



Table S1. Effects of various fertilizers on soil nutrient concentrations, pH, cation exchange capacity, organic matter, moisture, and compaction of a native soil Kentucky bluegrass maintained at 7.6 cm in Ames, IA, USA in 2019 and 2020.

Treatment ¹	P ² mg kg ⁻¹	K mg kg ⁻¹	Mg mg kg ⁻¹	Ca mg kg ⁻¹	S mg kg ⁻¹	Zn mg kg ⁻¹	pH	CEC cmolc kg ⁻¹	Organic Matter %	Soil Moisture ³ % v/v	Soil Compaction ⁴ kPa
Synthetic fertilizer with black gypsum (SFBG)	16.9 ⁵	119.0	595.4	2343.5	7.5	2.1	6.9	16.8	4.5	36.6 ⁴	1275
Poly-coated humic-coated urea (PCHCU)	15.0	101.4	583.8	2289.3	4.8	2.1	7.0	16.2	4.5	37.0	1344
PCHCU (0.75 rate)	15.2	111.4	578.3	2253.3	4.8	1.8	7.0	16.1	4.6	36.3	1346
Urea (0.75 rate) + humic dispersing granules (HDG)	14.0	110.3	570.2	2247.2	4.9	1.9	6.9	15.9	4.2	37.0	1234
Urea (0.5 rate) + HDG	14.6	109.0	576.0	2272.3	4.9	2.0	7.0	16.0	4.3	36.9	1294
Urea	14.5	108.6	599.2	2383.5	4.8	2.5	6.9	16.7	4.3	36.9	1260
Stabilized nitrogen	18.8	117.4	596.7	2342.2	4.7	2.1	7.1	16.3	4.3	37.4	1269
HDG	16.8	121.9	593.1	2323.3	5.0	5.4	7.0	16.4	4.3	38.3	1210
Nontreated	16.7	125.4	588.2	2289.7	5.0	2.0	7.0	15.9	4.3	37.6	1296
LSD _{0.05} ⁶	NS ⁷	NS	NS	NS	0.8	NS	NS	NS	NS	NS	NS

¹ Fertilizer treatments were applied in April, May, Sep., and Oct. in 2019 and 2020. SFBG, PCHCU, urea, and stabilized nitrogen were applied at 48.8 kg N ha⁻¹, PCHCU (0.75 rate) and urea (0.75 rate) were applied at 36.6 kg N ha⁻¹, urea (0.5 rate) was applied at 24.4 kg N ha⁻¹, and HDG was applied at 44.9 kg HDG ha⁻¹.

² Soil samples were collected to a depth of 5.1 cm on 13 May and 31 Oct. in 2019 and 2020 (after one fertilizer application and end of field season, respectively). Phosphorus (P), potassium (K), magnesium (Mg), calcium (Ca), sulfur (S), and zinc (Zn) concentrations, pH, cation exchange capacity (CEC), and organic matter values were determined by soil tests conducted by Solum, Inc. (Ames, IA, USA) and SureTech Laboratories (Indianapolis, IN, USA).

³ Soil moisture was measured using a time domain reflectance sensor with 7.6 cm tines.

⁴ Soil compaction was measured using a digital soil penetrometer to a depth of 22.9 cm.

⁵ No interaction between years, sampling date, and treatment effect, means are pooled across years and sampling dates.

⁶ Treatment mean comparisons were separated using Fisher's protected least significant difference (LSD) at the $p \leq 0.05$ level.

⁷ NS, nonsignificant at the 0.05 probability level.