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Economic strategies of plant absorptive roots vary with root diameter

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Supporting information

Fig. S1 Root cross-sections for *Cryptocarya chinensis* (Lauraceae) (a, order 1; b, order 3; c, order 5) and *Endospermum chinense* (Euphorbiaceae) (d, order 1; e, order 3; f, order 5). The cortex and stele for root order 1 and order 3 and the secondary xylem for root order 5 are indicated by arrows.

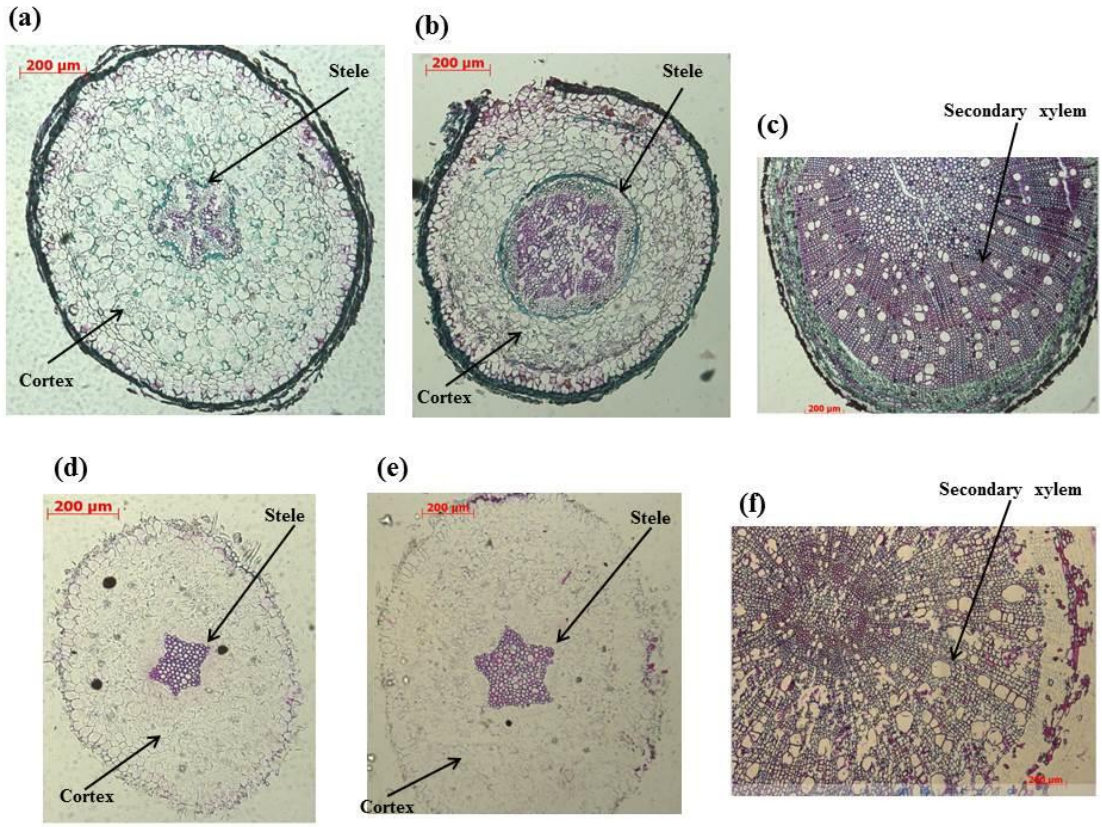

Fig. S2 Frequency distribution of thickness of root EC for absorptive roots in the current study (a) and a previous study (Kong et al. 2014) (b). Root EC is defined as the tissue outside the stele including the epidermis and the cortex.

