

Article

Estimating Switchgrass Biomass Yield and Lignocellulose Composition from UAV-Based Indices

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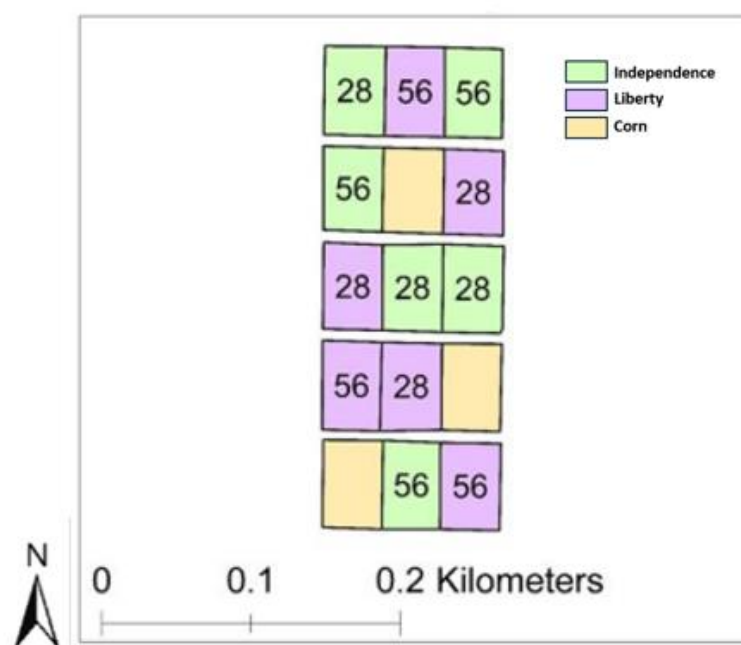
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Supplemental



Supplemental Figure S1. Plot layout in Urbana, IL, showing switchgrass (*Panicum virgatum* L) cultivars Independence and Liberty and their respective annual N application (28 or 56 kg N ha⁻¹) rates. (Adapted from Hamada et al [26].)

Supplemental Table S1. Switchgrass biomass yield estimation based on linear, exponential, partial least square, and random forest regression models using single and multiple predictor indices under sampling periods in July and August of 2021–2023. The relative mean squares error (RMSE), mean absolute error (MAE), and coefficient of determination (R^2) for the evaluated models during the validation phase were calculated by taking the average prediction scores across 10 validation datasets.

Period	Model	Predictor(s)	Training			Test			Validation		
			R^2	RMSE (Mg ha ⁻¹)	MAE (Mg ha ⁻¹)	R^2	RMSE (Mg ha ⁻¹)	MAE (Mg ha ⁻¹)	R^2	RMSE (Mg ha ⁻¹)	MAE (Mg ha ⁻¹)
Mid-July	Linear	NDRE	0.62	0.89	0.74	0.75	1.33	1.11	0.73	1.79	1.54
		GNDVI	0.81	0.42	0.33	0.77	0.82	0.75	0.63	2.70	2.51
		GNDVI + NDRE	0.83	0.41	0.33	0.80	0.89	0.83	0.65	2.63	2.45
		GNDVI + NDVI + NDRE	0.80	0.41	0.33	0.74	0.92	0.86	0.63	2.72	2.52
	Exponential	NDRE	0.55	0.80	0.85	0.59	1.46	1.27	0.73	1.73	1.55
		GNDVI	0.80	0.47	0.41	0.75	0.74	0.59	0.64	1.69	1.50
		GNDVI + NDRE	0.81	0.45	0.40	0.74	0.82	0.75	0.67	1.58	1.40
		GNDVI + NDVI + NDRE	0.81	0.43	0.37	0.75	0.99	0.93	0.58	1.86	1.65
	PLSR	NDRE	0.60	1.00	0.85	0.69	1.46	1.27	0.72	1.73	1.55
		GNDVI	0.80	0.47	0.42	0.79	0.74	0.59	0.60	1.66	1.50
		GNDVI + NDRE	0.84	0.45	0.40	0.82	0.82	0.75	0.59	1.58	1.40
		GNDVI + NDVI + NDRE	0.79	0.43	0.37	0.75	0.99	0.93	0.42	1.82	1.65
	Random for-est	NDRE	0.66	0.65	0.52	0.64	0.86	0.69	0.72	1.43	0.95
		GNDVI	0.94	0.41	0.33	0.82	0.58	0.53	0.71	1.76	1.52
		GNDVI + NDRE	0.91	0.40	0.31	0.79	0.63	0.55	0.62	1.71	1.43
		GNDVI + NDVI + NDRE	0.91	0.32	0.24	0.76	0.69	0.62	0.60	1.85	1.60
Mid-August	Linear	NDRE	0.72	0.55	0.46	0.79	0.47	0.98	0.75	0.65	0.29
		GNDVI	0.86	0.54	0.43	0.79	0.37	0.79	0.86	0.59	0.43
		GNDVI + NDRE	0.88	0.51	0.44	0.84	0.35	0.40	0.88	0.91	0.73
		GNDVI + NDVI + NDRE	0.89	0.49	0.40	0.86	0.19	0.96	0.85	0.66	0.47
	Exponential	NDRE	0.71	0.37	0.22	0.74	0.58	0.39	0.75	0.50	0.21
		GNDVI	0.82	0.63	0.52	0.79	0.40	0.13	0.86	0.44	0.32
		GNDVI + NDRE	0.85	0.56	0.47	0.81	0.37	0.10	0.88	0.83	0.70
		GNDVI + NDVI + NDRE	0.85	0.56	0.47	0.82	0.27	0.99	0.86	0.64	0.50
	PLSR	NDRE	0.71	0.57	0.42	0.74	0.58	0.69	0.75	0.50	0.31
		GNDVI	0.82	0.63	0.52	0.79	0.40	0.53	0.86	0.44	0.32
		GNDVI + NDRE	0.82	0.63	0.52	0.81	0.37	0.40	0.88	0.44	0.32
		GNDVI + NDVI + NDRE	0.85	0.56	0.47	0.82	0.27	0.99	0.86	0.64	0.50
	Random for-est	NDRE	0.68	0.61	0.81	0.54	0.79	0.72	0.40	0.49	0.32
		GNDVI	0.93	0.39	0.33	0.94	0.44	0.43	0.72	0.82	0.55
		GNDVI + NDRE	0.94	0.36	0.30	0.71	0.77	0.71	0.69	0.98	0.68
		GNDVI + NDVI + NDRE	0.82	0.42	0.34	0.86	0.58	0.54	0.44	0.82	0.41