Assessing and predicting the curing of grasslands

bushfire CRC

Stuart Anderson
Ensis Forest Biosecurity and Protection[1]
stuart.anderson@ensisjv.com

Program A: Safe Prevention, Preparation and Suppression

Project objective

To develop improved methods for the assessment and prediction of grassland curing as an input into fire danger rating systems and fire behaviour models

What is curing and why is it important?

Degree of curing refers to the proportion of cured and dead material in grasslands. It is a critical input into grassland fire behaviour and fire danger models. Current curing inputs are often inaccurate, leading to incorrect determination of grassland fire danger levels and potential fire behaviour. Fire managers need accurate information in order to protect life and property.

Current methods of curing assessment

Remote sensing
Remote sensing is used in parts of Australia. Current methods use the reflective properties of grasses at different wavelengths to calculate an index to determine curing, closely related to the Normalised Difference Vegetation Index (NDVI). This has had little validation or extension outside of southern Australia, and there are issues with its application, due to atmospheric and view angle effects on satellite measurements.
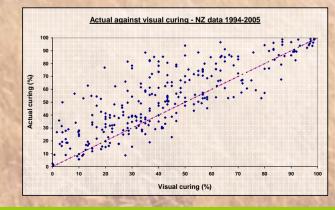
Visual
Often the most inaccurate technique, as evident in the graph of New Zealand curing data shown alongside. Problems include difficulties obtaining and extrapolating estimates over large areas, experience of observers, calibration of visual assessments, and timing and frequency of observations.

Deliverables

- Accurate curing information for input into grassland fire danger rating and fire behaviour models
- Systems applicable across a range of grassland and pasture types, accounting for varying environmental and management influences
- Models or systems capable of assessing current levels, and predicting future levels, of grassland curing
- The ability to assess and predict green-up of grasses at the end of the fire season
- Improved curing data for use in comparative products, e.g. maps for regions
- Development of curing climatologies based on weather climatologies
- Models and systems that are easy to use and implement operationally, and have scientific credibility

Actual against visual curing - NZ data 1994-2005

Y-axis: Actual curing (%) — 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100
X-axis: Visual curing (%) — 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100

Research methods

Remote sensing

Reflectance techniques
The vegetation index technique will be extended to other grasslands. Advances in remote sensing processing and sensors provides an opportunity to improve accuracy of this technique. Analysis of historical data will enable development of curing climatologies for regions.

Thermal approaches
A new approach, using thermal remote sensing to relate land surface temperature and water stress in vegetation to the curing process. Combination of thermal and vegetation index approaches will be investigated.

Pasture modelling

Evaluation and modification of agricultural pasture growth models for curing determination. These models account for environmental and physiological factors regulating grass growth, and hold promise for predicting future curing levels.

Field sampling program

An Australasian-wide field sampling program commencing in 2005/06 will provide data for development and validation of techniques. Results from recent pilot studies in the ACT and New Zealand will aid in developing sampling methods.

Project participants

Ensis Forest Biosecurity and Protection, Bureau of Meteorology, University of New South Wales – ADFA, CSIRO Plant Industry, Australian and New Zealand end-user agencies
[1] Ensis – the combined forces of CSIRO and SCION (formerly New Zealand Forest Research)