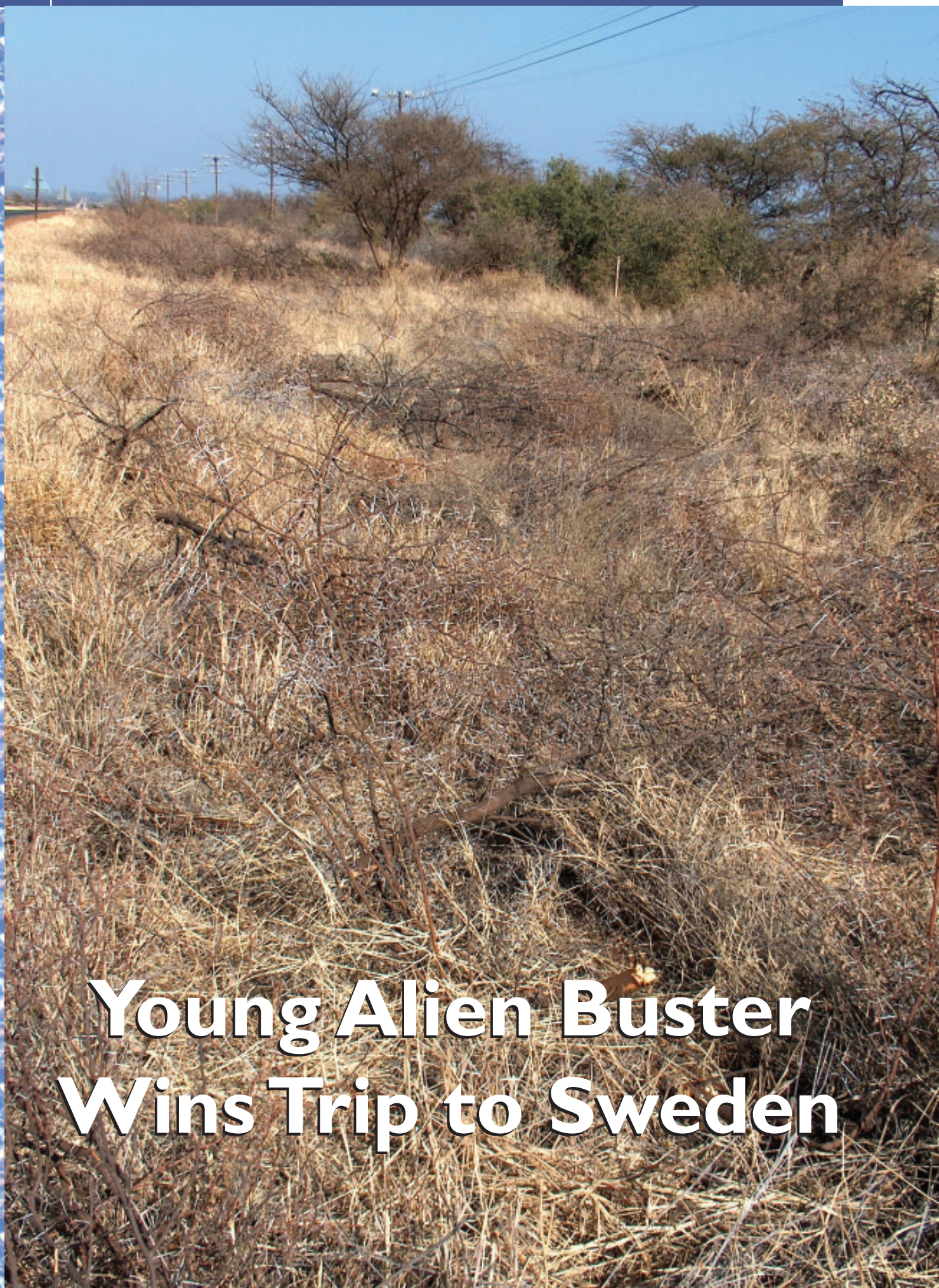

Young Alien Buster Wins Trip to Sweden

"The greatness of any nation is measured by the way it celebrates its children and their achievements."

This saying was quoted by the Minister of Water Affairs and Forestry, Ms Buyelwa Sonjica, when she announced the winners of this year's South African Youth Water Prize at the Kathu High School in the Northern Cape. She said it was a privilege to witness the rise of a generation of young people "who will make South Africa stand shoulder-to-shoulder with other great nations of the world".

