The statistical outlier removal filter detects outlier points that are further away from their neighbors than the mean of the point clouds. Two parameters were used in the process, including number of points to use for mean distance estimation (N) and standard deviation multiplier threshold (n). The first parameter is set to select a certain number of points approximating a reference point and the mean distance and standard deviation will be calculated (Equation 1 and 2 below). Then the distance threshold (ds) will be calculated (Equation 3 below). If the distance between the reference point and the i th selected points (the selected points are the N points approximating the reference point) were greater than or equal to ds (di ⩾ ds), it is classified as noise and vice versa. The denoised point cloud data were then inspected by colleagues before further analysis.

$$\bar{d} = \frac{\sum_{i=1}^{N} di}{N} \quad (1)$$

$$\delta = \frac{\sum_{i=1}^{N} \left(di - \bar{d}\right)}{N} \quad (2)$$

$$ds = \bar{d} + n \times \delta \quad (3)$$

Table S1. Fitting equations of biomass estimation using inventory approach.

Regression approach	Species	Parameters	Equation
OLS ($y=ax^2+bx+c$)	*Grewia biloba*	Crown area (CA)	$y = 0.98x + 0.57$
		Crown length (CL)	$y = 0.41x + 0.90$
		Crown width (CW)	$y = 0.45x + 0.66$
		Height(H)	$y = 0.68x + 0.76$
		Basel diameter(D)	$y = 0.32x + 0.03$
	Vitex negundo	CA	$y = 0.8x + 0.26$
		CL	$y = 0.77x + 0.54$
		CW	$y = 0.44x + 0.49$
		H	$y = 1.25x + 0.59$
		D	$y = 0.47x + 0.02$
	Diospyros lotus	CA	$y = 1.16x + 0.46$
		CL	$y = 0.56x + 0.80$
		CW	$y = 0.5x + 0.65$
		H	$y = 0.83x + 0.63$
		D	$y = 0.29x + 0.01$
NLS ($y=a*D^2H+b$)	*Grewia biloba*	D, H	$y=0.42 * D^2H+60.06$
	Vitex negundo	D, H	$y=0.2 * D^2H+19.12$
	Diospyros lotus	D, H	$y=1.1 * D^2H+56.99$
NLS ($y=a*CA^b$)	*Grewia biloba*	CA	$y=61.14 * CA^{1.003}$
	Vitex negundo	CA	$y=58.19 * CA^{1.18}$
	Diospyros lotus	CA	$y=42.34 * CA^{1.61}$

Table S2. Fitting equations of biomass estimation using non-voxel-based approach.

Species	Predicted measurements (y)	Parameters (x)	Fitting equations	R^2	RMSE (g)
Grewia biloba	Stem biomass (g)	In(stem volume)	$y=17.55x^2-150.62x+328.99$	0.95	10.67
	Leaf biomass (g)	LA (cm^2)	$y=0.0035x+1.42$	0.87	3.22
	Total biomass (g)	Predicted total biomass (g)	$y=0.94x+4.57$	0.95	11.27
Vitex negundo	Stem biomass (g)	In(stem volume)	$y=9.81x^2-95.88x+239.41$	0.94	4.09
	Leaf biomass (g)	LA (cm^2)	$y=0.0023x+0.38$	0.68	1.48
	Total biomass (g)	Predicted total biomass (g)	$y=1.11x-3.07$	0.93	4.23
Diospyros lotus	Stem biomass (g)	In(stem volume)	$y=17.28x^2-142.47x+298.16$	0.97	6.93
	Leaf biomass (g)	LA (cm^2)	$y=0.0036x+0.32$	0.93	2.4
	Total biomass (g)	Predicted total biomass (g)	$y=1.01x+0.57$	0.96	7.79

