

* Corresponding author. Sustainable Forest Management Area, Forest and Wood Technology Research Centre (CETEMAS), Pumarabule, Carbayín, s/n, 33936, Siero, Asturias, Spain.

E-mail addresses: ahavia@cetemas.es (A. Hevia), ale_crabi@yahoo.es (A. Crabiffosse), juangabriel.alvarez@usc.es (J.G. Álvarez-González), anadaria.ruiz@usc.es (A.D. Ruiz-González), jmajada@cetemas.es (J. Majada).

<https://doi.org/10.1016/j.jenvman.2017.09.051>

Journal of Environmental Management 205 (2018) 9–17



Contents lists available at ScienceDirect

Journal of Environmental Management

journal homepage: www.elsevier.com/locate/jenvman



Research article

Assessing the effect of pruning and thinning on crown fire hazard in young Atlantic maritime pine forests



Andrea Hevia^{a,*}, Alejandra Crabiffosse^b, Juan Gabriel Álvarez-González^b, Ana Daria Ruiz-González^b, Juan Majada^a

^a Forest and Wood Technology Research Centre (CETEMAS), Pumarabule, Carbayín, s/n, 33936, Siero, Asturias, Spain

^b Sustainable Forest Management Unit (UXFS), Departamento de Ingeniería Agroforestal, Escuela Politécnica Superior, Universidad de Santiago de Compostela, Campus Universitario s/n, 27002, Lugo, Spain

ARTICLE INFO

Article history:

Received 2 May 2017
Received in revised form
12 September 2017
Accepted 18 September 2017

Keywords:

Silviculture
Vertical canopy fuel distribution
Canopy bulk density
Canopy base height
Wildfires
Pinus pinaster

ABSTRACT

Management of fuel to minimize crown fire hazard is a key challenge in Atlantic forests, particularly for pine species. However, a better understanding of effectiveness of silvicultural treatments, especially forest pruning, for hazard reduction is required. Here we evaluate pruning and thinning as two essential silvicultural treatments for timber pine forests. Data came from a network of permanent plots of young maritime pine stands in northwestern Spain. Vertical profiles of canopy bulk density were estimated for field data and simulated scenarios of pruning and thinning using individual tree biomass equations. Analyses of variance were conducted to establish the influence of each silvicultural treatment on canopy fuel variables. Results confirm the important role of both pruning and thinning in the mitigation of crown fire hazard, and that the effectiveness of the treatments is related to their intensity. Finally, models to directly estimate the vertical profile of canopy bulk density (CBD) were fitted using the Weibull probability density function and usual stand variables as regressors. The models developed include variables sensitive to pruning and thinning interventions and provide useful information to prevent extreme fire behavior through effective silviculture.

© 2017 Elsevier Ltd. All rights reserved.