



Integrated Pest & Crop Management

Multi-herbicide Resistant Palmer Amaranth Confirmed in Missouri — by Mandy Bish and Kevin Bradley

In September, Southern Illinois University weed scientist Karla Gage along with Ronald Krausz, researcher and farm manager of SIU’s Belleville Research Center, identified a population of Palmer Amaranth with glyphosate- (group 9) and PPO- (group 14) resistance. This population, found just north of St. Louis in the Mississippi river bottoms, is the first confirmed case of multi-resistant Palmer amaranth in Missouri, and the first known instance of a Palmer amaranth population in Missouri with resistance to post-emergence applications of group 14 herbicides like fomesafen (Flexstar, Marvel, etc.), lactofen (Cobra), or aciflurofen (Ultra Blazer). The team sent tissue to the Illinois Plant Clinic where the samples were confirmed to have elevated copy numbers of the EPSPS gene, leading to glyphosate resistance, and the sample tested positive for a point mutation in the PPO gene known to confer resistance to PPO-inhibitor herbicides. PPO resistance in Palmer amaranth was first discovered in Tennessee in 2015 and more recently other populations have been discovered in southern Illinois. Midwest growers have had to contend with PPO-resistant populations of waterhemp



Figure 1: Palmer amaranth growing in a cornfield near West Alton, Missouri in 2016. Photo courtesy of University of Missouri undergraduate Wyatt Coffman

for many years, and especially in Missouri and Illinois, multiple-resistant waterhemp is now the rule rather than the exception. This new finding with Palmer amaranth re-emphasizes the need for an integrated approach to the management of troublesome pigweed species like Palmer amaranth and waterhemp; one that includes multiple herbicide modes of action and cultural practices that minimize the deposition of weed seed back into the soil. If you have Palmer amaranth populations that you suspect are resistant to the group 14 herbicides, we’d like to hear about it and would be glad to discuss this with you further. 🍷



Figure 2: Waterhemp (left) and Palmer (right) present in the same field. Notice the long petioles on the palmer plant along with the broader leaves and poinsettia-like leaf arrangement. Waterhemp leaves tend to be narrower than palmer with shorter petioles.



Figure 3: The seedhead of a Palmer amaranth plant can reach over 1.5 feet in length; no other pigweed seedhead will grow to that length.

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Weather Data for the Week Ending October 30, 2016

Station	County	Weekly Temperature (°F)						Monthly Precipitation (in.)		Growing Degree Days‡	
		Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	Oct 1 - 30	Departure from long term avg.	Accumulated Since Apr 1	Departure from long term avg.
Corning	Atchison	73	48	84	38	61	+10	0.93	-1.75	4134	+683
St. Joseph	Buchanan	72	51	81	43	61	+9	1.64	-1.16	4005	+564
Brunswick	Carroll	73	52	84	41	62	+10	3.54	+0.59	4218	+725
Albany	Gentry	69	49	81	36	59	+8	1.47	-1.05	3606	+256
Auxvasse	Audrain	71	50	82	42	60	+7	0.71	-2.17	4013	+453
Vandalia	Audrain	70	49	82	40	59	+7	0.59	-2.08	3997	+503
Columbia-Bradford Research and Extension Center	Boone	71	50	82	43	60	+7	0.98	-1.93	3903	+240
Columbia-Capen Park	Boone	74	48	85	39	59	+5	1.22	-1.90	4003	+207
Columbia-Jefferson Farm and Gardens	Boone	73	52	82	43	61	+8	1.04	-1.88	4138	+462
Columbia-Sanborn Field	Boone	72	54	83	46	62	+8	1.08	-1.94	4349	+543
Columbia-South Farms	Boone	72	51	82	44	61	+8	1.10	-1.86	4084	+415
Williamsburg	Callaway	70	49	83	42	59	+6	0.85	-2.45	3839	+346
Novelty	Knox	68	49	80	42	58	+6	2.04	-1.04	3718	+303
Mosow Mills	Lincoln	70	48	84	42	59	+6	0.50	-2.87	4063	+417
Linneus	Linn	70	50	81	39	59	+8	2.04	-0.86	3821	+464
Monroe City	Monroe	70	49	83	41	59	+8	1.51	-1.22	3943	+467
Versailles	Morgan	75	52	83	43	64	+10	1.51	-1.90	4274	+497
Green Ridge	Pettis	74	52	81	43	62	+10	2.69	-0.72	4092	+557
Unionville	Putnam	67	48	80	41	57	+7	1.53	-1.58	3586	+471
Lamar	Barton	75	56	82	49	64	+9	4.75	+1.16	4293	+339
Butler	Bates	75	53	81	44	63	+9	4.80	+1.41	4199	+203
Cook Station	Crawford	77	49	81	42	62	+8	2.30	-1.07	3962	+206
Round Spring	Shannon	78	45	82	41	59	+6	2.15	-1.35	3839	+245
Mountain Grove	Wright	76	54	79	47	63	+10	2.08	-1.33	3885	+310
Delta	Cape Girardeau	76	47	83	42	61	+6	1.06	-2.73	4307	+137
Cardwell	Dunklin	80	53	85	47	66	+9	0.92	-3.43	4840	+282
Clarkton	Dunklin	80	50	84	45	64	+8	1.34	-1.78	4738	+254
Glendonville	Dunklin	80	51	84	47	65	+8	0.94	-2.12	4733	+282
Charleston	Mississippi	79	50	85	45	64	+8	0.19	-3.38	4724	+508
Hayward	Pemiscot	79	51	84	45	64	+7	1.20	-2.78	4638	+143
Portageville	Pemiscot	80	53	86	46	66	+9	1.04	-3.11	4964	+433
Steele	Pemiscot	81	51	85	43	65	+7	0.99	-2.90	4869	+326

‡Growing degree days are calculated by subtracting a 50 degree (Fahrenheit) base temperature from the average daily temperature. Thus, if the average temperature for the day is 75 degrees, then 25 growing degree days will have been accumulated.

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