A SIMPLE FUEL MOISTURE INDEX FOR EUCALYPT LITTER

J.J Sharples, R.O Weber
School of Physical, Environmental and Mathematical Sciences, University of New South Wales at the Australian Defence Force Academy
R.H.D McRae
A.C.T Emergency Services Agency

In Viney (1991) the following equation for the moisture content (% of oven dried weight) of eucalypt litter was introduced

$$m = 5.658 + 0.04651H + 3.151\times10^{-4}\frac{H^3}{T} - 0.1854T^{0.77} \quad (1)$$

where H is the relative humidity (%) and T is the temperature (°C) of the air. Equation (1) fits the moisture content data contained in McArthur (1967) with a correlation coefficient of 0.998; the error ranges between -0.5% and 0.6% with a mean absolute error of 0.17% of oven dried weight.

We consider a simple fuel moisture index (after Pook (1993), Pook and Gill (1993) and A.M. Gill, Pers. Comm.), defined as a function of relative humidity and temperature as

$$FMI^* = 10 - 0.25(T - H) \quad (2)$$

Equation (2) embodies the intuitive notion that hotter and drier air results in lower fuel moisture content. Figure 1 shows a plot of FMI^* (unitless) against Viney's moisture content m (%) as defined by equation (1), as derived from simulated data.

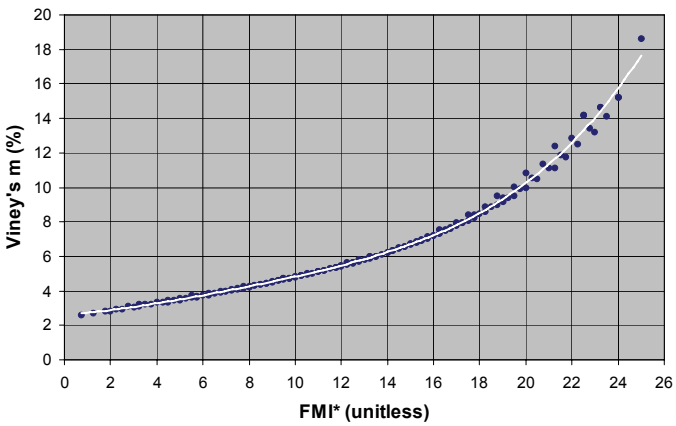

Figure 1. FMI* versus Viney's fuel moisture function. The white line is the fitted polynomial function.

FMI*	m (%)	FMI*	m (%)
2	3.0	17	8.0
4	3.5	18	9.0
6	4.0	19	9.5
8	4.5	20	10.0
10	5.0	21	11.0
12	5.5	22	12.5
13	6.0	23	14.0
14	6.5	24	16.0
15	7.0	25	18.0
16	7.5	26	20.0

Table 1. Tabular version of Figure 1

The relationship between *FMI** and *m* is characterised by a fourth order polynomial that fits the data with a correlation coefficient of 0.999 and with a mean absolute error of 0.2%.

We may conclude that, for practical purposes, *FMI** gives an equivalent measure of fuel moisture content for eucalypt litter that is intuitive and easy to calculate. Once the temperature and relative humidity are known, *FMI** can be calculated using mental arithmetic and the corresponding fuel moisture content of eucalypt litter can be accurately obtained by appealing to the graph in Figure 1 or Table 1. This method could be easily applied to estimate fuel moisture content in the field, for example, where it would have an advantage over more unwieldy methods. The result also suggests that *T-H* may be a useful variable for gauging moisture content of fuels in general.

References: McArthur, A.G. (1967) *Department of National Development, Forestry and Timber Bureau Leaflet No. 107*. Canberra, Australia.
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