

Spatial autocorrelation in masting phenomena of *Quercus serrata* detected by multi-spectral imaging

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We developed a multiple linear regression methodology for estimating acorn yield of *Quercus serrata* from airborne multi-spectral images. We also calculated spatial autocorrelation from the spatial distribution of yields estimated by the developed models, and evaluated the spatial pattern by comparison with simulation output of Satake & Iwasa's theoretical models which assume nonlinear internal allocation and pollen exchange between trees within a finite range. A significant correlation was found between the acorn yield and images observed in 2003 and 2004. Through images segmentation procedure and applying the model developed, the acorn yields of approximately 5,700 canopies were estimated. The correlation coefficients calculated from the estimated spatial distributions of yield decreased as distance increased. Our experimentally estimated spatial distribution agrees with the patterns derived from theoretical models. Combinations of our findings and simulation results suggest that an endogenous mechanism may drive the masting of *Q. serrata*.