

# **ADVANCES IN FOREST FIRE RESEARCH**

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**DOMINGOS XAVIER VIEGAS  
LUÍS MÁRIO RIBEIRO**

## The last landscape gardeners: Incident analysis of traditional burns in Portugal

Emanuel Oliveira<sup>1</sup>; Raquel Lobo-do-Vale<sup>2</sup>; Maria Conceição Colaço <sup>\*3</sup>

<sup>1</sup>*Universidad Santiago de Compostela, Departamento de Ingeniería Agroforestal, Rúa Benigno Ledo, 27002. Lugo, Spain, {emanuelrenato.sousadeoliveira@rai.usc.es}*

<sup>2</sup>*Centro de Estudos Florestais, Instituto Superior de Agronomia, Universidade de Lisboa, Tapada da Ajuda, 1349-017 Lisboa, Portugal, {raquelvale@isa.ulisboa.pt}*

<sup>3</sup>*Centro de Ecologia Aplicada Baeta Neves (CEABN-InBIO), Instituto Superior de Agronomia, Universidade de Lisboa, Tapada da Ajuda, 1349-017 Lisboa, Portugal, {ccolaco@isa.ulisboa.pt}*

*\*Corresponding author*

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Fire use, Traditional fire, Wildfire, Fatalities, Rural population

### Abstract

In Portugal, there are countless historic and legislative references about fire use in rural areas. This popular use of fire to manage the huddled of agricultural and forestry leftovers and small burns to clean the farmed lands continues nowadays, to be used in rural environments. However, these environments are becoming depopulated, with aged populations which are often isolated.

Every year, in the social media, there are news about fatalities or injuries from elder people when using fire in the landscape. In 2018 the number of incidents were much higher than usual. For that, the objective of this work was to identify which were the factors that could explain this anomaly.

To obtain a systematic data of the incidents, a thorough analysis of the regional and national newspapers, both in paper and online, was performed from 2008 to 2020. Variables like date, place, sex, age and other were gathered. All the incidents variables were complemented with meteorological data associated with wildfire risk, sociodemographic variables and the legislative context.

From 2008 to 2020 there were 50 incidents, with 78% of fatalities. The anomaly of incidents in 2018 corresponded to 42% of cases. Most of the incidents occurred with elder (75%) and male (82%) people. The predominant months of occurrence were April and October particularly in the year 2018. The majority of fatalities (69%) occurred when the victim was burning alone. Legislative, social and meteorological analysis showed that the most probable factor that lead to the incidents anomaly of 2018 was the extreme pressure to manage the vegetation, held by police forces, legislation and fines value if you didn't comply.

### 1. Introduction

In Portugal, there are countless historic and legislative references about fire use in rural areas (OTI, 2021). This popular use of fire to manage the huddled of agricultural and forestry leftovers and small burns to clean the farmed lands continues nowadays, to be used in rural territories. However, these areas are becoming depopulated, with aged populations remaining, and often isolated.

If in the 50's of the XX century, the territory had a network of patches with agriculture and woodlands, maintained by the local farmers, at the present, this no longer occurs. Consequently, there is an increase of the biomass accumulated in unused areas creating fuel-loads prone to wildfires. The remaining population continues to use fire for the management of the land, however not always with the strength to control it (Colaço, 2019). As mentioned in the report of WWF (2019), "under these circumstances, the traditional use of fire in the maintenance of pasture and agricultural land can have disastrous effects when the flames spread onto abandoned plots and turn into uncontrollable wildfires".

Not only wildfires can start by these traditional burns, but this practice can lead to injuries or even fatalities. Every year, all over Europe, in the social media, there are news about fatalities or injuries from elder people when using fire in the landscape. In 2018 the number of incidents in Portugal was much higher than the usual

