Table S1. Use of the WNSUR method to develop simultaneously model combinations of *AGB* and its components validated by Leave-One-Out Cross Validations (LOOCV).

Combination of component equation systems	Weight variable	Bias (%)	RMSE (kg)	MAPE (%)
Combination 1:				
$Bst = a_1 \times D^{b1}$	$1/D$	-1.6	0.316	20.9
$Bbr = a_2 \times D^{b2}$	$1/D$	-31.7	0.262	54.5
$Ble = a_3 \times D^{b3}$	$1/D$	-15.5	0.215	40.2
$Bba = a_4 \times D^{b4}$	$1/D$	-13.6	0.188	34.3
$AGB = Bst + Bbr + Ble + Bba$	$1/D$	-6.8	0.642	22.9
Combination 2:				
$Bst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	5.3	0.289	19.3
$Bbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-53.7	0.283	72.3
$Ble = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-3.4	0.236	36.0
$Bba = a4 \times (D^2H)^{b4}$	$1/D^2H$	-2.9	0.158	32.3
$AGB = Bst + Bbr + Ble + Bba$	$1/D^2H$	-2.8	0.795	23.4
Combination 3:				
$Bst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	3.4	0.279	18.5
$Bbr = a_2 \times D^{b2}$	$1/D$	-30.0	0.261	52.8
$Ble = a_3 \times D^{b3}$	$1/D$	-10.3	0.210	37.2
$Bba = a_4 \times D^{b4}$	$1/D$	-13.2	0.194	35.3
$AGB = Bst + Bbr + Ble + Bba$	$1/D$	-3.2	0.654	21.7
Combination 4:				
$Bst = a_1 \times D^{b1}$	$1/D$	0.1	0.290	20.3
$Bbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-22.0	0.273	48.9
$Ble = a_3 \times D^{b3}$	$1/D$	-13.2	0.233	40.4
$Bba = a_4 \times D^{b4}$	$1/D$	-12.3	0.190	34.2
$AGB = Bst + Bbr + Ble + Bba$	$1/D$	-3.9	0.577	20.8
Combination 5:				
$Bst = a_1 \times D^{b1}$	$1/D$	1.5	0.316	22.3
$Bbr = a_2 \times D^{b2}$	$1/D$	-28.9	0.262	52.6
$Ble = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-17.3	0.246	43.0
$Bba = a_4 \times D^{b4}$	$1/D$	-11.2	0.196	36.8
$AGB = Bst + Bbr + Ble + Bba$	$1/D$	-5.0	0.613	21.5
Combination 6:				
$\mathbf{Bst = a_1 \times D^{b1}}$	$\mathbf{1/D}$	**8.2**	**0.332**	**25.6**
$\mathbf{Bbr = a_2 \times D^{b2}}$	$\mathbf{1/D}$	**-24.7**	**0.263**	**51.1**
$\mathbf{Ble = a_3 \times D^{b3}}$	$\mathbf{1/D^{0.5}}$	**-12.6**	**0.229**	**40.5**
$\mathbf{Bba = a_4 \times (D^2H)^{b4}}$	$\mathbf{1/(D^2H)^{0.9}}$	**5.9**	**0.160**	**35.8**
$\mathbf{AGB = Bst + Bbr + Ble + Bba}$	$\mathbf{1/(D^2H)^{0.3}}$	**2.2**	**0.564**	**18.8**

