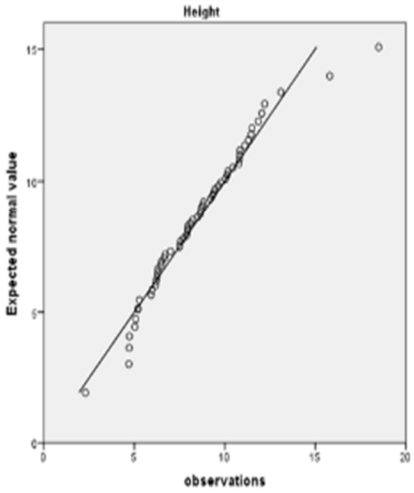
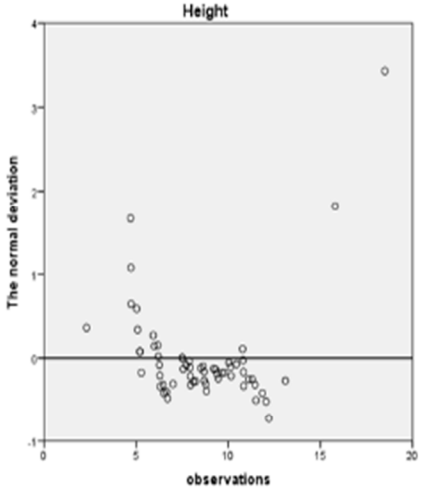
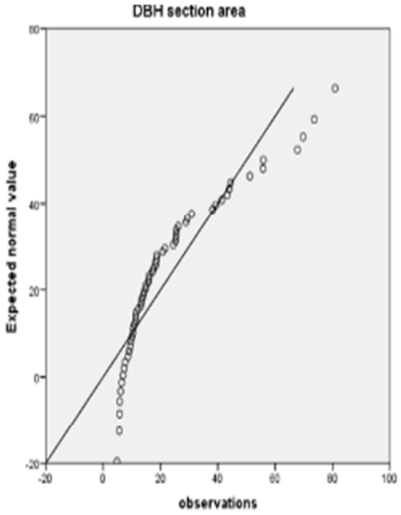
forests

