-5.19	7.54	12.28	5.26	-2.58	17.45	3.71	-9.27

## Research Projects

Project	Project Lead
Corn earworm evaluation trial	C. Abel
High fidelity genetics root tracker trial	
Long-term nitrogen corn trial	S. Archontoulis
Forecast and assessment of cropping systems (FACTS)	
Crop residue/nitrogen retention trial	
Miscanthus research	
Miscanthus/corn nitrogen rate trial	N. Boersma
Switchgrass variety trial	
DrainSpace tile depth study	
Pivot Bio corn trials	M. Castellano
INRC corn and soybean trial	
Iowa nitrogen initiative	
John Deere planter evaluation trials	M. Darr
John Deere spraying systems trial	
Humic acid corn and soybean trials	D. Dinnes
Organic corn breeding trial	J. Edwards
Corn breeding nursery	
Corn hybrid nitrogen efficiency trial	J. Edwards/S. Archontoulis
Corn rootworm research	A. Gassmann
Soybean genetic mapping	J. Hayes
Prairie forbs establishment trials	R. Hellmich
Soil cube /biological nitrogen project	M. Helmers
Saturated buffer observation trials	T. Isenhardt
Weed science cover crop trial	
Weed science pesticide evaluation trials	P. Jha
Weed seed destructor trial	
DOP soybean relative maturity trial	
Soybean planting population study	Z. Koopman/M. Witt
Foliar biological treatment on soybean	
Foliar AMS on soybean	
Comparison of biofuel systems (COBS)	M. Liebman
Sustainable ag cropping systems	
Long-term tillage study	
Microbial nitrogen fixation corn trial	
Soybean foliar biological trial	M. Licht
Soybean biological seed treatment trial	
Stand reduction/greensnap corn trial	
Biological coated urea corn trial	

Project	Project Lead
Corn breeding/double haploid research	T. Lubberstedt
Forage and biomass crop production	K. Moore
Enviraction facility	
FEEL research plots	
Plant Pathology corn-soybean tillage trial	D. Mueller
Plant Pathology foliar corn trial	
Plant Pathology soybean disease trials	
Corn seedling disease research	G. Munkvold
Organic cropping systems trial	P. O'Brien
LEBRC lab facility	B. Ramirez
Corn and soybean fungicide trials	
Corn cover crop disease trial	A. Robertson
Plant Pathology foliar corn trial	
LEBRC lab facility	B. Ramirez
Corn and soybean yield trials	J. Rouse/Ryan Budnik
Sorghum breeding	M. Salas
Mung bean research	A. Singh
Soybean breeding	D. Singh
Oat variety trial	
Corn breeding nursery	M. Schnable
Winter Rye Variety trial	
Corn nitrogen rate evaluation trial	
Corn breeding nursery	P. Scott
Bioreactor Evaluation Trial	
LAiYERS Water Quality Trial	M. Soupir
Oxbow and Bioreactor Site-Uthe Farm	
BCRF Plant Zoo	A. Suby
Robotic plant imaging study	L. Tang
Soil compaction tire trial	
Self-propelled sprayer tire footprint trial	M. Tekesti
Soil machine dynamics laboratory	
Soybean cyst nematode trials	Tylka/Gebhart
Enviratron facility	S. Whitham
Corn breeding trial	M. D. Yandean-Nelson
Corn breeding/sorghum breeding	J. Yu
Broadband tower project	H. Zhang