



Figure S1. The spectral reflectance profile of the five study sites. (a) Brighton, Illinois (IL); (b) Urbana, IL; (c) Madrid, Iowa (IA); (d) Ithaca, Nebraska (NE); and (e) South Shore, South Dakota (SD), sites. The spectral reflectance value of each band was averaged over all switchgrass cultivars and perennial grass types at each study site. NIR = near-infrared; DOY = day-of-year.

Table S1. Additional field characteristics and management data.

Site	Soil Type	Herbicide		Fertilizer	
		Date	Description	Date	Description
Brighton, IL 39°3'23.23"N, 90°11'7.62"W	<u>Elco silt loam</u> 5-18% slope (fine-silty, mixed, superactive, mesic Oxyaquic Hapludalfs)		Atrazine (2-chloro-4-ethylamino-6-isopropylamino-1,3,5-triazine 2.3 L/ha; Round-up (Glyphosate 0.58 L/ha)	4/15/2020	UAN 32% N
	<u>Homen silt loam</u> 2-5% (fine-silty, mixed, superactive, mesic Fragic Oxyaquic Hapludalfs)	4/6/2020			
	<u>Bunkum silt loam</u> 5-10% (fine-silty, mixed, superactive, mesic Aquic Hapludalfs)				
	<u>Keomah silt loam</u> 0-2% (Fine, smectitic, mesic Aeric Endoaqualfs)				
Urbana, IL 40°4'7.68"N, 88°11'26.78"W	<u>Drummer silt clay loam</u> 0-2% slope (fine-silty, mixed superactive, mesic Typic Endoaquolis)	5/30/2020	Atrazine (2-chloro-4ethylamino-6-isopropylamino-1,3,5-triazine 2.3 L/ha)	Not applicable	Establishment year- no fertilizer applied
	<u>Flanagan silt loam</u> 0-2% slope (Fine, smectitic, mesic Aquic Argiudolis)				
	<u>Clarion loam</u> 2-10% slope (Fine-loamy, mixed superactive, mesic Typic Hapludolls)				
Iowa 41°55'52.17, 93°45'49.28"W	<u>Coland clay loam</u> 0-2% (Fine-loamy, mixed, superactive, mesic Cumulic Endoaquolis)				
	<u>Spillville loam</u> 2-5% (Fine-loamy, mixed, superactive, mesic Cumulic Hapludolls)	6/4/2020; 7/1/2020; 7/17/2020	2,4-D (1.9 L/ha) Stinger (clopyralid 0.4 L/ha) Quinclorac (1.2 L/ha)	6/4/2020	UAN 32% N
	<u>Zenor sandy loam</u> 5-9% (Coarse-loamy, mixed, superactive, mesic Typic Hapludolls)				
	<u>Nicollet loam</u> 1-3% (Fine-loamy, mixed, superactive, mesic Aquic Hapludolls)				
Nebraska 41°8'57.54"N, 96°27'14.07"W	<u>Yutan silty clay loam</u> 2-6% slope (Fine-loamy, mixed, superactive, mesic Mollic Hapludalfs)		Atrazine (2-chloro-4ethylamino-6-isopropylamino-1,3,5-triazine 2.4 L/ha); 2,4-D (2.4 L/ha); Dual II Magnum (S-metolachlor 1.2 L/ha)	5/1/2020 – 5/11/2020	Urea 46% N; Independence
	<u>Tomek silt loam</u> 0-2% (Fine, smectitic, mesic Pachic Argiudolls)	5/12/2020			
	<u>Filbert silt loam</u> 0-1% (Fine, smectitic, mesic Vertic Argialbolls)				
South Dakota	<u>Vienna-Brookings Complex</u> 0-2% slope (Fine-loamy, mixed, superactive, frigid Calcic Hapludolls and fine-silty, mixed, superactive, frigid Pachic Hapludolls)	Not applicable	Not needed	6/22/2020	UAN 28% N

45°6'20.30"N, Renshaw-Fordville loam 0-6% (Fine-loamy over sandy or sandy skeletal,
97°3'42.41"W mixed, superactive, frigid Calcic and Pachic Hapludolls)

Table S2. Plant frequency across perennial grass crops/cultivars in the spring-summer of 2020.

Site	All crops/cultivars Average cover [min.–max.] (%)	By crop/cultivar density [min.–max.] (%)
Brighton, IL	30% [10–60%]	Liberty SW [11–26%] Independence SW [9–29%] Shawnee SW [41–62%]
Urbana, IL	50% [32–67%]	Liberty SW [32–67%] Independence SW [35–55%]
Iowa	46% [2–93%]	Liberty SW [34–71%] Independence SW [2–18%] Shawnee SW [51–93%]
Nebraska	85% [75–98%]	Liberty SW [57–83%] Big bluestem [82–93%] Low diversity [83–98%] Independence SW [76%]
South Dakota	100% [100–100%]	Carthage SW [100–100%] Sunburst SW [100–100%]

min. = minimum; max. = maximum; SW = switchgrass.