SPATIAL DISTRIBUTION OF *Melocactus conoideus* BUIN. & BRED. 1973 (CACTACEAE) IN SERRA DO PERIPERI, VITÓRIA DA CONQUISTA, BAHIA, BRAZIL: REASSESSMENT OF A PROTECTED POPULATION AFTER FIVE YEARS AND FIRST ACCOUNTS OF UNPROTECTED POPULATIONS.

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INTRODUÇÃO

Spatial distribution patterns, traditionally recorded for descriptive purposes in ecological population studies, are regarded as snapshots of particular system configurations in time, but are also considered the resultant of different mechanisms operating in various scales simultaneously (Fortin and Dale, 2005). Recently, technical and analytical developments are improving causal explanatory prospects to be achieved through spatial pattern analysis. According to McIntyre and Fajardo (2009), causal processes can be inferred from spatial patterns as long as rigorous scientific reasoning is employed in investigations. These authors specify rigorous investigation procedures for maximizing causal process inference from spatial pattern as the “space as surrogate” approach, comprising a priory hypothesis proposition, ecological knowledge of the system under study and precise spatial analysis. Spatial effects are of crucial importance for endangered populations as the main threats worldwide for biodiversity are habitat conversion and fragmentation. In southwest Bahia, Brazil, the endemic cactus species *Melocactus conoideus* is facing severe habitat destruction caused mostly by urban expansion and mining activities. This species is restricted to a narrow habitat of 10km2 in Serra do Periperi, a chain of hills in Vitória da Conquista municipality, Bahia, Brazil, in which it grows exclusively on quartzite gravel substrate outcrops. *M. conoideus* is a globose, long lived cactus with very low rates of germination and growth, characteristics that hinder population dynamics monitoring.

OBJETIVOS

To assess and describe natural population’s spatial patterns in Serra do Periperi, following Oliveira and colleagues (2007). We returned to the site studied in 2007 by those authors five years after their publication, and further assessed population spatial patterns in three unprotected habitat patches in which mining activities had ceased.

MATERIAL E MÉTODOS

Four different areas were studied: Serra do Periperi Municipal Park (PMSP) and outcrop patches numbered 21, 22 and 23. In each area a 20 x 20 m sampling grid, divided in 16 5x5 quadrate plots, was established from a random origin point. All individuals larger than 5mm stem diameter within the grid area had position recorded in relation to vertical and horizontal grid axes. Sexual maturity condition (juvenile or adult) and health status (qualitative evidence of symptoms at stem and cephalium tissues) were also registered. Spatial distribution was determined with Ripley’s K function, a second order statistic for calculating spatial point processes distribution. Univariate Riley’s K is calculated for testing for “Complete Spatial Random” distribution (CSR) model fit, while bivariate K is computed for testing association between different event conditions (Fortin and Dale, 2005). Statistical significance is evaluated comparing K function curve position to null hypothesis (CSR for univariate and absence of association for bivariate estimates) 99% confidence interval envelopes calculated by Monte Carlo simulations. The linearized form (L) of K function statistic is presented for univariate tests of CSR distribution as long as bivariate (juvenile vs. adults and “w/out symptoms” vs. “w/symptoms”) associations tests for the four population studied. Calculations were performed using “ads” package for R program (Pelissier and Goreaud, 2013).

RESULTADOS

The four areas studied presented differing population densities: 332 individuals in PMSP (0.83 ind/m2), 90 in patch 21 (0.23ind/m2), 53 in patch 22 (0.13ind/m2) and 93 in patch 23 (0.23ind/m2). L function estimates of population’s distribution in patches 21 and 22 showed similar behavior: change from aggregated spatial pattern to random pattern at cca. 8,800mm in patch 21 and at cca. 6.100mm in patch 23. The spatial distribution of patch 23’s population, however, did not show any changes in spatial pattern at the scales analyzed: L function estimate indicated clumped distribution until 10,000mm, the largest scale analyzed. In PMSP, L function estimate indicated clumped distribution pattern until cca. 9.600mm, at which point the curve crosses the confidence envelope boundary Maturity bivariate test indicated independency among adults and juveniles for all study sites. Health status bivariate test also conformed to null hypothesis of no association in all sites except PMSP, in which L function test indicated repulsion among infected individuals in relation to healthy ones beginning at cca. 3,000mm scale.

DISCUSSÃO

Results in this study support earlier estimates of spatial pattern assessment of *Melocactus conoideus*, with aggregated distribution patterns at smaller scales followed by a trend to random and uniform patterns afterwards. L function estimate behavior of PMSP population in this study agreed with L estimate behavior calculated by Oliveira and colleagues (2007). In these authors estimates, individuals are clumped until spatial scale of 10,800mm. Beyond this scale, Oliveira and colleagues (2007) L function curve indicated change in distribution pattern, as the clumps were regularly distributed. Here this tendency could be observed but not confirmed, since the sampling plot scale was smaller. However, CSR L function test results for population at patch 23 needs to be further assessed, since it’s L function estimate curve showed no trend towards changing to random distribution at larger scales, contrary to results for the other 3 populations assessed. In PMSP, infected and healthy individuals mutual repulsion trend is reflected, in the field, in one group of infected individuals being relatively isolated from the majority of healthy ones. This may result from particular transmission processes or past mortality of susceptible individuals in most of the population.

CONCLUSÃO

Spatial patterns recorded for populations in unprotected sites showed similar behavior as the protected population (PMSP) pattern, except in one site (patch 23). The protected population reassessment at 2013 showed similar trend as the first assessment in 2007. Our group is investigating spatial effects of dispersion agents activities, soil properties and quartzite extraction disturbances roles in generation of the recorded patterns. These series of investigations proposed would attend to the “space as surrogate” approach (McIntyre and Fajardo, 2009), contributing to causal processes understanding of spatial distribution patterns for this endangered species.

REFERÊNCIAS BIBLIOGRÁFICAS

FORTIN, Marie-Josée; DALE, Mark Randall Thomas. Spatial analysis: a guide for ecologists. Cambridge: Cambridge University Press, 2005.

McINTIRE, Eliot J.B.; FAJARDO, Alex. Beyond description: the active and effective way to infer processes from spatial patterns. Ecology, v.90,n.1, pp. 46–56, 2009.

OLIVEIRA, H.M.F. *et al*. Padrão de distribuição espacial de Melocactus conoideus (Cactaceae) no Parque Municipal Serra do Periperi, Vitória da Conquista, Bahia. Anais do VIII Congresso de Ecologia do Brasil, 23 a 28 de Setembro de 2007, Caxambu – MG.

PELISSIER, R.; GOREAUD, F. ads: Spatial point patterns analysis. R package version 1.3-1. Disponível em: . Acesso em: 10 jul. 2013