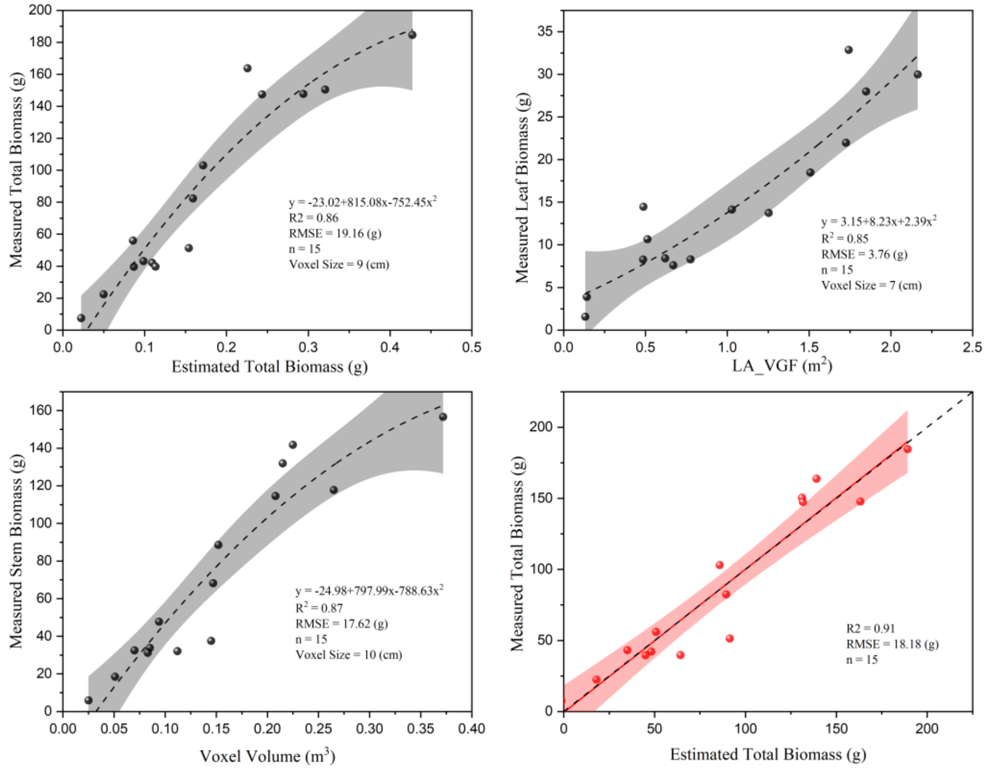

Figure S1. Voxel-based approach for estimating biomass of *Grewia biloba* with optimal voxel sizes.