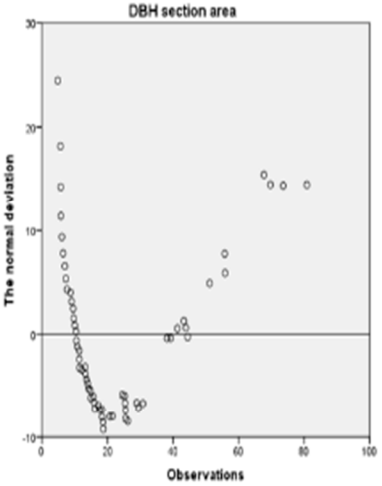
MDPI

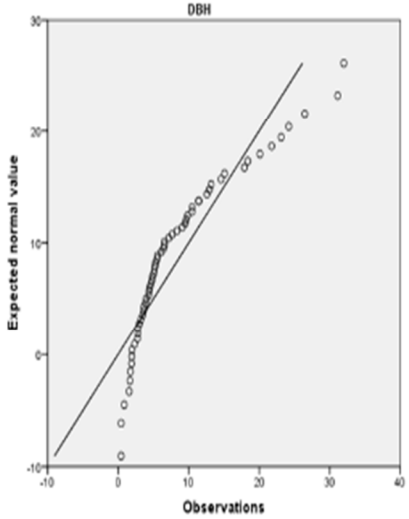
Online available Materials

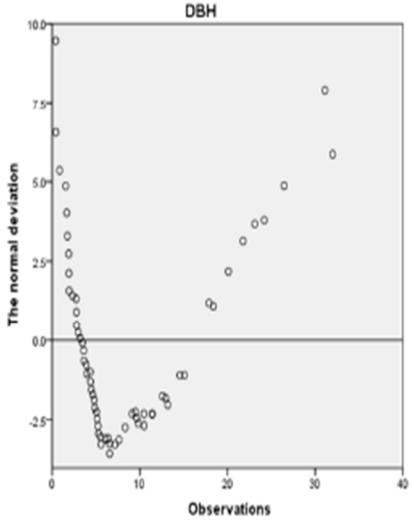


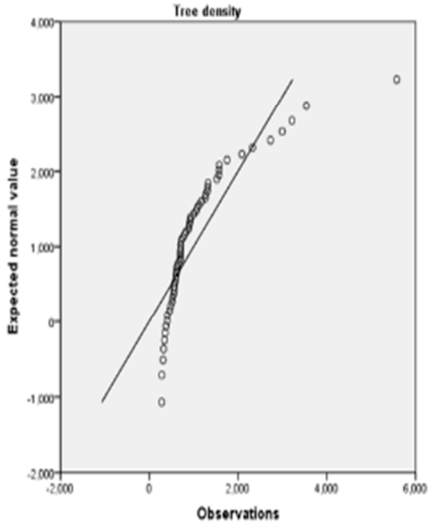


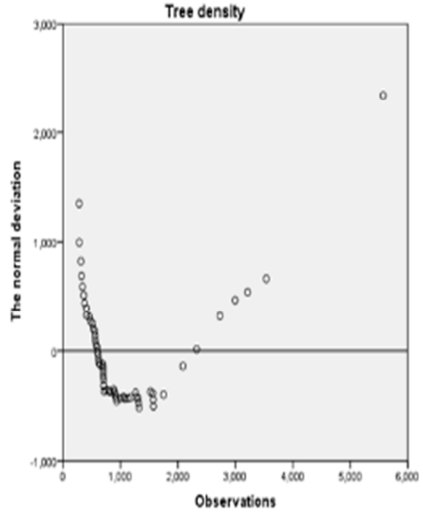


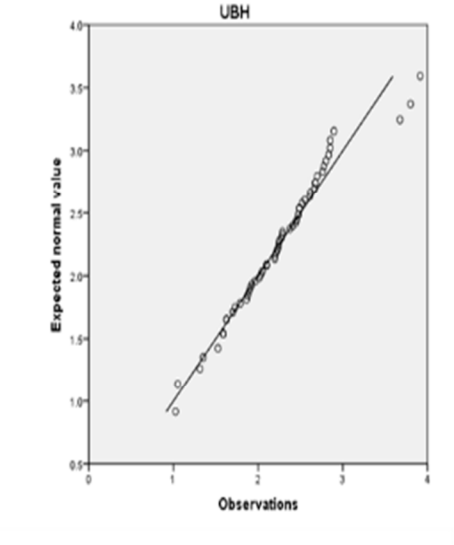


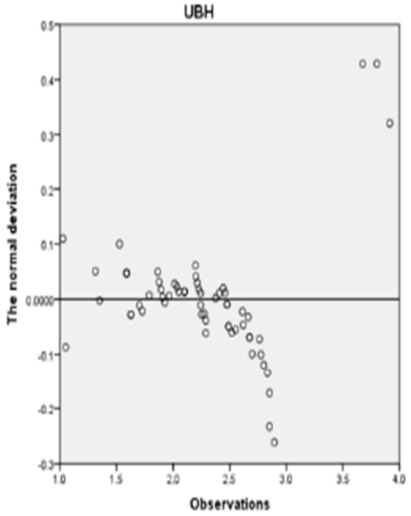


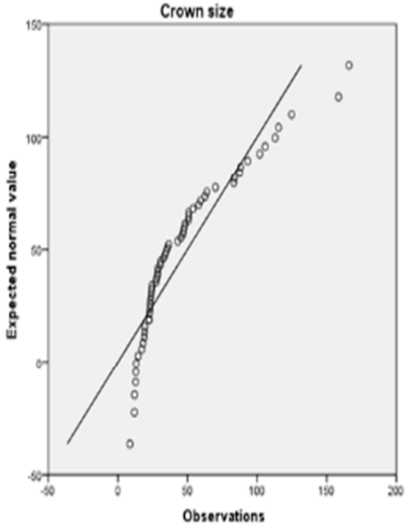


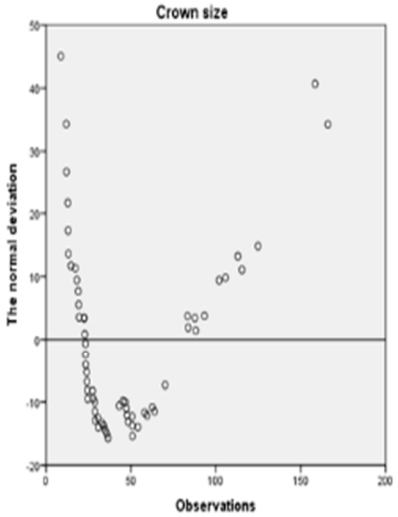


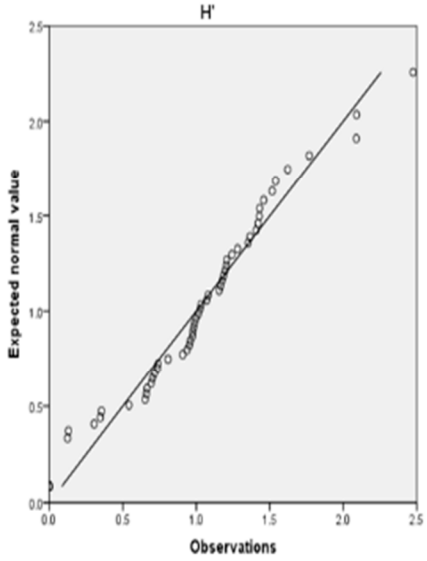


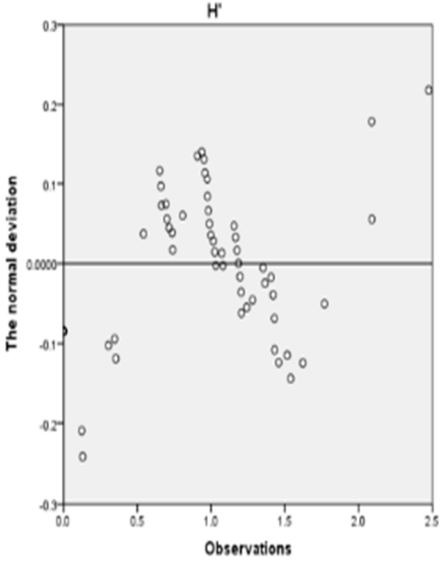

UBH
Expected normal value
Observations

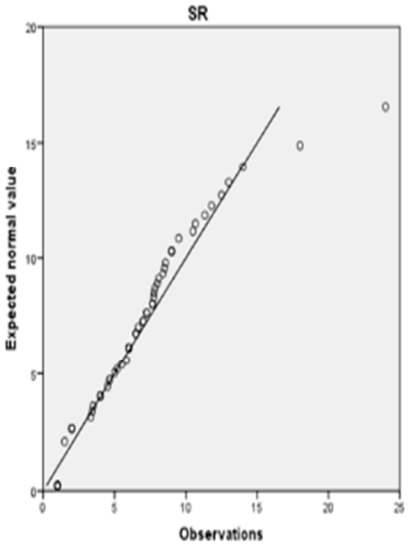

UBH
The normal deviation
Observations

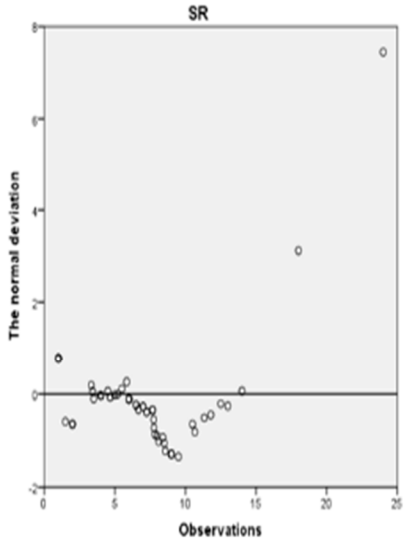

Crown size
Expected normal value
Observations

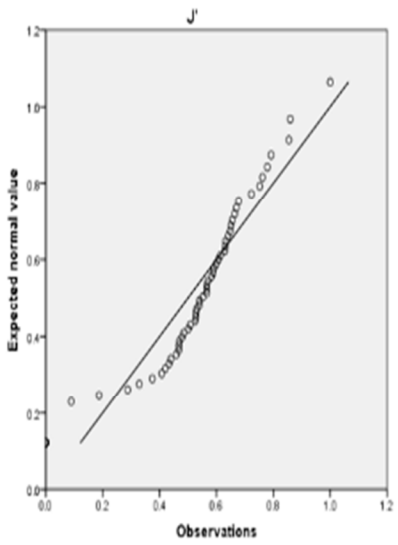

Crown size
The normal deviation
Observations

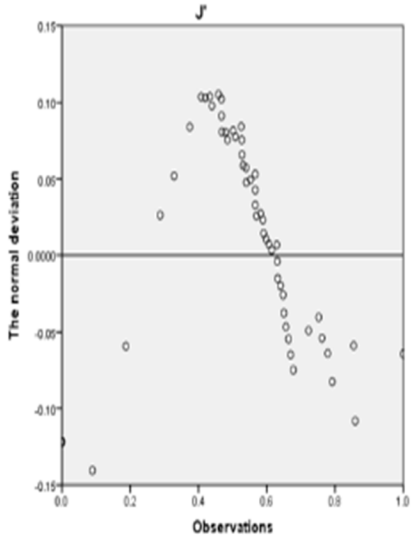

H'
Expected normal value
Observations

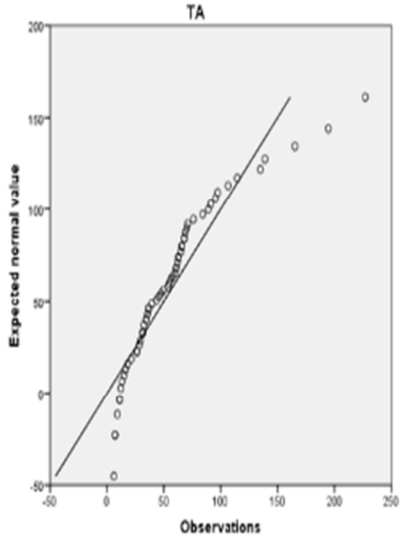

H'
The normal deviation
Observations

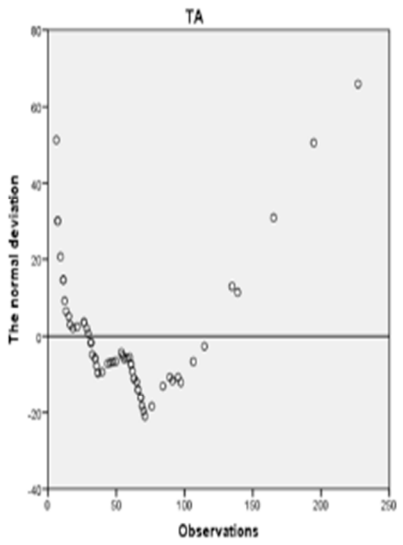

SR
Expected normal value
Observations

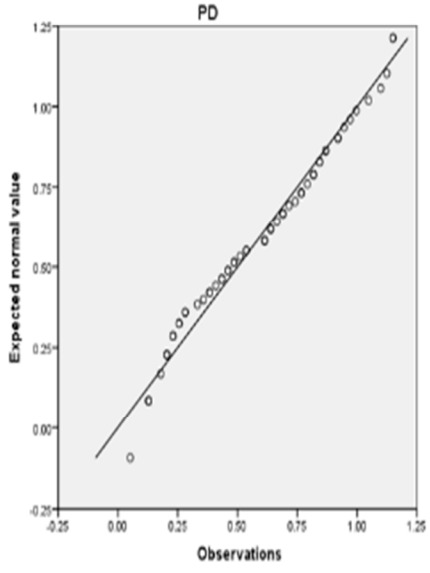

SR
The normal deviation
Observations

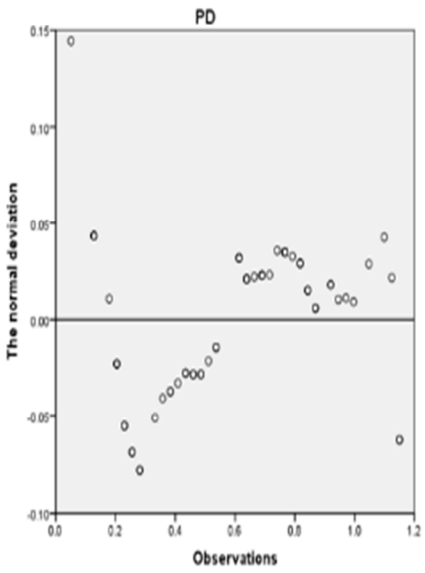

J'
Expected normal value
Observations

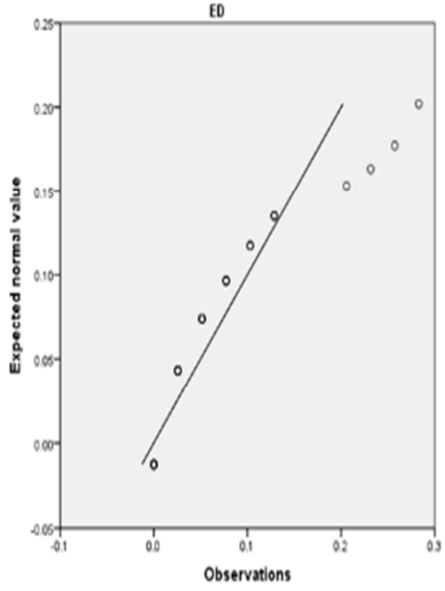

J'
The normal deviation
Observations

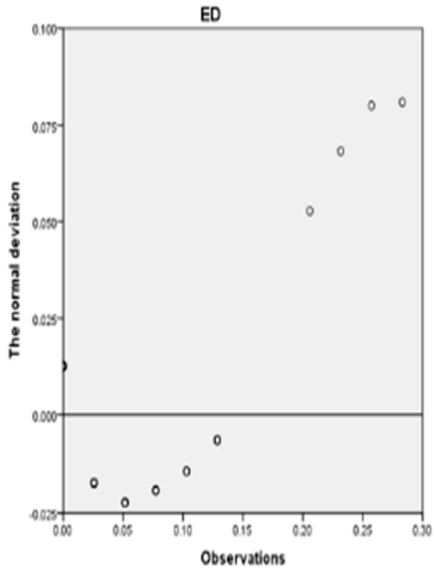

TA
Expected normal value
Observations

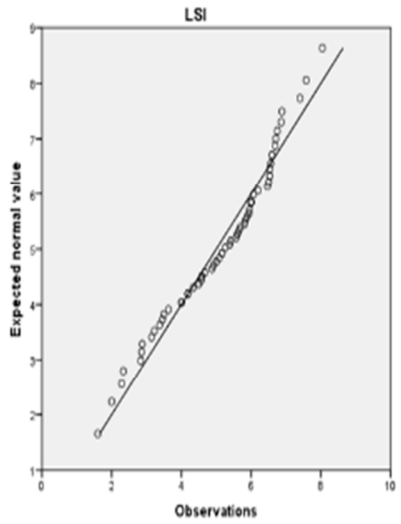

TA
The normal deviation
Observations

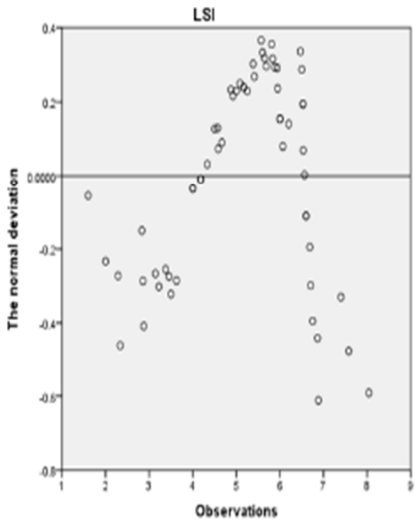

PD
Expected normal value
Observations

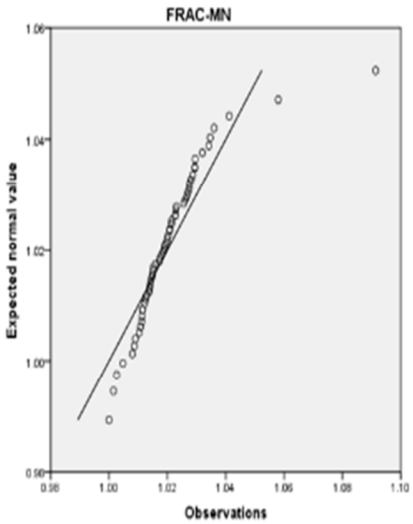

PD
The normal deviation
Observations

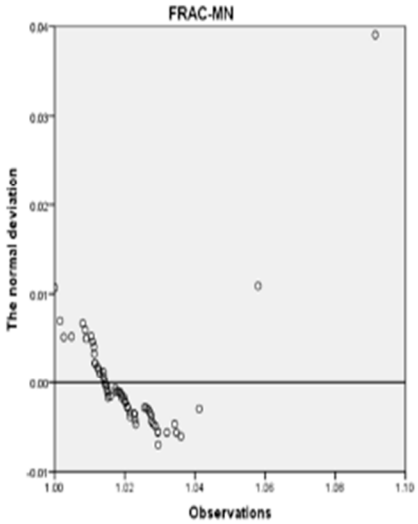

ED
Expected normal value
Observations

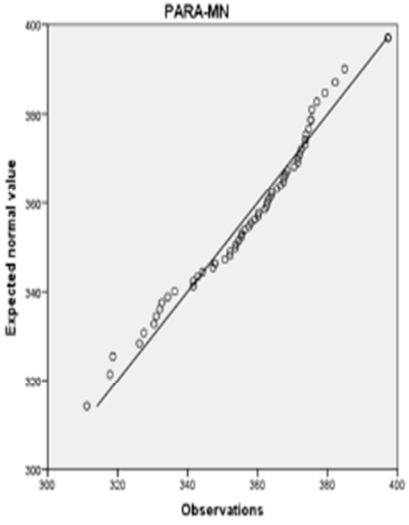

ED
The normal deviation
Observations

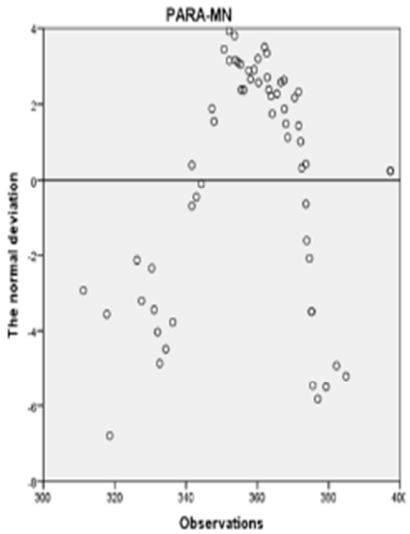

LSI
Expected normal value
Observations

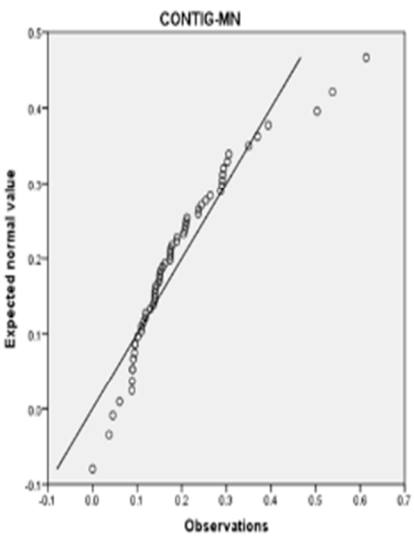

LSI
The normal deviation
Observations

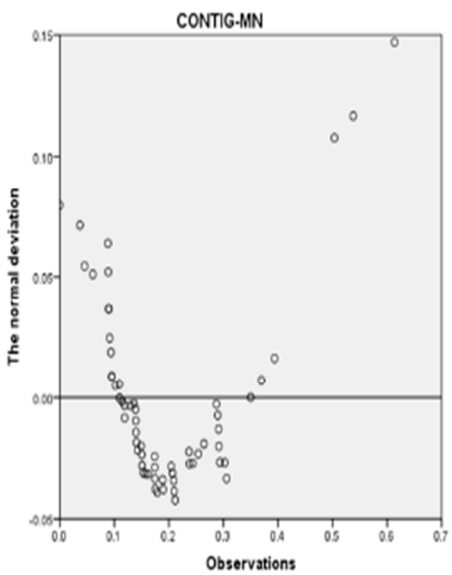

FRAC-MN
Expected normal value
Observations

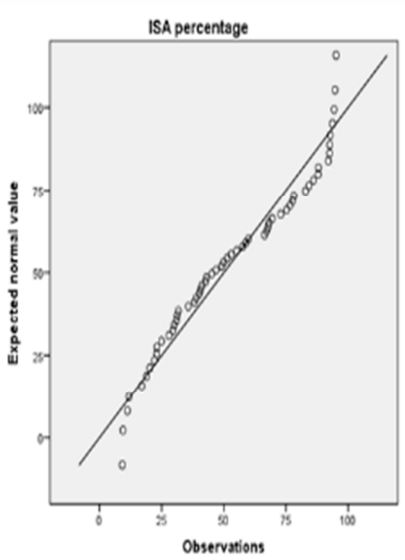

FRAC-MN
The normal deviation
Observations

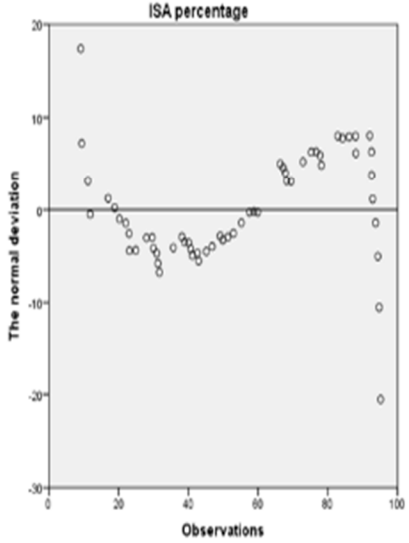

PARA-MN
Expected normal value
Observations

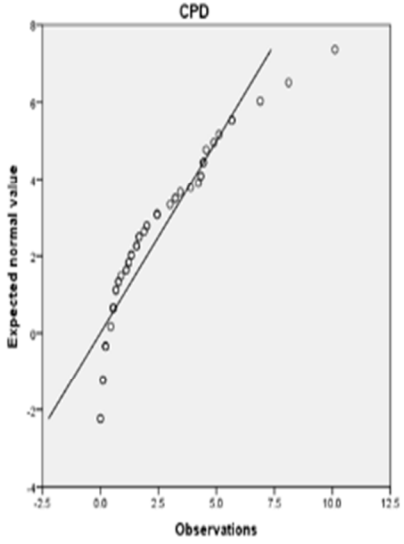

