ABC News

Grass could turn toxic waste into energy

By Carl Holm for ABC Science Online

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A team of Australian and Chinese scientists claims to have pioneered a method to decontaminate polluted land and provide an ecologically renewable energy resource in the process.

Napier grass is a tall, perennial plant that is native to the tropical grasslands of Africa.

They say the secret lies in a relative of the sugar cane plant, known as giant napier grass.

The project is a collaboration between the Cooperative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE), and the Hong Kong-based HLM Asia Group and Shaoguan University in China's Guangdong Province.

Napier grass (pennisetum purpureum) is a tall, perennial plant that is native to the tropical grasslands of Africa.

CRC CARE managing director Professor Ravi Naidu says giant napier grass was chosen for the project because it grows in extremely poor soils and is efficient at drawing heavy metals and other pollutants out of contaminated soil.

Professor Naidu says the grass is good at decontaminating soils for two reasons.

"The first is that when you have hydrocarbon contamination, the grass is able to pump oxygen into the soil and through that process certain types of hydrocarbons will biodegrade," he said.

"The other role is with metal contaminants - the grass is able to take up metals and accumulate them in the upper parts of the grass."

The grass has been tested on several large sites in Guangdong province which had been heavily contaminated by mining activity.

Professor Naidu says the trials showed the grass was effectively removing metals like copper, nickel and cadmium, as well as high concentrations of zinc and lead.

He says the giant napier grass was also selected because of its potential for ethanol production.

"The grass has a fairly high sugar content and is therefore used to generate ethanol through a fermentation process," he said.

The grass will now be tested at other locations in China and a team is looking into trials on polluted sites in Egypt.

More assessment needed

Dr Isa Yunusa, an environmental scientist at the University of New England, says the basic concept has been around for some time, but the scope of the CRC CARE project is something new.

"I'm not aware of the technique being applied at such a large scale," he said.

"Scientifically yes, the idea sounds attractive, and I can say that it has some scientific basis, because in the past five or six years I've worked in this area, looking at how plants extract heavy metals, but this is taking it to a new dimension."

Dr Yunusa says it is difficult to assess the project properly until CRC CARE releases scientific literature on the subject. But he raised a number of concerns.

"I think it will depend on the concentration of these metals," he said.

"Secondly, it will depend on the efficiency of this plant to be able to extract these metals and the tolerance of the plant itself to high concentrations.

"The third thing is whether these metals can be depleted to such an extent to make the soil suitable for growing crops.

"If the crops accumulate the toxins in the edible parts of the plant, then there's a problem."

Heavy metals

He also questioned what happens to the accumulated heavy metals when ethanol is produced from the grass.

Professor Naidu says that when ethanol is burned, the metals do not volatilise.

"During the fermentation process, the metals come out as a residue and we're left with a very small volume to deal with. The residue is then immobilised with a particular chemical and that's how you extract the toxic metals in a non-toxic form," he said.

Professor Naidu says there are 160,000 contaminated sites in Australia and there is an urgent need to replace the prevalent "dig and dump" site remediation culture.

He says quarantine negotiations are underway to bring the grass into Australia.

He says there are several former mining sites in the Northern Territory and Queensland that would make ideal testing grounds.

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