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Quantification of conditional differentiation by Life table response experiments: A case study with kelp temperature regimes

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Competing species cannot overlap their resource exploitation beyond a limit where one is inevitably eliminated. Their coexistence requires the partition of ecological niches attained by conditional differentiation. Since the overall fitness results from the holistic integration of the fitness specific to each of the life-cycle components, evolutionists are interested in determining which aspects drive species A to outcompete species B under a set of conditions. This requires a Taylor expansion of the life cycle model, known in demography as Life Table Response Experiment (LTRE). Kelp species have been observed differentiating their adaptation to water temperature, leading to geographical zonation. We tested whether two cryptic *Lessonia* sp. partitioned their niche occupation along the Chilean shores by differentiating their haploid micro stages adaptations to water temperature. In a preliminary analysis, we tested the sensitivity of fitness to the vital rates, the sensitivity of the vital rates to temperature and whether the vital rates did significantly change between species. This approach loses the holistic details of the life-cycle as well as not translating effective differences between vital rates into effective differences in fitness. The result was a deterring amount of graphics and tables erroneously suggesting everything significantly differed and with an impact on fitness. A posterior LTRE demonstrated this not to be true and that only the fertility of the haploid females are different in their temperature regimes among species with a significant impact on fitness and niche occupation. LTRE enables a focused analysis providing truthful and synthetic results and conclusions.

Biography

Vasco Manuel Nobre de Carvalho da Silva Vieira has obtained his PhD in University of Algarve in 2011 with specialization in Population Dynamics and Ecology. He has also worked at the ALGAE-Marine Plant Ecology Research Group of University of Algarve and then in Maretec-Marine Technology Group of Instituto Superior Técnico. He has 17 published articles in the subject of marine ecology, environment and technology to his credit.

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