PARA-MN
The normal deviation
Observations

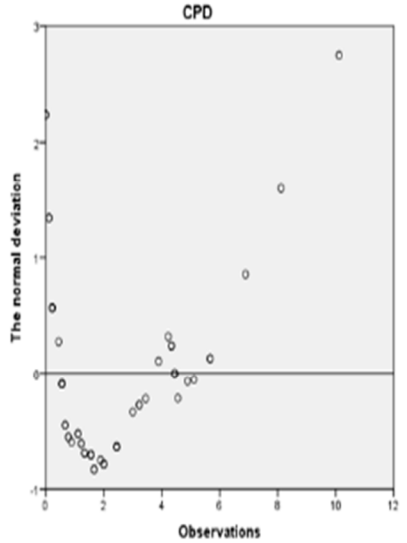

CONTIG-MN
Expected normal value
Observations

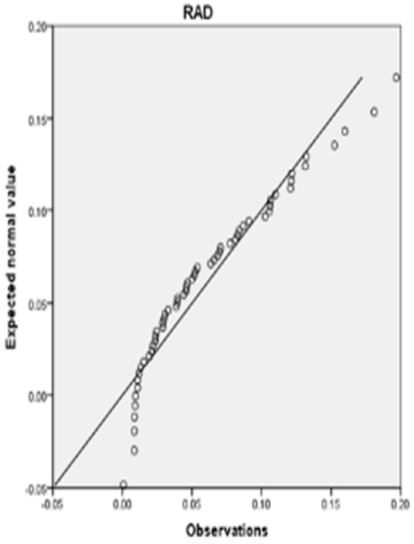

CONTIG-MN
The normal deviation
Observations

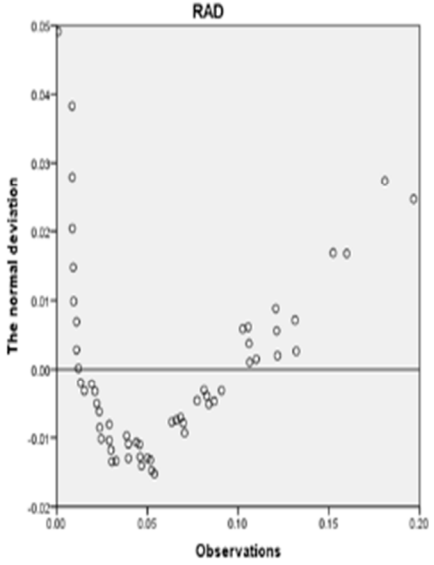

ISA percentage
Expected normal value
Observations

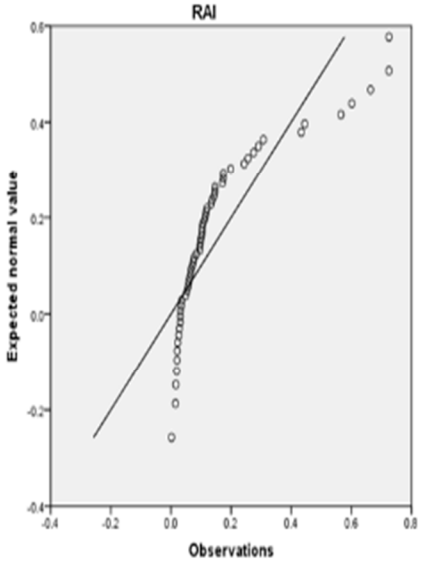

ISA percentage
The normal deviation
Observations

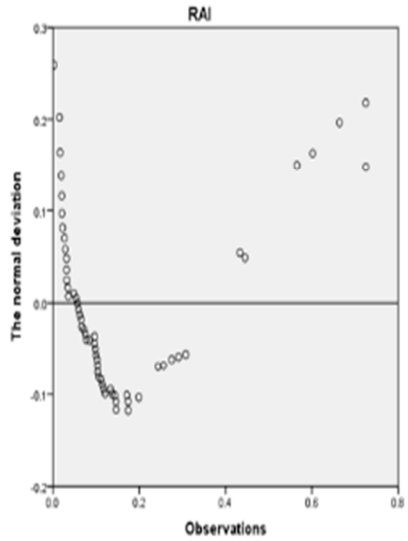

CPD
Expected normal value
Observations

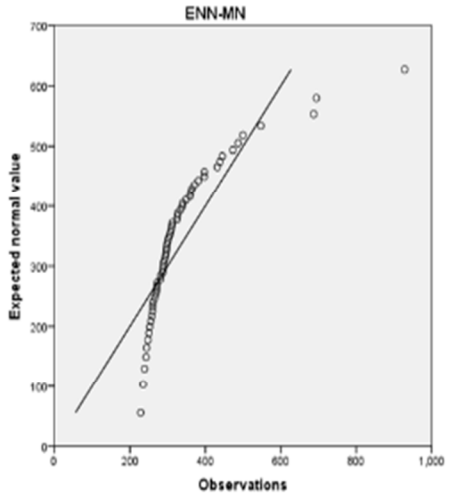

CPD
The normal deviation
Observations

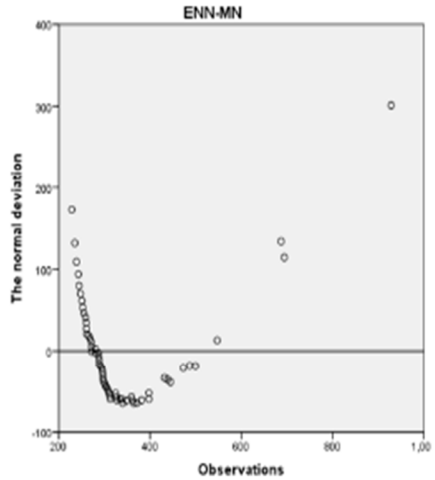

RAD
Expected normal value
Observations

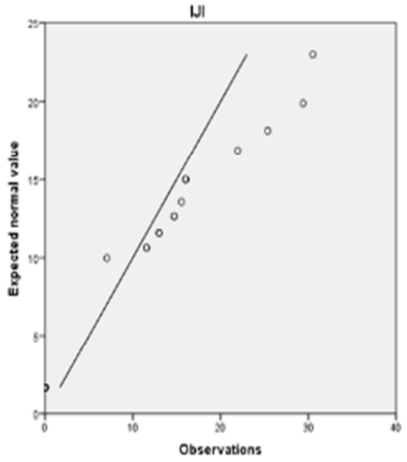

RAD
The normal deviation
Observations

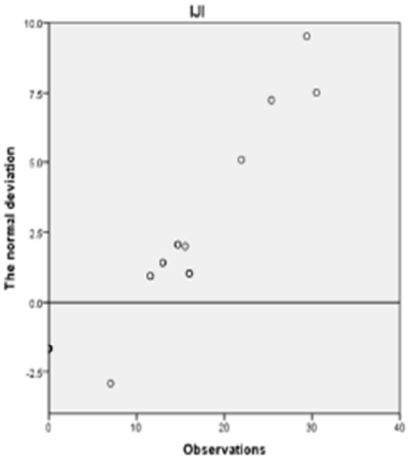

RAI
Expected normal value
Observations

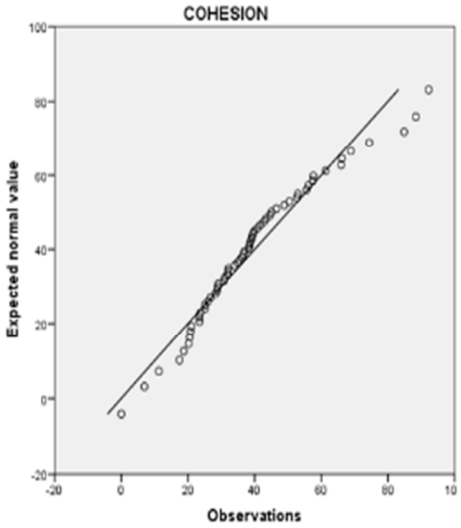

RAI
The normal deviation
Observations

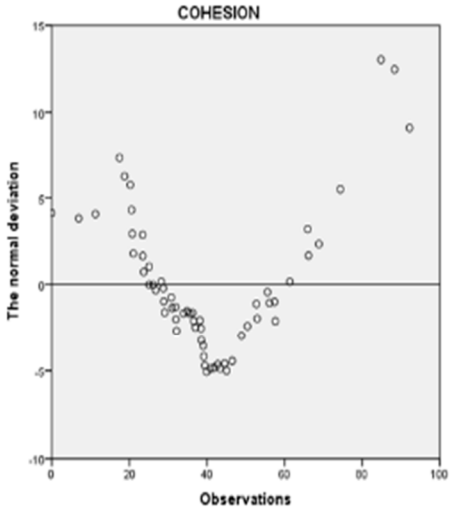

ENN-MN
Expected normal value
Observations


ENN-MN
The normal deviation
Observations


IJI
Expected normal value
Observations


IJI
The normal deviation
Observations


COHESION
Expected normal value
Observations


COHESION
The normal deviation
Observations

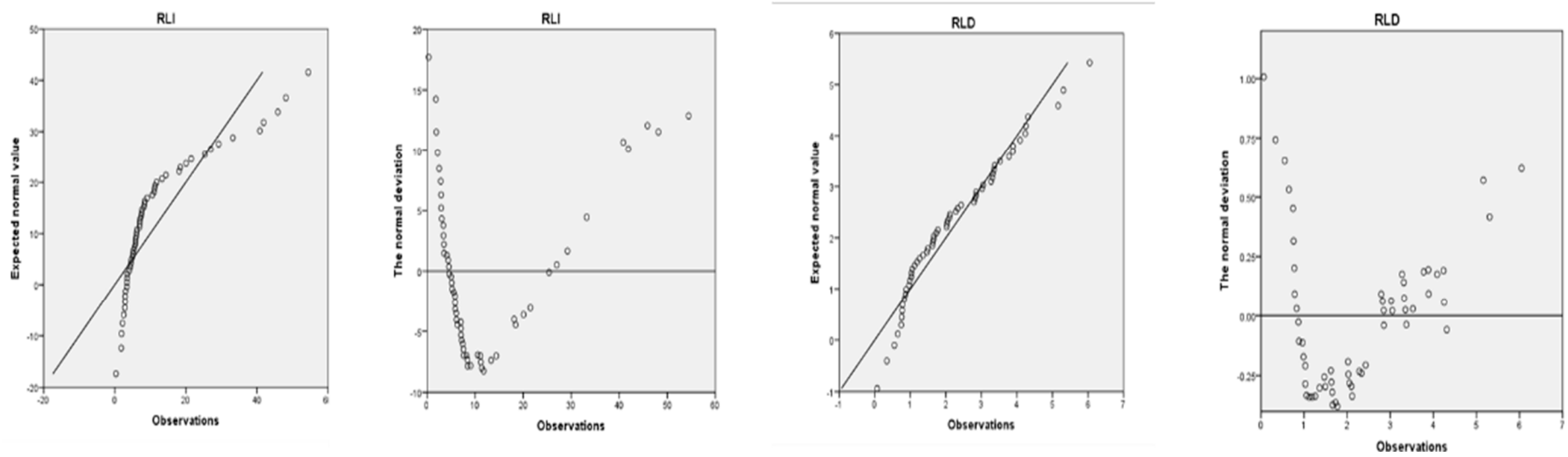
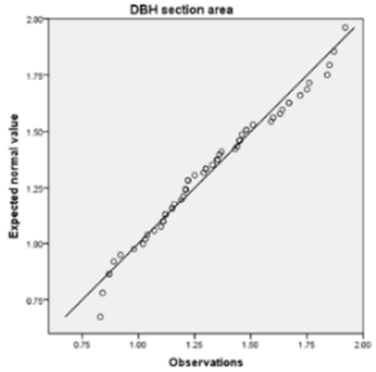
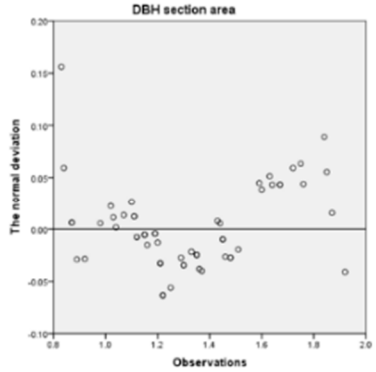
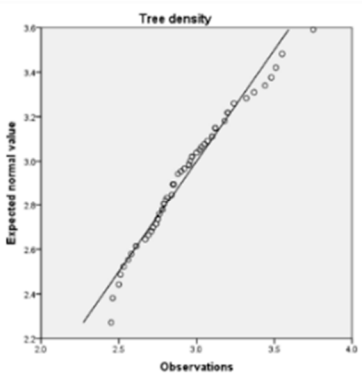
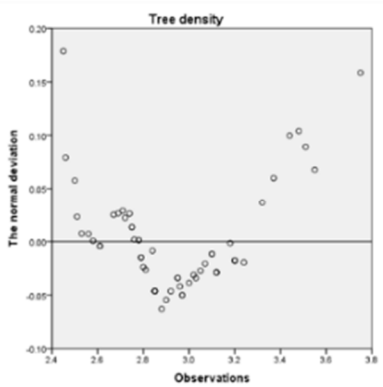


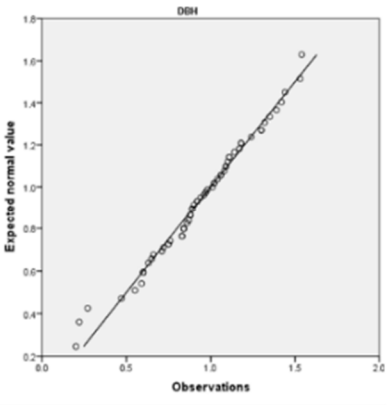
Figure S1. QQ-plots for the raw data. Criteria: the raw data(observations) linear distribution around the expected normal values, together with the normal deviations unbiasedly distributed around the zero line indicates that the raw data is normal distributed; or else, the data is not normal distributed and further analysis of variance needs transformation of these data for securing the data basic assumption for statistical analysis. We found height, UBH, H', SR, PD, LSI, PARA-MN, COHESION, ISA percentage and RLD data is normal distribution, can be used directly in ANOVA. The non-normal data (DBH section area, TD, DBH, Crown size, J', TA, ED, FRAC-MN, CONTIG-MN, ENN-MN, IJI, CPD, RAD, RAI and RLI) were transformed in the following Figure S2.

