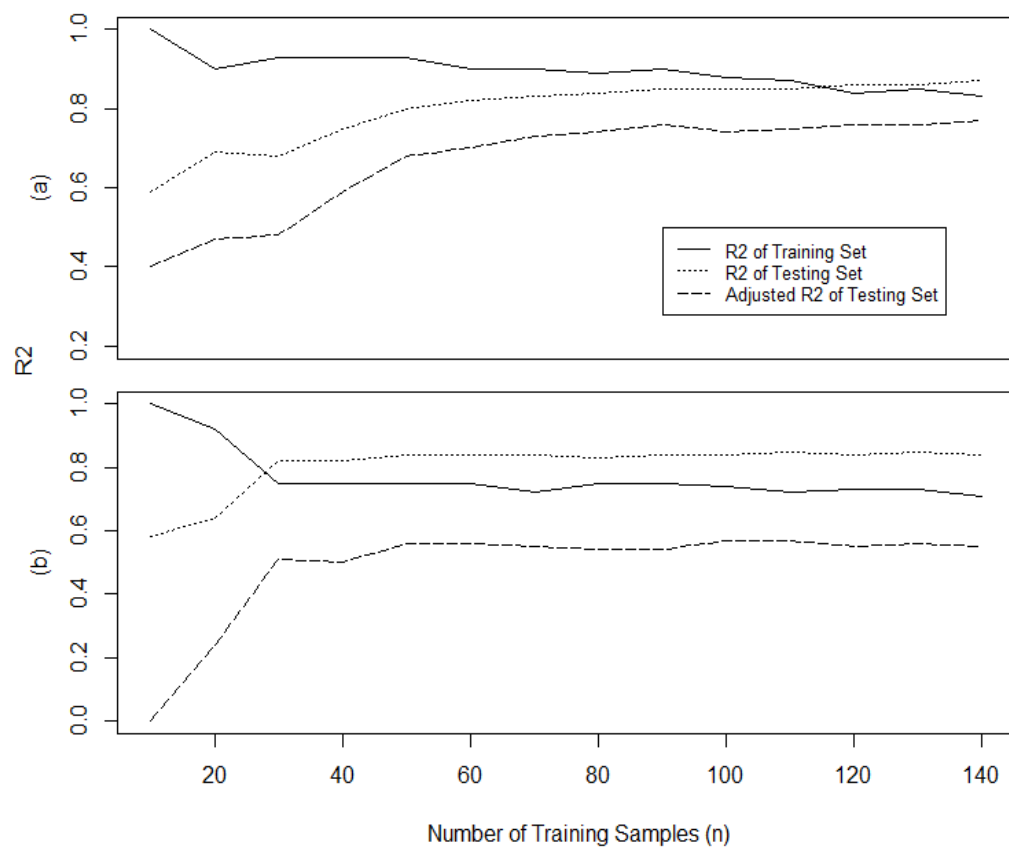## Supplementary Materials

Figure S1. Coefficient of determination (R^2) of Partial Least Square Regression (PLSR) using field spectral data to predict (**a**) cogongrass and (**b**) dead plant coverage using training sets of different sizes
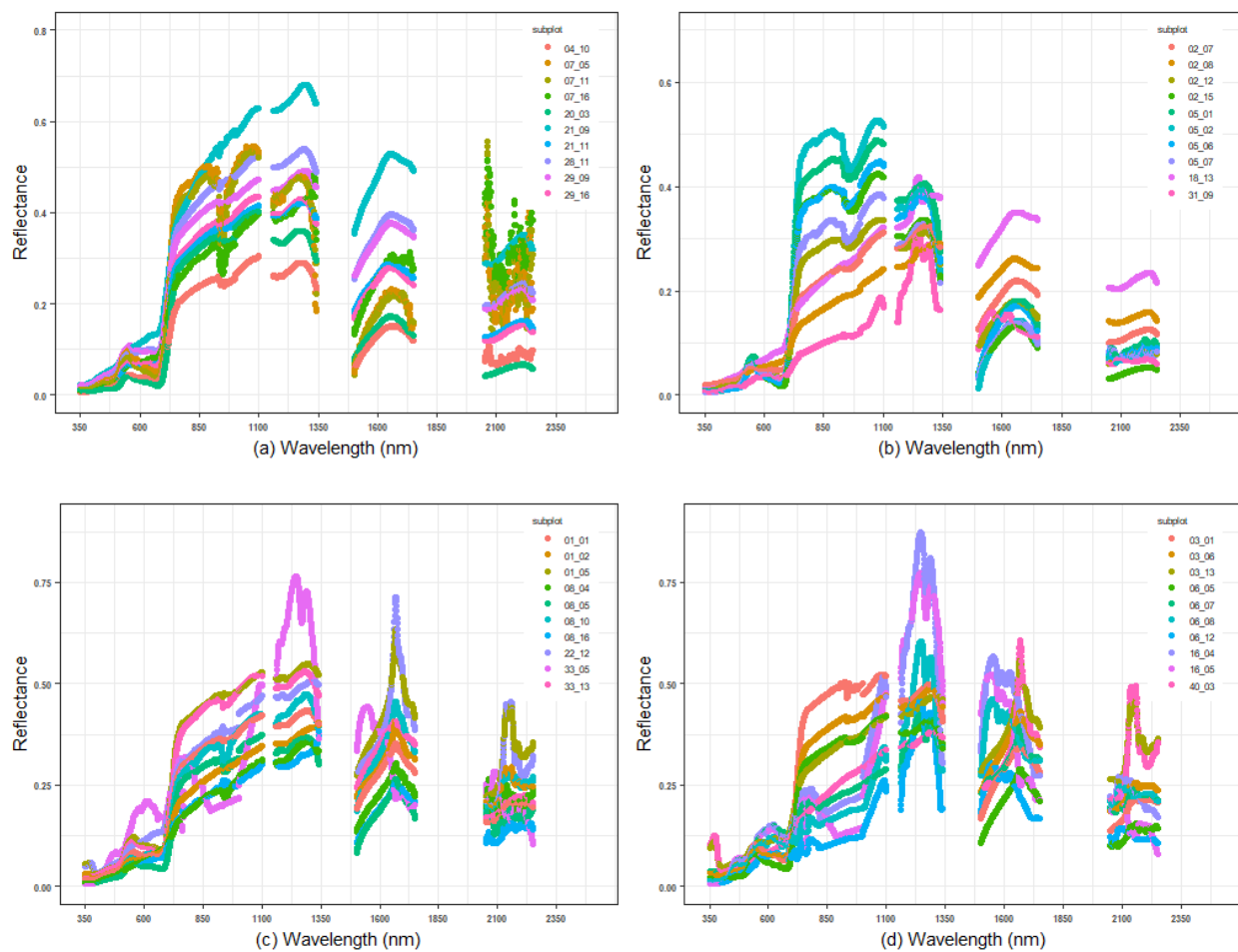
Figure S2. Reflectance of 10 subplots randomly selected from (a) ambient invaded subplots, (b) ambient