

# Problem plants and overgrazing reduce veld quality

January bush (*Gnidia polycephala*) is an indigenous dwarf shrub that tends to dominate in overgrazed veld. This photograph was taken near Vorstershoop in the Kalahari.

**T**he ecological diversity or biodiversity of plant communities, is usually expressed as the total number of vascular plant species (excluding mosses and lichens) present in an area. For practical reasons, plant surveys that, for example, assess the carrying capacity of veld for livestock and wildlife, tend to focus on grasses, herbs, shrubs and trees. The latter are vascular plants, which are visible above ground at a certain stage.

It is relatively easy to measure and assess an existing situation. However, it is far more difficult to deduce what the historical veld condition was like or what it will look like in future.

Plant surveys need to consider that seeds, bulbs and tubers can survive in the soil for several years, or even decades. It only germinates when conditions, such as soil moisture, are favourable. This consideration is particularly important in very dry areas, where certain plants' seeds and underground reproductive organs can survive in the soil for a very long time.

## Diversity and carrying capacity

The best gauge for plant biodiversity is to measure each plant species' relative contribution (in numbers) to the plant community. For example, two communities can include the same plant species. One species may dominate in one community in terms of numbers, while in another its numbers are more proportional.

Invasive alien plants and indigenous increaser plants that are truly harmful, have the same tendency to dominate plant communities with numbers. When a single species dominates a plant community by suppressing other species, biodiversity and carrying capacity is suppressed.

Plant numbers are related to plant mass. The latter is the best measure of a plant's ability to compete with other species for growth factors such as water, light and nutrients. Consequently, both plant numbers and plant mass must be considered when assessing the competitiveness of plants.

## Levels of bush encroachment

In practice, the degree of bush encroachment, or the density of trees and shrubs, can be expressed in number

of plants per hectare or tree equivalent biomass per hectare. According to this, three levels of bush encroachment can be identified, namely low (<1 000/ha), medium (1 000 to 2 000/ha) and high (>2 000/ha).

Such a simple approach can be enhanced by additional information such as knowledge about the characteristics of problem types. Characteristics may include toxicity, being unpalatable for animals and the ability to eventually suppress valuable plant species to such an extent, that grazing capacity and carrying capacity are lost.

## The famine weed

The invasive alien plant famine weed (*Parthenium hysterophorus*) originally came from South America. The plant presents a serious problem in fields and



Pom-pom weed (*Campuloclinium macrocephalum*) in the Rietvlei Nature Reserve outside Pretoria.



Famine weed (*Parthenium hysterophorus*) in the Kruger National Park, where it is eradicated using herbicides and biological control methods.

natural veld in the subtropical eastern parts of South Africa (including the Kruger National Park) and further north, all the way through the eastern parts of Africa as far as Ethiopia (including the Masai Mara and Serengeti).

This plant secretes toxins that suppress the establishment and growth of other plants. It is not grazed by wildlife or livestock. When ingested by accident or during a food shortage, it is toxic to animals. As observed in the Kruger National Park, it germinates as soon as the last seasonal rain has fallen in March/April. Virtually no indigenous plants actively grow during this period, which promotes successful invasion.

### Invasive alien plants

The national alien and invasive plant list (water and veld habitats) contains 379 plant species grouped into the following four categories by the *National Environmental Management: Biodiversity Act, 2004* (Act 10 of 2004):

- **Category 1a (51 types):** Prohibited plants that must be controlled or eradicated.
- **Category 1b (236 species):** Species that must be controlled and, where possible, removed or eradicated.
- **Category 2:** Certified invasive plants with commercial or practical value (permits required for cultivation).
- **Category 3:** Mostly ornamental plants in gardens or those that are now growing elsewhere, which are

proven invaders. Existing plants may be retained, but their spread and distribution must be prevented.

In terms of increaser types, the national list of bush encroachment indicators contains the names of 60 tree species and 15 shrubs, all indigenous to South Africa. Unlike invasive alien species, increaser species as a rule are not the problem. As a result, they are not prohibited but are considered symptoms and indicators of poor land management.

### Natural enemies

Invasive alien plants usually get the upper hand due to the absence of natural enemies. The latter does not survive as it usually does not migrate with the plants to new parts of the world or isn't adapted to the new environment. By contrast, indigenous increaser types are constantly exposed to natural enemies, which they've lived with for millennia.

An important control method for alien species is identifying natural enemies (biological control agents) in the plants' countries/continents of origin. These need to increase in order to be released in their new environment over time.

An essential condition for the multiplication and release of biological control agents (e.g. insects and pathogens) is that they have been proven 100% host specific under quarantine conditions. They must therefore damage only the target plant (alien invader).

Various control methods can be used to manage problem plants. This includes biological control using natural enemies, mechanical methods (cutting and removing), physical methods (fire) and chemical control with herbicides.

### Disadvantages of overgrazing

Signs of excessive livestock and/or wildlife loads and consequent overgrazing can be observed in areas where grasses with low palatability (decreasers) dominate, zones containing few or no plants, or zones where indigenous plant encroachment or alien plant invasion is noticeable.

Man-made factors such as vegetation and soil disturbance as well as natural factors such as erosion and drought, can temporarily create ideal conditions for problem plants to settle and dominate over time. This will result in a decrease in plant diversity in the affected area.

A great deal can be learned from old photographs depicting landscapes, such as those taken during the Anglo-Boer War. The 'then' and 'now' images clearly show how the shrub and tree components have increased dramatically over the years.

### Bankrupt bush and pompom

The indigenous shrub, bankrupt bush (*Seriphium plumosum*), is a member of the fynbos family that prefers mountainous and rocky areas. Its distribution has probably been aided by grassland overgrazing.

Pompom (*Campuloclinium macrocephalum*), an alien invader from South America, is another serious threat to natural grassland. This plant will exploit overgrazing. It apparently took root in the Pretoria area roughly 40 years ago and then invaded the grasslands of Gauteng, Mpumalanga, KwaZulu-Natal and Limpopo.

Plant ecologists and agriculturalists must always remember that vegetation is but one component of an ecosystem. Its relationships with the soil environment and climate are fundamentally important for the optimal functioning of any ecosystem. **SF**

References available on request.

Dr Charlie Reinhardt is associated with Villa Academy. He is also extraordinary professor in weed science at Stellenbosch University's Department of Agronomy, and research leader at the South African Herbicide Resistance Initiative (SAHRI) at the University of Pretoria. For enquiries, contact him on 083 442 3427 or send an email to [dr.charlie.reinhardt@gmail.com](mailto:dr.charlie.reinhardt@gmail.com).