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Weather seasonality and temporal pattern of live and dead fuel moisture content in Mediterranean shrubland

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Wildland fires represent an important disturbance for ecosystems in the Mediterranean Basin. Many factors affect wildland fire occurrence and behaviour (topography, weather, fuel). At level of vegetation, as well as fuel type, the fuel status, and in particular the water fuel status, plays a crucial role in determining the wildland fire danger. Drier fuel, in fact, makes easier fire ignition and propagation. Evergreen sclerophyll shrubland is a prominent feature of Mediterranean areas; in addition, shrub species are an important component of the understorey vegetation that constitutes the surface fuels primarily responsible for the ignition and the spread of wildland fires in Mediterranean forests. In these areas, where climate is characterized by prolonged summer drought, seasonal decrease of fuel moisture can determine severe fire danger when combined with critical meteorological conditions. Therefore, a better understanding of temporal variation of live and dead fuel moisture content and of their relations to weather variables could contribute to improve our knowledge of burning characteristics of maquis species and to identify critical periods of high ignition danger for Mediterranean ecosystems.
The main objectives of this work were i) to describe the temporal pattern of live and dead fuel moisture content (FMC) for some Mediterranean shrubs, ii) to evaluate the influence of weather conditions on the variation of these variables and on the length of fire season and iii) to evaluate the applicability of the moisture codes used in meteorological danger indices to estimate the FMC of dead fuel in Mediterranean ecosystems.
The study was carried out in North Western Sardinia (Italy). FMC of live and dead fuel was determined periodically during four consecutive years on several Mediterranean shrub species. Relative to live fuel, phenological phases of each species were also observed during sampling period. During the whole period of experimentation, moisture soil content and meteorological variables were recorded. In addition dead fuel moisture was monitored in field on hourly basis using humidity sensors. Regarding live fuel, the influence of weather seasonal variations and vegetative and reproductive cycle on fuel moisture content was analysed. Different behaviours among species were evidenced. Relative to dead fuel (litter, 1h fraction and 10 h fraction) temporal patterns of moisture content determined by field sampling and humidity sensor were compared to the three moisture codes of the Canadian Forest Fire Weather Index System.