|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | | | | | | **Value** | | **Description/Reference** | |
| Wind velocity (m/s) at the open land. | | | | | | 11.11   [40km/h] | | Tweak to obtain FDI 50, 80 and 100 in AS3959-2018 | |
| 16.67   [60km/h] | |
| 19.44   [70km/h] | |
| Heat of Combustion (kJ/kg) | | | | | | 18 600 | | Byram et al. 1959. | |
| Reaction fuel | | | | | | C=3.87  H=5.63  O=2.57 | | Calculated based on the ultimate analysis of Eucalyptus leaves (Table 5.2 thesis: Wadhwani) | |
| Soot yield | | | | | | 0.0175 | | Table 5.8 Combustion properties of Eucalyptus leaves-Open case: (Thesis: Wadhwani ) | |
| Ambient temperature (0C) | | | | | | 39 | | Similar to grass fire simulation. A reasonable value according to the psychrometric chart. | |
| Relative humidity (%) | | | | | | 25 | | Similar to grass fire simulation. A reasonable value according to the psychrometric chart. | |
| Forest fuel  Length/width  (leaves)(mm) | | Type1: Eucalyptus | | | | L=120    wmax= 17 | | Eucalyptus globulus (EUCLID: blade lanceole - <https://apps.lucidcentral.org/euclid/text/entities/eucalyptus_globulus_subsp._globulus.htm>) | |
| Type 2:Banksia | | | | L=100    wmax= 16 | | Phyllometric parameters and artificial neural networks  for the identification of *Banksia* accessions. (Messina et al 2009 Australian Systematic Botany-processed image of banksia oblongifolia) | |
| \*Type 3: Acacia | | | | L=100    wmax=16 | | Similar vegetation is Western Juniper (Miller et al.1987, Royce et al.1993). | |
| Fuel moisture(%) | | surface | | | | 3.84 | | Eqn 2.58 Fire behaviour knowledge in Australia (Cruz et al.2014) | |
| canopy | | | | 3.84 | |
| Thermo-physical properties | moisture | Density (kg/m3) | | | | 1000 | | Moinuddin et al. 2019, Mell et al. 2019 | |
| Thermal conductivity (W/m/K) | | | | 2.0 | |
| Specific heat (kJ/kg/K) | | | | 4.184 | |
| Eucalyptus leaves | Density (kg/m3) | | | | 650 | | Table 5.1 thesis (thesis: Wadhwani). | |
| Thermal conductivity (W/m/K) | | | | 0.31 | | R. L. Hays, "The thermal conductivity of leaves," 1975 | |
| Specific heat (kJ/kg/K) | | | | 2.76 | | A. Aston, "Heat storage in a young eucalypt forest," 1985 | |
| Fuel mass per volume (kg/m2) | Forest | canopy | | | | 0.05 | | AS3959-2018  Table B3:Vegetation classification and fuel load and, Bulk density calculated according to ‘Canopy fuel characteristics and potential crown fire’ - Ioannis et al.2007 | |
| understorey | | | | 0.25 | |
| Scrub | canopy | | | | 0.0 | |
| Understorey | | | | 0.833 | |
| Mallee/Mulga | canopy | | | | 0.0 | |
| understorey | | | | 0.267 | |
| Drag law for static fuel | | | | | | Haider and Levenspiel model. | | The modified FDS 6.6.0 code will be used. Drag law is based on the shape of the leaves.  A. Haider and O. Levenspiel, "Drag coefficient and terminal velocity of spherical and non-spherical particles," Powder technology, Vol. 58, no. 1, pp. 63-70, 1989. | |
| Canopy height max (m) | | Forest | | | | 40 | | AS3959-2018  Table B3:Vegetation classification and fuel load, Table 2.3 | |
| Scrub | | | | 3 | |
| Mallee/Mulga | | | | 3 | |
| Under storey height min (m) | | Forest | | | | 10 | | AS3959-2018-Fig. 2.4 (B), 2.4 (E), 2.4(F) | |
| Scrub | | | | 3 | |
| Mallee/Mulga | | | | 3 | |