Combination 7:				
$Bst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	2.6	0.271	17.0
$Bbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-56.1	0.277	73.9
$Ble = a_3 \times D^{b3}$	$1/D$	-37.7	0.191	49.7
$Bba = a_4 \times D^{b4}$	$1/D$	-1.1	0.314	57.1
$AGB = Bst + Bbr + Ble + Bba$	$1/D^2H$	-11.0	0.825	25.8
Combination 8:				
$Bst = a_1 \times D^{b1}$	$1/D$	-1.1	0.297	19.6
$Bbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-46.9	0.280	67.3
$Ble = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-2.7	0.247	36.6
$Bba = a_4 \times D^{b4}$	$1/D$	-18.2	0.195	35.9
$AGB = Bst + Bbr + Ble + Bba$	$1/D^2H$	-6.7	0.618	21.9
Combination 9:				
$Bst = a_1 \times D^{b1}$	$1/D$	-0.8	0.276	18.8
$Bbr = a_2 \times D^{b2}$	$1/D$	-46.4	0.259	65.0
$Ble = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-2.3	0.248	36.7
$Bba = a_4 \times (D^2H)^{b4}$	$1/D^2H$	-4.5	0.158	30.2
$AGB = Bst + Bbr + Ble + Bba$	$1/D^2H$	-4.6	0.611	21.9
Combination 10:				
$Bst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	-0.2	0.276	16.6
$Bbr = a_2 \times (D^2H)^{b2}$	$1/(D^2H)^{-0.5}$	-37.7	0.278	60.9
$Ble = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-36.8	0.266	57.9
$Bba = a_4 \times D^{b4}$	$1/D^{-0.5}$	-16.6	0.193	35.1
$AGB = Bst + Bbr + Ble + Bba$	$1/(D^2H)^{-0.5}$	-11.9	0.750	25.8
Combination 11:				
$Bst = a_1 \times D^{b1}$	$1/D$	-2.1	0.293	19.0
$Bbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-48.1	0.278	68.2
$Ble = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-3.1	0.252	37.3
$Bba = a_4 \times (D^2H)^{b4}$	$1/D^2H$	-4.5	0.155	29.7
$AGB = Bst + Bbr + Ble + Bba$	$1/D^2H$	-5.5	0.648	22.1
Combination 12:				
$Bst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	6.7	0.294	20.1
$Bbr = a_2 \times D^{b2}$	$1/D$	46.0	0.285	60.1
$Ble = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-2.7	0.252	37.1
$Bba = a_4 \times (D^2H)^{b4}$	$1/D^2H$	14.8	0.239	44.2
$AGB = Bst + Bbr + Ble + Bba$	$1/D^2H$	0.0	0.792	23.5
Combination 13:				
$Bst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	2.1	0.293	18.1
$Bbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-53.7	0.282	72.5
$Ble = a_3 \times D^{b3}$	$1/D$	-20.5	0.211	42.0
$Bba = a_4 \times (D^2H)^{b4}$	$1/D^2H$	-8.0	0.156	29.7
$AGB = Bst + Bbr + Ble + Bba$	$1/D^2H$	-8.5	0.797	25.2

Combination 14:				
$Bst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	4.9	0.280	18.7
$Bbr = a_2 \times D^{b2}$	$1/D$	-37.9	0.259	57.4
$Ble = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-4.0	0.241	36.8
$Bba = a_4 \times D^{b4}$	$1/D$	-16.4	0.259	41.7
$AGB = Bst + Bbr + Ble + Bba$	$1/D^2H$	-2.9	0.790	23.8
Combination 15:				
$Bst = a_1 \times D^{b1}$	$1/D$	0.1	0.301	20.7
$Bbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-50.7	0.283	70.3
$Ble = a_3 \times D^{b3}$	$1/D$	-34.7	0.241	55.0
$Bba = a_4 \times (D^2H)^{b4}$	$1/D^2H$	-2.6	0.160	31.8
$AGB = Bst + Bbr + Ble + Bba$	$1/D^2H$	-10.8	0.638	23.1
Combination 16:				
$Bst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	13.7	0.255	22.0
$Bbr = a_2 \times D^{b2}$	$1/D$	-48.1	0.275	70.3
$Ble = a_3 \times D^{b3}$	$1/D$	-52.6	0.230	68.8
$Bba = a_4 \times D^{b41} \times H^{b42}$	$1/D$	18.2	0.182	37.2
$AGB = Bst + Bbr + Ble + Bba$	$1/D^2H$	-6.0	0.875	30.6

In bold, the simultaneous model combination selected based on LOOCV statistics. *Bst, Bbr, Ble, Bba* and *AGB* are biomass of stem, branches, leaves, bark and total tree aboveground biomass, respectively.

Table S2. Use of the WNSUR method to simultaneously develop model combinations of *AGC* and its component validated by Leave-One-Out Cross Validations (LOOCV).

