Potential impact of climate change on length of ignition danger season in Mediterranean shrubland of North Sardinia

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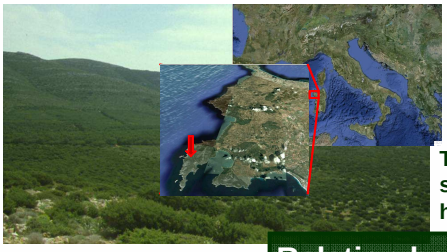
The main aim of this work is to identify useful tools to forecast impacts of expected climate change on live fuel moisture content (Live FMC) in Mediterranean shrublands.

The study was carried out in North Western Sardinia, Italy (40° 36' N; 8° 09' E, 30 m a.s.l.). The study area is covered by Mediterranean maquis and garigue. The climate is Mediterranean.

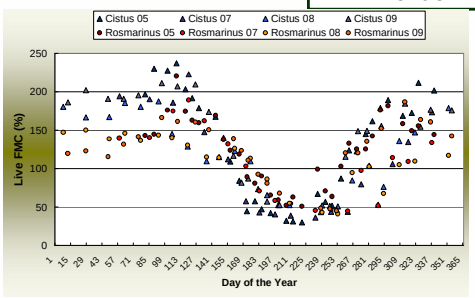


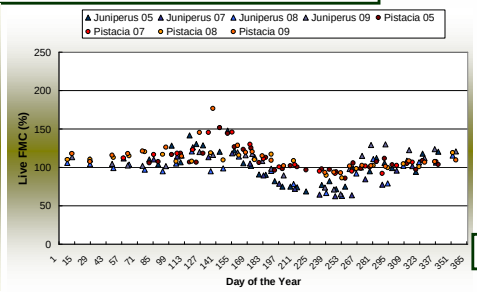
Moisture content of fine live fuel (diameter < 0.6 cm) was determined periodically during four years on several Mediterranean shrub dominant species of the study area : *Cistus monspeliensis* L., *Pistacia lentiscus* L., and *Juniperus phoenicaea* L.
Meteorological variables were also recorded.

The potential climate change impact on ignition danger season in Mediterranean Basin shrubland was simulated using the Drought code and future climate scenarios at local scale derived from an advanced high resolution Regional Climate Model realised by CMCC and University of Belgrade (SITRA project).

Relation between Drought code and live fuel moisture content

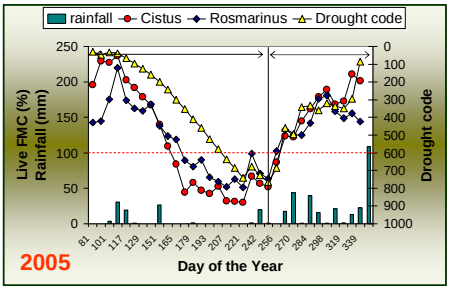
Live fuel moisture content annual pattern

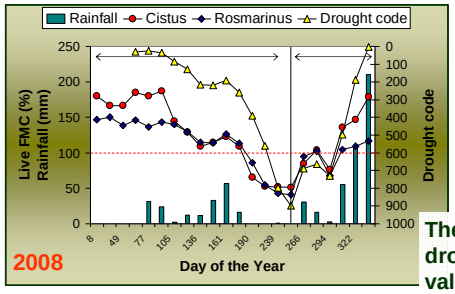




Different ranges and seasonal trends of live fuel moisture were observed for the species examined. The highest variability was observed for *Cistus* and *Rosmarinus*.

The logistic regression approach was used in order to establish the relationship between the danger season and DC. The danger season was classified as a binary response (true/false) by using a threshold of LFMC of 100%.





Statistical parameters provided by the logistic analysis

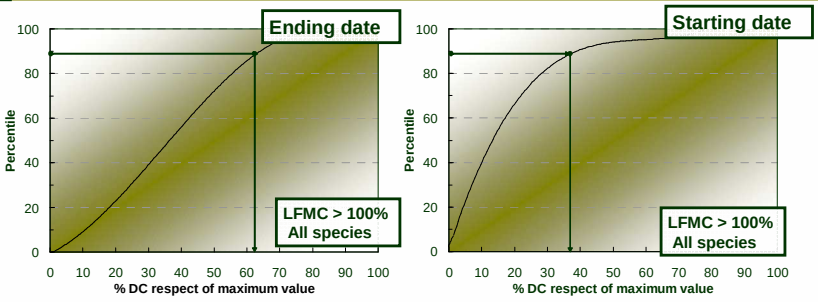
Dependent variable	AIC Akaike Information Criterion	P-value Hosmer Lemeshow Chi-Square	% Correct classification
Cistus	62.82	0.65**	82.8
Juniperus	76.93	0.22**	81.7
Pistacia	44.82	0.93**	90.3
Rosmarinus	54.19	0.25**	84.9

The DC explains a large amount of the variability in the variable drought season. The model based on DC provided significant values of the Hosmer and Lemeshow test, indicating no evidence of a lack of fit; in addition, the models provided high values of correct classification for all the species.

Estimating starting and ending dates of danger season

In order to compare different years DC was expressed as percentage of his maximum value during the different seasons. The thresholds for estimating the start and the end of ignition danger season were calculated by analysing two different data series: data from beginning of year until the date in which the drought code reached his maximum value were analysed for estimating the start date, whereas, the others were used for estimating the end of danger season.

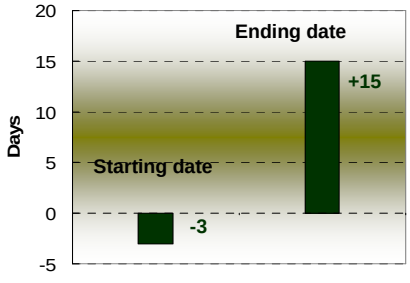
The 90th percentile value is about 60% of maximum value reached during the different seasons for ending date and about 40 % for starting date



Percentile curve for Drought code considering live fuel moisture data higher than 100%.

Expected impacts of climate change on fuel status

Differences in number of days between Starting and Ending dates estimated using data from the Regional Climate Model for baseline(1961 – 1990) and A1B scenario (2071 – 2100)



An increase of length of danger fire season was observed for scenario A1B.

The first results reported here suggest that future climate projections could determine changes in fuel moisture dynamics and affect the duration of the danger fire season. As a consequence of this fact a probable general increase of fire danger in the Mediterranean area could be expected.