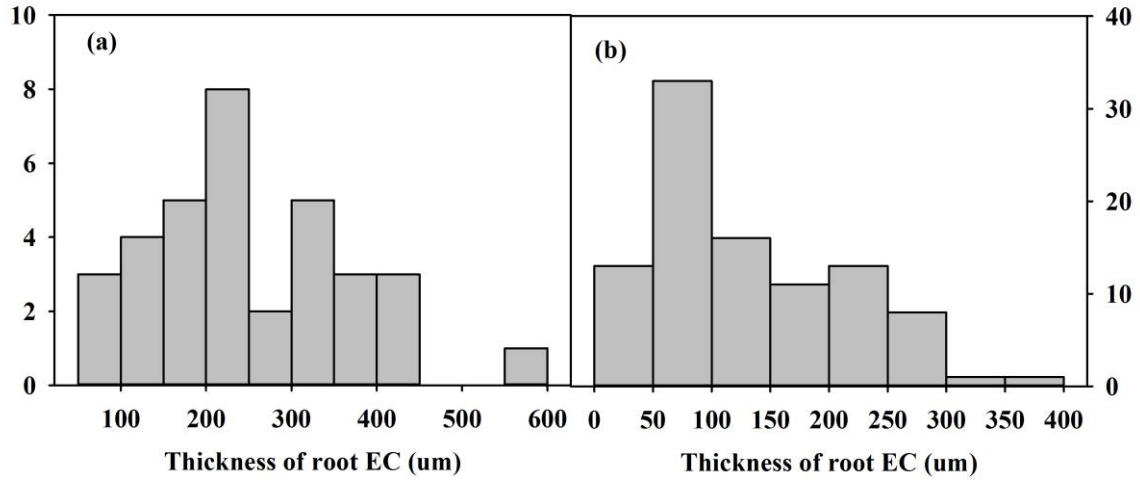

Fig. S3 Relationships between root tissue density and root N concentration for total (black line), thin (solid circles, grey line) and thick (open circles) absorptive roots. Data are from 96 species recalculated from Kong et al. (2014). For the thick absorptive roots, two outlying values are identified because such relationship is significant when they included (R^2=0.24, p=0.01) and nonsignificant when they excluded (R^2=0.025, p=0.45). These two values may represent rare cases and can lead to inflated error rates and distoration of statistic estimates and as such inappropriately affect the overall results. Therefore, the two outlying values are excluded for regression analysis of the thick absorptive roots.