Combination of component equation systems	Weight variable	Bias (%)	RMSE (kg)	MAPE (%)
Combination 1:				
$Cst = a_1 \times D^{b1}$	$1/D$	-4.1	0.143	18.5
$Cbr = a_2 \times D^{b2}$	$1/D$	-32.8	0.129	55.6
$Cle = a_3 \times D^{b3}$	$1/D$	-15.9	0.095	37.3
$Cba = a_4 \times D^{b4}$	$1/D$	-14.5	0.085	33.9
$AGC = Cst + Cbr + Cle + Cba$	$1/D$	-8.8	0.316	23.5
Combination 2:				
$Cst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	2.3	0.144	17.9
$Cbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-55.9	0.142	75.1
$Cle = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-1.9	0.105	32.8
$Cba = a4 \times (D^2H)^{b4}$	$1/D^2H$	-2.7	0.071	31.6
$AGC = Cst + Cbr + Cle + Cba$	$1/D^2H$	-4.7	0.394	24.0
Combination 3:				
$Cst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	1.5	0.137	17.3
$Cbr = a_2 \times D^{b2}$	$1/D$	-30.6	0.128	53.7
$Cle = a_3 \times D^{b3}$	$1/D$	-12.0	0.093	34.9
$Cba = a_4 \times D^{b4}$	$1/D$	-13.6	0.086	33.8
$AGC = Cst + Cbr + Cle + Cba$	$1/D$	-4.9	0.325	22.2
Combination 4:				
$Cst = a_1 \times D^{b1}$	$1/D$	-3.0	0.132	17.9
$Cbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-24.5	0.136	51.5
$Cle = a_3 \times D^{b3}$	$1/D$	-14.5	0.103	37.6
$Cba = a_4 \times D^{b4}$	$1/D$	-13.8	0.085	33.0
$AGC = Cst + Cbr + Cle + Cba$	$1/D$	-6.7	0.295	21.9
Combination 5:				
$Cst = a_1 \times D^{b1}$	$1/D$	-1.3	0.144	20.1
$Cbr = a_2 \times D^{b2}$	$1/D$	-29.2	0.129	53.2
$Cle = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-18.2	0.111	41.2
$Cba = a_4 \times D^{b4}$	$1/D$	-13.3	0.087	34.9
$AGC = Cst + Cbr + Cle + Cba$	$1/D$	-7.4	0.303	22.3
Combination 6:				
$Cst = a_1 \times D^{b1}$	$1/D$	4.7	0.140	22.0
$Cbr = a_2 \times D^{b2}$	$1/D$	-23.6	0.130	50.5
$Cle = a_3 \times D^{b3}$	$1/D^{0.5}$	-13.2	0.100	37.4
$Cba = a_4 \times (D^2H)^{b4}$	$1/(D^2H)^{0.9}$	5.0	0.075	35.7
$AGC = Cst + Cbr + Cle + Cba$	$1/(D^2H)^{0.3}$	-0.1	0.292	20.0
Combination 7:				
$Cst = a_1 \times (D^2H)^{b1}$	$1/(D^2H)^{0.5}$	-3.0	0.133	19.4
$Cbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-62.4	0.146	83.6
$Cle = a_3 \times D^{b3}$	$1/D$	-36.2	0.096	52.7
$Cba = a_4 \times D^{b4}$	$1/D$	5.8	0.111	57.0
$AGC = Cst + Cbr + Cle + Cba$	$1/D^2H$	-12.7	0.387	28.3