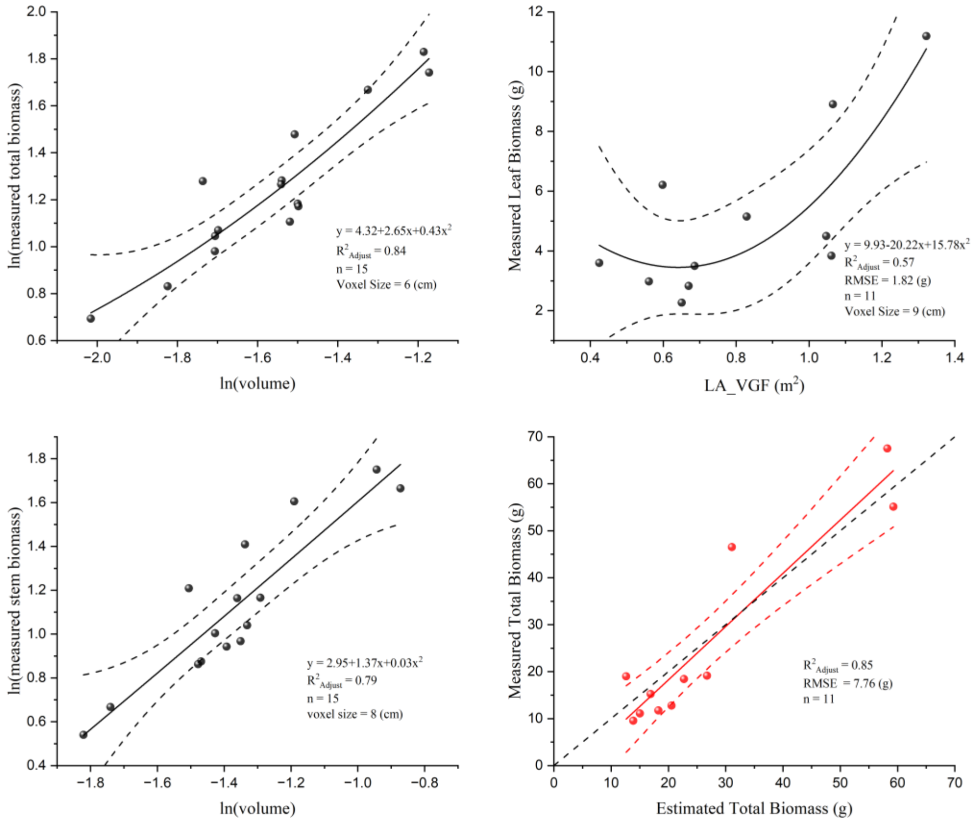

Figure S2. Voxel-based approach for estimating biomass of *Vitex negundo* with optimal voxel sizes.

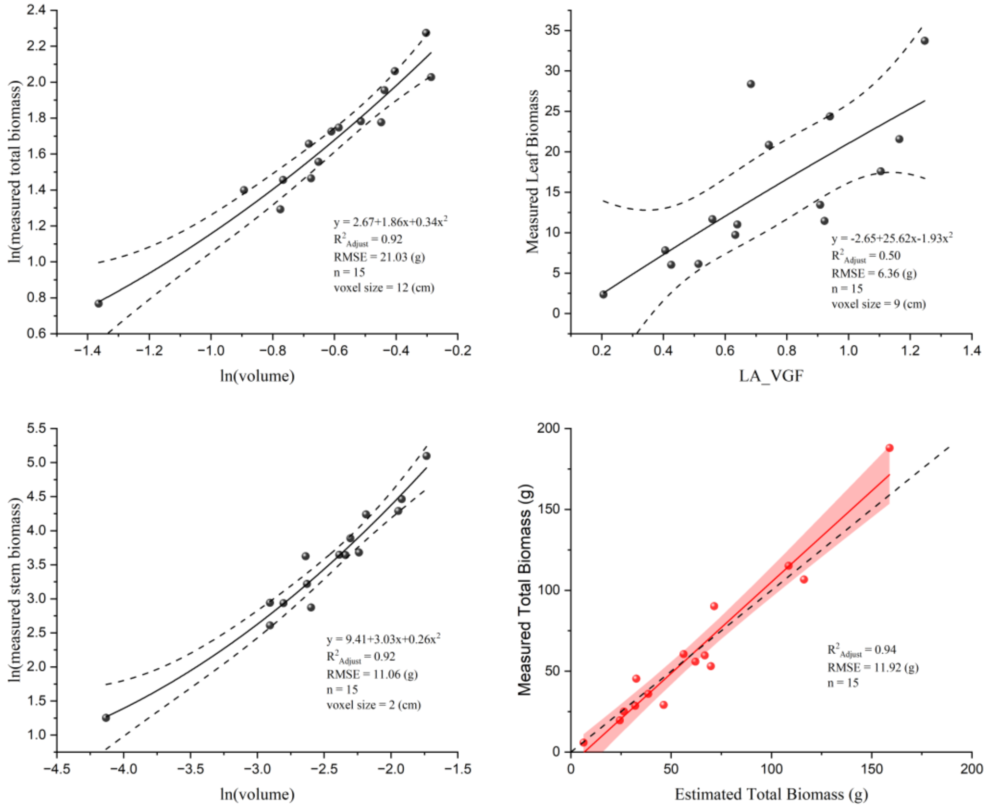

Figure S3. Voxel-based approach for estimating biomass of *Diospyros lotus* with optimal voxel sizes.

