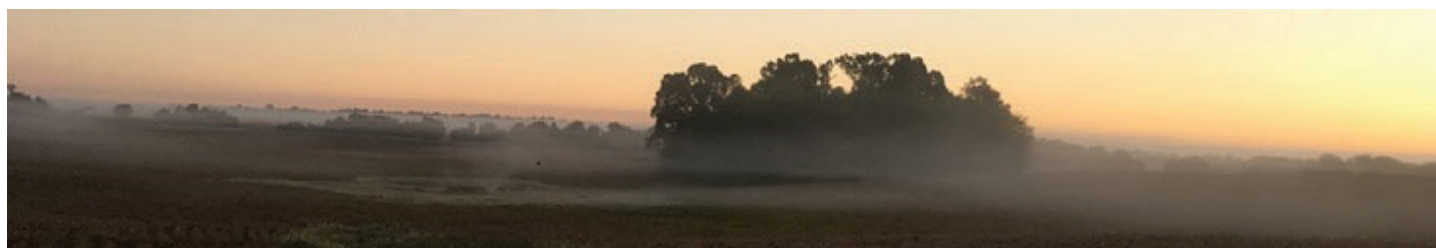


The Roller Coaster We Called the 2019 Soybean Season

Carrie Knott—Extension Grain Crops Specialist



A quick glance at this year’s weather data makes it *appear* that the soybean crop this year should be good to excellent. From Jan 1 to Oct 20, most of Kentucky had warmer than average daily temperatures (except Cumberland Gap and Henderson) and all of Kentucky had more precipitation than expected, based upon the 30-year average (Table 1).

Table 1. Actual maximum, minimum and average air temperature and total precipitation and the deviation (dev.) from the 30-year average from January 1, 2019 to October 20, 2019 for various locations across Kentucky. Data provided by University of Kentucky Agricultural Weather Center (<http://www.wagwx.ca.uky.edu>). †Deviation from the 30-year average.

Location	Air Temperature (°F)						Total Precipitation (inches)	
	Maximum		Minimum		Average		Actual	Dev.
	Actual	Dev.†	Actual	Dev.	Actual	Dev.		
Bardstown	72	+2	51	+3	61	+2	43.74	+7.47
Berea	72	+4	49	+2	60	+3	43.14	+5.85
Bowling Green	74	+4	54	+7	64	+5	43.49	+3.09
Buckhorn Lake	70	+2	52	+4	61	+3	42.55	+5.10
Covington	69	+1	51	+3	60	+2	44.27	+10.56
Cumberland Gap	61	-7	47	-1	54	-4	56.96	+15.62
Dix Dam	71	+3	51	+4	61	+3	39.32	+1.85
Glasgow	72	+2	52	+4	62	+3	45.12	+2.63
Grayson	73	+5	50	+2	61	+3	42.34	+8.16
Hardinsburg	71	+1	51	+3	61	+2	47.63	+8.52
Henderson	71	-2	50	0	60	-1	38.31	+2.32
Jackson	72	+4	53	+5	62	+4	42.83	+4.54
Lexington	72	+4	52	+5	62	+4	40.00	+3.73
London	72	+4	52	+4	62	+4	50.25	+13.62
Louisville	73	+3	55	+7	64	+5	40.81	+4.72
Mayfield	72	0	51	+2	62	+1	51.22	+9.39
Nolin Lake	73	+3	52	+5	63	+4	50.32	+9.30
Paducah	73	+1	53	+4	63	+2	57.03	+17.78
Princeton	72	-1	51	+2	62	+1	44.90	+4.52
Quicksand	72	+4	50	+3	61	+4	41.55	+3.26
Somerset	71	+3	49	+2	60	+3	47.64	+6.97
Spindletop Research Farm	72	+4	51	+4	62	+4	40.04	+3.77
Williamstown	69	+1	49	+2	59	+1	46.11	+10.39

Unfortunately, the reality of this year’s growing season was that it was very similar to a roller coaster! Initially, most of the state had temperatures that were well above the 30-year average for April and May with precipitation from much of the state similar to the 30-year (Table 2 and 3). From June to August, temperatures were much closer to the 30-year average than the spring temperatures with excessive rain across the entire state for June (Table 2 and 3). Precipitation in July and August was quite different across the state. Some regions had excessive precipitation, such as Paducah and Grayson in July and Princeton in August, while other regions began to become quite dry beginning in July, such as Bardstown, Glasgow, Lexington (including Spindletop Research Farm), Hardinsburg, and Louisville. This dry trend has continued for most of the state, along with excessive temperatures, for September and October (Table 2 and 3).

Table 2. The deviation from the 30-year normal for average daily temperatures at various locations across Kentucky. Data provided by University of Kentucky Agricultural Weather Center (<http://www.wagwx.ca.uky.edu>).