The national winner of the 2004 competition was Jacques Deacon, a grade 12 learner, from Kathu, with his invention, "Alien Buster 1-2-3". Runner-up prizes were won by Nokuthula Dubazane from KwaZulu-Natal for an environmental study on water, water pollution, wastage and sanitation in and around Ladysmith; Dean Butler from Mpumalanga for an investigation into the use of partially recycled sewerage water for crop irrigation; and Kirsty van den Bergh and Niveshni Maistry from Gauteng for their innovative design of a rural water purifier.

In her address Minister Sonjica stressed the importance of science and said South Africa's leaders and educators had a duty to encourage young people to study science "and especially studies in water for sustainable development – as water is central to the country's economic activity".

She said the South African Youth Water Prize formed part of the Department of Water Affairs and Forestry's School based water and sanitation education programme called the "2020 Vision for Water".

"The 2020 Vision for Water programme seeks to empower the youth with knowledge and water management skills and will enable them to participate in integrated water resource management and other environmental programmes.

"Through the 2020 programme our children learn about water and sanitation at an early age and on a daily basis. We are therefore instilling the values of water resource management into the future generations. These young people will in turn transfer this knowledge and skills to their parents and communities at large. Children are better placed to change the mindset and educate their parents that water is not only a gift from God, but also a scarce resource that should be conserved and protected."

The finalists in the 2004 South African Youth Water Prize. From left: Jacques Deacon from the Northern Cape, the overall winner who represented South Africa at the international Stockholm Junior Water Prize competition in Sweden with his invention, Alien Buster 1,2,3 – a device used for eradicating alien invasive plants; Niveshni Maistry and Kirsty van den Bergh runners-up from Gauteng, Nomxolisi Matyana, Director of the Department of Water Affairs and Forestry's 2020 Vision for Water programme, Nokuthula Dubazane, runner-up from KwaZulu-Natal and Dean Butler, runner-up from Mpumalanga.

CAREERS

The Minister said the 2020 Vision programme was used to stimulate the interest of youth in water resource management careers as well as promoting science, technology and research, and referred to the Water Research Commission's career guide – *Water @ Work* – which she recently launched in Grahamstown. She said this publication would "guide learners

The newly published career guide – Water@Work – available from the Water Research Commission in Pretoria.

Left: *Invasive Prosopis trees tend to form dense, impenetrable thickets that render the land useless for normal farming practices.*

Jacques Deacon, winner of the SA Youth Water prize, demonstrating his Alien Buster 1-2-3.

Labourers "fighting" invasives with the Alien Buster 1-2-3.

on the selection of careers in water resource management as well as within the water sector broadly".

Referring to the South African Youth Water Prize competition, the Minister said it was usually preceded by the provincial and national competitions and "culminates in the International Junior Water Prize, held in Stockholm, Sweden, annually.

"In this competition the learners identify water and sanitation related problems in their communities. The challenge for these young people is then to come up with solutions and innovations to solve those problems. This is what the South African Youth Water Prize is all about," she said.

ALIEN BUSTER

One of the most important water related problems for the community of the Northern Cape, where Jacques Deacon, the 2004 SA Youth Water Prize winner, lives, is the growing infestation of alien invasive vegetation, especially Prosopis trees and their adverse effect on the scarce water resources of the area.

The Northern Cape is the driest province in South Africa with a mean annual rainfall – at a quaternary catchment scale – of 226 mm and a mean annual runoff of about 4.5 mm. This lack of rainfall makes the province very dependent on ground water.

Today, groundwater resources in the province are threatened by alien Prosopis invasions which closely track underground water aquifers and suck the earth dry.

Jacques says the Prosopis trees have a deep and extensive root system that can reach water tables of 12 to 18 m and deeper. (The longest roots measured in the Arizona desert in the USA were 53 m). A mature Prosopis tree can use about 60 to 100 litres of water on a hot day, while water use per hectare, with dense stands, is estimated to be nearly a million litres per year.

PROPAGATION

He says until the 1960s government agencies actively encouraged the propagation of Prosopis trees, commonly known as Mesquite (or Suidwesdoring or Peulbome in the local language) in the arid northwestern regions of South Africa to provide shade, wood, fuel and animal fodder to farmers.

