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PATTERNS OF GENE FLOW IN WHITE OAK STANDS ACROSS EUROPE

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Gene flow, occurring in plants by means of dispersal of pollen and seed, affects the genetic structure of populations, creates opportunities for hybridization and thereby influences the ability of a species to adapt to future environmental changes. The evolution of populations can be studied by comparing different spatial locations, characterized by different climates. Our objective was to improve our understanding of the dispersal function of species and its evolutionary abilities. In order to do so, we measured the extent of gene flow in nine oak stands located in nine European countries. Studying a wide geographical range of stands under very different environmental conditions allowed the evolutionary responses of species to environmental change to be assessed, using space as a proxy for time. Exhaustive sampling of adult trees (mostly sessile [*Quercus petraea* (Matt.) Liebl.] and pedunculate oaks [*Q. robur* L.]) was conducted in geographically continuous plots. The spatial location of each tree was recorded, and acorns were sampled on several mother trees within each stand. Seven of the nine stands were also sampled for seedlings. Genotypes of adults, seeds and seedlings were obtained for four to eight nuclear microsatellite loci. When possible, fathers/parent(s) were assigned to the seeds/seedlings using likelihood ratio calculations. We estimated the mating success of the various male and female parents and constructed pollen and seed dispersal curves for each stand. We compared the trends across stands, and attempted to identify generalities and outliers. Although differences among stands (shape, sampling) clearly affected the results and precluded general conclusions, some common trends could still be detected. Reproductive success distributions were all L shaped, with a few parents generating many offspring and many parents contributing to few offspring. Dispersal curves were better estimated for pollen than for seeds (because more data were available for pollen); rather large confidence bands were obtained, with larger mean distances for pollen than for seeds.

Keywords: dispersal, nuclear microsatellites, oak, parentage, paternity