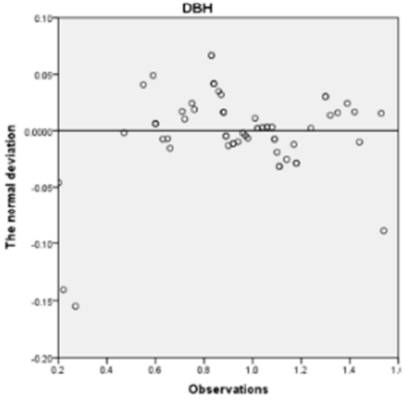

DBH section area
Expected normal value
Observations

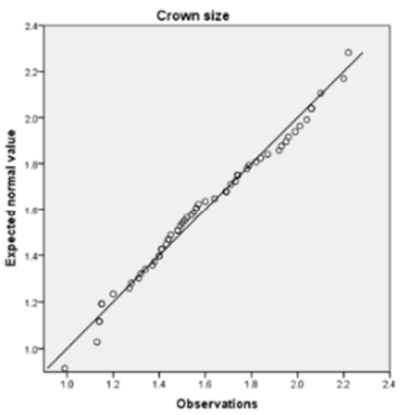

DBH section area
The normal deviation
Observations

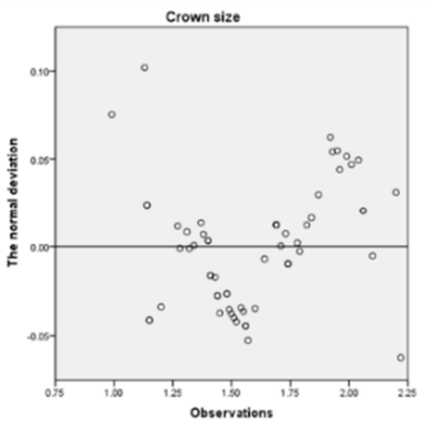

Tree density
Expected normal value
Observations

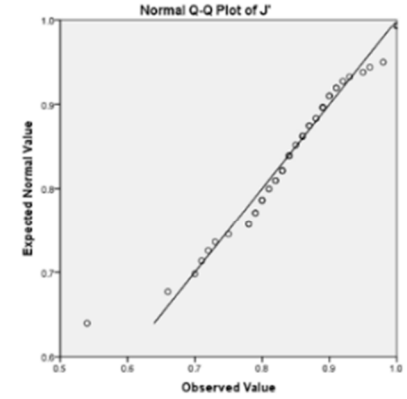

Tree density
The normal deviation
Observations

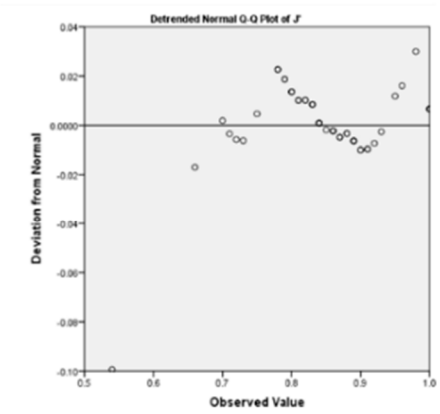

DBH
Expected normal value
Observations

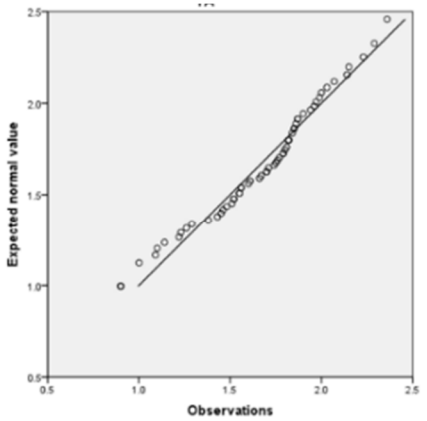

DBH
The normal deviation
Observations

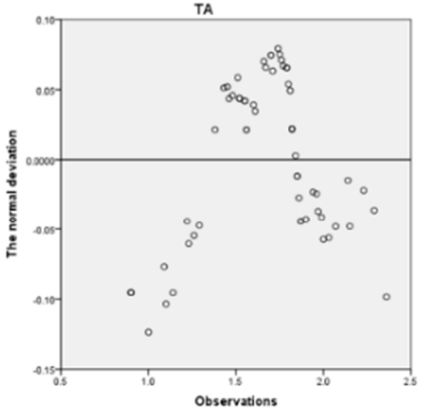

Crown size
Expected normal value
Observations

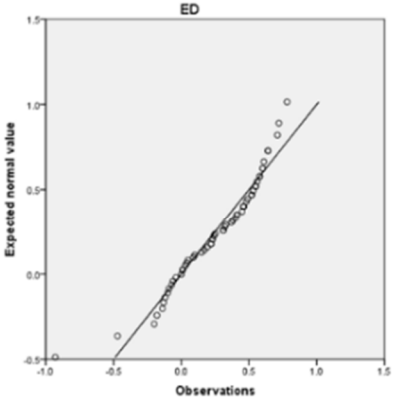

Crown size
The normal deviation
Observations

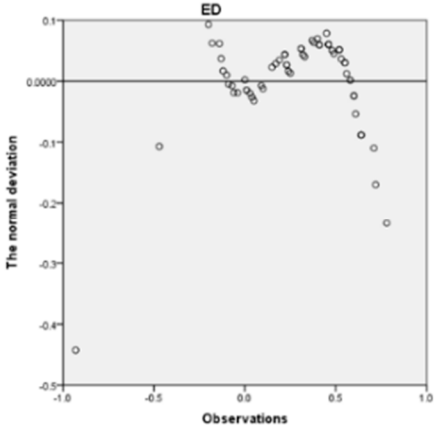

Normal Q-Q Plot of J'
Expected Normal Value
Observed Value

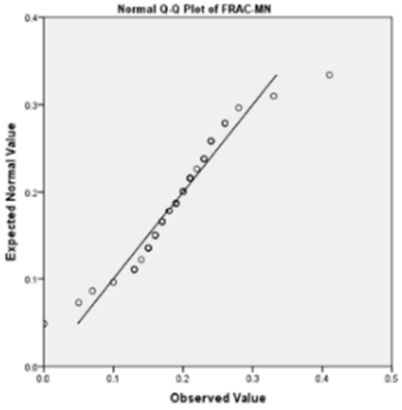

Detrended Normal Q-Q Plot of J'
Deviation from Normal
Observed Value

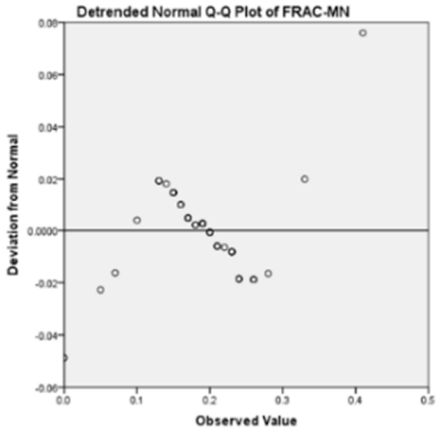

Expected normal value
Observations

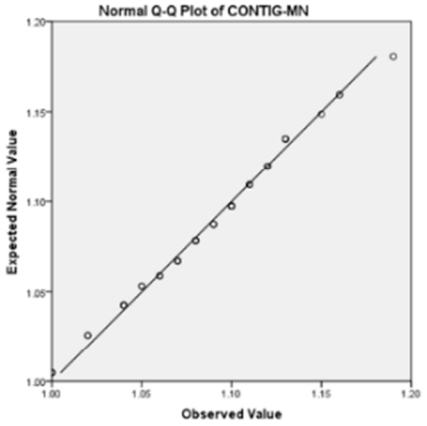

TA
The normal deviation
Observations

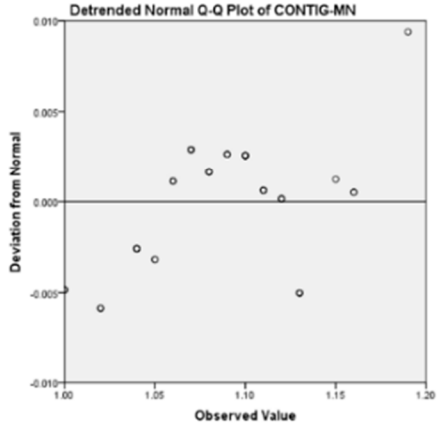

ED
Expected normal value
Observations

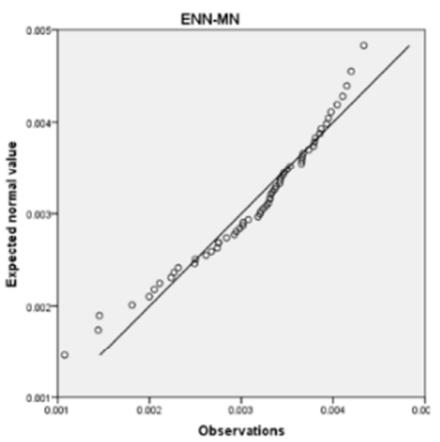

ED
The normal deviation
Observations

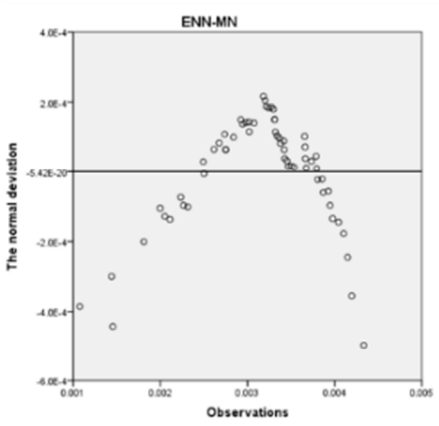

Normal Q-Q Plot of FRAC-MN
Expected Normal Value
Observed Value

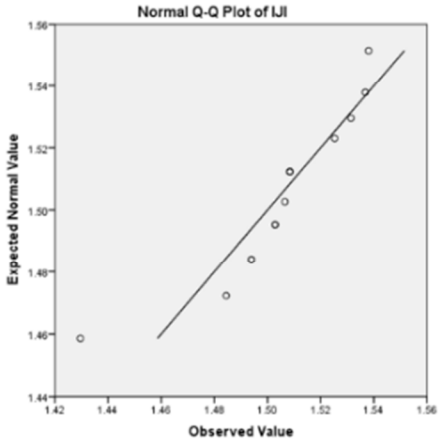

Detrended Normal Q-Q Plot of FRAC-MN
Deviation from Normal
Observed Value

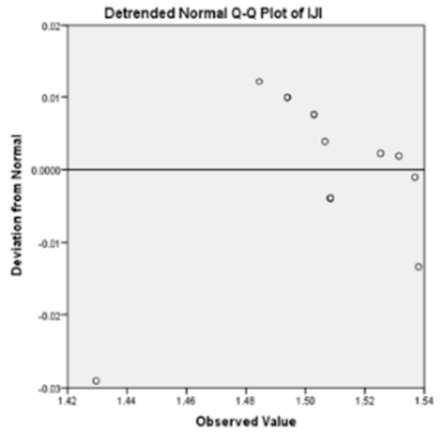

Normal Q-Q Plot of CONTIG-MN
Expected Normal Value
Observed Value

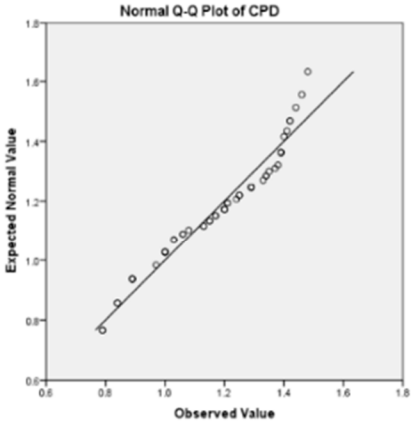

Detrended Normal Q-Q Plot of CONTIG-MN
Deviation from Normal
Observed Value

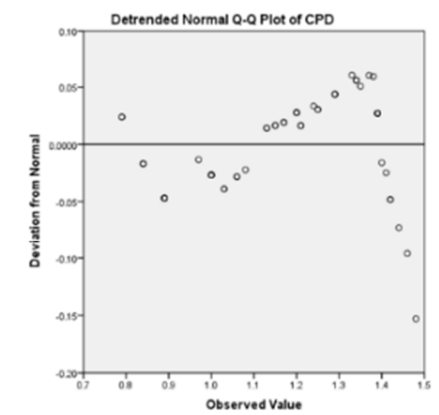

ENN-MN
Expected normal value
Observations


ENN-MN
The normal deviation