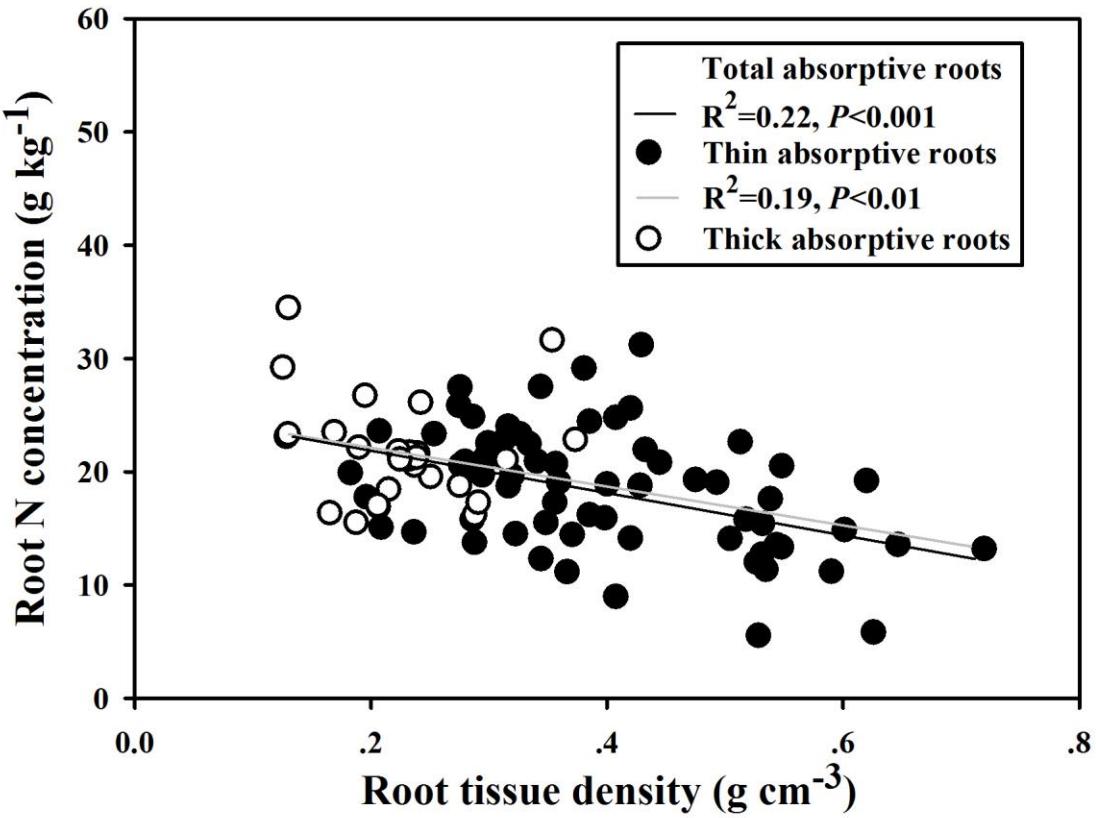

Fig. S4 Quadratic relationships between the extractive C fraction and root tissue density (a) and between the recalcitrant C fraction and root tissue density (b) for thin (solid circles, black line) and thick (open circles, grey line) absorptive roots using moving average data. The recalcitrant C fraction is the sum of the acid-soluble C fraction and the acid insoluble C fraction.

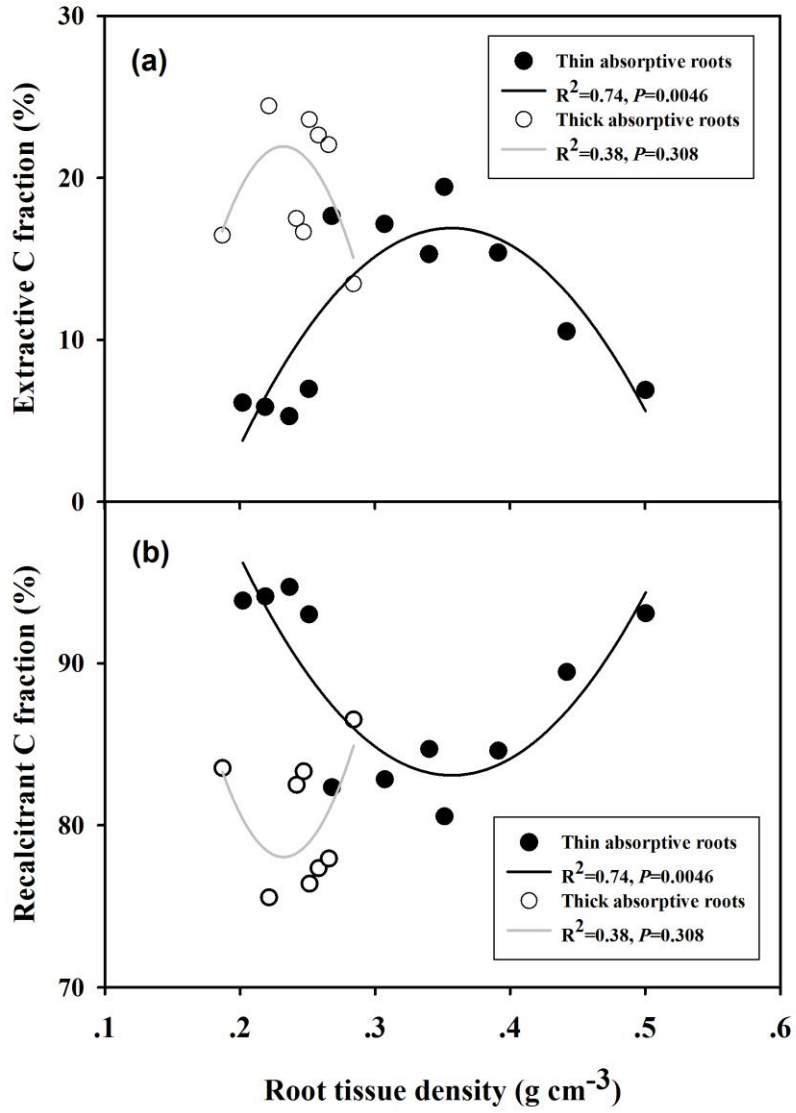

Fig. S5 Relationships between root tissue density and thickness of root EC over the total (black line), thin (solid circles, grey line) and thick (open circles) absorptive roots. Data are from 96 species recalculated from a previous study Kong et al. (2014). Root EC is defined as the tissue outside the stele including the epidermis and the cortex.

