Table S1. Multiple linear regression analysis of clone, planting density, Clone × Planting density and branching characteristics.

Branch characteristics		Clone			Planting density			Clone × Planting density			R^2
		B	t value	*p* value	B	t value	*p* value	B	t value	*p* value	
BN	Total	-	-	-	-0.766	-5.804	< 0.001*	-0.824	-6.237	< 0.001*	0.625
	Live	-	-	-	-0.748	-6.027	< 0.001*	-0.882	-7.103	< 0.001*	0.668
	Death	-	-	-	-0.361	-1.765	0.088	-0.243	-1.190	0.244	0.100
BP	Live	-	-	-	0.142	0.666	0.511	-0.005	-0.021	0.983	0.021
	Death	-	-	-	0.142	0.666	0.511	-0.005	-0.021	0.983	0.021
DB	Total	-	-	-	0.052	0.241	0.811	0.130	0.609	0.547	0.013
	Live	-	-	-	0.106	0.496	0.623	0.114	0.534	0.597	0.012
	Death	-	-	-	-0.122	-0.570	0.573	0.014	0.066	0.948	0.017
BD		-	-	-	-0.459	-2.410	0.023*	0.017	0.088	0.930	0.219
BL		-	-	-	-0.531	-2.943	0.006*	0.030	0.166	0.869	0.299
BA		-	-	-	-0.199	-1.553	0.131	-0.886	-6.903	< 0.001*	0.645

*$P < 0.05$. B is the standardized regression coefficient.

Table S2. The normality information of the horizontal spatial distribution of branches under different treatments.

Treatment	Shapiro-Wilk test				
	Indicator	Orientation	Statistics	df	p values
Yang 061 (2500 trees·ha^{-1})	BN (total)	northeast	0.944	8	0.649
		southeast	0.904	8	0.311
		southwest	0.936	8	0.573
		northwest	0.771	8	0.014
	BN (live)	northeast	0.833	8	0.063
		southeast	0.941	8	0.622
		southwest	0.975	8	0.932
		northwest	0.792	8	0.023
	BN (death)	northeast	0.824	8	0.051
		southeast	0.828	8	0.056
		southwest	0.73	8	0.005

Treatment	Shapiro-Wilk test				
	Indicator	Orientation	Statistics	df	p values
Yang 061 (3333 trees·ha^{-1})	BD	northwest	0.724	8	0.004
		northeast	0.826	8	0.054
		southeast	0.864	8	0.132
		southwest	0.897	8	0.272
	BL	northwest	0.942	8	0.634
		northeast	0.811	8	0.037
		southeast	0.906	8	0.325
		southwest	0.863	8	0.128
	BA	northwest	0.903	8	0.309
		northeast	0.901	8	0.296
		southeast	0.861	8	0.122
		southwest	0.752	8	0.009
	BN (total)	northwest	0.979	8	0.96
		northeast	0.91	8	0.355
		southeast	0.961	8	0.821
		southwest	0.932	8	0.53
	BN (live)	northwest	0.928	8	0.502
		northeast	0.946	8	0.674
		southeast	0.945	8	0.662
		southwest	0.907	8	0.336
	BN (death)	northwest	0.936	8	0.57
		northeast	0.815	8	0.041
		southeast	0.782	8	0.018
		southwest	0.794	8	0.025
	BD	northwest	0.815	8	0.041
		northeast	0.905	8	0.32
		southeast	0.871	8	0.152
		southwest	0.948	8	0.694
	BL	northwest	0.767	8	0.013
		northeast	0.869	8	0.147
		southeast	0.94	8	0.612
		southwest	0.82	8	0.047
	BA	northwest	0.916	8	0.401
		northeast	0.946	8	0.674
		southeast	0.928	8	0.496
		southwest	0.906	8	0.328
		northwest	0.937	8	0.579
Yang 020 (3000 trees·ha^{-1})	BN (total)	northeast	0.924	8	0.459
		southeast	0.828	8	0.056
		southwest	0.956	8	0.767
		northwest	0.955	8	0.757