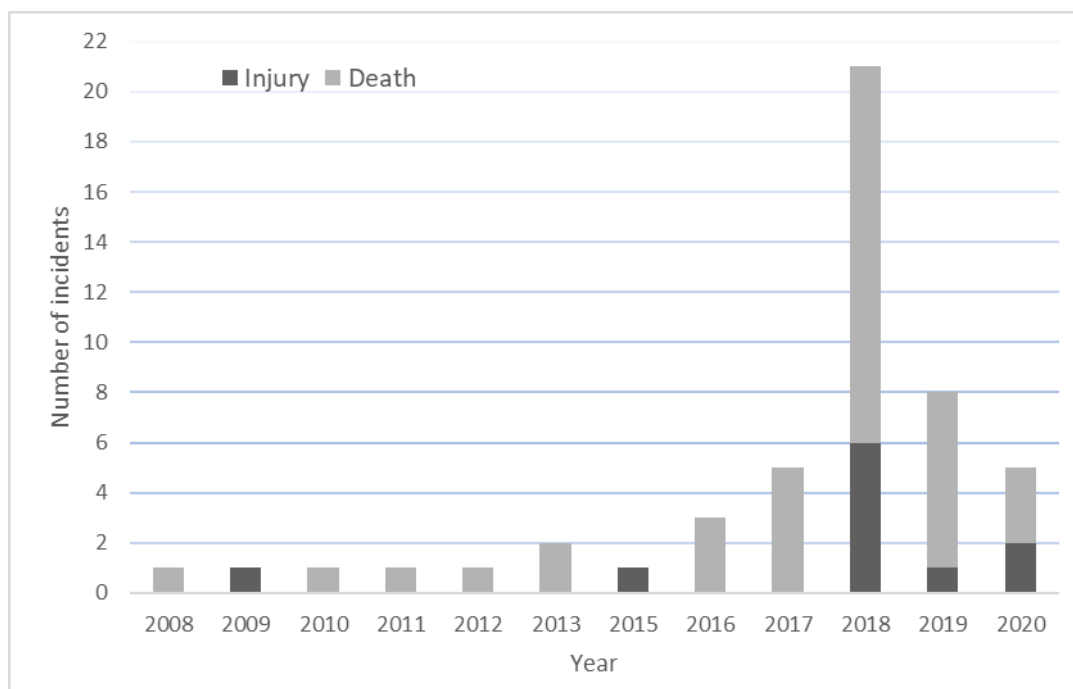
yearly three or four records. Thus, the objective of this work was to identify all the injuries and fatalities that occurred by the use of fire, analysing which were the factors that could explain 2018 increase of numbers.

## 2. Methodology

To obtain a systematic data of the incidents, a thorough analysis of the regional and national newspapers, both in paper and online, was performed from the years 2008 to 2020. For the search online the terms used were “incidents, death, fatalities, injury” cross over with “agricultural burns, traditional burn, stubble burn, farmer, elder population”. Variables like date, place, sex, age and other information considered relevant were gathered from the newspapers. All the incidents variables were complemented with meteorological data associated with wildfire risk provided by the Information Management System of Wildfire (ICNF, 2021), sociodemographic variables obtained from the National Statistical Institute (INE, 2020) and the legislative context. A statistical analysis was performed crossing over the incidents with meteorological data (FWI indices), sociodemographic data and to the legislation context.

## 3. Results and discussion

From 2008 to 2020 there were 50 incidents, with 78% of fatalities. The anomaly of incidents in 2018 corresponded to 42% of cases (figure 1).



**Figure 1- Number of incidents (injury and death) during the 2008-2020 period in Portugal.**

The predominant months of incident occurrence were March/April and October particularly in the year 2018. While the first period of the year coincides with the deadline for the fuel management mandatory by law before the fire season, the second period in October coincides with the preparation of the fields to plant new agricultural cultures.

Between the months of December until April, the incidents only occurred after the year 2015 with a greater predominance on the years of 2018 and 2019. Instead, the incidents occurring in October and November ranged most of the study period (2008-2020).

### 3.1. Sociodemographic characteristics

Age can be considered a critical factor. Most of the incidents (from 2008 to 2020) happened with people above 66 years old (72%) and male (84%). All the incidents occurred with women above 70 years old. Traditionally in southern Europe, field work that uses fire is a gender issue, with predominance for men to perform it (Proxecto

Batefogo, 2019). Most of the incident with women are related with burnings that the couple were performing together. However, the majority of fatalities (69%) occurred when the victim was burning alone and only 10% burned with company, usually with their wives. The information for all the incidents is incomplete since the newspapers in 21% of the news didn't mentioned how was this context (alone vs. with company).

