A new key to the tropical forest

***Australian Tropical Rain Forest Trees*: a new interactive identification system for more than 1000 species.**

An interactive database of Australia's tropical rain forest trees offers, in one neat package, the fruit of 30 years' study by botanist Dr Bernie Hyland from the Division of Plant Industry.

Australian Tropical Rainforest Trees, complied by Hyland and Dr Trevor Whiffen from Melbourne's LaTrobe University, is a plant identification system designed to simplify the work of researchers, paleobotanists, foresters, educators, horticulturists, students and naturalists. It provides keys for identifying 1056 rain forest trees using features of their leaves, fruits, flowers, bark, seedlings or geographic distribution in any order or combination.

In the past, rain forest tree identification has been complicated by the difficulties of locating and retrieving flower samples. Many trees flower spasmodically or at long intervals, or are too tall for collecting flowers. With the 'tree key', users can identify species without the need for their flowers.

The package consists of two computer disks (IBM and Macintosh) and three accompanying volumes. The first book contains descriptions and illustrations of the plant features available for identification, a glossary and a species list, including scientific, common and trade names. The second book briefly describes each species, including additional features to aid identification and notes on distribution and ecology.

Also included in the package is a copy of the *Leaf Atlas of Australian Tropical Rain Forest Trees*, another botanical innovation which allows users to compare leaf specimens with near life-sized illustrations covering all species included in the key.

Australian Tropical Rain Forest Trees, An Interactive Identification System costs $195 plus $20 postage. The *Leaf Atlas of Australian Tropical Rain Forest Trees* is separately available at a cost of $80 plus $8 postage.

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Gas emissions reduced with pulsed power

Methods of reducing gases that cause acid rain (sulfur dioxide, nitrogen oxide and nitrogen dioxide) and of improving ash collection in power stations using Australian coals are being studied by scientists at CSIRO's divisions of Coal and Energy Technology and Applied Physics.

They are investigating the workings and design of the electrostatic precipitator, one of the means of reducing industrial flue emissions. In conventional designs, a steady high voltage is applied to the precipitator, which consists of a grid of wires and metal plates. The high voltage creates electric charges which attach themselves to the dust particles which then migrate to the metal plates where thay are collected.

Previous studies in Europe have shown that noxious gas emissions are drastically reduced when a precipitator is supplied with pulsed voltage instead of a constant high voltage. A team including Dr John Lawke, Dr Richard Morrow and Colin Paulson is looking at why this is so.

With funding from the Australian Coal Association Research Program, the team aims to better understand this phenomenon and thus to design new electrode systems to improve the efficiency of precipitators. The group is contributing to international research into the use of pulsed power supplies for precipitators.

In a precipitator supplied with constant voltage, sulfur dioxide and nitrogen oxides in the flue gas escape into the atmosphere and after some time oxidise and produce sulfuric and nitric acids. But when pulsed power is applied to the precipitator, some or all of these oxides are removed before the flue gas is discharged into the atmosphere.

The team has also found that pulsed power supply improves dust collection in the precipitator. The project can therefore lead to new precipitator systems that will be more effective for plants using Australian coals. Local coals sometimes produce ash which can be difficult to collect in conventional precipitators and pulsed power can bring great improvements.

Recycling oil

Another project at the Division of Coal and Energy Technology involves the commercial development of a process that recycles transformer oil. The $2.3 million project, co-funded by New South Wales electricity producer Pacific Power and the Industry Research and Development Board, aims to develop a simple, economic process that can be used at remote power stations and electricity substations.

Australia's power generation and distribution companies spend about $214 million yearly on imports of transformer oil. The oil is used as insulating material for transformers, but it degrades over time. Under current practices, the degraded oil is replaced and disposed of, since there has been no satisfactory way of recycling it.

Research has shown that the new recycling process recovers more than 99% of the oil for re-use. The electrical properties of the recycled oil are retained and the process also destroys polychlorinated biphenyls (PCBs), a group of hazardous compounds. PCBs are present in some older transformer oils and the new process converts them into harmless chloride salts. A unit capable of processing one tonne daily of degraded and contaminated oil is expected to be commissioned by mid-year.

A series of articles on cleaner production begins on page 14.

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