



Assessing the effectiveness of clear cutting in eradicating the pine wood nematode

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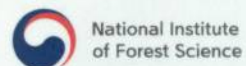
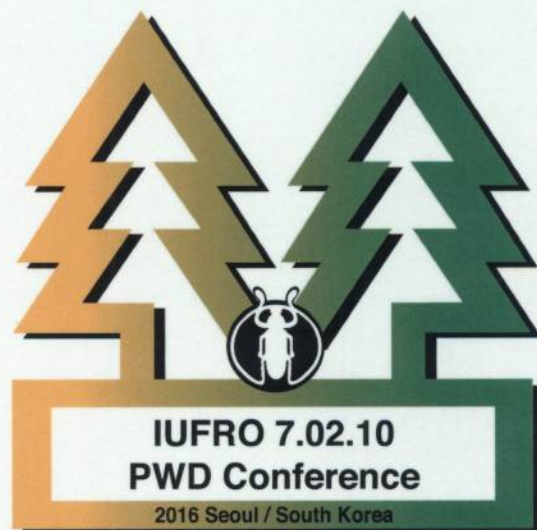
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Assessing the effectiveness of clear cutting in eradicating the pine wood nematode

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The pine wood nematode (PWN), *Bursaphelenchus xylophilus*, was first discovered in Europe in 1999 (in Portugal). Despite the regulation measures imposed by the European Union (Implementing Decision 2012/535/EU), the PWN has spread to a large part of Portugal and has been recently detected in Spain. The current contingency plan consists of: surveys for nematode detection, eradication measures to eliminate the nematode where it is present, and containment measures to prevent a further spread of the nematode where it cannot be eradicated. The requested eradication measure is to fell, remove and dispose of all susceptible plants within a zone of a minimum radius of 500 m around any infected tree (so-called clear cut zone, CCZ).

To assess the effectiveness of such clear cuttings, a process-based simulation model was developed to describe the dispersal of the insect vector in Europe, *Monochamus galloprovincialis*, the nematode transmission to healthy trees and the effects of removing host trees within a CCZ of variable radius. First, a dispersal kernel was fitted to vector flight distances recorded in flight mill experiments. Since these distances may not be representative of vector flight behavior in the field, the kernel was then refined using data collected in mark-recapture experiments.

Our results show that clear cut zones of a 500m-radius would not be effective at eradicating PWN in unfragmented landscapes of pine plantations. Using this strategy, only between 0.1 and 11% of nematode transmissions could be prevented, and a radius of 15 to 38 km would be necessary to obtain a 99.9% effectiveness. This study reveals that the current European regulation is not appropriate in the case of unfragmented forests. Since it would be impossible to extent CCZ radius to the necessary distances, other methods should be investigated. In particular, contingency plans based on detection and management of individual infected trees represent a promising option in terms of cost-effectiveness.

Report available at: <https://www.anses.fr/fr/system/files/SVEG2014SA0103RaEN.pdf>

Keywords: *Bursaphelenchus xylophilus*, Clear-cut; Dispersal, Eradication, Europe, Flight mill, Mark-recapture experiment, Modelling, *Monochamus galloprovincialis*