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Emissions from prescribed fires of two shrub species: *Genista scorpius* and *Calluna vulgaris*

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In the Mediterranean area, forest fires have increased in number over the last 50 years, including bush fires. These produce large amounts of atmospheric carbonaceous material, particularly elemental carbon (EC) and organic carbon (OC), which play an important role in global warming (Boreddy et al., 2017). Prescribed fires have effects on the vegetation, soil, wildlife, water and air. So, the main aims of this study was to study the impact of prescribed burnings on air quality and to search the relation between the smoke generated in bush fires and the seed germination processes after the fire.

On October 2016, in La Cueta, León (NW Spain), six prescribed fires were conducted. Two species of shrubs were combusted: *Calluna vulgaris* (2 fires) and *Genista hispanica* subsp. *occidental* (4). During the sampling campaign various instruments were used: *i*) a Gent stacked filter unit sampler to collect PM_{10} onto polycarbonate filters; *ii*) a low volume ECHOPM of TECORA to collect $PM_{2.5}$ onto quartz filter; *iii*) a thermocouple network to register the temperature evolution of the fires; *iv*) TEDLAR bags for smoke sampling; *v*) CO and CO_2 Combo IAQ Meter. The quartz filters have been analyzed by a thermo-optical method for EC and OC determination. The ion concentration in the filters has been obtained by ion chromatography. Besides, the major organic components in the smoke samples have also been obtained.

The $PM_{2.5}$ concentrations registered were 31.1 and 12.0 $\mu g\ m^{-3}$ on average in *Calluna* and *Genista* burnings, respectively. For *Calluna*, the sum EC+OC represented 28.1% of $PM_{2.5}$, while for *Genista* it accounted for 32.9%. The sum of CO, CH_4, NO and C_2H_4 constituted more than 97.6 % of total mass gases concentration emitted in *Calluna* and *Genista* burnings. However, *Calluna* burnings presented higher gaseous concentration than *Genista* (81.3 vs 28.9 ppm, respectively). Regarding $PM_{2.5}$, the water soluble inorganic ions for *Calluna* presented higher concentrations than for *Genista* (except Cl^-). Furthermore, Cl^-, SO_4^{2-}, Na^+, Mg^{2+} and Ca^{2+} constituted more than 80% of the total ion emissions in the burning of both species. In terms of emission factors (EF) or mass of pollutant emitted per unit mass of fuel burned (Fig. 1), EF_{CO2} for *Calluna* were similar to those obtained during Amazonian forest clearing fires (Soares Neto et al., 2009).

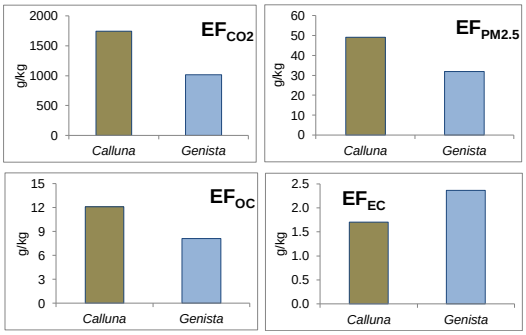

Fig. 1. Emission Factor (EF) of CO_2, $PM_{2.5}$, OC and EC during *Calluna* and *Genista* burnings.

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Boreddy et al. 2017. Temporal and diurnal variations of carbonaceous aerosols and major ions in biomass burning influenced aerosols over Mt. Tai in the North China Plain during MTX2006. *Atmos. Environ*., 154, 106-117.

Soares Neto et al. 2009. Biomass consumption and CO_2, CO and main hydrocarbon gas emissions in an Amazonian forest clearing fire. *Atmos. Environ.* 43, 438-446.