Evaluation of the efficiency of a long term retardant in laboratory

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ABSTRACT – Fire retardants are chemical agents used to reduce or eliminate combustion of a flammable material, widely used to prevent and combat forest fires in countries such as United States, Spain and Australia. In Brazil its use is incipient and needs advances in the research and regulatory sectors. This work aimed to evaluate different concentrations of a long term retardant on development phase, using the Effective efficiency index (IEE) methodology. The tests were conducted in a combustion chamber at the Forest Fires Laboratory in the Universidade Federal do Paraná (UFPR). The experiment consisted of 4 treatments (concentrations of 5, 10, 15 and 20%) and water in 5 repetitions each. The fuel material used was tifton hay (Cynodon spp.) in proportion of 1.0 kg / m², forming a layer 8.0 cm thick on a surface of 150.0 cm long by 75.0 cm width (parcel). The product was applied in the final third of the parcel. The plots were burned lengthwise and, as the fire spread, the flame height (hc in cm) and the fire propagation velocity (r, in ms-1) were recorded every 10.0 cm of advance. The data were submitted to ANOVA statistical analysis and cluster analysis, performed using the software Statgraphics Centurion. The fire behavior parameters were: hc: 64.0 cm and r: 0.0070 m.s-1 as reference values, hc: 28.0 cm and r: 0.0026 m.s-1 for 5% concentration; hc: 21.2 cm and r: 0.0019 m.s-1 for 10% concentration; hc: 16.8 cm and r: 0.0023 m.s-1 to 15% concentration and hc: 29.0 cm and r: 0.0028 m.s-1 to 20%; hc: 30, 3 cm and r: 0,0031 m.s-1 for water. There was a statistically significant difference between treatments and, through cluster analysis, it was possible to observe two groupings: a) 5 and 20%; and b) 10 and 15%. However, according to the IEE the efficiency rates for each concentration were: 5%: 43,35; 10%: 49.29; 15%: 50.84; 20%: 42.76 and 30,87 for water. According to the assumptions of the IEE method, the only approved concentration, with restrictions on use, was 15%, while the others were disapproved.

Keywords: fire retardants, fires, efficiency index.