

Smoke Particle Emissions from Different Vegetation

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Aim to determine

- Vegetation emission factors (EF's)
- particle chemical composition
- Particle size distributions
- Effect of fuel characteristics on emissions

For a variety of different vegetation types, at different fuel moisture (FM), and fuel sizes.



Introduction



Method

Small samples of each fuel were burnt under controlled conditions.

Equipment

Modified high volume field sampler. Enables the measurement of carbon dioxide (CO₂), carbon monoxide (CO), particulate matter (PM), Methane (CH₄) and non-methane hydrocarbons (NMHC). Filters are also collected for chemical analysis.

Figure 1. Particle Emission Factors

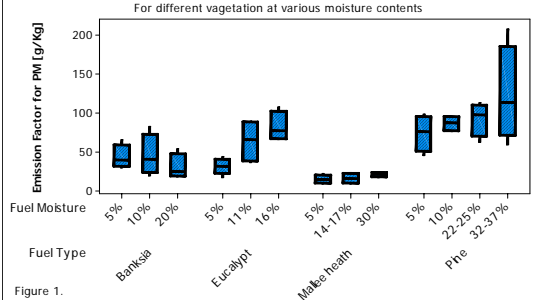


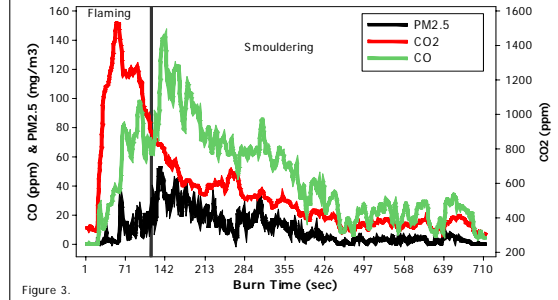
Figure 2. Eucalyptus emissions were different at varied FM. However, emissions were varied for high FM pine.

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Figure 3. Emissions are increased during flaming (and the transition to smouldering), and drop off steadily thereafter.

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Figure 3. Real-Time Emissions for Typical Vegetation Combustion



Preliminary Results – Typical Combustion

Figure 2. Average Emissions for Typical Vegetation Combustion

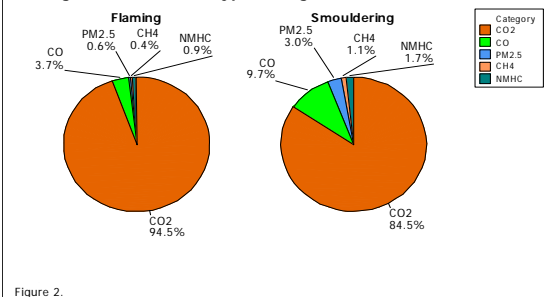


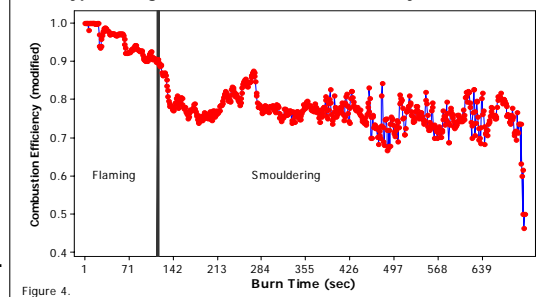
Figure 2. Emission of CO₂ dominates flaming stage, while CO, PM_{2.5}, CH₄ and NMHC are increased during smouldering.

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Figure 4. There is an increase in CE after the flaming - smouldering transition, possibly due to increased availability of O₂.

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Figure 4. Typical Vegetation Combustion Efficiency (modified)



Discussion – Conclusion

The preliminary results for this experiment indicate that eucalyptus varies emissions with fuel moisture, while the other fuel investigated show no significant difference, (although higher FM pine has increased variability). It was also shown that most of the CO and PM_{2.5} emissions were in the smouldering stage of combustion, where combustion efficiency was decreased.