

Potential role of camellias as fire-resistant plants in Galicia (NW Spain)

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Abstract. In Galicia, Northwest Spain, fires are a serious problem, especially in the summer. They can occur in forests and woods located very close to towns and villages, affecting not only the forests but also populated areas. Thus, it is necessary that the public administration and homeowners take special precautions to find solutions or alternatives for fire prevention. Although there are no fireproof plants, some species have proved to be more resistant than others, thus it is very important to select the correct plant. Research on the fire-resistance of vegetation has been the basis for establishing forest belts to reduce fire damage. Several states of the USA, Australia and even China consider the camellia genus as fire-resistant and so it is included in some lists of fire-resistant plants. Camellia species have been growing in Galicia for more than 200 years as ornamental plants, but they are wood species in their native areas and Galicia has the climatic and soil conditions to cultivate this species as forest plants. Moreover, in the last years, camellias have been cultivated in Galicia for seed oil extraction and tea production as a new economic resource boosting the economy in rural areas. The aim of this work is to introduce the use of camellia species, together with other indigenous plants, as protective agents in forest belts near living areas –implementing the FireSmart concept to prevent and reduce fire incidence – and as an economic resource in rural areas and small villages.

Keywords: Camellia species, FireSmart, prevent

INTRODUCTION

Fires are an environmental problem all over the world. Data collected by the European Forest Fire Information System (EFFIS) in five countries in the Mediterranean region of southern Europe (Portugal, Spain, France, Italy, and Greece) show that in 1980-2009 there were more than 1.5 million forest fires, affecting an area of 14,367 million hectares. This worrying situation is even more intense when verifying that certain regions in the north part of the Iberian Peninsula, and also in central and northern Europe, with the same weather conditions, recorded a similar number of fires (FAO, 2013).

Galicia is a region located in Northwest Spain, where very often fires affect populated areas. This risk is even greater in rural areas, where woods are very close to houses. This situation is very complex, but it is necessary to find solutions that guarantee safety in these

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areas. Homeowners and public administrations need to be aware of this problem and work together to search for solutions or alternatives for fire prevention.

One of the silviculture measures used to help control fires better is the use of green barriers as an alternative for fire suppression. In fact, the CypFire project, included in the EU-funded Programme Med, which investigates the use of cypress barriers against fires for the protection of Mediterranean Regions, considered that the use of green barriers using selected varieties of cypress mitigated natural risks, particularly wildfires, in vulnerable areas.

Thus, a promising solution against Galician fires may be the selection of the most adequate species to be used to create natural barriers. They have to be plants adapted to the climate and soil conditions of the region and catalogued as fire-resistant plants, i.e., plants that do not ignite easily from an ember or other ignition sources. These plants can be damaged or even killed by fire; however, their foliage and stems do not contribute significantly to increase the fuel load and, therefore, the fire's intensity. These kinds of plants have moist and soft leaves, low dead wood without accumulation of dry/dead material within the plant, low sap or resin materials, and are provided with enough water and nutrients to be healthy. There are plants catalogued as low flammability plants due to the following characteristics:

- × High moisture content
- × Broad fleshy leaves
- × Low and dense habit
- × Low dead material
- × Smooth trunks rather than rough bark
- × Thin bark attached to the trunk

Camellia cultivars show all these features (Figure 1). Their glossy, dark green leaves have a waxed coating that preserves their moisture and makes them fire-resistant. Moreover, the wood of this shrub plant is of low flammability.

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fire retardant garden plants for the urban fringes and rural areas

Why Plant Flammability is Important

During bushfires, the survival and longevity of a garden depends on the amount of fuel available. The more fuel available, the more likely the garden is to catch fire. The more fuel available, the more likely the garden is to catch fire. The more fuel available, the more likely the garden is to catch fire.



Flammability Groups

High Flammability

Moderate Flammability

Low Flammability

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Figure 1. Brochure published by Tasmania Fire Service (Australia), to explain the use of fire retardant garden plants. In the list of plants with low flammability, camellias are included. USA, at

least two states (California, Oregon) classify camellia as fire resistant. In South Carolina, it is considered a FireSmart plant (Figure 2). And various institutions in Australia list it as a plant with low flammability.

FireSmart is a planning tool designed to reduce the likelihood of large uncontrollable wildfires in forests near communities and infrastructure. Its objective is to use forest management practices (e.g., site preparation, regeneration, stand tending, harvest scheduling and systems, road construction ...) in a proactive and planned manner to reduce both the area burned and the risk associated to fire. The use of fire-resistant plants can help to reduce risk of fires and damages produced by them.

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Figure 2. Brochure published by South Carolina Forestry Commission, with a list of plants classified as "FireSmart". Among the shrubs, camellia can be found.

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nt does not mean fireproof, but all these features make camellias suitable to create the aforementioned green barriers to prevent and stop fire progress in forests and in populated areas, where there is a risk for the environment and also for human beings.

The genus *Camellia* has been present in the Galician landscape for about 200 years. This plant has adapted well to this region because its climate and soil conditions are suitable for its correct development. The most common use of the camellia in Galicia is the ornamental use of its flowers. However, in recent years, two new applications have been developed: the extraction of a valuable cosmetic oil with the seeds of some species (especially *Camellia japonica*) and tea production with the young leaves of *Camellia sinensis*.

Many American states, and countries in Asia and Oceania use camellias to create fire-resistant zones to prevent fire advance. In contrast, In Europe, especially in Spain where this plant is widespread and fires are a serious problem, camellia species are not used for this purpose. Therefore, it is necessary to increase governments' awareness of the importance to use camellia plantations as green barriers to protect the environment and populated areas against the fire.

More research is needed, both in the laboratory and in the field, to determine the dimensions and distribution of the plants in these safety zones created with camellias, since their effectiveness will depend on the results of a correctly designed previous study.

CONCLUSIONS

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Fires are an environmental problem over the world, especially in some regions as Galicia, located in Northwest Spain, where every year there are fires that cause serious environmental damages and are a risk for human beings.

Camellias are very abundant in the Galician landscape and they are listed as fire resistant plants in various states of USA, in Australia and even China. Although fire resistant does not mean fire proof, its physical characteristics make camellia a suitable plant to be used in fire prevention.

Spanish public institutions have to find viable solutions for this situation. One of them is to create safety areas with fire resistant plants that can prevent fire incidence.

Therefore, it is necessary to develop extensive assays in order to design adequate camellia green barriers to ensure their effectiveness.

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