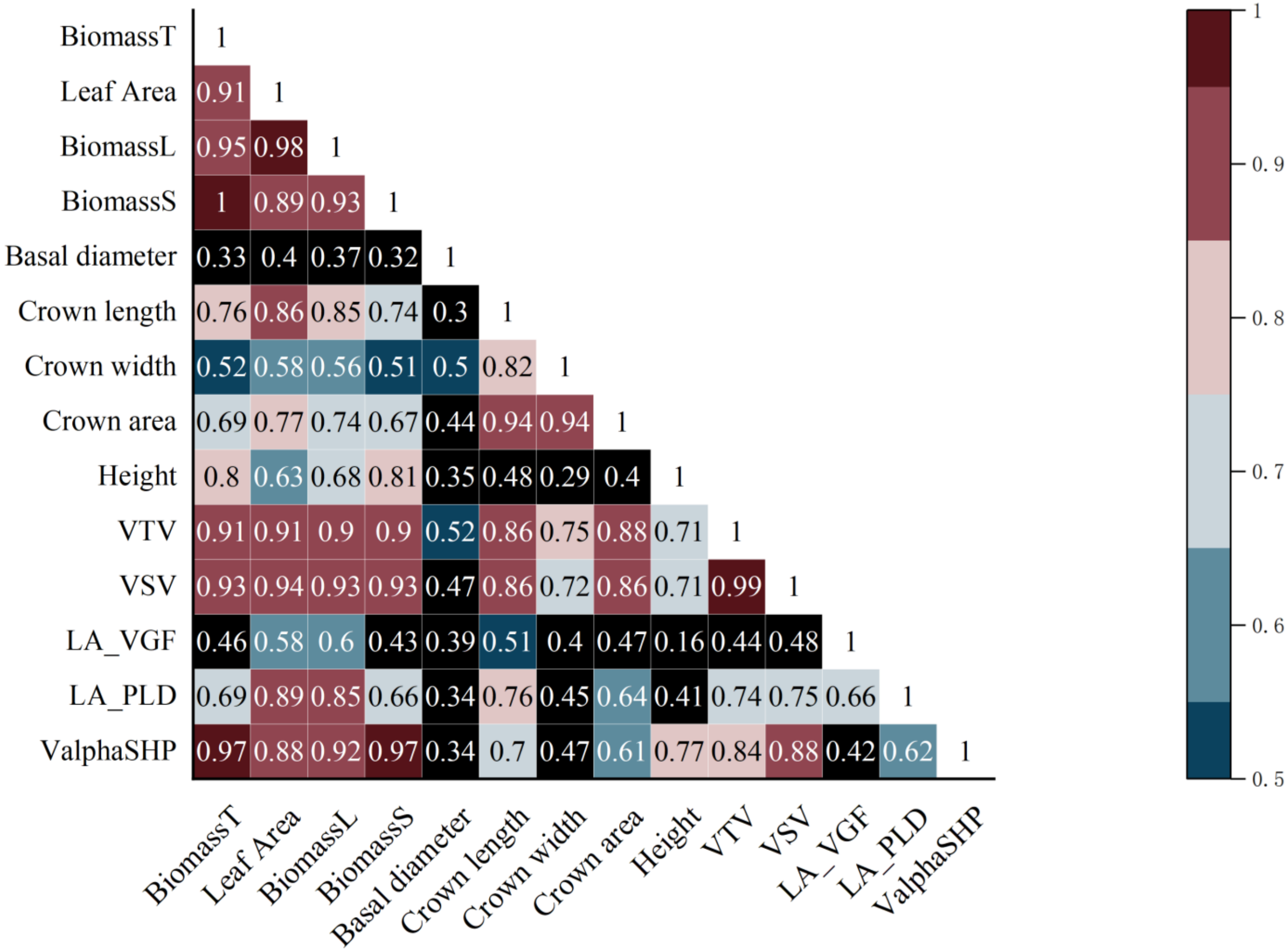

Figure S4. Correlation map of measured biomass and parameters used in three biomass estimation approaches (*Vitex negundo*).

