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3. BIOLOGICAL CONTROL OF LEGUMES (FAMILY FABACEAE) OF AMERICAN ORIGIN

3.1 Prosopis / mesquite *(Prosopis species)*

ORIGIN OF THE WEED

Several species of mesquite (*Prosopis* spp.) were imported into South Africa and Namibia from various sources in the USA, Hawaii and Mexico, some as early as 1880. Farmers were encouraged to plant them in large numbers to provide shade (fig. 1), fuel wood and fodder in the form of nutritious pods in the arid regions, where very few other trees could survive. Prosopis has become widespread and naturalised over large areas of the Northern Cape and Free State provinces, and is now regarded as problematic in most of these areas (fig. 2).

Although botanists still disagree on the classification of *Prosopis* species, it appears as if six species (or varieties) have become naturalised in South Africa. Four of them have become invasive: *Prosopis juliflora*, *P. velutina*, *P. glandulosa* var. *glandulosa* and *P. glandulosa* var. *torreyana*. The two varieties of *P. glandulosa* cause most of the problems, and are both natives of North America. Two more species (*P. chilensis* and *P. pubescens*) have not become invasive in South Africa, and are regarded as valuable tree species. The fact that the species hybridise freely makes it very difficult to identify the trees to species level.

BIOLOGICAL CONTROL

Read more about biological control in general in leaflet 1.3 of this series.

a. Prosopis seed beetles, *Algarobius prosopis* and *Neltumius arizonensis*

Because mesquite has several useful properties (e.g. edible seedpods, firewood and shade) as well as being invasive, consideration has only been given to seed-feeding insects for biological control. Agents that destroy seeds can reduce the invasiveness of the weed without affecting its beneficial attributes. Three host-specific seed-feeding bruchid beetle species from the south-western USA have been introduced into, and released in, South Africa: *Algarobius prosopis* (fig. 3), *Algarobius bottimeri* and *Neltumius arizonensis* (fig. 4). However, *A. bottimeri* apparently failed to become established, and will therefore not be discussed further. The larvae of both the established beetle species feed within the pods and destroy the seeds of prosopis without making the pods significantly less nutritious to livestock.

Background information on agent

Consult leaflet 3.2 in this series for essential information on the life cycle of this insect, its potential as biological control agent and its implementation.

b. Possible future agents

Research into the development of a **mycoherbicide** for prosopis is in progress. (A mycoherbicide consists of a suspension of fungal spores that can be applied to unwanted trees in the same way as a normal herbicide, to cause a fungal disease that will kill the treated trees only).

Figure 1. A single-stemmed prosopis tree providing shade in an arid region.

Figure 2. Prosopis trees growing in thickets lose all their useful attributes.

Several other, more destructive, natural enemies of prosopis are known, such as flower-destroying organisms that would prevent the production of pods, as well as stem-boring beetles and other organisms that have the potential to kill the plant. These will only be introduced into the country if farmers should decide in future that they are willing to sacrifice the pods or even the trees in order to control the invasion of prosopis.

3.1 Prosopis / mesquite *(Prosopis species)*

CONTROL STRATEGY	
Reduce seed germination	• Ensure that one or both seed beetle species are present. • Protect pods from livestock until larvae have completed their development: Fence off all prosopis infestations to prevent livestock from feeding on the pods before the beetles have had the chance to destroy the seeds. If this is not feasible, the alternative is to gather the fallen pods daily and stack them in an enclosure where livestock cannot reach them, but where the pods are exposed to the seed beetles.
Utilise sterile pods	Feed the pods to livestock after having been exposed to seed beetles for about one year
Get rid of unwanted trees	Suitable combination of mechanical and chemical methods
Convert dense prosopis thickets into woodlands/orchards	Remove excess trees, using method above, to encourage the surviving trees to grow larger and develop thicker stems. This will produce better timber and the yield of pods for livestock feed will increase dramatically.
Utilise products of clearing to defray the control costs	Use as firewood, parquet, wood chips, charcoal, briquettes etc. The wood smoke imparts an excellent flavour to meat products.
Utilise trees in orchard	Pods as fodder, timber, gum, new products

CONTACT PERSONS

Consult leaflet 1.4 in this series for the most updated contact details.

- Biocontrol research: Weeds Research Division, ARC-PPRI (Rietondale), Private Bag X134, Pretoria 0001; Tel (012) 329 3269; Fax (012) 329 3278; e-mail weeds@plant2.agric.za. Alternatively: UCT.
- Integrated control and utilisation of prosopis: Weeds Research Division, ARC-PPRI (Uitenhage), P O Box 330, Uitenhage 6230, Tel (041) 996 1465; Fax (041) 966 1467; e-mail: carl-arc@lantic.net.
- Chemical control and supply of biocontrol agents: National Department of Agriculture, Directorate of Agricultural Land Resource Management (D:LRM), North-West Province.

FURTHER READING

IMPSON, F.A.C., MORAN, V.C. & HOFFMANN, J.H. 1999. A review of the effectiveness of seed-feeding bruchid beetles in the biological control of mesquite, *Prosopis* species (Fabaceae), in South Africa. In: Olckers, T. & Hill, M.P. (Eds) *Biological Control of Weeds in South Africa (1990-1999). African Entomology, Memoir* No. 1: 81-88.

ZIMMERMANN, H.G. 1991. Biological control of mesquite, *Prosopis* spp. in South Africa. *Agriculture, Ecosystems and Environment* 37: 175-186.

ISBN 1-86849-180-1

Page design: Sanet du Plessis. This leaflet was printed by United Litho, with financial assistance from the *Working for Water* Programme of the Department of Water Affairs and Forestry and the National Department of Agriculture
Copies can be obtained from the librarian, ARC-PPRI at the above address.

Figure 3. An adult of the seed beetle, *Algarobius prosopis*.

Figure 4. An adult of the seed beetle, *Neltumius arizonensis*.