

Realistic approaches to the management of *Prosopis* species in South Africa

This policy brief is aimed at decision makers in South Africa involved in land use issues where the presence of Prosopis species as invasive woody weeds is a problem, in national, provincial and local government departments.

Prosopis (*Prosopis* species), also known as mesquite, is now one of the most common trees in the dry north-western regions of South Africa. Several species were introduced from various sources in the Americas, beginning in the 1880s. Farmers were encouraged to establish woodlots and *prosopis* became a common ornamental tree in many towns and homesteads. For many years it was perceived to be a most valuable source of shade, fodder and fuel wood in an inhospitable landscape. This started changing in the 1960s when the first alarming infestations appeared and when, in subsequent years, it became clear that conventional control methods were uneconomical because of the high costs in relation to low land values. An alternative way to deal with the problem consists of novel management approaches, which may enable some landowners to turn this abundant resource to an asset.



Prosopis street tree in Kimberly, South Africa.

Identified initiatives to improve the management of *Prosopis*

- Undertaking cost benefit analyses of small industries focusing on value-adding products.
- Supporting the establishment of viable small industries.
- Determining the status of *prosopis* within the present management initiatives.
- Prioritising areas for control, for integrated management and utilisation programmes.
- Selection and release of new biological control agents to reduce seed production even further.
- Supporting research on rehabilitation programmes, impact studies and integrated control.
- Promoting innovative silvicultural techniques for reverting selected infestation to manageable and productive orchards.
- Designing new tools and equipment to improve control and utilisation, e.g. roller mills, solar ovens and brush pullers.
- Establishing a forum for improved co-operation between the various departments and neighbouring states.
- Reassessment of the programme in ten years time.

Prosopis: the tree that greened the desert

Most species of *prosopis* have been highly valued by native peoples in the Americas for millennia, in the same way as their counterpart in South Africa, the camel thorn, *Acacia erioloba*, which is a key-stone species in the Kalahari desert. It was noted by Europeans in their American colonies how trees were able to produce abundant fuel and timber, animal feed, and food for human consumption, as well as gums, honey and medicines, in very dry and harsh conditions. It was for these reasons that *prosopis* was introduced from the Americas to many parts of the world, South Africa included. At first, *prosopis* proved to be a great success, growing so well, but eventually it appeared to grow too well. A well-intended project turned sour.

So what went wrong?

There are several reasons why prosopis, which was meant to impart so much good to South Africans, ended up becoming such a burden. And the problem has been a century in the making. In the first place, unsuitable *Prosopis* species were introduced and widely planted for more than fifty years, starting in the early 1900s. There was also early hybridization between two dominant species, *Prosopis velutina* and *Prosopis glandulosa* var. *torreyana*. These displayed what is known as “hybrid vigour” and proved to be very invasive indeed. The invasive trees lost most of their valuable properties, and hence were exploited less.

Then they dispersed and invaded. All livestock and game relish the nutritious pods, and the seeds were scattered far and wide, also being carried downstream by rivers and floodwaters. Large and rampant invasions developed, mainly in the shallows and along water courses, which out competed and replaced indigenous plants and lowered the water tables to the detriment of other vegetation and native trees, including the valuable camel thorn. The aggressive behavior of prosopis was further enhanced by a total lack of its associated natural enemies in its adopted countries. These were left behind when prosopis was carried to new continents.



Pods damaged by seed-feeding bruchid Beetles introduced as a biological control agent.



Prosopis invasion, or densification.

Prosopis in South Africa today

Prosopis velutina and *Prosopis glandulosa* var. *torreyana*, including their hybrids, have been declared category 2 invaders under the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA). A category 2 invader may not occur on any land or inland water surface other than in an area officially demarcated for that purpose or a biological control reserve. These plants may not be propagated or sold unless intended for use in such a demarcated area or in a biological control reserve, and all land users shall control plants of these species that occur on any land under their management.

Is eradication the answer?

Attempts at eradication, using chemical and mechanical programmes, began in the fifties but have failed. Treatment of cut stumps with picloram (Tordon®) in diesel was the standard method used for many years. However, the high costs of control and the environmental risks associated with this herbicide made large scale control operations impossible. Control costs often far exceeded the value of the land. Successful control was therefore not possible without large scale intervention by the State. Foliar applications by air turned out to be unsuccessful and even more costly.

The situation was further aggravated by conflicts of interest between those who used prosopis trees as a resource, and opponents who saw them only as pests. Landowners at the periphery of invasions, or those who have only scattered trees, benefited from prosopis, but once populations had reached a certain density, they reverted to multi-stemmed, dense, impenetrable thickets that also ceased to produce pods because of intra-specific competition, and so the once valuable tree lost all its positive attributes. Today more than 2 million hectares have been invaded to some degree and prosopis is continuing to expand its range.

New hope ?

