

Submitted Abstract

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Title	Forest Cover Changes And Presence Of European Blueberry (<i>Vaccinium Myrtillus</i> L.) In Beech Forest Gaps Of The Laga Mountains (Central Italy).
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Abstract

The abandonment of silvo-pastoral activities and consequent forest expansion or densification occurred in the last decades in the Apennine mountains (Italy) is causing a loss of plant biodiversity and of other ecosystem services. European blueberry (*Vaccinium myrtillus* L.) in central Italy is at its southern distribution limit and found at high elevation in gaps or treeline ecotones of beech forests on sandy and acidic soils, between 1400 and 2000 m a.s.l. In some areas, blueberry is extremely rare and only present in ridges and valleys. One of this spot, endemic for the Marche region, it is in a north-western slope of the Gran Sasso and Monti della Laga National Park. The progressive reduction or disappearance of forest gaps fostered this study which includes the detection of the forest cover changes and the blueberry occurrence in relation to other gap species (herbs, shrub, beech seedlings and saplings).

First, we measured the land cover changes occurred between 1954 and 2021 using historical aerial and satellite images. We produced forest cover maps with a supervised classification and used them to estimate the changes over time, providing gaps with 30-1000 m² of size. Along an altitudinal transect, we randomly selected and distributed 20 gaps between 1524 and 1767 m a.s.l. We sampled abundance of blueberry detected in 12 plots (1m x 1m) for each gap, along with other competitive species and beech regeneration: 4 plots located at the center of the gap (full light), 4 at the gap edges (half-shade) and 4 under forest canopy (full-shade). Above each plot, we detected and calculated gap fraction using a fisheye lens and a specific image-analyzer software.

Beech forest cover increased of 52%, causing a significant decrease of the number of gaps (from n=1738 in 1954 to n=341 in 2021). Within the gaps, the half-shade conditions are the most fitting for blueberry occurrence (27.5% on average) compared to full-light (16.9%) and full-shade (9.5%). Gap fraction showed a non-linear relationship with blueberry abundance ($R^2 = 0.66$, p-value = 0.013).

The ongoing densification process reduced the number and size of gaps, possibly limiting the blueberry occurrence and growth. Maintenance of forest gaps with specific silvicultural interventions around the margins are necessary for ensuring an adequate conservation of blueberry especially in regionally endemic location.