Application of the nearest neighbour indices in spatstat *R* package for Persian oak (*Quercus brantii* var. *persica*) ecological studies in Zagros woodlands, Iran

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Nearest neighbour indices applied in spatial ecology of forest stands describe correlations among trees relative to their distances. They are sensitive to the nature of the pattern of trees, which is extremely variable depending on environmental factors. These indices are well established in the *R* package **spatstat**. We aimed to investigate how the nearest neighbour indices in this package explain the observed pattern of Persian oak coppice trees in Zagros woodlands, Iran. We first took a census in a 9 ha homogeneous plot in these woodlands purely covered with Persian oak trees and tagged all of them to obtained their point map. Spatial pattern analysis of these trees was performed by nearest neighbour indices of *G(r)*, *F(r)*, *J(r)*, neighbourhood density function *(L_x)* and Clark & Evans (*CE)* to recognize the significant deviation of their pattern from CSR. Results showed that the overall spatial pattern of Persian oak coppice trees departed significantly from CSR. There was spatial segregation in their dispersion as indicated by the nearest neighbour indices. The *G(r)*, *F(r)* and *J(r)* indices were clearly above the confidence envelopes of CSR computed by 99 Monte Carlo simulations. Similar results were obtained by L_x and *CE*. Although each one of them explained the spatial dispersion of Persian oak trees differently, *J(r)* could show the regularity of the trees in different distances very well and the map produced by L_x could show the location of dense and sparse areas covered with Persian oak trees. It also was concluded that Persian oak coppice trees were located regularly and they were not related ecologically. These trees were independent and did not affect the establishment of each other that might be because of their coppice structure. This case study shows the efficiency of the *R* package **spatstat** to be implemented in precise and accurate computation of the nearest neighbour indices contributed to ecological studies of forests and woodlands.

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