Treatment	Shapiro-Wilk test				
	Indicator	Orientation	Statistics	df	p values
	BN (live)	northeast	0.963	8	0.842
		southeast	0.886	8	0.213
		southwest	0.956	8	0.769
		northwest	0.964	8	0.851
	BN (death)	northeast	0.912	8	0.366
		southeast	0.912	8	0.366
		southwest	0.931	8	0.522
		northwest	0.665	8	0.001
	BD	northeast	0.967	8	0.875
		southeast	0.904	8	0.316
		southwest	0.894	8	0.254
		northwest	0.943	8	0.637
	BL	northeast	0.947	8	0.679
		southeast	0.943	8	0.64
		southwest	0.902	8	0.301
		northwest	0.882	8	0.198
	BA	northeast	0.939	8	0.602
		southeast	0.901	8	0.294
		southwest	0.968	8	0.885
		northwest	0.869	8	0.148
Yang 020 (5100 trees·ha^{-1})	BN (total)	northeast	0.875	8	0.168
		southeast	0.958	8	0.794
		southwest	0.841	8	0.076
		northwest	0.966	8	0.865
	BN (live)	northeast	0.948	8	0.69
		southeast	0.904	8	0.313
		southwest	0.948	8	0.687
		northwest	0.968	8	0.883
	BN (death)	northeast	0.847	8	0.088
		southeast	0.827	8	0.056
		southwest	0.882	8	0.197
		northwest	0.917	8	0.408
	BD	northeast	0.748	8	0.008
		southeast	0.983	8	0.978
		southwest	0.929	8	0.508
		northwest	0.982	8	0.973
	BL	northeast	0.937	8	0.586
		southeast	0.798	8	0.027
		southwest	0.878	8	0.181
		northwest	0.841	8	0.077
	BA	northeast	0.828	8	0.057

Treatment	Shapiro-Wilk test				
	Indicator	Orientation	Statistics	df	p values
		southeast	0.773	8	0.015
		southwest	0.95	8	0.71
		northwest	0.857	8	0.113

Table S3. The normality information of the vertical spatial distribution of branches under different treatments.

Treatment	Shapiro-Wilk test				
	Indicator	Branch height (m)	Statistics	df	p values
Yang 061 (2500 trees·ha^{-1})	BN (total)	0-0.99	0.933	8	0.542
		1-1.99	0.925	8	0.472
		2-2.99	0.802	8	0.03
		3-3.99	0.895	8	0.263
		4-4.99	0.983	8	0.976
		5-5.99	0.874	6	0.242
		6-6.99			
	BN (live)	0-0.99	0.923	8	0.453
		1-1.99	0.883	8	0.202
		2-2.99	0.802	8	0.03
		3-3.99	0.895	8	0.263
		4-4.99	0.983	8	0.976
		5-5.99	0.874	6	0.242
		6-6.99			
	BN (death)	0-0.99	0.929	8	0.511
	BD	0-0.99	0.868	8	0.143
		1-1.99	0.812	8	0.038
		2-2.99	0.927	8	0.485
		3-3.99	0.959	8	0.796
		4-4.99	0.919	8	0.419
		5-5.99	0.947	6	0.716
		6-6.99			
	BL	0-0.99	0.925	8	0.47
		1-1.99	0.904	8	0.312
		2-2.99	0.918	8	0.411
		3-3.99	0.903	8	0.305
		4-4.99	0.926	8	0.483
		5-5.99	0.87	6	0.227
		6-6.99			
	BA	0-0.99	0.751	8	0.008
		1-1.99	0.9	8	0.287