Observations


Normal Q-Q Plot of IJI
Expected Normal Value
Observed Value


Detrended Normal Q-Q Plot of IJI
Deviation from Normal
Observed Value


Normal Q-Q Plot of CPD
Expected Normal Value
Observed Value


Detrended Normal Q-Q Plot of CPD
Deviation from Normal
Observed Value

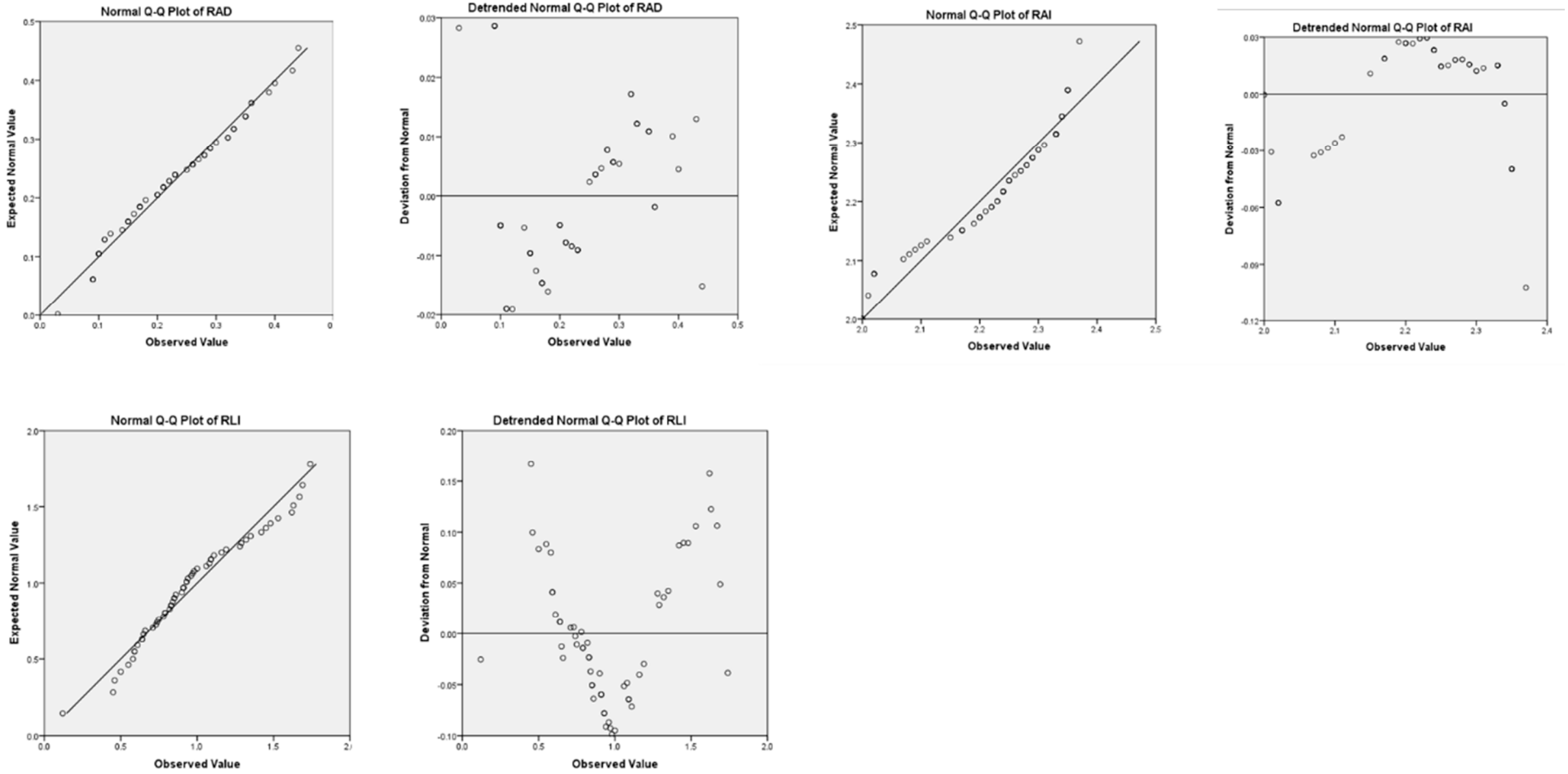
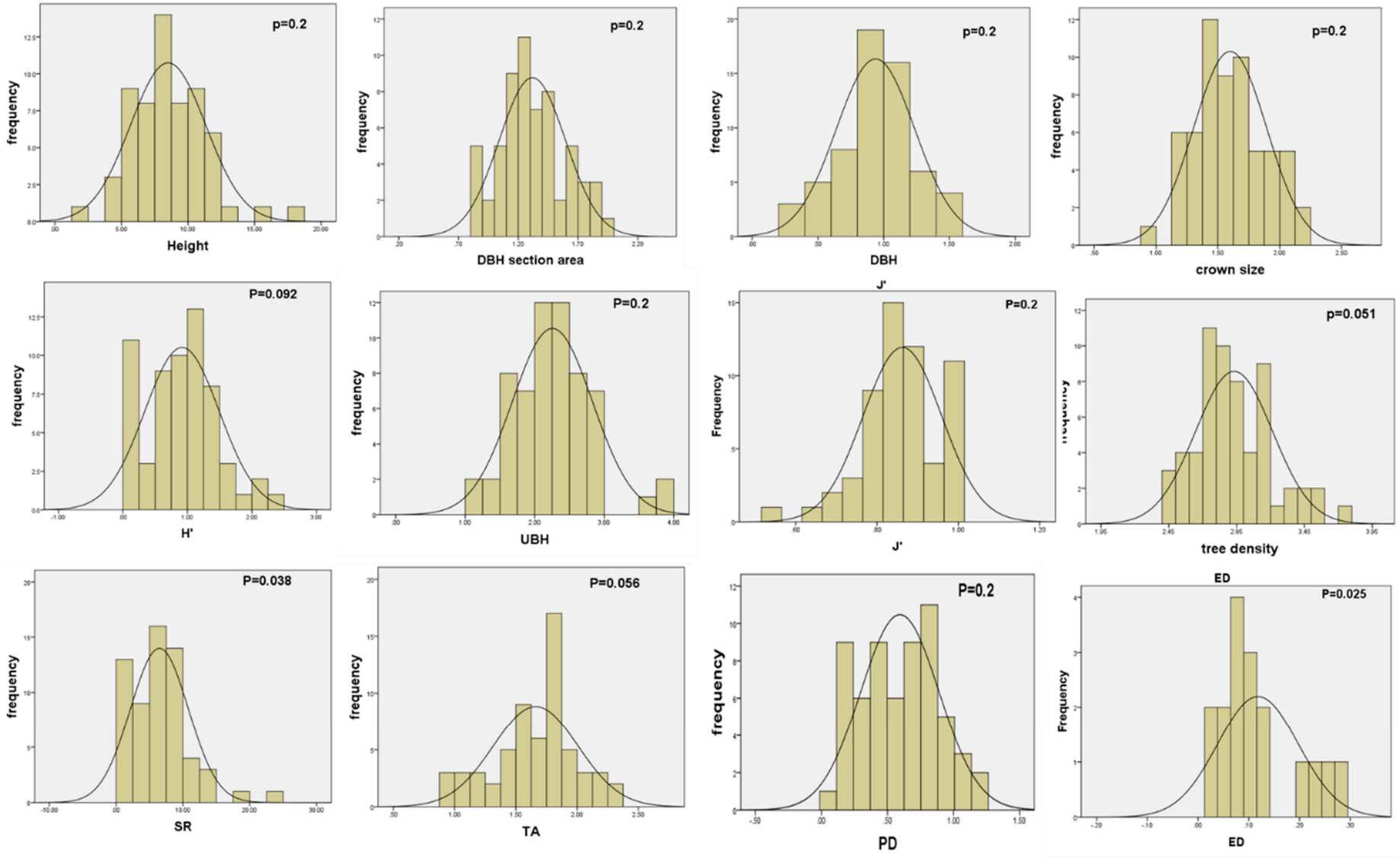
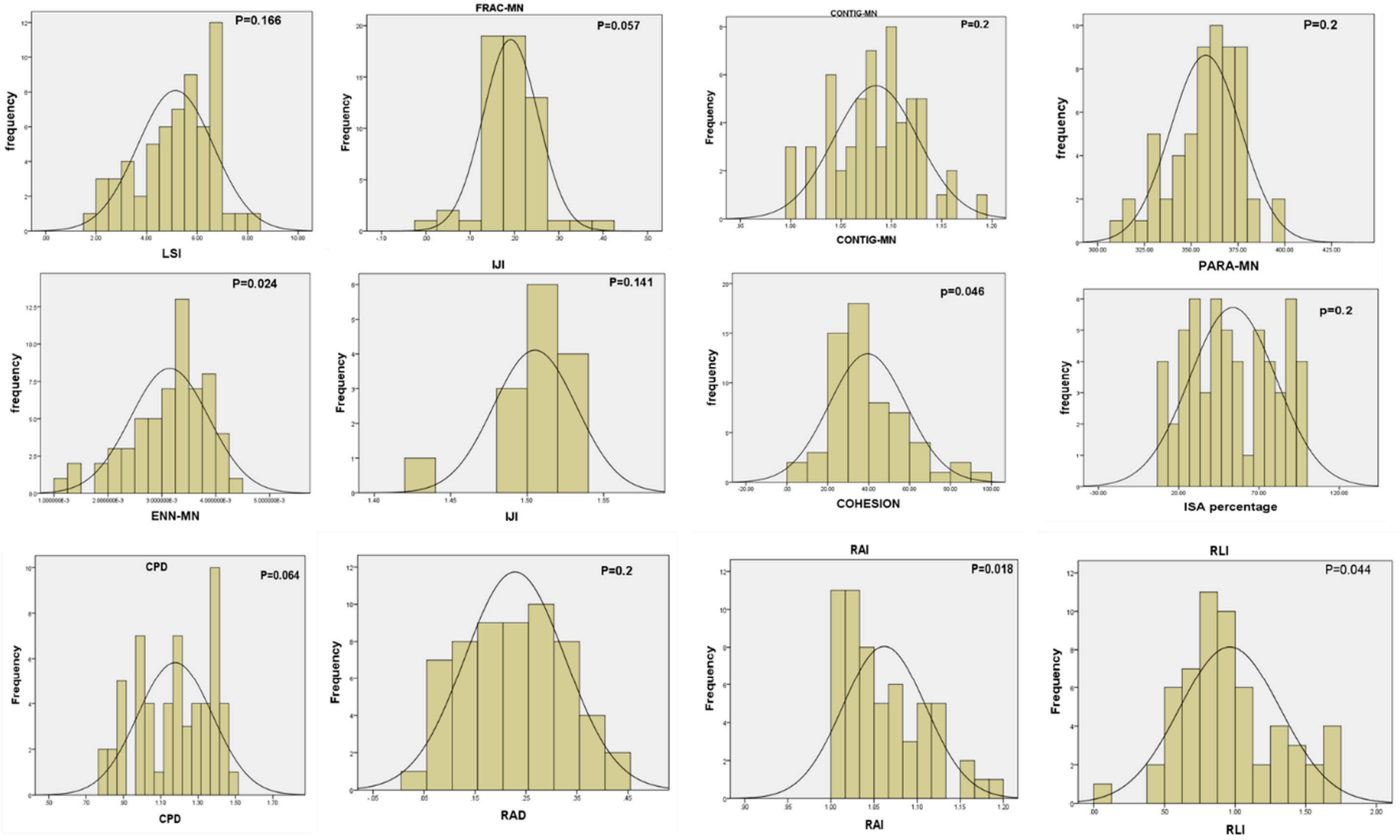


Figure S2. QQ-plots for the transformed data. Transformation way: (1) log(x) (DBH section area, TD, DBH, Crown size); (2) cos(x) (J') (3) Arccos(1/x) (FRAC-MN); (4) 1/sin(x+1) (CONTIG-MN); (5) 1/X (ENN-MN); (6) Arctan(x) (IJI); (7) Arctan(x+1) (CPD); (8) SQRT(X) (RAD); (9) 2/sin(x+1) (RAI); (10) log(x+1) (RLI).

forests

MDPI

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frequency
LSI
FRAC-MN
P=0.057
Frequency
CONTIG-MN
P=0.2
Frequency
CONTIG-MN
P=0.2
frequency
PARA-MN
P=0.024
frequency
ENN-MN
IJI
P=0.141
Frequency
IJI
p=0.046
frequency
COHESION
p=0.2
frequency
ISA percentage
CPD
P=0.064
Frequency
CPD
P=0.2
Frequency
RAD
RAI
P=0.018
Frequency
RAI
RLI
P=0.044
Frequency
RLI

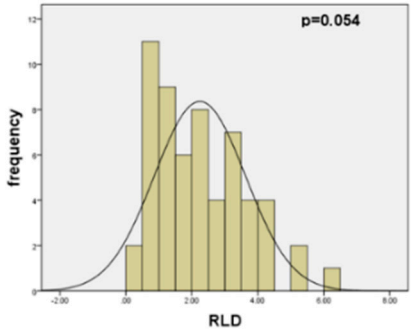


Figure S3. Histogram of frequency distribution of all data. Normal distribution analysis of the all data in Figure S1 and S2. Although the raw data and transformed data in Figure S1 and S2 look like following the normal distribution patterns. In this figure, we used statistically analysis to recognize the normality of the data. In this analysis, if the p value is higher than 0.05, so we recognized that the data are normal distributed; or else, the data should be re-transformed again.

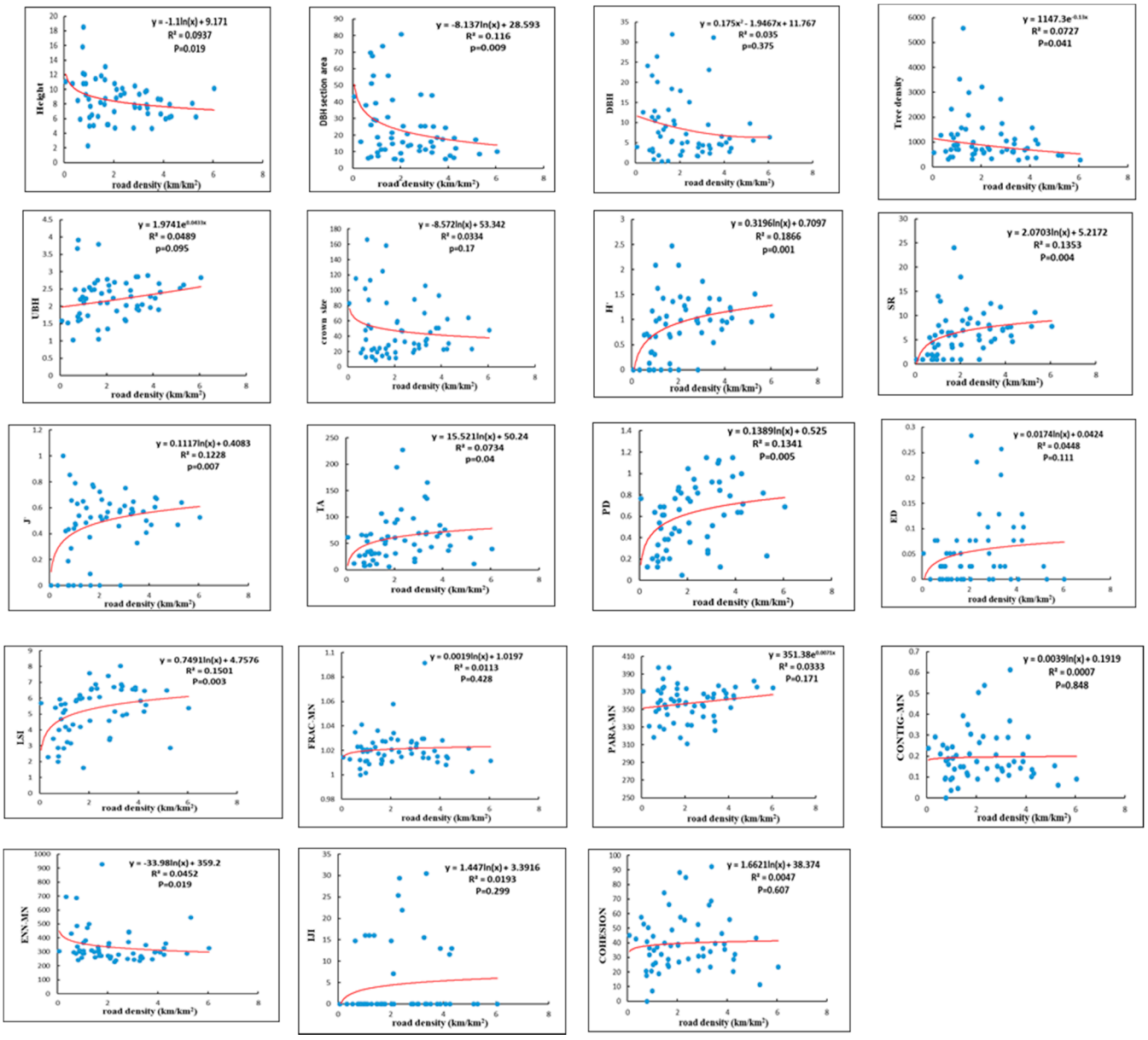


Figure S4. Regression analysis results between road density, Forest structural-taxonomic attributes and landscape metrics.

