

鼎湖山20公顷样地的径 级结构研究

宾粤

华南植物园

- ▶ **Metabolic ecology theory**—幂函数分布，幂是-2
- ▶ The theory assumes that a plant's resource use is proportional to its gross photosynthetic rate and plants grow until they are limited by resources.

$$f(D) = cD^{-2}$$

- ▶ **Demographic equilibrium theory**
- ▶ 生长率死亡率都是常数：负指数分布
- ▶ 生长率是常数，死亡率是幂函数：**weibull**分布
- ▶ 都是幂函数——一般：**quasi-Weibull**
死亡率与生长率成正比：**power**

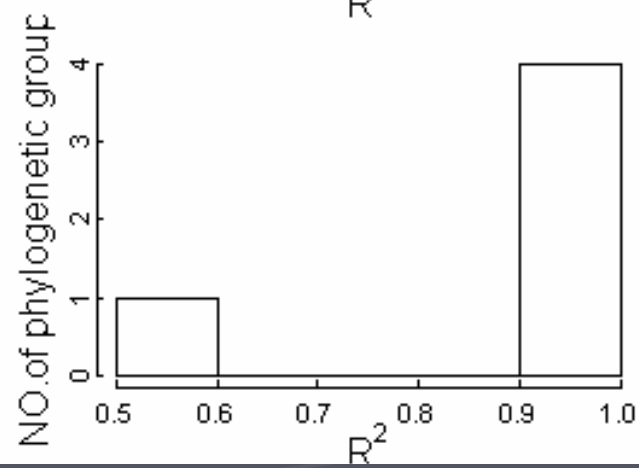
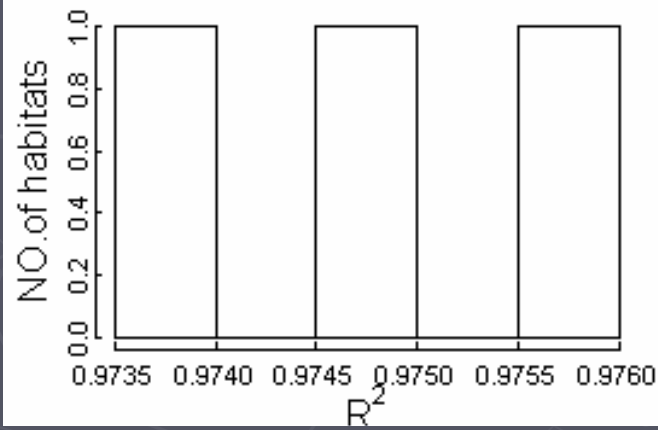
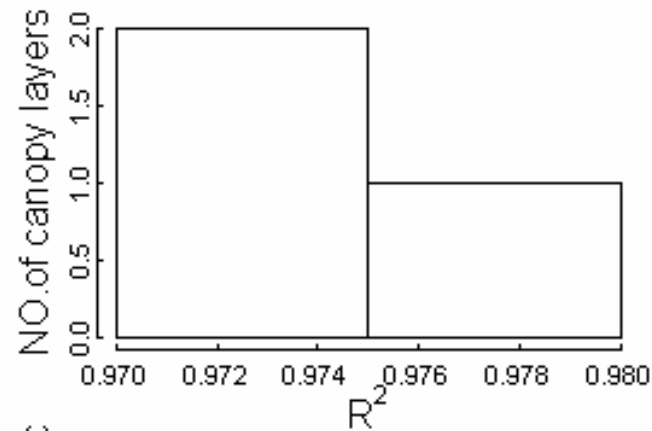
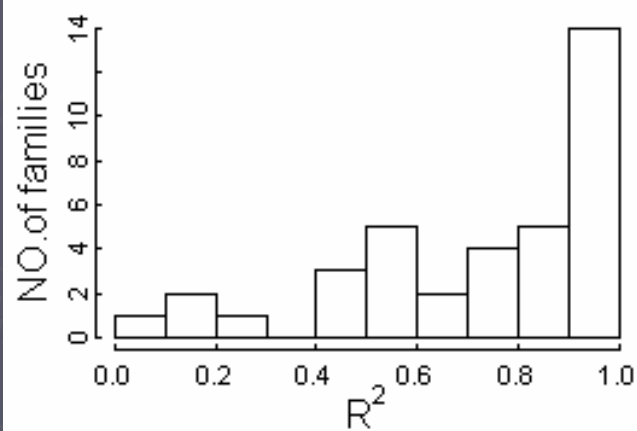
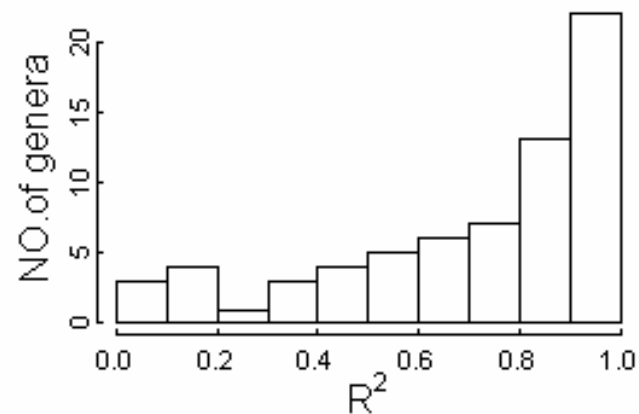
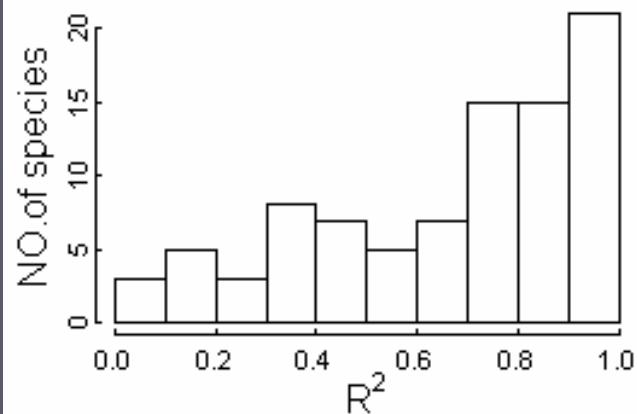
- ▶ to test whether the metabolic ecology theory (power function with exponent -2) and the demographic equilibrium theory (negative exponential, power, Weibull and quasi-Weibull function) work
- ▶ to evaluate which function produces the best prediction (AIC)
- ▶ to investigate the relation between population density and the shape of TSD by looking into the correlations between population density the fitted parameters.