Location	Deviation from the 30-year Average Daily Temperature (°F)						
	April	May	June	July	Aug	Sept	Oct 1-20
Bardstown	+2	+2	-1	0	+1	+7	+4
Berea	0	+2	-2	0	-1	+3	+3
Bowling Green	+4	+6	0	+2	+2	+9	+7
Buckhorn Lake	+3	+3	0	0	0	+6	+5
Covington	+1	+3	0	+3	+1	+7	+5
Cumberland Gap	-4	-3	-8	-7	-7	-1	0
Dix Dam	+4	+4	0	+1	0	+8	+6
Glasgow	+2	+3	-2	-1	-1	+5	+4
Grayson	+2	+3	0	+1	+2	+6	+4
Hardinsburg	+2	+4	-1	0	-1	+6	+3
Henderson	0	+3	-2	-1	-1	+4	+1
Jackson	+8	+7	+2	+3	+3	+11	+10
Lexington	+5	+5	+1	+3	+3	+10	+7
London	+3	+5	+1	+2	+2	+7	+5
Louisville	+5	+6	+3	+5	+4	+11	+7
Mayfield	0	+3	-1	-1	-1	+4	+2
Nolin Lake	+3	+4	0	+1	0	+6	+5
Paducah	+1	+3	0	+1	+1	+6	+3
Princeton	0	+2	-2	-1	-1	+4	+3
Quicksand	+5	+6	+2	+3	+2	+8	+8
Somerset	+2	+4	-1	0	-1	+5	+4
Spindletop Research Farm	+4	+5	+1	+3	+2	+9	+6
Williamstown	+4	+3	-1	+1	0	+6	+3
State Average	+2	+4	0	+1	0	+6	+5

Table 3. The deviation from the 30-year average for monthly precipitation at various locations across Kentucky. Data provided by University of Kentucky Agricultural Weather Center (<http://www.agwx.ca.uky.edu>).

Location	Deviation from the 30-year Average for Monthly Precipitation (inches)						
	Apr	May	June	July	Aug	Sept	Oct
Bardstown	1.25	-0.68	5.36	-3.01	0.54	-3.18	1.50
Berea	-0.04	-0.24	4.04	0.13	-1.10	-3.98	1.80
Bowling Green	0.55	-1.88	4.48	-2.10	2.43	-3.51	-1.71
Buckhorn Lake	-0.93	1.22	2.71	0.27	-1.28	-3.58	1.11
Covington	0.85	1.37	5.52	-1.83	0.44	-2.28	-1.75
Cumberland Gap	1.52	2.34	4.26	-0.69	-1.22	-2.45	-1.51
Dix Dam	-0.32	-1.93	4.70	1.22	-2.58	-3.36	0.41
Glasgow	0.39	-2.93	6.40	-1.73	-1.36	-3.81	0.70
Grayson	-1.21	1.53	1.74	2.39	0.11	-2.67	2.01
Hardinsburg	3.13	0.84	6.37	-1.81	-1.91	-3.63	0.09
Henderson	0.98	0.30	1.95	-1.70	0.08	-3.45	-2.18
Jackson	-1.30	0.42	4.55	1.72	-2.76	-3.52	-0.03
Lexington	0.51	-0.10	3.87	-1.46	-1.78	-3.20	1.07
London	-0.06	0.08	7.12	0.51	-0.59	-3.37	1.78
Louisville	2.39	-0.01	4.26	-3.09	-0.86	-3.12	-0.28
Mayfield	-0.27	1.47	0.20	1.50	1.08	-3.87	-2.09
Nolin Lake	-0.08	-3.06	8.46	-1.10	1.31	-4.10	0.05
Paducah	0.60	5.87	2.19	2.68	0.39	-3.37	-1.54
Princeton	-0.30	0.65	0.48	-1.17	2.30	-2.99	-0.46
Quicksand	-1.55	-0.57	4.53	1.07	-2.44	-3.48	0.67
Somerset	-0.95	1.59	4.13	-0.01	-1.29	-3.87	-0.93
Spindletop Research Farm	0.88	0.02	2.47	-1.70	-1.51	-3.02	0.95
Williamstown	2.45	0.14	3.45	0.76	-0.72	-2.89	-0.34
State Average	0.37	0.28	4.05	-0.40	-0.55	-3.33	-0.03

These extremely hot and dry conditions have led to some soybean fields just simply dying. This is a quite different physiological process than normal senescence of the crop that includes a gradual drying period. In some of our studies this year, the fields of soybean plants that died have a striking appearance. Most plants still have petioles (the part of the plant that attaches a leaf to the main stem) still attached to the main stems (Figure 1). Not only do these fields look quite different than normal, but they have also resulted in a difficult harvest for our small plot combines with the harvested seed having quite a bit of trash from those petioles.

Figure 1. Soybean field with petioles still attached to the main stem at harvest.



There is the concern that yield is reduced for a soybean crop that has just suddenly died due to hot, dry conditions. However, the study photographed in Figure 1 had an average yield of almost 84 bushels per acre, with the highest yielding plot almost 98 bushels per acre and the lowest yielding plot being 69 bushels per acre. This is in contrast to a different study that was planted two weeks later (on May 28). In that study, the petioles fell off as normal. However the yield of that study was quite a bit less; the average yield of the study was 53 bushels per acre and a range of plot yields from 49 to 57 bushels per acre.

Despite the weather conditions killing the earlier planted soybean study, the earlier planted study was obviously well past the grain fill period for soybean and just simply died without any impact on yield. However the soybean study planted just two weeks later was probably still in the R6 growth stage, which is extremely sensitive to stress. Given observations and preliminary analyses from some of our soybean studies this year, and the fact that Kentucky had a very wide range in planting dates this year, there are likely some fields with excellent yield potential and unfortunately, other fields that will be greatly impacted by the hot, dry conditions and will yield much less than expected.