Treatment	Shapiro-Wilk test				
	Indicator	Branch height (m)	Statistics	df	p values
		2-2.99	0.858	8	0.114
		3-3.99	0.785	8	0.02
		4-4.99	0.915	8	0.389
		5-5.99	0.95	6	0.737
		6-6.99			
Yang 061 (3333 trees·ha^{-1})	BN (total)	0-0.99	0.916	8	0.396
		1-1.99	0.843	8	0.08
		2-2.99	0.959	8	0.801
		3-3.99	0.933	8	0.542
		4-4.99	0.919	8	0.425
		5-5.99	0.887	4	0.369
	BN (live)	0-0.99	0.94	8	0.609
		1-1.99	0.843	8	0.08
		2-2.99	0.959	8	0.801
		3-3.99	0.933	8	0.542
		4-4.99	0.919	8	0.425
		5-5.99	0.887	4	0.369
	BN (death)	0-0.99	0.768	8	0.013
	BD	0-0.99	0.966	8	0.867
		1-1.99	0.903	8	0.31
		2-2.99	0.973	8	0.923
		3-3.99	0.983	8	0.976
		4-4.99	0.98	8	0.964
		5-5.99	0.959	4	0.774
	BL	0-0.99	0.972	8	0.912
		1-1.99	0.947	8	0.684
		2-2.99	0.94	8	0.614
		3-3.99	0.913	8	0.375
		4-4.99	0.891	8	0.242
		5-5.99	0.921	4	0.544
	BA	0-0.99	0.93	8	0.512
		1-1.99	0.841	8	0.077
		2-2.99	0.949	8	0.696
		3-3.99	0.919	8	0.421
		4-4.99	0.884	8	0.204
		5-5.99	0.898	4	0.422
Yang 020 (3000 trees·ha^{-1})	BN (total)	0-0.99	0.943	5	0.685
		1-1.99	0.88	8	0.188
		2-2.99	0.751	8	0.008
		3-3.99	0.913	8	0.373

Treatment	Shapiro-Wilk test				
	Indicator	Branch height (m)	Statistics	df	p values
		4-4.99	0.958	8	0.792
		5-5.99	0.905	8	0.318
		6-6.99	0.905	8	0.318
		7-7.99	0.942	8	0.633
		8-8.99	0.892	6	0.328
		9-9.99			
		0-0.99	0.925	5	0.563
		1-1.99	0.875	8	0.169
		2-2.99	0.751	8	0.008
		3-3.99	0.913	8	0.373
	BN (live)	4-4.99	0.958	8	0.792
		5-5.99	0.905	8	0.318
		6-6.99	0.905	8	0.318
		7-7.99	0.942	8	0.633
		8-8.99	0.892	6	0.328
		9-9.99			
	BN (death)	0-0.99	0.903	5	0.427
		1-1.99	0.665	8	0.001
		0-0.99	0.886	5	0.338
		1-1.99	0.944	8	0.652
		2-2.99	0.967	8	0.872
		3-3.99	0.925	8	0.475
	BD	4-4.99	0.85	8	0.095
		5-5.99	0.857	8	0.111
		6-6.99	0.889	8	0.229
		7-7.99	0.847	8	0.089
		8-8.99	0.858	6	0.182
		9-9.99			
		0-0.99	0.99	5	0.981
		1-1.99	0.96	8	0.812
		2-2.99	0.861	8	0.123
		3-3.99	0.967	8	0.872
	BL	4-4.99	0.861	8	0.124
		5-5.99	0.908	8	0.342
		6-6.99	0.897	8	0.27
		7-7.99	0.941	8	0.624
		8-8.99	0.982	6	0.961
		9-9.99			
		0-0.99	0.917	5	0.51
	BA	1-1.99	0.938	8	0.588
		2-2.99	0.956	8	0.776