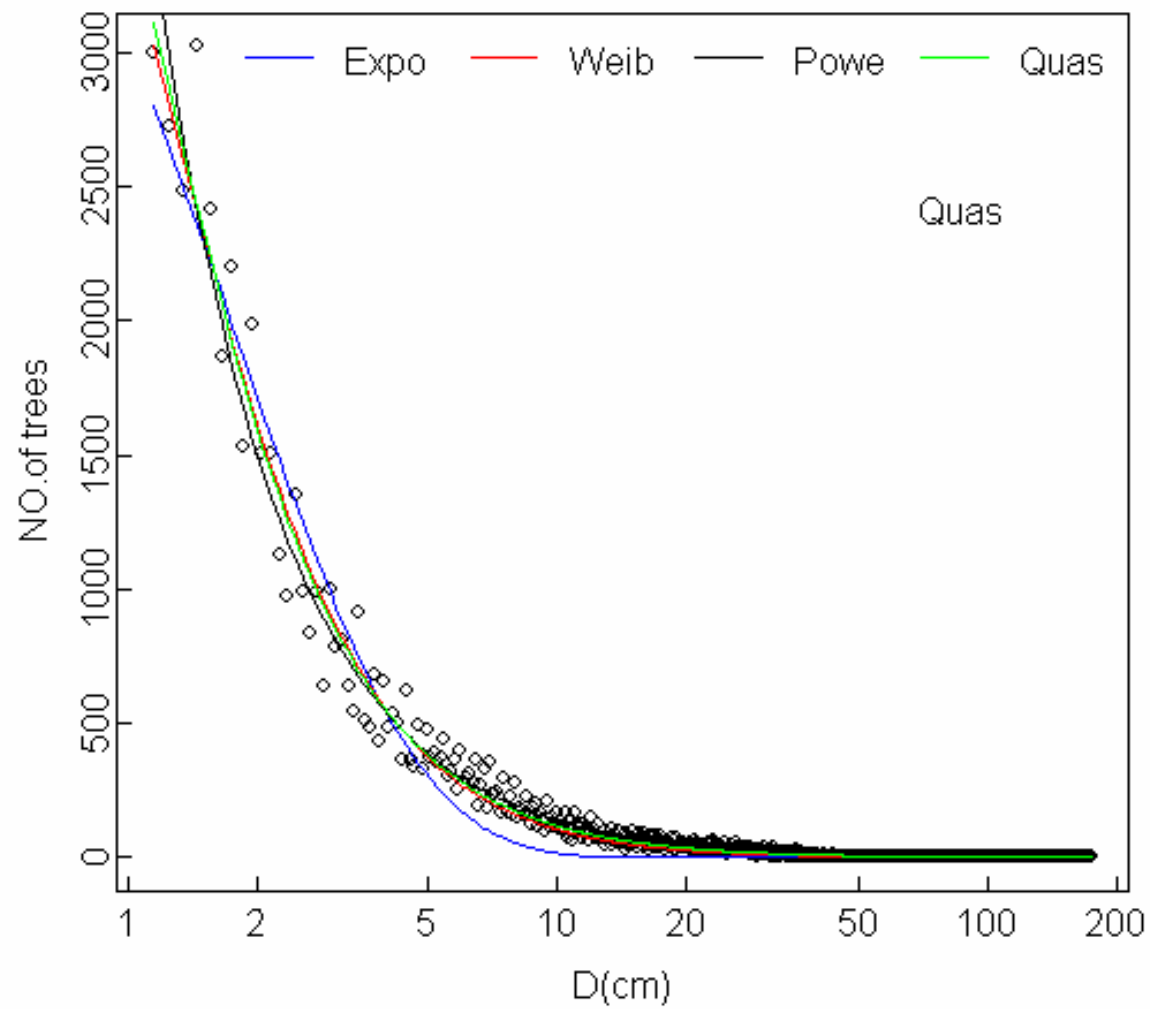
- ▶ Study site: 鼎湖山
- ▶ DBH 划分: 每0.1cm 一个径级