uninvaded subplots, (c) drought invaded subplots, and (d) drought uninvaded subplots.
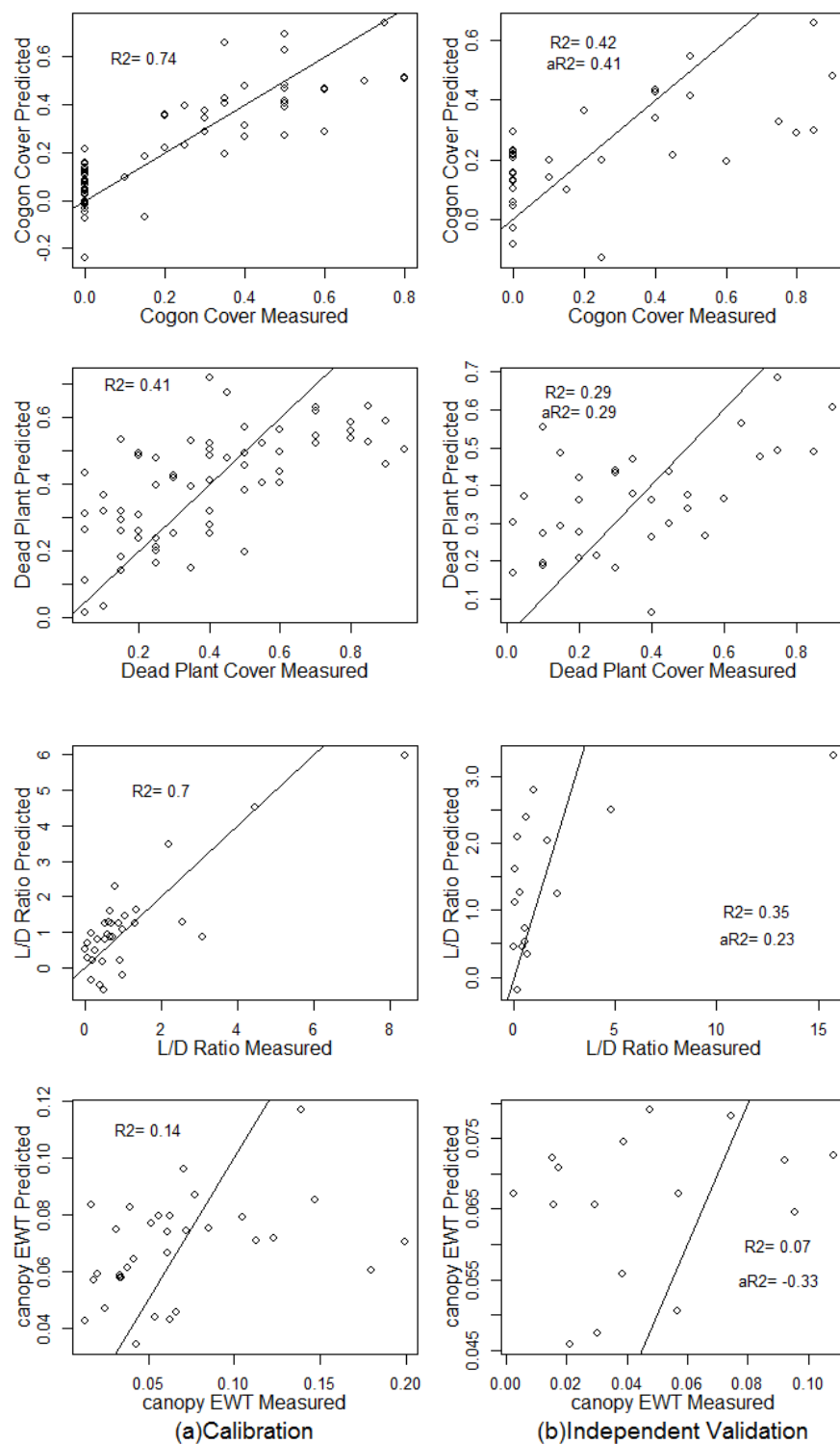
Figure S3. The results of PLSR models for cogongrass coverage, dead plant coverage, live to dead plant material ratio, and canopy EWT using original reflectance from drought dataset for calibration (column **a**) and independent validation (column **b**). The black lines are 1:1 line. R²=coefficient of