

## Co-operative environmental research

**H**ow do you work out what species a juvenile earthworm belongs to? Only with great difficulty. Does that matter? Yes. The lack of a quick, reliable identity test is a big problem for researchers examining ways to build up earthworm populations to improve the structure and fertility of agricultural soils.

Researchers at the Co-operative Research Centre for Soil and Land Management in Adelaide hope a 'DNA probe' will provide the solution. Development of probes for identification of earthworms, as well as of bacteria that control root diseases and soil fungi that help plants take up nutrients, is one of the research goals of the new Centre. This work will form part of a wide-ranging effort to develop and introduce ecologically sustainable land use systems and to reduce soil pollution, both rural and urban.

The Centre is one of the first 15, announced earlier this year, of up to 50 to be established over the next 2 years. Funding under the federal government program will reach \$100 million a year when all are operating. Each will bring together researchers from a range of organisations — universities, CSIRO, industrial companies, State government research centres etc. — and will be heavily involved in training and communication of research findings. Other Centres with a primarily environmental focus will be concerned with waste management and pollution control, and the Antarctic and Southern Ocean environment.

Dr Albert Rovira of the CSIRO Division of Soils, foundation Director of the Co-operative Research Centre for Soil and Land Management, sees it providing an exciting injection of talent into the area. The new government funding will support 12 PhD students, 10 post-doctoral fellows, three new scientist positions and a communication and technology transfer program with four communicators. 'The idea is to attract people from all over Australia and overseas', says Dr Rovira. Also working in the Centre will be about 30 researchers from

CSIRO, the University of Adelaide Soil Science Department and the South Australian Department of Agriculture.

Dr Rovira stresses the importance of the Centre's role in teaching and communication. It will run graduate programs in soil conservation and soil and water quality, and contribute to undergraduate courses in soil science. For farmers and other land managers it will run short courses on ways of tackling problems like salinity, acidity and soil degradation. It will also develop 'focus fields' on farms as demonstration sites for land-preserving farming techniques.

On the research front, one major goal will be to develop reliable ways to predict the effects of different farming methods on the organic matter content of soils around Australia. Maintaining and increasing soil organic matter is one of the keys to sustainable agriculture, and such tests will assist in the development of farming systems that achieve this.

Research on soil structure and fertility will focus on the development of productive systems that minimise soil disturbance and the breakdown of soil organic matter and encourage earthworm activity. One aim is to develop equipment for sowing seed while causing minimum disturbance to the soil.

Other research will examine in detail the causes of soil problems including salinity and acidity. Soil biotechnology work, as well as developing sophisticated probes for earthworm species, bacteria and fungi, will expand current efforts to develop biological control techniques for soil-borne root diseases.

Soil pollution investigations will mainly concern toxic heavy metals such as lead from motor-vehicle exhausts and the cadmium found in trace quantities in some fertilisers. Importantly, it will seek to develop a scientific basis for establishing regulatory guidelines for safe levels of pollutants in Australia's soils, in the crops and pastures grown in them and in grazing animals. Because

many of our soils differ from those in other parts of the world, standards developed overseas may often not be appropriate.

A big and rapidly growing cause of pollution of both soil and water is waste from intensive agricultural industries such as piggeries and cattle feedlots. Dr Graham Allison, Chief of the CSIRO Division of Water Resources, points out that 'very significant waste management issues' will arise if the expected major expansion in feedlotting occurs; one cow produces as much waste as ten people.

His Division's main contribution to the Co-operative Research Centre for Waste Management and Pollution Control, in which it is a partner, will be research on how best to locate such industries and minimise pollution from them. This Centre will bring together researchers from three universities, BHP, ICI, Australian Defence Industries, Brambles, IBM, Memtec, the Australian Nuclear Science and Technology Organisation and State government environmental authorities, as well as CSIRO. It plans not only to help solve waste disposal and pollution problems in Australia but also to develop waste management and pollution control technologies with major export potential.

Partners in the Antarctic and Southern Ocean Environment Co-operative Research Centre include the Australian Antarctic Division, CSIRO's Division of Oceanography, the Bureau of Meteorology, the Bureau of Mineral Resources and the University of Tasmania. Research will cover environmental management of the frozen continent, techniques for monitoring global climate and environmental change and the role of the region in controlling such change.

The other 12 Co-operative Research Centres announced so far cover aerospace structures, intelligent decision systems, robust and adaptive systems, eye technology, tissue growth and repair, cellular growth factors, tropical pest management, plant science, temperate hardwood forestry, mining technology and equipment, extractive metallurgy and Australia's petroleum industry. Further Centres are due to be announced at the end of this year.