结果1

	Total	Powe ^a	Expo ^b	Weib ^c	Quas ^d
Species	89	1 (1.1) ^e	0	26 (29.2)	62 (69.7)
Genus	68	1 (1.5)	0	18 (26.5)	49 (72.1)
Family	37	1 (2.7)	1 (2.7)	12 (32.4)	23 (62.2)
Canopy layer	3	0	0	1 (33.3)	2 (66.7)
Habitat	3	0	0	1 (33.3)	2 (66.7)
Phylogenetic group	5	1 (20)	0	2 (40)	2 (40)
Whole plot	1				1 (100)





结果2. Those that do Not violate the expectation of matabolic theory

- ▶ 10 species (6u, 2m, 2o)
- ▶ 6 genera
- ▶ 1 family

结果3

Functions	Parameters	Maximum DBH		Basal area		Abundance	
		r	p	r	p	r	p
Expo ^a	K_e	-0.029	0.786	-0.05	0	-0.202	0.057
	λ	-0.299	0.004	-0.2	0	0.116	0.281
Weib ^b	K_w	0.273	0.01	0.283	0.028	0.149	0.163
	u	-0.032	0.765	0.08	0.128	0.086	0.424
	v	0.551	0	0.524	0	0.009	0.933
	β	0.295	0.005	0.306	0.009	0.172	0.106
Powe ^c	K_p	-0.042	0.698	-0.047	0.001	-0.186	0.081
	θ	-0.334	0.001	-0.275	0	0.129	0.23
Quas ^d	K_q	0.121	0.259	0.195	0.002	-0.088	0.41
	α	0.014	0.893	0.127	0.003	-0.103	0.337
	β	0.419	0	0.298	0	-0.082	0.442

- strong links of traits with the parameters of the fitted TSDs were observed, indicating that the shapes of the TSDs were strongly dependent on species traits.

- ▶ to test whether the metabolic ecology theory and the demographic equilibrium theory work
- ▶ to evaluate which function produces the best prediction: quas
- ▶ to investigate the relation between species traits, population density and the shape of TSD by looking into the relations between species traits and the type of the best function and the fitted parameters.

Something remains to be tested

生长率和死亡率都是关于胸径的幂函数



谢谢

