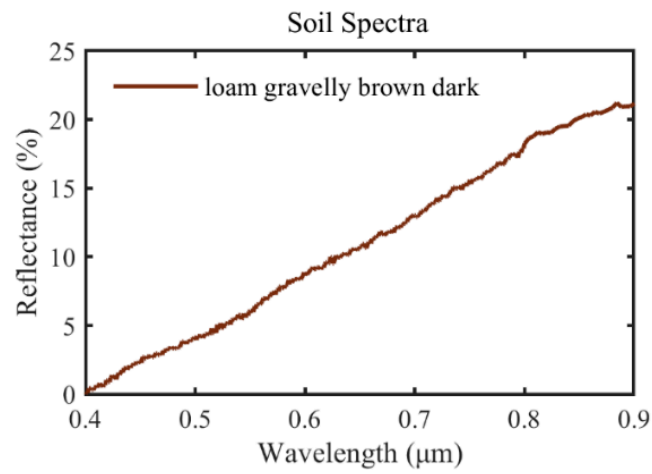**Supplementary Material**

Figure S1. Soil spectra called "loam_gravelly_brown_dark" used in the DART model (from the DART model database "Lambertian.db").
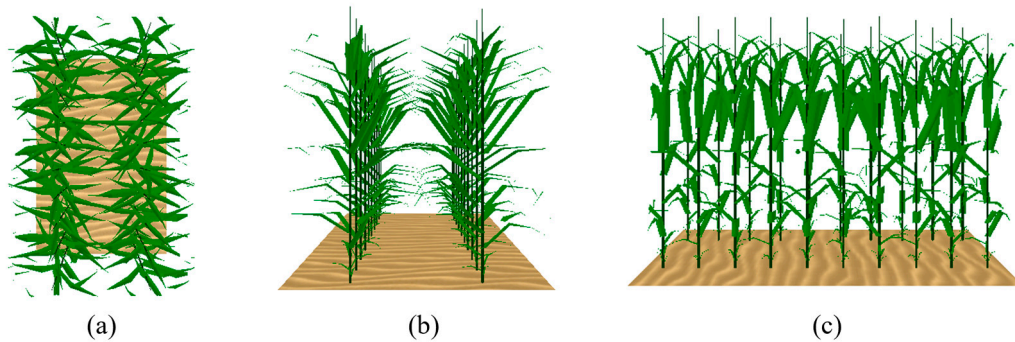

Figure S2. (**a**) Nadir and (**b**,**c**) side view of the 3-D canopy of maize simulated using the DART model. The size of the scene is 1.5 m × 1 m, and 20 maize are planted in two rows, with 10 in each row.
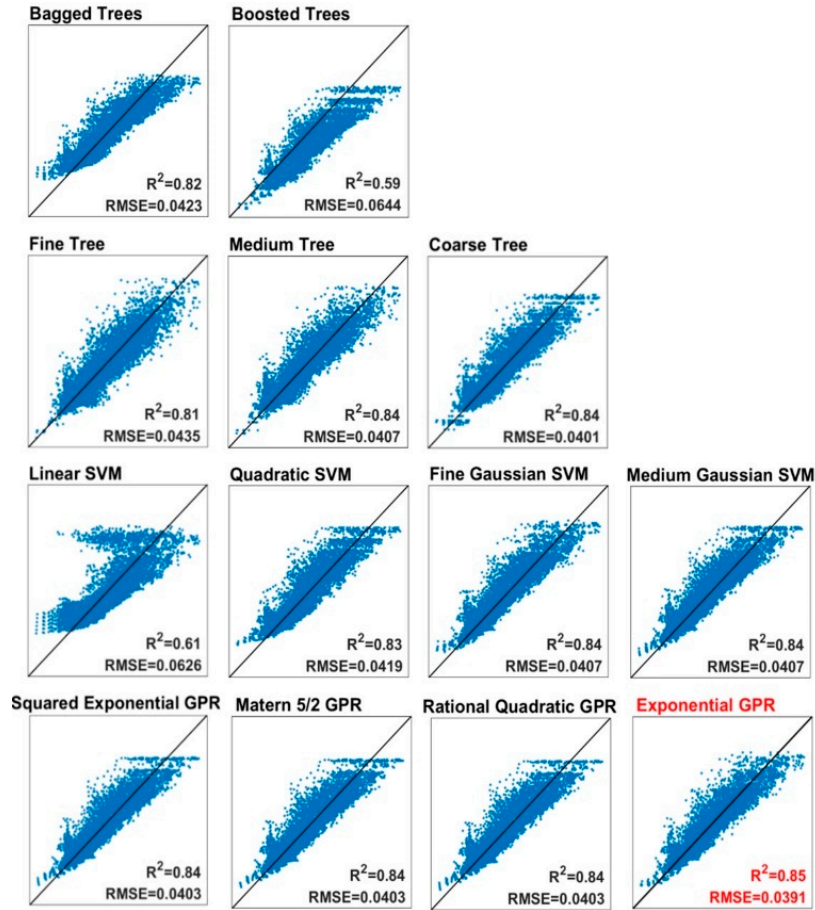
Figure S3. Training performance (Predicted vs. Actual) of machine learning algorithms based on 5-fold cross-validation method when the input parameters are soil reflectance at 780 nm and NDVI.

Table S1. The main parameters of the GPR model when using MATLAB to fit Gaussian process regression.

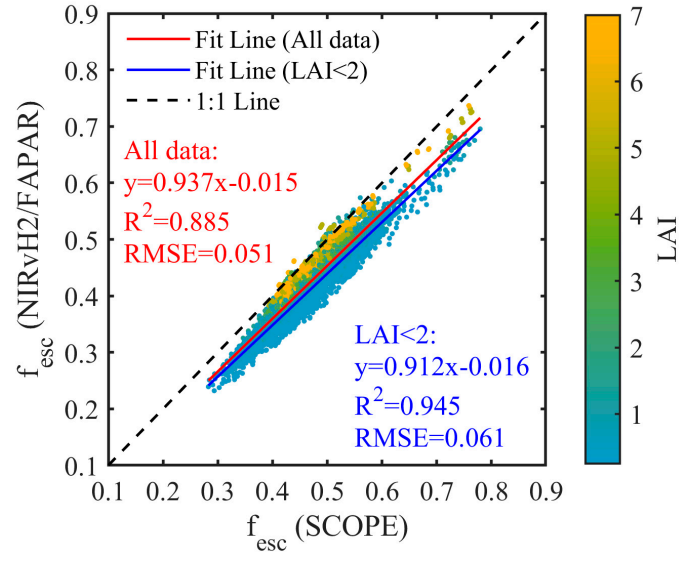| Parameters	Description	Value
FitMethod	Method for estimating GPR model Parameters	'SD'
BasisFunction	Explicit basis in GPR model	'Constant'
Standardize	Indicator of standardized data	1
KernelFunction	Form of covariance function	'Exponential'
ActiveSetMethod	Method for active set selection	'Random'
ActiveSetSize	Active set size	2000
PredictMethod	Method for prediction	'Exact'

Figure S4. Comparison of f_{esc} in the near-infrared band (760 nm) estimated by the NIRvH2/FAPAR model with the f_{esc} simulated by the SCOPE model. R^2 is the correlation coefficient of linear regression, and RMSE is the root mean square error between f_{esc} (SCOPE) and the f_{esc} values calculated by the NIRvH2/FAPAR model.