determination, aR²=adjusted coefficient of determination. Results from the ambient subplots are found in the main text.
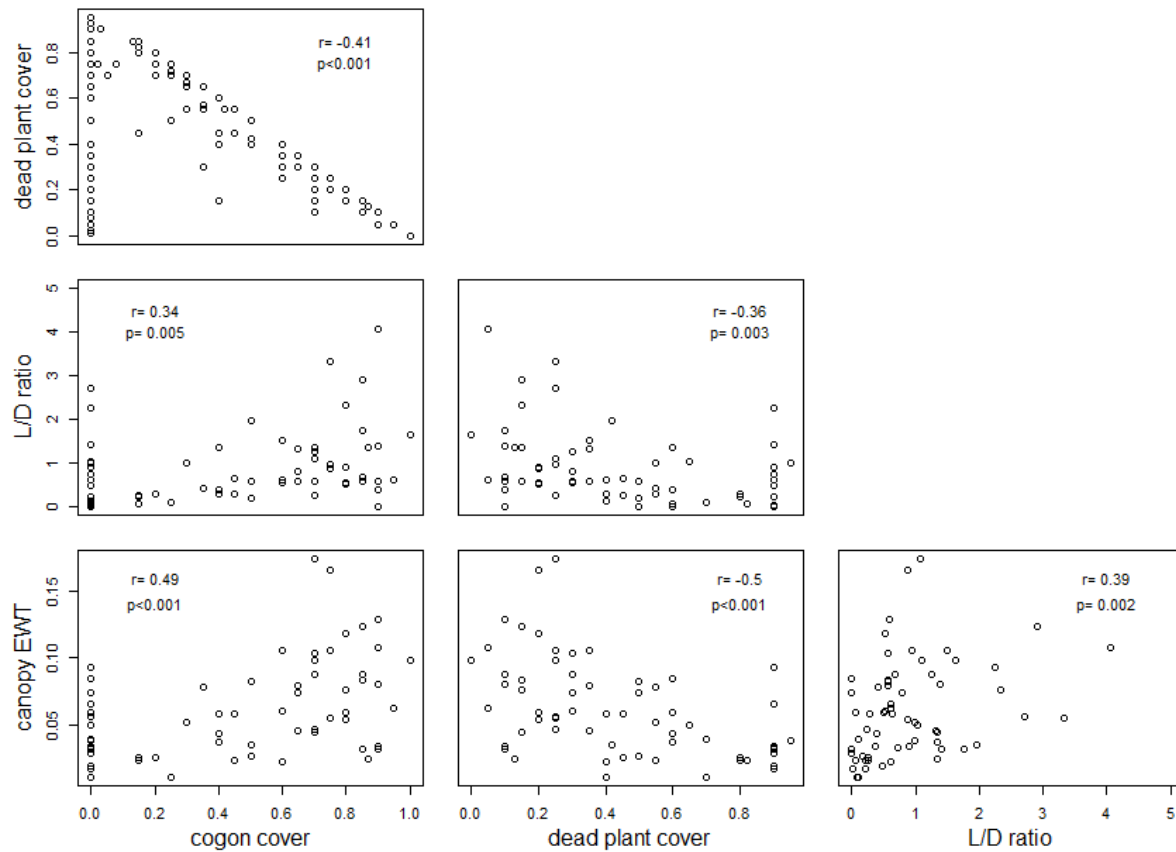
Figure S4. Pearson correlation between the vegetation characteristics under ambient treatment. The relationship between cogongrass coverage and dead plant coverage was developed from data taken in June 2015, February 2016, June 2016, December 2016, and March 2017 (N = 