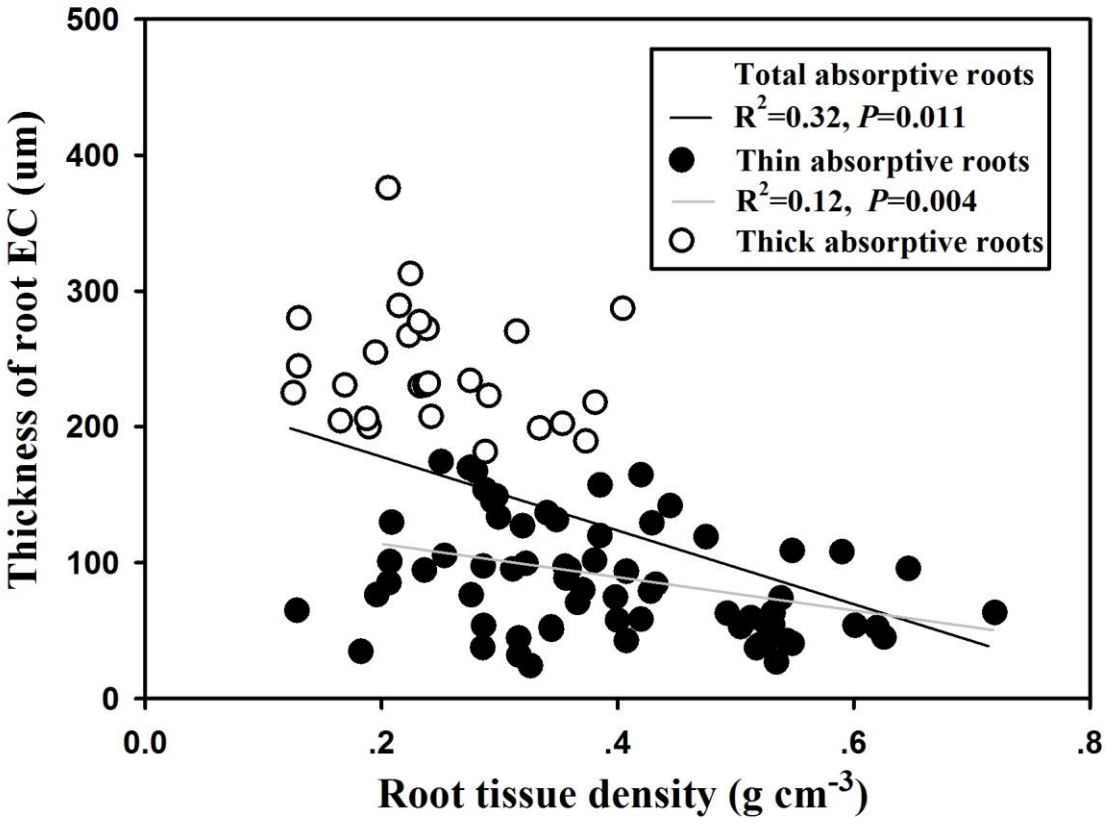

Fig. S6 Relationship between specific root length (SRL) and thickness of root EC for data of absorptive roots in the current study (a) and a previous study (Kong et al. 2014) (b). The relationships are fitted by exponential regressions.

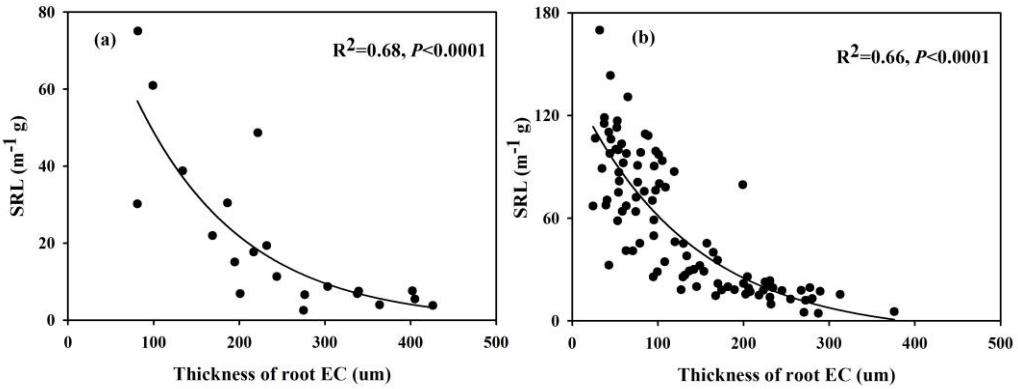

Table S1 Summary of root morphology and anatomical traits for each of the seven plant species used in our study. Data are presented as mean value with standard error in parentheses. Root EC refers to the tissue outside the stele including the epidermis and the cortex in absorptive roots. SRL = specific root length.