Great benefits were derived from these plantings and the campaign was thought to be a success. Unfortunately, the invasive potential of Prosopis trees –with their deep root systems, massive seed production and the absence of any natural insect enemies in South Africa – was not taken in to consideration and soon Prosopis became widely established throughout most of the drier regions of the country.

In the Northern Cape the first real notable invasion of Prosopis started after heavy rains in 1974. Since then, more than 1.8 million hectares of land have become infested.

Water is instrumental in the long-distance dispersal of Prosopis pods and seeds along seasonal water courses. From here the plants are spread onto the surrounding plains by domestic stock and wild animals feeding on the pods. Studies showed that for every one kilogram of pods eaten by sheep about 1 300 seeds are distributed. The trees tend to be multi-stemmed and form dense, impenetrable thickets that render the land useless for normal farming practices.

WORKING FOR WATER

The Department of Water Affairs and Forestry, through its well-known Working for Water programme, is leading the campaign to clear South Africa of invading alien plants. However, Jacques, with his prize-winning invention, Alien Buster 1-2-3, decided to add a little bit of impetus to the programme.

"The Alien Buster could be an important tool in the fight against invasive plants, especially Prosopis, and help save our scarce water resources in the area," he says.

Jacques' apparatus is a simple, easy to handle, multi-purpose, effective device, to eradicate alien Prosopis, by mechanical, biological or chemical means. It consists of a long pipe of adjustable length with a hook and a locking device at the one end and an umbrella at the other.

Mechanically, the Alien Buster can be used to harvest Prospis pods by hooking the apparatus onto a branch and then vigorously shaking the tree until all the dry, ripe seedpods drop to the ground.

Jacques says the umbrella protects the operator against the falling pods,

as well as against dangerous thorns, insects and snakes that often get shaken out of a tree.

Gathering Prosopis pods prevents the distribution of the seeds, while the treated and grounded pods make excellent animal feed that can fetch prices of R250 to R750 per ton.

For chemical control of the trees, Jacques plugs in the Alien Buster's nozzle, extension pipe and pump to spray herbicides on top of the trees.

He says in the Northern Cape chemical control of Prosopis trees involves the cut stump method – cutting down the trees and the then treating the remaining stumps with a mixture of the herbicide and diesel. This method, although effective, often leads to regrowth.

In his experiments with the Alien Buster, using a foliar herbicide application method, Jacques found that one week after he sprayed the tree with the herbicide Touchdown, the leaves turned yellow and started to drop. After three weeks the tree was completely dead. The tips of the branches were dry and could easily be broken off.

Once again, the umbrella protects the operator from poisonous sprays and dripping herbicide.

An area cleared of invasive vegetation and restored to its original condition.

The Department of Water Affairs and Forestry, through its Working for Water programme, is leading the campaign to clear South Africa (including the Northern Cape) of invading alien plants.

For the biological control programme for Prosopis two bruchid host-specific seed-feeding beetle species from the south-western USA, *Algarobius prosopis* and *Neltimius arizonensis* have been released in South Africa. These beetles can destroy up to 90% of seed embryos, but levels of damage are often minimal because livestock and game ingest most of the seeds soon after the pods fall to the ground, usually in January and February, and before the beetle larvae are able to fully colonise the pods.

Jacques' Alien Buster also has a biological control device for the release of seed-feeding beetles. He says his experiments showed that it was much better to release the insects in the top of the tree where they could fly straight to the seedpods and start working.

"A few insects were released near the ground on the stem of the tree and they were immediately attacked by ants. Only about 10% were able to escape and reach the top of the tree."

For the future, a research programme into the development of a myco-herbicide for Prosopis is in progress. This herbicide uses a suspension of fungal diseases spores to kill plants.

Jacques has employed two labourers to assist him with testing his Alien Buster in the field, showing that the use of the apparatus could be an important tool to create work for untrained, jobless people.

He now wants to adapt the Alien Buster (making it 1-2-3-4) by inverting the umbrella and fix it just below the hook. This will make it suitable for fruit farmers who could use the apparatus for harvesting nuts, avocados and pawpaws.

With all those newly won prize money safely in the bank that should be no problem for Jacques!