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Postfire encroachment of Fabiana imbricata is real? Assessing changes of shrubland occupation during 40 years in NW Patagonia steppe

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Landscapes are dynamic in space and time, being spatio-temporal processes of particular interest for landscape ecology. In particular, grasslands can change their structure through the expansion of shrubs in the landscape matrix. Shrub encroachment affect biodiversity as well as forage availability that is the key component of the productive use of rangelands. However, despite its recognition as a global problem, knowledge on the rates, dynamics and encroachment patterns is even scarce. For example, although it is generally accepted that fire control shrub encroachment, certain shrubby species could be favored by the occurrence of fire. In northwestern Patagonian steppe, Fabiana imbricata form large monospecific shrublands that are part of the landscape mosaic and its dynamics of regeneration is strongly related to fire. This long-lived shrub ($\approx$ 150 years) is a typical seeder that is killed by fire and recruits seedlings almost exclusively in post-fire, establishing even-age patches. Our objective was to determine whether F. imbricata shrublands have expanded during the last 40 years in a landscape fire prone. The study area corresponds to San Ramon ranch (22,000 ha) located in northwestern Patagonia steppe, Argentina (latitude -41° 04'; longitude -70° 51'). Two distribution maps of the species were made that corresponds to the study area in 1968 and 2011. The 1968 map was elaborated from the digitalization of aerial photographs (1:45000) while the 2011 map was produced with very high resolution satellite images, current aerial photographs and GPS field data. Both maps were loaded into a GIS environment, in which landscape metrics at patch and class level were determined and then compared. From remote sensing and dendroecological techniques, we know that the study area was almost entirely affected by fires during the study period. Therefore, the comparison of both maps allows us to know post-fire changes in the shrublands spatial configuration at the landscape scale and to infer the fire effect on these changes. Our results show that during the studied period F. imbricata shrublands has expanded over the grassland. Nowadays, the species occupies 20% more area than in 1968 and this area, is divided into a smaller number of patches that are closer to each other. The observed change in the shrublands spatial pattern is evidence of a post-fire shrub encroachment. These results contribute to the understanding of the role of fire in vegetation dynamics in fire prone ecosystems