Combination of component equation systems	Weight variable	Bias (%)	RMSE (kg)	MAPE (%)
Combination 8:				
$Cst = a_1 \times D^{b1}$	$1/D$	-3.1	0.130	17.2
$Cbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-52.6	0.141	72.7
$Cle = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-2.2	0.110	33.8
$Cba = a_4 \times D^{b4}$	$1/D$	-13.9	0.085	33.9
$AGC = Cst + Cbr + Cle + Cba$	$1/D^2H$	-8.3	0.309	22.4
Combination 9:				
$Cst = a_1 \times D^{b1}$	$1/D$	-4.8	0.150	18.8
$Cbr = a_2 \times D^{b2}$	$1/D$	-46.2	0.095	57.6
$Cle = a_3 \times (D^2H)^{b3}$	$1/D^2H$	1.7	0.114	35.6
$Cba = a_4 \times (D^2H)^{b4}$	$1/D^2H$	21.9	0.125	48.8
$AGC = Cst + Cbr + Cle + Cba$	$1/D^2H$	-3.2	0.319	23.7
Combination 10:				
$Cst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	-3.8	0.142	16.9
$Cbr = a_2 \times (D^2H)^{b2}$	$1/(D^2H)^{-0.5}$	-37.2	0.139	61.6
$Cle = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-31.4	0.119	51.6
$Cba = a_4 \times D^{b4}$	$1/D^{-0.5}$	-17.5	0.087	34.6
$AGC = Cst + Cbr + Cle + Cba$	$1/(D^2H)^{-0.5}$	-13.1	0.372	26.7
Combination 11:				
$Cst = a_1 \times D^{b1}$	$1/D$	-3.6	0.129	16.8
$Cbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-53.8	0.141	73.6
$Cle = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-1.2	0.112	33.8
$Cba = a_4 \times (D^2H)^{b4}$	$1/D^2H$	-2.7	0.070	29.9
$AGC = Cst + Cbr + Cle + Cba$	$1/D^2H$	-6.9	0.319	22.4
Combination 12:				
$\mathbf{Cst = a_1 \times (D^2H)^{b1}}$	$\mathbf{1/(D^2H)^{0.5}}$	**11.4**	**0.183**	**15.0**
$\mathbf{Cbr = a_2 \times D^{b2}}$	$\mathbf{1/D}$	**33.9**	**0.142**	**33.9**
$\mathbf{Cle = a_3 \times (D^2H)^{b3}}$	$\mathbf{1/(D^2H)^{0.5}}$	**9.3**	**0.107**	**25.1**
$\mathbf{Cba = a_4 \times (D^2H)^{b4}}$	$\mathbf{1/D^2H}$	**6.7**	**0.117**	**34.8**
$\mathbf{AGC = Cst + Cbr + Cle + Cba}$	$\mathbf{1/(D^2H)^2}$	**15.5**	**0.455**	**16.2**
Combination 13:				
$Cst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	-1.7	0.146	16.8
$Cbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-55.9	0.142	75.3
$Cle = a_3 \times D^{b3}$	$1/D$	-20.6	0.094	39.1
$Cba = a_4 \times (D^2H)^{b4}$	$1/D^2H$	-10.3	0.069	28.4
$AGC = Cst + Cbr + Cle + Cba$	$1/D^2H$	-11.5	0.396	26.6
Combination 14:				
$Cst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	0.1	0.141	16.9
$Cbr = a_2 \times D^{b2}$	$1/D$	-29.3	0.129	53.1
$Cle = a_3 \times (D^2H)^{b3}$	$1/D^2H$	-22.7	0.117	45.5
$Cba = a_4 \times D^{b4}$	$1/D$	-15.4	0.088	34.8
$AGC = Cst + Cbr + Cle + Cba$	$1/(D^2H)^{0.5}$	-8.1	0.366	24.5

Combination 15:				
$Cst = a_1 \times D^{b1}$	$1/D$	-4.2	0.137	18.0
$Cbr = a_2 \times (D^2H)^{b2}$	$1/D^2H$	-52.5	0.143	73.6
$Cle = a_3 \times D^{b3}$	$1/D$	-26.8	0.097	44.2
$Cba = a_4 \times (D^2H)^{b4}$	$1/D^2H$	10.2	0.105	43.4
$AGC = Cst + Cbr + Cle + Cba$	$1/D^2H$	-10.2	0.334	25.6
Combination 16:				
$Cst = a_1 \times (D^2H)^{b1}$	$1/D^2H$	-6.8	0.163	21.2
$Cbr = a_2 \times D^{b2}$	$1/D$	-75.3	0.218	75.3
$Cle = a_3 \times D^{b3}$	$1/D$	-22.9	0.083	22.9
$Cba = a_4 \times D^{b41} \times H^{b42}$	$1/D$	22.0	0.215	63.8
$AGC = Cst + Cbr + Cle + Cba$	$1/(D^2H)$	-16.6	0.346	21.2

In bold, the simultaneous model combination selected based on LOOCV statistics. *Cst*, *Cbr*, *Cle*, *Cba* and *AGC* are carbon sequestration of stem, branches, leaves, bark and total tree aboveground carbon, respectively.