137). The other relationships were developed from data taken in February 2016, June 2016, and December 2017 (N = 64).
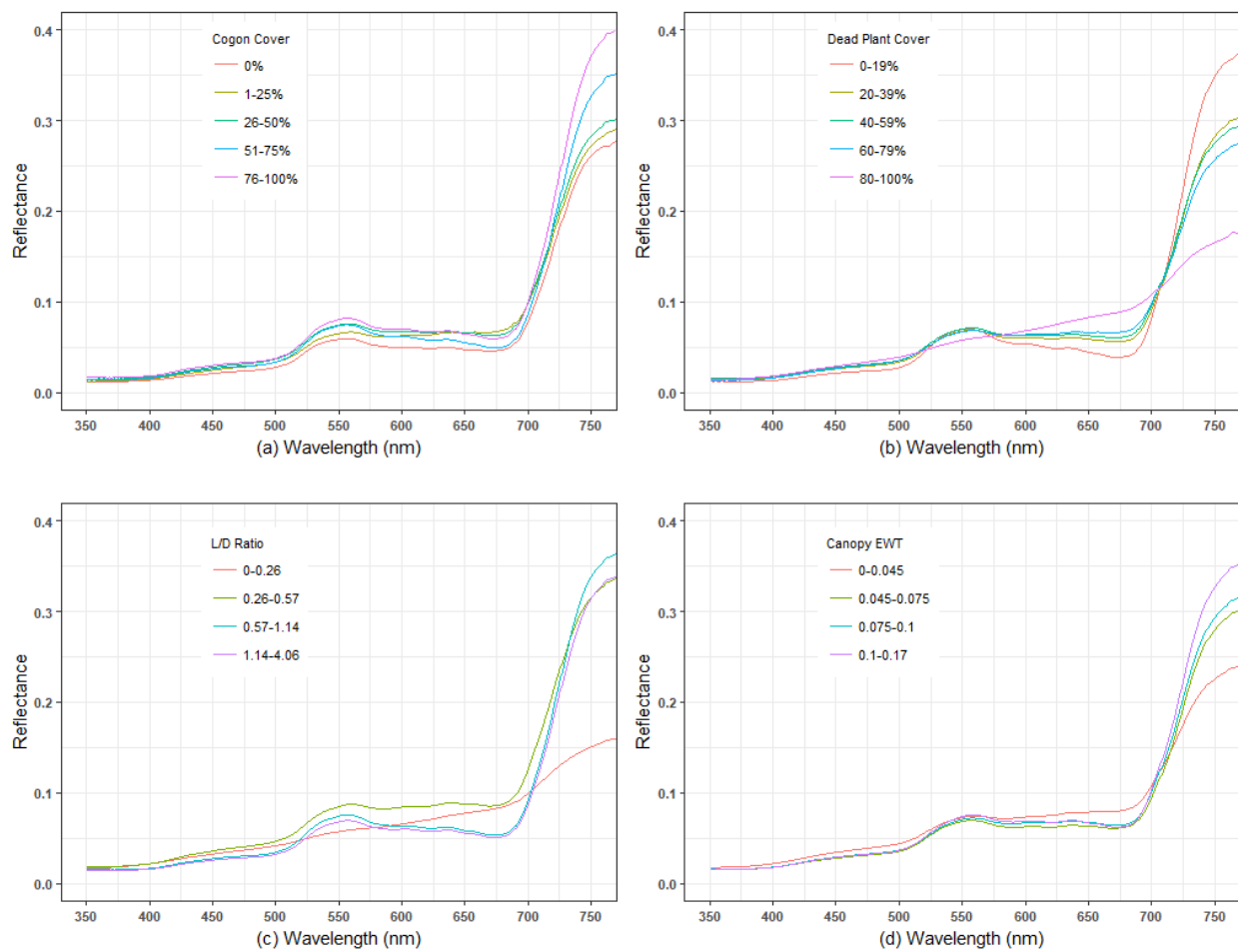
Figure S5. Mean hyperspectral reflectance in just the visible wavelength ranges for different quantiles of the following vegetation characteristics: (**a**) cogongrass coverage, (**b**) dead plant coverage, (**c**) live to dead plant material ratio, and (**d**) canopy EWT.