Plant species	Root order	Root diameter (μm)	Root tissue density (g cm^{-3})	Thickness of root EC (μm)	SRL (m g^{-1})
D. dichotoma	1	196.80(9.01)	0.60(0.05)	70.5(3.10)	75.1(3.94)
	2	255.59(20.94)	0.47(0.06)	81.06(5.16)	30.18(4.47)
	3	412.34(27.99)	0.50(0.08)	119.45(7.25)	13.31(2.38)
	4	623.32(128.96)	0.50(0.04)	169.86(19.09)	6.78(0.68)
A. auriculiformis	1	286.47(12.46)	0.22(0.02)	98.81(4.85)	60.96(5.4)
	2	362.03(18.26)	0.27(0.03)	134.19(9.51)	38.78(2.62)
	3	509.85(34.16)	0.34(0.06)	168.68(16.51)	21.93(1.98)
	4	552.44(22.39)	0.33(0.03)	160.63(13.40)	6.36(0.82)
	5	852.78(29.42)	0.35(0.03)	146.21(0)	2.47(0.31)
G. axillaris	1	539.9(15.82)	0.36(0.02)	216.76(5.43)	17.68(1.66)
	2	630.63(20.14)	0.37(0.02)	242.84(9.46)	11.31(0.99)
	3	659.87(32.32)	0.43(0.03)	150.6(19.45)	6.86(0.65)
	4	687.50(19.21)	0.60(0.04)	201.07(23.67)	3.70(0.34)
	5	1289.20(75.31)	0.57(0.04)	161.12(22.05)	1.17(0.12)
C. lanceolata	1	558.09(18.42)	0.21(0.02)	221.51(8.28)	48.68(4.25)
	2	488.53(12.37)	0.25(0.02)	186.1(6.53)	30.43(2.85)
	3	532.01(21.27)	0.24(0.02)	194.69(9.81)	15.08(1.57)
	4	773.20(48.83)	0.31(0.03)	235.91(34.07)	7.24(0.51)
	5	1071.33(42.59)	0.26(0.02)	236.28(18.40)	2.98(0.23)
P. baillonii	1	574.50(14.78)	0.28(0.03)	232.07(6.18)	19.33(1.15)
	2	745.19(31.45)	0.24(0.02)	301.8(11.55)	8.71(0.39)
	3	866.27(40.11)	0.21(0.02)	337.76(15.79)	6.83(0.38)
	4	1021.15(79.76)	0.26(0.04)	363.79(23.80)	3.94(0.33)
	5	1672.37(236.49)	0.24(0.02)	550.6(34.15)	2.3(0.24)
E. chinense	1	748.89(39.21)	0.28(0.02)	266.12(16.59)	6.57(0.31)
	2	1133.34(57.74)	0.25(0.02)	405.84(26.84)	5.45(0.41)
	3	1240.00(46.05)	0.27(0.02)	426(22.00)	3.77(0.2)
	4	2065.00(107.3)	0.31(0.02)	341.5(25.01)	2.74(0.2)
	5	2460.00(229.35)	0.29(0.02)	364(12.89)	0.56(0.15)
C. chinensis	1	982.23(27.63)	0.20(0.03)	339.17(11.75)	7.51(1.15)
	2	1133.75(89.98)	0.25(0.03)	275(16.47)	7.57(0.4)
	3	1170.00(67.21)	0.49(0.02)	393.19(24.46)	2.51(0.48)
	4	1815.72(179.61)	0.36(0.02)	347.15(73.75)	1.61(0.33)

5	2766.67(120.19)	0.33(0.03)	353.34(20.47)	0.70(0.27)

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