Table S1. Field-surveyed raw data quality check for all figures and tables used in this paper.

grid number	sample points in each grid	Forest attributes	mean value	standard error of mean	standard deviation
2	3	tree height(m)	10.44	0.53	0.91
		DBH section area(cm2/m2)	44.45	8.22	14.24
		DBH(cm/stems)	19.68	2.76	4.78
		tree density(stems/ha)	1750.48	603.05	1044.52
		Under branch height(m)	2.03	0.25	0.43
		Crown size(cm)	88.16	39.28	68.03
		the number of species	1.00	0.00	0.00
4	2	tree height(m)	9.31	1.66	2.35
		DBH section area(cm2/m2)	29.41	11.24	15.89
		DBH(cm/stems)	20.05	7.41	10.48
		tree density(stems/ha)	881.28	309.85	438.20
		Under branch height(m)	1.63	0.18	0.25
		Crown size(cm)	87.60	68.08	96.28
		the number of species	6.00	4.00	5.66
5	2	tree height(m)	7.72	2.12	2.99
		DBH section area(cm2/m2)	7.29	2.84	4.02
		DBH(cm/stems)	10.54	1.34	1.89
		tree density(stems/ha)	700.00	93.65	132.45
		Under branch height(m)	2.21	0.49	0.69
		Crown size(cm)	12.72	1.84	2.60
		the number of species	8.00	1.00	1.41
7	2	tree height(m)	12.05	1.25	1.77
		DBH section area(cm2/m2)	67.74	17.20	24.32
		DBH(cm/stems)	45.84	0.60	0.85
		tree density(stems/ha)	407.14	121.43	171.73
		Under branch height(m)	1.79	0.01	0.02
		Crown size(cm)	166.00	11.28	15.95
		the number of species	1.50	0.50	0.71
12	3	tree height(m)	4.73	0.65	1.12
		DBH section area(cm2/m2)	4.81	1.46	2.53
		DBH(cm/stems)	7.05	1.10	1.91
		tree density(stems/ha)	1570.37	973.57	1686.28
		Under branch height(m)	1.35	0.19	0.34
		Crown size(cm)	11.93	6.54	11.32
		the number of species	4.00	1.53	2.65
13	2	tree height(m)	9.45	3.08	4.35
		DBH section area(cm2/m2)	13.96	10.35	14.64
		DBH(cm/stems)	20.36	10.66	15.08

		tree density(stems/ha)	339.73	39.73	56.19
		Under branch height(m)	1.86	0.01	0.02
		Crown size(cm)	32.84	14.04	19.86
		the number of species	9.50	6.50	9.19
14	2	tree height(m)	13.18	4.97	7.02
		DBH section area(cm2/m2)	12.48	1.64	2.32
		DBH(cm/stems)	932.64	99.30	140.44
		tree density(stems/ha)	2.85	0.73	1.03
		Under branch height(m)	28.80	16.96	23.99
		Crown size(cm)	12.50	3.50	4.95
		the number of species	9.50	6.50	9.19
15	2	tree height(m)	8.78	3.43	4.84
		DBH section area(cm2/m2)	14.90	10.40	14.70
		DBH(cm/stems)	12.30	3.90	5.51
		tree density(stems/ha)	997.26	222.26	314.32
		Under branch height(m)	3.80	1.93	2.72
		Crown size(cm)	17.20	6.16	8.71
		the number of species	3.50	1.50	2.12
17	2	tree height(m)	11.10	2.80	3.96
		DBH section area(cm2/m2)	43.28	23.42	33.13
		DBH(cm/stems)	32.77	2.79	3.95
		tree density(stems/ha)	572.73	372.73	527.12
		Under branch height(m)	1.59	0.56	0.80
		Crown size(cm)	83.28	21.68	30.66
		the number of species	1.00	0.00	0.00
19	2	tree height(m)	7.93	0.68	0.95
		DBH section area(cm2/m2)	13.30	2.00	2.83
		DBH(cm/stems)	11.42	1.18	1.66
		tree density(stems/ha)	1324.40	472.13	667.70
		Under branch height(m)	1.59	0.06	0.09
		Crown size(cm)	30.62	5.18	7.33
		the number of species	6.00	1.00	1.41
20	3	tree height(m)	6.28	1.38	2.39
		DBH section area(cm2/m2)	12.11	6.28	10.89
		DBH(cm/stems)	11.24	2.10	3.64
		tree density(stems/ha)	922.93	253.82	439.62
		Under branch height(m)	2.41	0.38	0.67
		Crown size(cm)	30.66	10.63	18.41
		the number of species	4.67	1.20	2.08
22	5	tree height(m)	9.45	2.53	5.65
		DBH section area(cm2/m2)	18.11	5.63	12.58
		DBH(cm/stems)	18.35	3.57	7.99
		tree density(stems/ha)	729.19	331.28	740.77

		Under branch height(m)	2.23	0.46	1.03
		Crown size(cm)	44.72	13.24	29.60
		the number of species	11.60	3.08	6.88
23	10	tree height(m)	10.16	1.64	5.20
		DBH section area(cm2/m2)	13.57	3.04	9.61
		DBH(cm/stems)	13.55	1.65	5.23
		tree density(stems/ha)	706.59	109.85	347.39
		Under branch height(m)	2.70	0.49	1.55
		Crown size(cm)	46.64	9.39	29.68
		the number of species	8.40	0.81	2.55
24	3	tree height(m)	5.78	1.07	1.85
		DBH section area(cm2/m2)	18.26	8.41	14.57
		DBH(cm/stems)	9.64	3.93	6.80
		tree density(stems/ha)	2194.85	548.26	949.62
		Under branch height(m)	1.85	0.23	0.40
		Crown size(cm)	32.59	13.69	23.71
		the number of species	9.00	0.58	1.00
25	2	tree height(m)	11.30	2.80	3.96
		DBH section area(cm2/m2)	21.55	13.66	19.32
		DBH(cm/stems)	29.36	12.99	18.37
		tree density(stems/ha)	311.78	61.78	87.37
		Under branch height(m)	1.31	0.39	0.55
		Crown size(cm)	158.48	46.32	65.51
		the number of species	4.00	3.00	4.24
29	2	tree height(m)	18.50	14.88	21.04
		DBH section area(cm2/m2)	6.96	5.03	7.12
		DBH(cm/stems)	7.22	2.44	3.45
		tree density(stems/ha)	1307.81	292.19	413.22
		Under branch height(m)	1.59	0.21	0.30
		Crown size(cm)	12.89	7.41	10.48
		the number of species	4.50	3.50	4.95
30	4	tree height(m)	5.28	0.59	1.17
		DBH section area(cm2/m2)	10.42	4.88	9.76
		DBH(cm/stems)	10.01	0.77	1.55
		tree density(stems/ha)	1264.01	625.24	1250.48
		Under branch height(m)	2.20	0.52	1.03
		Crown size(cm)	27.33	6.02	12.04
		the number of species	9.00	1.08	2.16
31	4	tree height(m)	6.17	0.26	0.52
		DBH section area(cm2/m2)	6.47	2.15	4.29
		DBH(cm/stems)	8.34	1.36	2.72
		tree density(stems/ha)	1078.44	99.94	199.88
		Under branch height(m)	1.91	0.37	0.73

		Crown size(cm)	23.16	7.30	14.60
		the number of species	7.75	3.40	6.80
32	6	tree height(m)	7.94	0.69	1.69
		DBH section area(cm2/m2)	18.32	4.89	11.98
		DBH(cm/stems)	23.70	2.48	6.08
		tree density(stems/ha)	360.90	101.04	247.50
		Under branch height(m)	2.66	0.24	0.59
		Crown size(cm)	62.55	14.81	36.29
		the number of species	5.83	1.08	2.64
33	10	tree height(m)	9.65	1.24	3.92
		DBH section area(cm2/m2)	16.10	2.85	9.00
		DBH(cm/stems)	19.31	3.00	9.49
		tree density(stems/ha)	618.59	204.90	647.97
		Under branch height(m)	2.85	0.30	0.94
		Crown size(cm)	70.08	25.40	76.21
		the number of species	8.10	1.29	4.09
34	4	tree height(m)	6.65	0.88	1.77
		DBH section area(cm2/m2)	5.77	1.94	3.88
		DBH(cm/stems)	13.38	2.23	4.46
		tree density(stems/ha)	375.10	101.38	202.75
		Under branch height(m)	2.29	0.21	0.41
		Crown size(cm)	50.85	5.56	11.11
		the number of species	7.25	1.60	3.20
35	3	tree height(m)	7.00	0.71	1.23
		DBH section area(cm2/m2)	9.04	1.58	2.74
		DBH(cm/stems)	11.57	1.12	1.94
		tree density(stems/ha)	699.14	95.78	165.89
		Under branch height(m)	2.10	0.47	0.81
		Crown size(cm)	34.70	10.40	18.01
		the number of species	18.00	4.36	7.55
36	7	tree height(m)	10.78	1.24	3.28
		DBH section area(cm2/m2)	55.86	20.61	54.52
		DBH(cm/stems)	22.02	4.89	12.95
		tree density(stems/ha)	1175.38	295.64	782.18
		Under branch height(m)	2.20	0.36	0.94
		Crown size(cm)	53.99	10.38	27.45
		the number of species	3.43	1.29	3.41
41	7	tree height(m)	6.46	0.58	1.53
		DBH section area(cm2/m2)	10.84	4.06	10.73
		DBH(cm/stems)	13.11	2.00	5.30
		tree density(stems/ha)	525.61	46.32	122.56
		Under branch height(m)	1.88	0.18	0.47
		Crown size(cm)	27.66	5.33	14.10

		the number of species	8.57	0.65	1.72
42	6	tree height(m)	10.12	1.58	3.86
		DBH section area(cm2/m2)	10.02	2.43	5.95
		DBH(cm/stems)	21.44	2.61	6.40
		tree density(stems/ha)	283.38	108.98	266.95
		Under branch height(m)	2.83	0.51	1.26
		Crown size(cm)	48.20	6.99	17.11
		the number of species	7.83	1.01	2.48
43	13	tree height(m)	8.11	0.71	2.58
		DBH section area(cm2/m2)	17.19	3.30	11.89
		DBH(cm/stems)	19.92	2.73	9.83
		tree density(stems/ha)	479.24	71.12	256.44
		Under branch height(m)	2.52	0.25	0.91
		Crown size(cm)	63.87	8.97	32.34
		the number of species	7.77	1.26	4.53
44	6	tree height(m)	8.21	1.34	3.27
		DBH section area(cm2/m2)	24.86	7.12	17.45
		DBH(cm/stems)	18.23	2.46	6.04
		tree density(stems/ha)	823.52	145.50	356.40
		Under branch height(m)	1.94	0.50	1.23
		Crown size(cm)	93.72	45.15	110.60
		the number of species	6.67	1.12	2.73
45	3	tree height(m)	9.78	4.51	7.81
		DBH section area(cm2/m2)	43.92	31.21	54.06
		DBH(cm/stems)	27.89	13.34	23.11
		tree density(stems/ha)	644.54	247.94	429.45
		Under branch height(m)	1.93	0.26	0.44
		Crown size(cm)	105.71	87.08	150.82
		the number of species	7.67	3.53	6.11
46	2	tree height(m)	8.75	2.45	3.46
		DBH section area(cm2/m2)	16.76	5.35	7.56
		DBH(cm/stems)	18.35	9.25	13.08
		tree density(stems/ha)	939.60	582.89	824.33
		Under branch height(m)	2.29	0.19	0.27
		Crown size(cm)	57.50	33.02	46.70
		the number of species	9.00	0.00	0.00
47	2	tree height(m)	5.03	0.18	0.25
		DBH section area(cm2/m2)	9.50	7.55	10.68
		DBH(cm/stems)	10.09	5.39	7.63
		tree density(stems/ha)	897.96	9.07	12.83
		Under branch height(m)	2.10	0.30	0.42
		Crown size(cm)	13.06	6.46	9.14
		the number of species	4.00	3.00	4.24