Table S1. The number of plant samples in each field campaign. L/D ratio is the ratio of live to dead plant material. Canopy EWT is canopy equivalent water thickness.

Period / Variable/Treatment	Cogongrass Cover		Dead Plant Cover		L/D Ratio		Canopy EWT	
	Ambient	Drought	Ambient	Drought	Ambient	Drought	Ambient	Drought
June2015	54	52	54	52	0	0	0	0
Feb2016	28	34	28	34	27	34	27	34
June2016	10	15	10	15	10	15	10	15
Dec2016	29	24	29	24	26	24	26	24
Mar2017	16	26	16	26	0	0	0	0
Total	137	151	137	151	64	73	64	73

Table S2. Predictive ability of hyperspectral estimation of vegetation characteristics using data from drought plots. Results for the ambient plots can be found in the main text. NL = number of latent variables; RMSE = root mean square error; C = calibration models using training data; P = independent validation models using testing data.

Vegetation Characteristic	NL	R^2(C)	RMSE(C)	RE(C)	R^2(CV)	RMSE(CV)	RE(CV)	R^2(P)	R^2_{adj}(P)	RMSE(P)	RE(P)
Cogon Cover	15	0.79	0.12	49.64%	0.55	0.19	79.12%	0.47	0.46	0.21	86.68%
Dead Plant Cover	9	0.68	0.15	28.61%	0.53	0.18	38.36%	0.47	0.46	0.19	46.17%
L/D Ratio	6	0.48	1.78	140.97%	0.22	1.93	163.44%	0.29	-1.16	1.88	186.70%
Canopy EWT	4	0.21	0.03	55.75%	0.04	0.04	67.38%	0.09	0.06	0.04	70.86%

Table S3. The results from a nonparametric analysis of variance (Kruskal-Wallis test) for sampling period, cogongrass introduction, and their interaction among experimental subplots in (**a**) cogongrass coverage, (**b**) dead plant coverage, (**c**) live to dead plant material ratio, and (**d**) canopy EWT.

Treatment	Kruskal-Wallis H	P value
(a) cogongrass cover		
sampling period	21.6	<0.001
(b) dead plant cover		
sampling period	28.9	<0.001
cogongrass introduction	0.8	= 0.364
interaction of period and cogongrass	83.2	<0.001
(c) L/D ratio		

sampling period	1.7	= 0.420
cogongrass introduction	3.0	= 0.083
interaction of period and cogongrass	21.2	<0.001

(d) canopy EWT		
sampling period	13.8	= 0.001
cogongrass introduction	4.8	= 0.029
interaction of period and cogongrass	23.3	<0.001