Development of a model system to predict wildfire behaviour in pine plantations

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Objectives:

To develop a model system aimed at predicting the rate of spread and other associated fire behaviour characteristics in pine plantations. Sought system attributes were: (1) applicability over the full spectrum of fire behaviour (i.e., from gentle surface fires to fully-developed, high-intensity crown fires); (2) explicit inclusion of the effects of relevant fuel complex variables determining the start and spread of crown fires; and (3) adequate quantitative description of fire behaviour factors and processes determining crowning.

Fuel dynamics in pine plantations

The proposed model system -- Pine Plantation Pyrometrics (PPPY) -- aims to predict the rate of spread and type of fire over the full range of fire behaviour for a variety of pine plantation fuel complex structures. The system encompasses a suite of fire environment and fire behaviour models that describe the relevant processes occurring within and above a spreading fire. PPPY distinguishes three modes of fire spread: surface fire, passive crown fire and active crown fire. In order to be able to do this, the system relies on three core models; a surface fire spread model, a model assessing the onset of crowning, and a model predicting the type of crown fire and its associated spread rate.

Further information:

Cruz, M.G. and Fernandes P.M. Development of fuel models for fire behaviour prediction in maritime pine stands. In review IJWF.

Head fire spread rate as a function of open wind speed for 12-year-old unthinned and thinned radiata pine plantation stands.