Species Area Relationships in a Mountainous Agro-Pastoral Ectone in Northern China

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Key words : agro-pastoral ectone , species-area relationship (SAR) , the power model , the exponential model , mountain

Introduction Species area relationships (SAR) in plant communities have been characterized by species-area curves that have been used in the literature to describe an increasing number of species with increasing area of habitat (Scheiner , 2003) . The most widely applied models of SAR have been the exponential model [S=c+z log A (1)] and the power-law model [log S=c +z log A (2)] (Jon , 2003) , where S is the number of species in the habitat whose area was A , and c and z coefficients were constant . The objective of our study was to determine the best-fit model of SAR for a mountainous plant community in the agro-pasture transition zone in northern China .

Materials and methods This study was conducted in a rangeland ecosystem , state-level field science observation and research station in Guyuan of Hebei Province in China (115°41′ E , 41°49′ N) , which is located in a typical agro-pastoral transition region in northern China (Huang et al . , 2007) . This study site contains nine mountains surrounded by farmland , where flax and naked-oat are the main economic crops . The research sites , which have more than 50 years history of cultivation , are located between 15 and 25-km northwest of the station . Three transects were set up from the foot to the top of every southern slope in the study area in August , 2007 to establish a continuous elevation gradient (1400 m-1500 m) . Each transect was 10 m wide and 60-80m long . The total number of quadrats was 189 , each 1 ×1m^2 . In each quadrat , all species were identified . Species-area curves were constructed for both models . Model fit was evaluated and compared using the adjusted r^2 value (Jon et al . 2003) . Species-area curves were tested using SAS 9 .0 procedures for linear regression .

Result SAR relationships for both the exponential model and the power model for Mountains in the agriculture zone exhibited a strongly linear relationship (Table 1) . The power model had a slightly better fit (adjusted r^2 0 .83) than the exponential model (adjusted r^2 0. 80) .

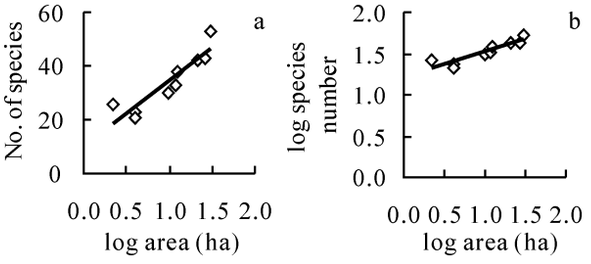

Figure 1 *Exponential species-area curves (a) n= 9 mountains ; power species-area curves (b) n = 9 mountains .*

Table 1 *Comparison of both models of SAR .*

Type of model	Model	Adj r^2	P
exponential	S=10 .32+24 .12 log A	0 .80	0 .0007
power	log S=1 .20+0 .31 log A	0 .83	0 .0004

Conclusion Our research shows the species-area relationship which is most appropriately described by the power model (equation 2 , Figure 1b) for these mountains ecosystems in Agro-pastoral transition zone .

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