51	3	tree height(m)	6.70	0.87	1.50
		DBH section area(cm2/m2)	25.20	13.86	24.00
		DBH(cm/stems)	15.97	2.07	3.59
		tree density(stems/ha)	1123.89	607.67	1052.52
		Under branch height(m)	1.89	0.87	1.50
		Crown size(cm)	36.43	10.24	17.73
		the number of species	4.67	0.33	0.58
52	8	tree height(m)	8.81	0.68	1.93
		DBH section area(cm2/m2)	15.76	2.47	6.99
		DBH(cm/stems)	17.43	1.72	4.86
		tree density(stems/ha)	557.21	110.12	311.46
		Under branch height(m)	2.61	0.24	0.67
		Crown size(cm)	58.04	6.15	17.40
		the number of species	9.00	0.50	1.41
53	3	tree height(m)	6.26	1.05	1.82
		DBH section area(cm2/m2)	8.69	2.92	5.05
		DBH(cm/stems)	15.03	3.23	5.59
		tree density(stems/ha)	458.46	128.65	222.82
		Under branch height(m)	2.62	0.18	0.32
		Crown size(cm)	23.17	3.87	6.71
		the number of species	10.67	1.20	2.08
54	6	tree height(m)	8.19	1.07	2.63
		DBH section area(cm2/m2)	18.57	6.25	15.31
		DBH(cm/stems)	13.87	1.89	4.64
		tree density(stems/ha)	1087.81	421.88	1033.38
		Under branch height(m)	2.71	0.49	1.20
		Crown size(cm)	44.91	11.02	26.99
		the number of species	11.00	3.82	9.36
55	5	tree height(m)	4.70	1.31	2.93
		DBH section area(cm2/m2)	18.62	10.05	22.48
		DBH(cm/stems)	32.55	13.92	31.12
		tree density(stems/ha)	281.08	92.92	207.78
		Under branch height(m)	2.05	0.13	0.30
		Crown size(cm)	45.28	14.38	32.15
		the number of species	5.20	1.98	4.44
56	2	tree height(m)	4.77	0.57	0.80
		DBH section area(cm2/m2)	5.22	0.07	0.10
		DBH(cm/stems)	8.95	0.13	0.19
		tree density(stems/ha)	810.79	48.59	68.72
		Under branch height(m)	1.69	0.21	0.30
		Crown size(cm)	4.88	0.88	1.24
		the number of species	6.50	2.50	3.54
57	2	tree height(m)	8.23	1.68	2.37

		DBH section area(cm2/m2)	30.81	9.60	13.58
		DBH(cm/stems)	12.55	0.29	0.41
		tree density(stems/ha)	2087.34	1032.66	1460.40
		Under branch height(m)	2.49	0.06	0.09
		Crown size(cm)	14.56	5.12	7.24
		the number of species	6.50	5.50	7.78
58	2	tree height(m)	7.55	2.55	3.61
		DBH section area(cm2/m2)	25.51	7.25	10.26
		DBH(cm/stems)	20.09	2.74	3.88
		tree density(stems/ha)	613.36	141.36	199.91
		Under branch height(m)	2.68	0.65	0.92
		Crown size(cm)	22.40	17.12	24.21
		the number of species	5.00	1.00	1.41
59	3	tree height(m)	5.98	0.15	0.26
		DBH section area(cm2/m2)	7.67	2.07	3.59
		DBH(cm/stems)	8.15	2.91	5.04
		tree density(stems/ha)	1574.56	546.56	946.67
		Under branch height(m)	2.24	0.13	0.23
		Crown size(cm)	22.77	6.41	11.10
		the number of species	7.67	2.19	3.79
60	4	tree height(m)	7.88	1.64	3.28
		DBH section area(cm2/m2)	9.65	3.54	7.08
		DBH(cm/stems)	13.50	2.19	4.37
		tree density(stems/ha)	594.69	156.68	313.36
		Under branch height(m)	2.01	0.36	0.71
		Crown size(cm)	33.92	8.62	17.23
		the number of species	7.25	0.95	1.89
61	3	tree height(m)	10.03	1.59	2.75
		DBH section area(cm2/m2)	25.34	9.96	17.25
		DBH(cm/stems)	20.40	1.72	2.98
		tree density(stems/ha)	596.69	196.73	340.74
		Under branch height(m)	2.44	0.69	1.20
		Crown size(cm)	59.41	15.80	27.37
		the number of species	7.00	3.46	6.00
64	2	tree height(m)	5.93	0.53	0.74
		DBH section area(cm2/m2)	6.07	4.06	5.75
		DBH(cm/stems)	14.11	2.27	3.21
		tree density(stems/ha)	322.44	140.15	198.20
		Under branch height(m)	2.49	0.81	1.15
		Crown size(cm)	23.28	8.40	11.88
		the number of species	5.50	1.50	2.12
65	3	tree height(m)	10.83	1.22	2.11
		DBH section area(cm2/m2)	51.17	18.22	31.56

		DBH(cm/stems)	17.90	1.60	2.77
		tree density(stems/ha)	2326.39	1138.44	1971.84
		Under branch height(m)	3.91	1.22	2.11
		Crown size(cm)	35.65	11.29	19.55
		the number of species	1.00	0.00	0.00
68	2	tree height(m)	7.50	1.70	2.40
		DBH section area(cm2/m2)	11.44	6.63	9.37
		DBH(cm/stems)	12.90	3.07	4.34
		tree density(stems/ha)	708.33	125.00	176.78
		Under branch height(m)	2.29	0.19	0.27
		Crown size(cm)	24.24	16.40	23.19
		the number of species	10.50	4.50	6.36
70	3	tree height(m)	9.38	1.30	2.25
		DBH section area(cm2/m2)	25.49	11.68	20.24
		DBH(cm/stems)	16.85	1.61	2.79
		tree density(stems/ha)	1052.90	418.53	724.91
		Under branch height(m)	2.46	0.52	0.90
		Crown size(cm)	28.69	11.06	19.15
		the number of species	3.33	1.45	2.52
71	2	tree height(m)	7.95	2.15	3.04
		DBH section area(cm2/m2)	18.34	12.55	17.75
		DBH(cm/stems)	14.73	3.63	5.14
		tree density(stems/ha)	821.43	345.24	488.24
		Under branch height(m)	2.76	1.24	1.75
		Crown size(cm)	24.00	6.08	8.60
		the number of species	6.50	5.50	7.78
74	2	tree height(m)	11.45	1.65	2.33
		DBH section area(cm2/m2)	73.62	36.48	51.60
		DBH(cm/stems)	17.57	5.89	8.33
		tree density(stems/ha)	5572.54	4713.17	6665.43
		Under branch height(m)	2.55	0.10	0.14
		Crown size(cm)	19.36	10.24	14.48
		the number of species	1.00	0.00	0.00

Table S2. Stepwise regression and model diagnosis results in Low RD region and medium-heavy RD regions

Low RD regions								
1. Model Summary (Low RD height)								
Model	R	R^2	Adjusted R^2	SE	Durbin-Watson		p	
2	.659[b]	0.434	0.374	2.9476	1.532		.022[b]	
Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
2	Constant	13.011	1.305		9.968	0		
	IJI	-0.273	0.104	-0.454	-2.623	0.017	0.995	1.01
	RAD	-153.038	59.269	-0.447	-2.582	0.018	0.995	1.01
Collinearity Diagnostics[a]								
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				Constant	IJI	RAD		
2	1	2.167	1	0.04	0.08	0.04		
	2	0.706	1.752	0.03	0.92	0.04		
	3	0.127	4.132	0.93	0	0.92		
Residuals Statistics[a]								
		Minimum	Maximum	Mean	SD	N		
Predicted Value		4.0656	12.8946	9.3	2.45539	22		
Residual		-6.271	7.16111	0	2.80375	22		
Std. Predicted Value		-2.142	1.454	0	1	22		
Std. Residual		-2.128	2.429	0	0.951	22		
2. Model Summary(Low RD DBH section area)								
Model	R	R^2	Adjusted R^2	SE	Durbin-Watson		p	
6	.927	.860	.804	9.77	1.595		.000[g]	
Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
6	Constant	-2079.479	309.10		-6.72	.000		
	IJI	-1.261	.407	-.354	-3.10	.007	.716	1.397
	FRAC	2002.247	278.75	.955	7.18	.000	.528	1.893
	ED	-565.070	108.63	-.714	-5.20	.000	.496	2.015
	RAI	-342.668	92.549	-.423	-3.70	.002	.715	1.398
	PARA	.316	.137	.309	2.305	.036	.521	1.918

	CPD	-9.666	5.360	-.187	-1.80	.091	.866	1.154	

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions						
				Constant	IJI	FRAC	ED	RAI	PARA	CPD
6	1	5.219	1.000	.00	.01	.00	.01	.01	.00	.01
	2	1.017	2.265	.00	.36	.00	.04	.02	.00	.02
	3	.326	4.000	.00	.50	.00	.28	.02	.00	.26
	4	.279	4.325	.00	.10	.00	.12	.14	.00	.63
	5	.157	5.762	.00	.00	.00	.24	.65	.00	.00
	6	.002	56.13	.00	.01	.01	.21	.16	.69	.04
	7	2.46E-5	460.0	1.00	.02	.99	.11	.00	.31	.04

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	.3229	69.85	32.3	20.449	22
Residual	-17.64	13.76	.00000	8.2557	22
Std.Predicted Value	-1.565	1.835	.000	1.000	22
Std. Residual	-1.806	1.409	.000	.845	22

3. Model Summary(Low RD DBH)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
1	.398[a]	.158	.116	7.3169	2.865	.067[b]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
1	Constant	14.122	2.768		5.102	.000		
	TA	-.121	.062	-.398	-1.94	.067	1.000	1.000

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				Constant	TA
1	1	1.826	1.000	.09	.09
	2	.174	3.240	.91	.91

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	.3229	69.8542	32.3338	20.44933	22
Predicted Value	1.259	13.2645	9.6843	3.09869	22
Residual	-9.920	16.497	.00000	7.14063	22
Std. Predicted	-2.719	1.155	.000	1.000	22

Value					
Std. Residual	-1.356	2.255	.000	.976	22

4. Model Summary(Low RD TD)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
1	.569[a]	.324	.290	1048.9	1.702	.006[b]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
1	Constant	549.238	365.81		1.501	.149		
	CPD	1659.415	535.69	.569	3.098	.006	1.000	1.000

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				Constant	CPD
1	1	1.791	1.000	.10	.10
	2	.209	2.930	.90	.90

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	549.2375	3130.54	1445.9920	709.08316	22
Predicted Value	-1696.129	3179.5	.00000	1023.69057	22
Residual	-1.265	2.376	.000	1.000	22
Std. Predicted Value	-1.617	3.031	.000	.976	22
Std. Residual	549.2375	3130.54	1445.9920	709.08316	22

5. Model Summary(Low RD UBH)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
2	.530[b]	.281	.205	.59529	1.878	.044[c]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
2	Constant	3.433	.473		7.260	.000		
	ENN	-.003	.001	-.497	-2.44	.025	.915	1.092
	ED	-9.062	4.874	-.378	-1.85	.079	.915	1.092

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions		
				Constant	ENN	ED

2	1	2.548	1.000	.01	.01	.05
	2	.411	2.491	.01	.05	.72
	3	.042	7.834	.98	.93	.23

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	1.6099	2.7530	2.2073	.35358	22
Residual	-.7803	1.59576	.00000	.56624	22
Std.Predicted Value	-1.689	1.543	.000	1.000	22
Std. Residual	-1.311	2.681	.000	.951	22

6. Model Summary(Low RD Canopy size)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
4	.824	.678	.603	28.968	1.975	.000[e]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
Constant	132.92	26.035		5.106	.000			
RLI	6.719	1.747	.609	3.846	.001	.755	1.325	
ENN	-.201	.055	-.556	-3.629	.002	.805	1.242	
CPD	-39.395	14.999	-.366	-2.626	.018	.973	1.028	
ED	-603.80	251.680	-.366	-2.399	.028	.813	1.230	

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				Constant	RLI	ENN	CPD	ED
4	1	3.818	1.000	.00	.01	.01	.02	.01
	2	.619	2.484	.00	.16	.00	.00	.39
	3	.381	3.165	.00	.12	.01	.71	.07
	4	.145	5.133	.05	.70	.21	.14	.29
	5	.037	10.194	.95	.00	.78	.13	.23

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	.8356	156.60	53.3354	37.85204	22
Residual	-40.08	40.947	.00000	26.06407	22
Std.Predicted Value	-1.387	2.728	.00000	1.000	22
Std. Residual	-1.384	1.414	.00000	.900	22

7. Model Summary(Low RD H')

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
1	.658[a]	.432	.404	.46144	2.082	.001[b]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
1	Constant	-.043	.201		-.212	.834		
	RAD	36.126	9.255	.658	3.903	.001	1.000	1.00

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				Constan	RAD
1	1	1.873	1.000	.06	.06
	2	.127	3.835	.94	.94

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	-.0152	1.3850	.6435	.39303	22
Residual	-1.005	.80896	.00000	.45032	22
Std. Predicted Value	-1.676	1.887	.000	1.000	22
Std. Residual	-2.179	1.753	.000	.976	22

8. Model Summary(Low RD SR)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
1	.687[a]	.472	.446	2.868	2.287	.000[b]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
1	Constant	-.073	1.253		-.058	.954		
	RAD	243.333	57.544	.687	4.229	.000	1.000	1.000

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				Constant	RAD
1	1	1.873	1.000	.06	.06
	2	.127	3.835	.94	.94

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted	.1129	9.5447	4.5498	2.64732	22

Value					
Residual	-5.987	7.30869	.00000	2.79977	22
Std. Predicted Value	-1.676	1.887	.000	1.000	22
Std. Residual	-2.087	2.548	.000	.976	22

Medium and high RD regions

9. Model Summary(Medium and high RD height)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
1	.288[a]	.083	.056	1.9715	2.183	.088[b]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Toleranc	VIF
1	Constant	9.588	.930		10.31	.000		
	ENN	-.005	.003	-.288	-1.75	.088	1.000	1.000

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				Constant	ENN
1	1	1.935	1.000	.03	.03
	2	.065	5.475	.97	.97

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	5.188	8.5054	8.0629	.58465	36
Residual	-3.68	4.90709	.00000	1.94316	36
Std. Predicted Value	-4.91	.757	.000	1.000	36
Std. Residual	-1.86	2.489	.000	.986	36

10. Model Summary(Medium and high RD DBH section area)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
1	.279[a]	.078	.051	14.282	1.483	.099[b]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Toleranc	VIF
1	Constant	27.289	5.537		4.928	.000		
	RAD	-96.317	56.78	-.279	-1.69	.099	1.000	1.00

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				Constant	RAD
1	1	1.903	1.000	.05	.05
	2	.097	4.427	.95	.95

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	8.343	25.0279	18.8084	4.09493	36
Residual	-17.7	57.9672	.00000	14.0768	36
Std. Predicted Value	-2.55	1.519	.000	1.000	36
Std. Residual	-1.24	4.059	.000	.986	36