| Firebrands  (classified into 22 sizes of cylindrical shape, 13 sizes of cubic shape, and 7 sizes of spherical shape firebrands) | | Cylindrical shape, dimensions  (cm)  (length/diameter) | | | | Fbcy1 | 0.877 | 0.236 | Taken from “Investigation of firebrand production during prescribed fire”: El Houssami et al. 2016 Fire Technology.  Fig 9. Firebrands samples.  Processed the images to determine the dimensions and shapes. |
| Fbcy2 | 1.010 | 0.282 |
| Fbcy3 | 0.933 | 0.266 |
| Fbcy4 | 1.044 | 0.209 |
| Fbcy5 | 1.059 | 0.284 |
| Fbcy6 | 6.108 | 1.412 |
| Fbcy7 | 3.166 | 0.850 |
| Fbcy8 | 3.333 | 0.817 |
| Fbcy9 | 3.426 | 0.922 |
| Fbcy10 | 2.297 | 0.593 |
| Fbcy11 | 2.557 | 0.623 |
| Fbcy12 | 3.411 | 0.583 |
| Fbcy13 | 2.230 | 0.529 |
| Fbcy14 | 1.819 | 0.408 |
| Fbcy15 | 2.689 | 0.285 |
| Fbcy16 | 9.130 | 1.222 |
| Fbcy17 | 6.250 | 0.290 |
| Fbcy18 | 4.780 | 0.140 |
| Fbcy19 | 3.343 | 0.303 |
| Fbcy20 | 6.444 | 0.380 |
| Fbcy21 | 3.395 | 0.125 |
| Fbcy22 | 3.350 | 0.435 |
| Cubic shape, dimensions  (cm)  (Width/ Length) | | | | Fbcu1 | 0.808 | 0.574 |
| Fbcu2 | 0.852 | 0.545 |
| Fbcu3 | 0.826 | 0.543 |
| Fbcu4 | 0.962 | 0.658 |
| Fbcu5 | 3.671 | 2.326 |
| Fbcu6 | 2.012 | 1.460 |
| Fbcu7 | 1.915 | 1.384 |
| Fbcu8 | 2.307 | 1.465 |
| Fbcu9 | 1.520 | 0.975 |
| Fbcu10 | 1.465 | 0.968 |
| Fbcu11 | 1.384 | 0.919 |
| Fbcu12 | 1.403 | 0.851 |
| Fbcu13 | 1.167 | 0.861 |
| Spherical shape, dimensions  (cm)(Radius) | | | | Fbs1 | 0.351 |  |
| Fbs2 | 0.289 |  |
| Fbs3 | 1.566 |  |
| Fbs4 | 0.861 |  |
| Fbs5 | 0.764 |  |
| Fbs6 | 0.667 |  |
| Fbs7 | 0.528 |  |
| Drag laws | | | | Haider and Levenspiel drag models. | | A. Haider and O. Levenspiel, "Drag coefficient and terminal velocity of spherical and non-spherical particles," Powder technology, Vol. 58, no. 1, pp. 63-70, 1989. | |
| Density (kg/m3)  (Eucalyptus) | | | | Barks: 590 | | Table  5.1 (thesis: Wadhwani). | |
| Leaves:650 | |
| Conductivity (W/m/K)  (Eucalyptus) | | | | Barks: 0.38 | | A. Aston, "Heat storage in a young eucalypt forest," 1985 | |
| Leaves:0.36 | | R. L. Hays, "The thermal conductivity of leaves," Planta, Vol. 125, no. 3, pp. 281-287, 1975. | |
| Specific heat (kJ/kg/K)  (Eucalyptus) | | | | Barks: 2.802 | | A. Aston, "Heat storage in a young eucalypt forest," 1985 | |
| Leaves:2.760 | |
| \*Initial temperature (0C) | | | | 411 | | (Thesis: Wadhwani). obtained from the VUSSG experiment. | |
| Fireline  (static) | | Length (m) | | | | 100 | | AS3959. | |
| Depth (m)  D=tr Í ROS ( for forests) | | | | 31        [FDI 100] | | Alexander, M.E., and Cruz, “Interdependencies between flame length and Fireline intensity in predicting crown fire initiation and crown scorch height”. 2012. **21**(2): p. 95-113. | |
| 24.75  [FDI 80] | |
| 15        [FDI 50] | |
| Magnitude (kW/m) | Forest | | FDI50 | 27002.55 | | Calculated based on the equations in Fire behaviour Knowledge -Cruz et al.2014 and AS3959-2018:Table B4, equations B1, B2. | |
| FDI80 | 43117.61 | |
| FDI100 | 54485.33 | |
| Scrub | | FDI50 | 58841.88 | |
| FDI80 | 96107.42 | |
| FDI100 | 115814.4 | |
| Mallee/  Mulga | | FDI50 | 18829.4 | |
| FDI80 | 30754.38 | |
| FDI100 | 37060.61 | |
| Tree trunks | | Height (m) | | Eucalyptus | | 25 | | Calculated based on AS3959.  Represented by non-burning obstacles. | |
| Banksia | | 1.5 | |
| Acacia | | 1.5 | |
| spreading | | | | - | | random | |
|  |  |  |  |  |  |  |  |  |  |