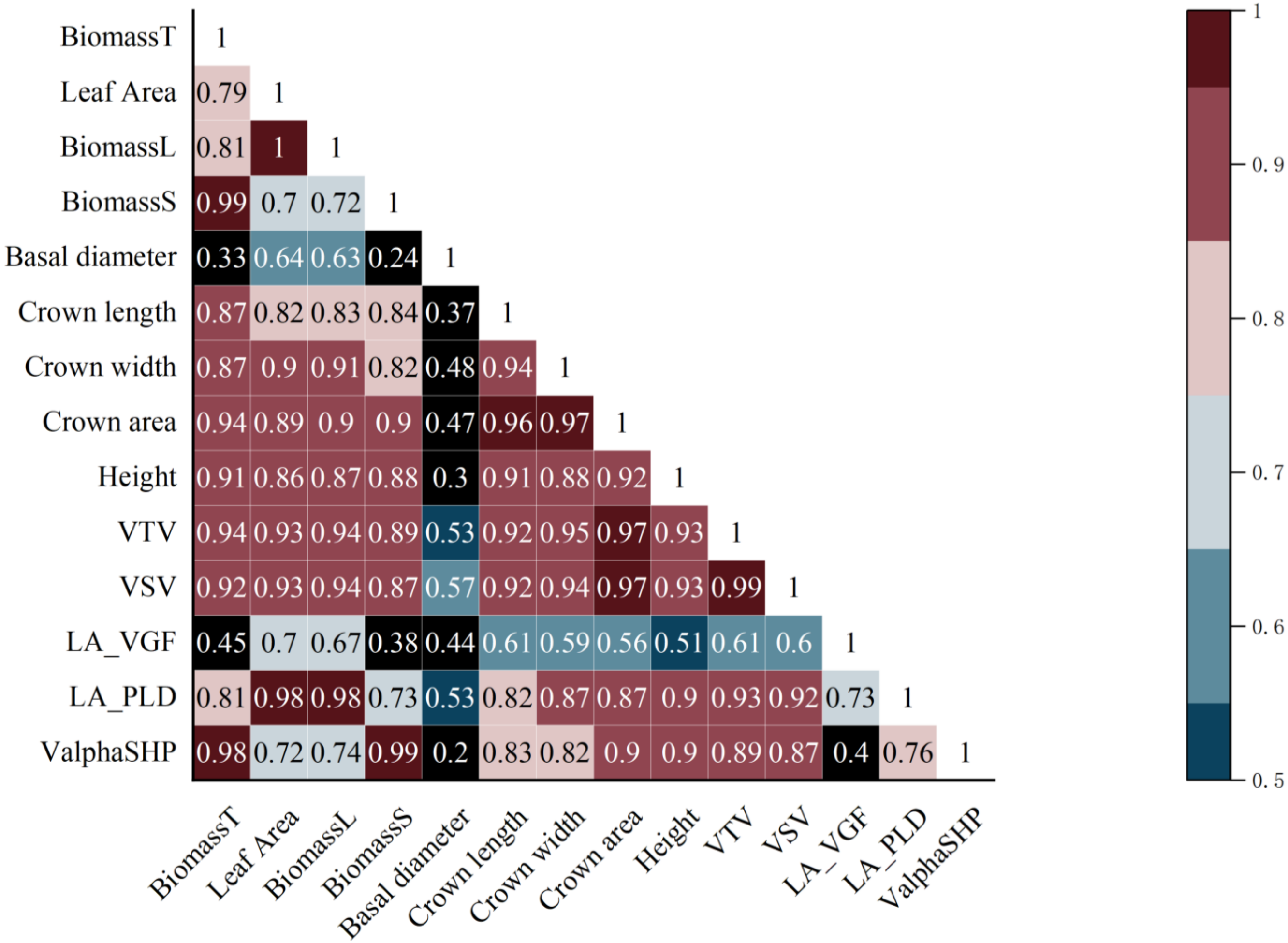

Figure S5. Correlation map of measured biomass and parameters used in three biomass estimation approaches (*Diospyros lotus*).