11. Model Summary(Medium and heavy RD DBH)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
2	.438[b]	.191	.142	7.08	2.612	.030[c]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
2	Constant	-52.583	25.20		-2.08	.045		
	PARA	.189	.074	.434	2.568	.015	.859	1.165
	RLD	-2.280	1.146	-.336	-1.99	.055	.859	1.165

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions		
				Constant	PARA	RLD
2	1	2.923	1.000	.00	.00	.01
	2	.076	6.185	.01	.00	.89
	3	.001	52.696	.99	1.00	.10

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	1.3427	15.269	7.9532	3.34527	36
Residual	-11.3910	20.558	.00000	6.87551	36
Std. Predicted Value	-1.976	2.187	.000	1.000	36
Std. Residual	-1.609	2.903	.000	.971	36

12. Model Summary(Medium and heavy RD TD)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
2	.434[b]	.189	.139	586.9	2.517	.032[c]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Toleranc	VIF
2	Constant	1635.479	292.2		5.595	.000		
	CPD	-105.143	47.04	-.356	-2.23	.032	.969	1.032
	ISA%	-7.342	3.662	-.319	-2.00	.053	.969	1.032

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions		
				Constant	CPD	ISA%
2	1	2.642	1.000	.02	.03	.02
	2	.286	3.038	.00	.54	.28
	3	.072	6.056	.98	.42	.69

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	348.18	1358.03	881.621	274.82	36
Residual	-835.48	1857.55	.00000	569.94	36
Std. Predicted Value	-1.941	1.73	.000	1.000	36
Std. Residual	-1.423	3.16	.000	.971	36

13. Model Summary(Medium and high UBH)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
3	.538[c]	.289	.223	.4743	1.420	.011[d]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
3	Constant	1.266	.298		4.246	.000		
	COHESION	.018	.006	.653	3.089	.004	.498	2.01
	RAD	5.043	1.953	.399	2.582	.015	.932	1.07
	ED	-2.771	1.448	-.395	-1.91	.065	.522	1.91

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				Constant	COHESION	RAD	ED
3	1	3.334	1.000	.01	.01	.01	.02
	2	.484	2.624	.01	.00	.10	.36

3	.143	4.826	.05	.21	.46	.33
4	.039	9.240	.93	.78	.43	.29

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	1.783	2.9270	2.2794	.28930	36
Residual	-.756	1.20609	.00000	.45353	36
Std. Predicted Value	-1.71	2.238	.000	1.000	36
Std. Residual	-1.59	2.543	.000	.956	36

14. Model Summary(Medium and high RD Canopy size)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
1	.349[a]	.122	.096	29.11	1.900	.037[b]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Tolerance	VIF
1	Constant	24.434	10.82		2.257	.031		
	ISA%	.388	.179	.349	2.171	.037	1.000	1.00

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				Constant	ISA%
1	1	1.894	1.000	.05	.05
	2	.106	4.226	.95	.95

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	27.98	61.0515	45.4468	10.6826	36
Residual	-38.5	98.1198	.00000	28.6915	36
Std. Predicted Value	-1.63	1.461	.000	1.000	36
Std. Residual	-1.32	3.371	.000	.986	36

15. Model Summary(Medium and heavy RD H')

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
2	.433	.187	.138	.4888	1.909	.033[c]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	

		B	SE	Beta			Tolerance	VIF
2	Constant	.752	.140		5.352	.000		
	IJI	.021	.009	.363	2.273	.030	.966	1.03
	RLI	.011	.006	.312	1.952	.059	.966	1.03

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions		
				Constant	IJI	RLI
2	1	2.034	1.000	.07	.08	.07
	2	.765	1.631	.01	.70	.14
	3	.201	3.178	.92	.22	.79

Residuals Statistics[a]

	Minimum	Maximum	Mean	SD	N
Predicted Value	.7920	1.5117	1.0447	.22782	36
Residual	-.9976	1.6519	.00000	.47471	36
Std. Predicted Value	-1.109	2.050	.000	1.000	36
Std. Residual	-2.041	3.379	.000	.971	36

16. Model Summary(Medium and high RD SR)

Model	R	R^2	Adjusted R^2	SE	Durbin-Watson	p
1	.318[a]	.101	.074	4.27002	2.155	.059[b]

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coef	t	Sig.	Collinearity Statistics	
		B	SE	Beta			Toleranc	VIF
1	Constant	1.614	3.112		.519	.607		
	LSI	1.028	.526	.318	1.954	.059	1.000	1.0

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions	
				Constant	LSI
1	1	1.974	1.000	.01	.01
	2	.026	8.630	.99	.99

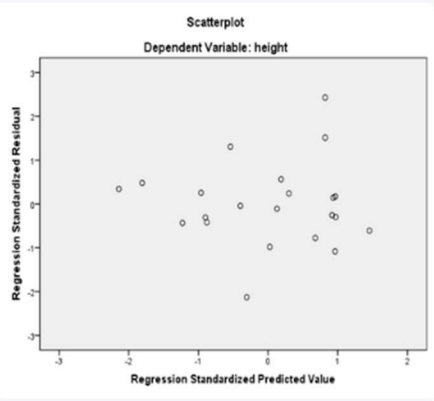
Residuals Statistics[a]

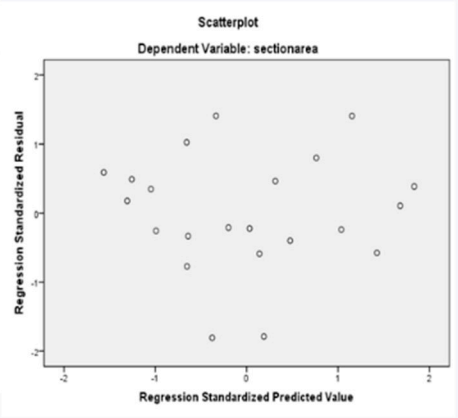
	Minimum	Maximum	Mean	SD	N
Predicted Value	3.2600	9.8853	7.5329	1.4099	36
Residual	-6.78541	16.2145	.00000	4.2085	36
Std. Predicted	-3.030	1.668	.000	1.000	36

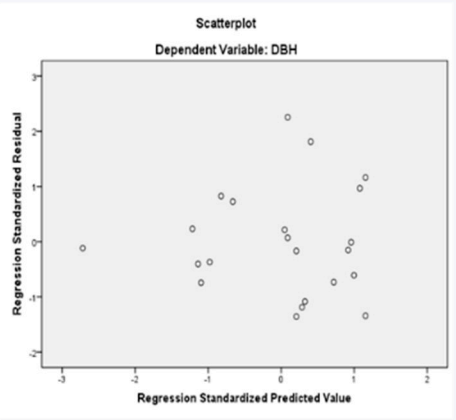
Value					
Std. Residual	-1.589	3.797	.000	.986	36

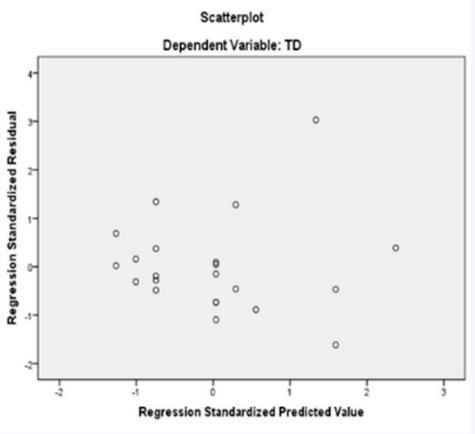
forests

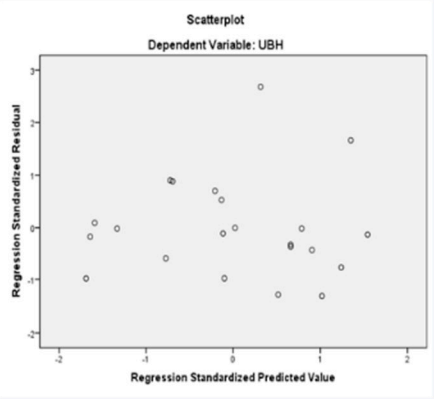
MDPI

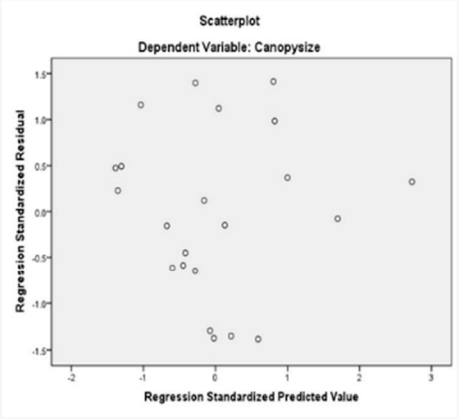


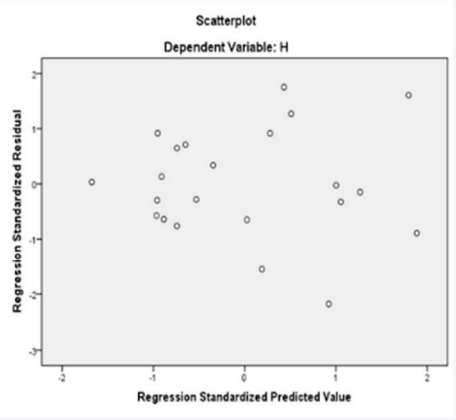


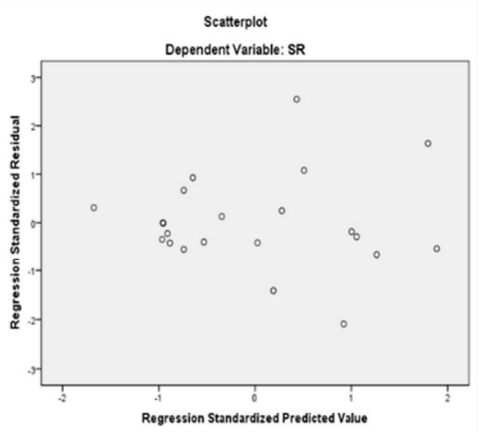












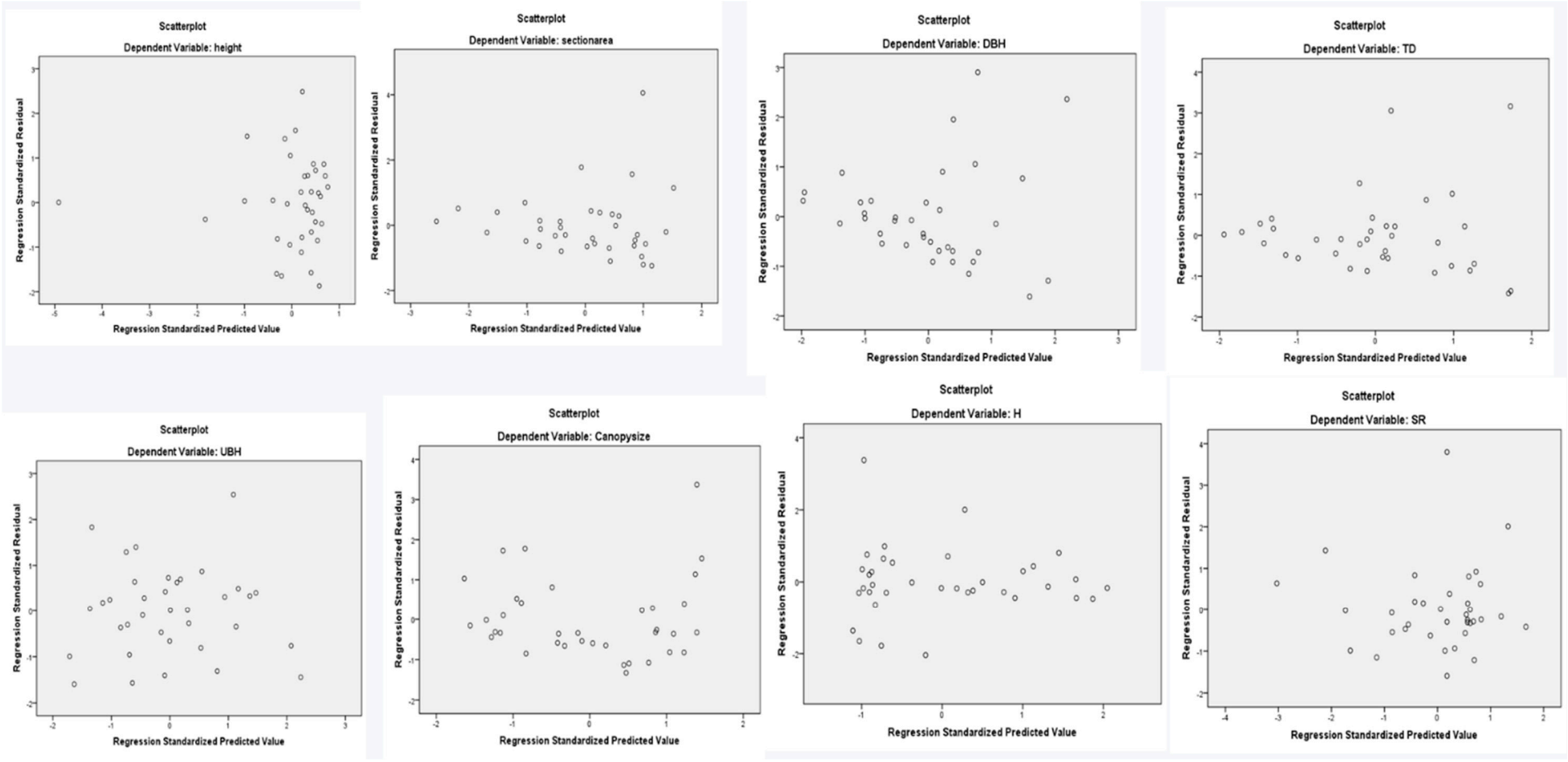


Figure S5. Residual figure for residual homogeneity and heteroscedasticity diagnosis: The result of residual analysis shows that our average residual is 0, which indicates homogeneity of residual (Table S2). As can be seen from the residual diagram, the points in the diagram are basically uniformly distributed around the line Y=0, which indicates the homogeneity of the residual and the absence of heteroscedasticity (Figure S5).