The first real opportunity to manage prosopis invasions came with the establishment of the state-supported Working for Water Programme in 1995. The main objective of this programme is to address the threat of invasive alien species in South Africa at a scale never seen before in South Africa, while simultaneously fulfilling socio-economic goals. The total budget for this programme is around R400m per year and it is expected to run for at least 20 years. For the year 2002/2003, a total area of prosopis was cleared that would be equivalent to 1500 ha at 100% canopy cover, at a cost of R1.39m, and an additional R3.26m was spent on follow-up treatment of areas (4108 ha) cleared during previous years. The herbicide costs alone amounted to R804 per ha. Indications are that, at this rate of control, it may take more than 50 years to get prosopis infestations under some measure of control. The prognosis for successfully controlling prosopis by these means is not good.

New initiatives provide some new hope

Following the failure of earlier control efforts, results of early utilisation programmes were equally poor, as they were *ad hoc*, uncoordinated and subject to confusing legislation. More recently, however, government agencies, and in particular the Working for Water Programme, have been successful in approaching the problem in other ways, notably:

- Identifying the value of new, selected biological control agents.
- New utilisation initiatives focusing on value-adding products.
- Improved chemical control.
- A national coordinated initiative.
- Support for innovative research.



Sheep feeding on prosopis pods.

The new management plan: a 20-year vision

Over 50 stakeholders, representing all spheres of society and government, met in Kimberley in November 2001 to discuss the “Status and Long-term Management of Prosopis”. The resulting declaration was: “In 20 years from now, invasive prosopis in Southern Africa will be under control and confined to areas where it can be managed to deliver sustainable benefits”. They envisaged the following, among others:



A useful source of timber or an invasive weed?

- New and value-adding utilisation programmes.
- Mapping populations, prioritising areas and cost/benefit analyses.
- Reducing seeding, densification and dispersal with new, host-specific, biological control agents.
- Screening for new and more cost-effective herbicides and rehabilitation programmes.
- Developing integrated agroforestry systems, including switching to benign varieties.

The Working for Water Programme (Department of Water Affairs and Forestry) is the custodian of this initiative and is supported by the Departments of Agriculture and Environment and Tourism, and various other agencies and small business developers. A selected programme committee drives its implementation.

Immediate actions

Prosopis has unique properties that can add much value to harsh semi-desert environments, provided it is properly managed for sustainable yields and prevented from becoming invasive. It is unfortunate that prosopis was left unattended for too long, resulting in rampant invasions. It is seen as imperative for now that immediate support is given by all involved to find an acceptable and sustainable solution. A failure in achieving this may result in increased efforts to control prosopis biologically by using more aggressive natural control agents, other than seed-feeders. Such a decision cannot be taken lightly in view of the permanent and irreversible nature of such actions that may drastically diminish the positive attributes of the plant.

Information is power

By law, all landowners who have prosopis on their properties are compelled to design management plans to reduce infestations and/or render the plants harmless. Useful information can be obtained from representatives of the Working for Water offices in Kimberley, Upington and other main centres in the north-western parts of South Africa, and from the Provincial Departments of Agriculture and Environmental Affairs.



Prosopis - a new resource for South Africa ?

Selected publications below provide much information on the control and management of *Prosopis* species.

Campbell, P.L. 2000. Rehabilitation recommendations after alien plant control. Plant Protection Research Institute Handbook No. 11. (ARC-PPRI, Pretoria, Private Bag X134, Queenswood 0121; tel. 012 808 8222).

Campbell, P.L. 2000. Grab-a-grass for the Free State, Northern Cape, North West & Gauteng: Guidelines for Rehabilitation After Alien Plant Control. (ARC-PPRI, Pretoria, Private Bag X134, Queenswood 0121; tel. 012 808 8222)

Henderson, L. 2001. Alien weeds and invasive plants. Plant Protection Research Institute Handbook No. 12. (ARC-PPRI, Pretoria, Private Bag X134, Queenswood 0121; tel. 012 808 8222).

Directorate: Land Use and Soil Management. CARA Legislation Made Easy. (tel. 053 831 1793 or 012 319 7560).

Klein, H. 2002. Prosopis / mesquite (*Prosopis* species). PPRI Leaflet Series: Weeds Biocontrol, No. 3.1 pp. 1-2. (ARC-PPRI, Pretoria, Private Bag X134, Queenswood 0121; tel. 012 356 9841).

Klein, H. 2002. Prosopis seed beetles (*Algarobius prosopis* and *Neltumius arizonensis*). Plant Protection Research Institute Leaflet Series: Weeds Biocontrol, No. 3.2. pp. 1-3 (ARC-PPRI, Pretoria, Private Bag X134, Queenswood 0121; tel. 012 356 9841).

For further information contact: Mr. A. Witt, Plant Protection Research Institute, Agricultural Research Council, PO Box 8783, Pretoria, 0001, South Africa. Tel. +27 (0)12 356 9839, Fax: +27 (0)12 342 3948 Website: www.arc.agric.za or HDRA, Ryton Organic Gardens, Coventry CV8 3LG, UK. Email: ove-enquiry@hdra.org.uk Website: www.hdra.org.uk/international_programme
Photo credits: H Zimmermann

This is an output from a research project funded by the United Kingdom Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID. R7295 Forestry Research Programme. To download publications from this project, including other policy briefs in this series, visit the HDRA website (www.hdra.org.uk/international_programme/ip_publications.htm).

Written by H Zimmerman and NM Pasiecznik

©HDRA 2005