Treatment	Shapiro-Wilk test				
	Indicator	Branch height (m)	Statistics	df	p values
		3-3.99	0.95	8	0.716
		4-4.99	0.94	8	0.614
		5-5.99	0.92	8	0.429
		6-6.99	0.897	8	0.272
		7-7.99	0.983	8	0.976
		8-8.99	0.908	6	0.421
		9-9.99	0.943	5	0.685
Yang 020 (5100 trees·ha^{-1})	BN (total)	0-0.99	0.889	8	0.229
		1-1.99	0.941	8	0.626
		2-2.99	0.918	8	0.411
		3-3.99	0.908	8	0.342
		4-4.99	0.891	8	0.239
		5-5.99	0.943	5	0.685
	BN (live)	0-0.99	0.831	8	0.06
		1-1.99	0.941	8	0.626
		2-2.99	0.918	8	0.411
		3-3.99	0.908	8	0.342
		4-4.99	0.891	8	0.239
		5-5.99	0.943	5	0.685
	BN (death)	0-0.99	0.798	8	0.027
	BD	0-0.99	0.901	8	0.295
		1-1.99	0.843	8	0.081
		2-2.99	0.98	8	0.965
		3-3.99	0.865	8	0.134
		4-4.99	0.91	8	0.353
		5-5.99	0.872	5	0.273
	BL	0-0.99	0.826	8	0.054
		1-1.99	0.956	8	0.772
		2-2.99	0.971	8	0.906
		3-3.99	0.901	8	0.293
		4-4.99	0.832	8	0.062
		5-5.99	0.944	5	0.697
	BA	0-0.99	0.875	8	0.169
		1-1.99	0.906	8	0.327
		2-2.99	0.825	8	0.053
		3-3.99	0.9	8	0.289
		4-4.99	0.971	8	0.902
		5-5.99	0.847	5	0.184

Table S4. Variance homogeneity test of horizontal spatial distribution of branches under different

treatments.

Treatment	Indicator	Levin statistics	df1	df2	p values
Yang 061 (2500 trees·ha^{-1})	BN (total)	0.821	3	28	0.493
	BN (live)	0.481	3	28	0.698
	BN (death)	0.712	3	28	0.553
	BD	1.374	3	28	0.271
	BL	1.828	3	28	0.165
	BA	1.16	3	28	0.343
Yang 061 (3333 trees·ha^{-1})	BN (total)	0.84	3	28	0.483
	BN (live)	0.983	3	28	0.415
	BN (death)	1.4	3	28	0.263
	BD	0.109	3	28	0.954
	BL	1.108	3	28	0.362
	BA	1.679	3	28	0.194
Yang 020 (3000 trees·ha^{-1})	BN (total)	0.074	3	28	0.973
	BN (live)	0.741	3	28	0.537
	BN (death)	2.101	3	28	0.123
	BD	1.962	3	28	0.143
	BL	0.383	3	28	0.766
	BA	2.711	3	28	0.064
Yang 020 (5100 trees·ha^{-1})	BN (total)	0.232	3	28	0.873
	BN (live)	0.077	3	28	0.972
	BN (death)	1.829	3	28	0.165
	BD	0.423	3	28	0.738
	BL	1.77	3	28	0.176
	BA	0.801	3	28	0.504

Table S5. Variance homogeneity test of vertical spatial distribution of branches under different treatments.

Treatment	Indicator	Levin statistics	df1	df2	p values
Yang 061 (2500 trees·ha^{-1})	BN (total)	2.029	6	41	0.084
	BN (live)	4.213	6	41	0.002
	BN (death)	15.016	6	41	0
	BD	2.124	5	37	0.084
	BL	5.564	5	37	0.001
	BA	263.107	5	37	0
Yang 061 (3333 trees·ha^{-1})	BN (total)	1.33	9	62	0.24
	BN (live)	1.347	9	62	0.232
	BN (death)	10.326	9	62	0
	BD	1.932	5	39	0.111
	BL	2.109	5	39	0.085

Yang 020 (3000 trees·ha^{-1})	BA	10.186	5	39	0
	BN (total)	1.105	6	41	0.376
	BN (live)	2.102	6	41	0.074
	BN (death)	2.114	6	41	0.072
	BD	0.382	5	38	0.858
	BL	1.323	5	38	0.275
	BA	0.481	5	38	0.788
Yang 020 (5100 trees·ha^{-1})	BN (total)	1.179	9	59	0.325
	BN (live)	0.356	9	59	0.951
	BN (death)	3.44	9	59	0.002
	BD	1.677	5	39	0.163
	BL	3.839	5	39	0.006
	BA	0.447	5	39	0.813