In what relates to the sociodemographic context, most of the incidents (64%) occur in regions with high ageing index (people above 65 years / people bellow 15 years x 100) and 41% in areas with very low population density (values bellow 50 inhab/km<sup>2</sup>).

These factors could roughly explain the risk associated with the use of fire by an elder population, isolated and conditioned by the lack of renewal of the population that allows maintaining traditional practices safely, where the use of fire as a rural tool is included. However, these factors don't explain the increase in 2018.

### 3.2. Meteorology analysis

Meteorology is a factor that influence greatly fire behaviour and its control. Among other meteorological data, and analysis of the Daily Severity Rating (DSR) of the day and area where the incident occurred was performed. This index indicates the difficulty in fire extinguishing operations reflecting the effort required to its deletion (Rego & Colaço, 2013). So, the higher the value of DSR, the most complex and difficult will be fire control and extinction. The analysis showed that 75% of the incidents occurred on days with very low values, so it did not indicate a relationship with the difficulty of burning and consequent incidents.

Once more the meteorology does not explain the increase of 2018.

### 3.3. Legislation context

Immediately after the extreme wildfires that affected Portugal in 2017, prevention and the responsibility to do fuel management was considered a priority. In particular, around houses and roads, with a bigger demand from the government and from the authorities that control it. Although the legislation already existed (DL 124/2006), in 2018 the authorities increased public announces, doubled the fines if the citizen don't comply, and the police forces were more present doing inspection. These impositions, led to a real race to comply with the law, leading to the speculation of the prices, which were very high for the majority of the population, particularly the elderly without resources (in many cases with very low retirement pensions).

The pressure about fuel management around the houses felt by the citizens it is well expressed in figure 2, where google trends shows the interest on this subject on google searches.

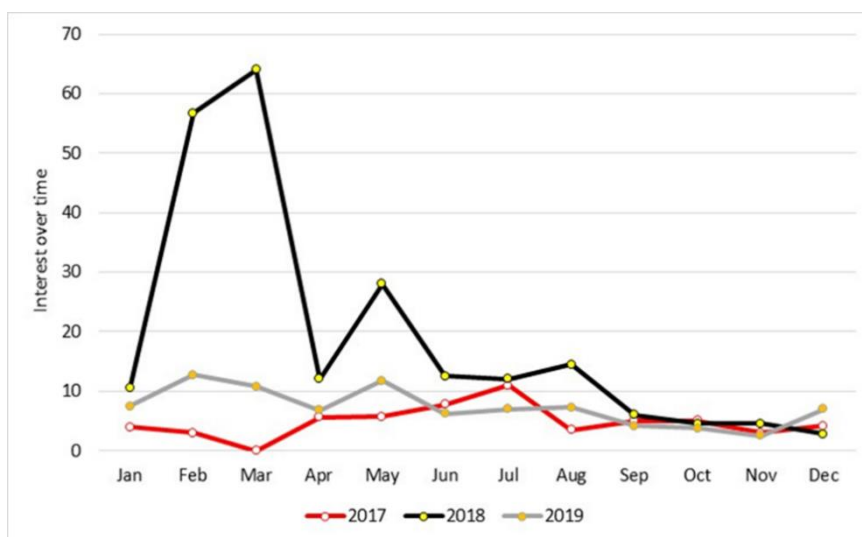


Figure 2- Internet search interest on the topic "Fuel clearing around the houses" on google trends

## 4. Final remarks

Since 2019, in Portugal, to burn agricultural debris it is necessary to ask permission on an Mobile app. The numbers for 2020 and 2021 reach more than one million permits (personal communication Oliveira, E.).

Although 50 incidents on a universe of millions can be considered very low, we should consider that our goal is to have zero fatalities performing these actions in the field.

Legislative, social and meteorological analysis showed that the most probable factor that lead to the incidents anomaly was the extreme pressure to manage the vegetation, held by police forces, legislation and fines value if you didn't comply.

Several actions from the forest authorities to support and to monitor the traditional burns and to know who is going to perform it have been taken. Considering the results above, it is important that the burns done with elder people who are alone and on a high or very high structural fire risk zone, should be supported by fire teams in the field.

Also, in here there are evidences that a mandatory law with high pressure from the authorities, should always be complemented with pedagogical and support actions. When that doesn't happen, it can lead to unsecure actions leading to injuries or fatalities.

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