Kraisorn Wiriya 2009: Fuel Model and Fire Behavior Prediction in Dry Deciduous Dipterocarp Forest at Huai Kha Khaeng Wildlife Sanctuary, Uthai Thani Province. Doctor of Philosophy (Forestry), Major Field: Forestry, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor San Kaitpraneet, Ph.D. 167 pages.

The objectives of the study were to determine fuel properties, fire behaviors and to construct fuel models for predicting fire behavior in the dry deciduous dipterocarp forest at Huai Kha Khaeng Wildlife Sanctuary, Uthai Thani Province. The nested sample plots of fuel data collection were laid in line plots systematic sampling for fuel properties and ecological data collection at the sample sites, where were divided into 3 sub-sites according to fuel bed characteristics namely: litter fuel, litter with short grass fuel and tall grass fuel. Totally twenty eight burning plots with 200m x 200m size of each were established in experimental burning site for fire behavior data collection. Rothermel's fire spread model was applied to predict rate of fire spread and Byram's model was applied to determine fireline intensity and flame length.

The results revealed that fuel types were classified into 2 categories: dead and live; dead fuels were litter, twig and dead herb; live fuels were live herb and undergrowth. Fuel model was classified into 3 models namely litter, litter with short grass and tall grass. Averages of rate of fire spread, fireline intensity and flame length for litter fuel model were 1.34 m min^{-1}, 184.71 kW m^{-1} and 0.86 m, respectively, averages of those for litter with short fuel model were 2.75 m min^{-1}, 414.76 kW m^{-1} and 1.27 m, respectively and averages of those for tall grass fuel model were 2.39 m min^{-1}, 408.61 kW m^{-1} and 1.24 m, respectively. Fire behavior predictions in conditions of wind velocities and slopes ranged from 0 to 12 km h^{-1} and from 0 to 40 per cent, respectively: for litter fuel model; rates of fire spread ranged from 0.79 to 6.25 m min^{-1}, fireline intensities ranged from 109 to 861 kWm^{-1}, flame lengths ranged from 0.69 to 1.79 m: for litter with short grass fuel model; rates of fire spread ranged from 0.86 to 10.72 m min^{-1}, fireline intensities ranged from 129 to 1,611 kWm^{-1}, flame lengths ranged from 0.75 to 2.39 m and for tall grass fuel model; rates of fire spread ranged from 0.88 to 12.41 m min^{-1}, fireline intensities ranged from 149 to 2,115 kWm^{-1}, flame lengths ranged from 0.80 to 2.71 m. Fire behaviors ranged from low to moderate fire severities, that could generally be attacked at the head, flanks and rear fires by firefighters using hand tools. Hand line with at least 4 m wide could hold the fire. Essentially, the study is firstly conducted in the area and it would be very useful information for forest fire control planning in the area.

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