



RENU-KAROO is developing indigenous seed orchards and local skills to restore mining and grazing damage in arid Karoo rangeland.

Mission: To make ecological restoration with locally indigenous plants a sought-after service in the Central Karoo, thereby sustaining ecological services and generating new livelihoods.

Vision: To supply locally indigenous seeds and plants and to develop expertise in seed collection, horticulture, and veld restoration within the village of Prince Albert, and in the surrounding Karoo. We will establish demonstration trials and involve students in restoration research in order to develop our knowledge base.

Products:

1. Seeds of a range of Karoo grasses and shrubs suitable for reseeding overgrazed rangeland and re-establishing vegetation on damaged sites in the Little or Nama Karoo. These are available for sale within the Western Cape Province (permit condition).
2. Indigenous tree saplings (*Acacia karroo*, *Cadaba aphylla*, *Diospyros lycioides*, *Grewia robusta*, *Rhigozum obovatum*, *Rhus burchellii*, *Rhus lancea*)
3. Consulting services include veld condition assessment, plant identification, botanical assessment, ecological restoration planning.

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GUIDELINES FOR VELD RESTORATION

These notes give a brief introduction to common veld problems and their treatment

Reseeding – putting forage plants back into veld

When there are few or no palatable plants left in the veld, resting will not improve veld condition because there will be no seeds available as a source of new plants. It will therefore be necessary to reseed.

Seed collection and storage

Sowing of veld is expensive and it is therefore important to select species that are suitable for the local soil and climate. The most suitable species are the ones that grow naturally on the farm (locally indigenous). Where only a small part of a farm is dominated by poisonous bushes it should be possible to collect the seeds of a mixture of palatable plant species from areas of veld in better condition. These are usually far from waterpoints and along roadsides that are fenced out of camps. The best time to collect seed varies with plant species, but is usually 6 to 8 weeks after a major spring or autumn rainfall event. Seeds can be picked from the plants or soil by hand, or sucked up with a modified vacuum cleaner or leaf blower. Make sure that the seeds are completely dry or they will rot. Pack seeds into hessian bags so they can breathe and store them in a cool dry place. Most bossie seeds should be sown within 24 months of collection and some last for one year. The longer seeds are kept, the fewer will germinate. Grass seeds keep better than bossie seeds.

Commercially available Karoo veld seeds

If you have no local source of seed it may be necessary to negotiate with a neighbour to collect seed, or to buy seed. Seed collection on public ground such as adjacent to provincial and national roads, requires a permit. There are unfortunately very few sources, and little choice, of indigenous veld seed. The Worcester Veld Reserve supplies seeds of Karoo Bietou (*Tripteris sinuata*), Kapokbos (*Eriocephalus ericoides*) and rooisaadgras (*Ehrharta calycina*) seed suitable for sowing in Namaqualand and the Little Karoo. The only commercially-available veld seed suitable for summer rainfall regions is *Eragrostis curvula* (blouaadgras) and *Themeda triandra* (rooigras).

Seed preparation

Some seeds germinate better if they are treated in some way before sowing.

- Soetdoring (*Acacia karroo*) seeds should have boiling water poured over them and soak in this water over night before planting.
- Klappiesbrak (*Tetragonia spicata*) seeds should be leached in running water for 48 hours before planting. To do this put the seeds in a net bag and suspend them in a leiwat furrow, river, or lavatory cistern.

Sowing seasons

The timing of sowing is important. If seed is sown many weeks before rain falls it will be eaten by ants and birds or will die on the soil surface in the hot sun. Sowing seed into loose soil operation may partly overcome the problem of seed exposure to sun and predators. Ideally you should sow fresh seed just before a rainstorm. Given the unpredictable nature of Karoo rainfall, this is hard to achieve. For most of the Karoo,

seeds that germinate in autumn are more likely to lead to plant establishment than seeds sown in spring. However, you will need to work with nature. Sowing grass seed in spring is appropriate in the summer rainfall eastern Karoo, whereas sowing seeds immediately after late summer-autumn rain is recommended for establishment of forage shrubs in the southern and western regions.

Site preparation

Karoo plants establish most successfully from seed sown in a hand dug depression to which litter (small braches) and water are added. They should not be planted deeply but rather sown on a roughened (raked) soil surface. Follow up watering once weekly in the first month is helpful for seed establishment in landscaping.

For more information on putting palatable plants back into veld

Esler, K.J., Milton, S.J. & Dean, W.R.J. 2006. *Karoo Veld - Ecology and Management*. Briza Press, Pretoria. 224 pages. ISBN 1 875093 52 4 (English), ISBN 1 875093 55 9 (Afrikaans)



Some seeds that RENU-KAROO supplies for veld restoration. Clockwise from upper left: *Fingerhuthia africana* (vingerhoedgras), *Tripteris sinuata* (bietou), *Rhus lancea* (karee), *Erioccephalus ericoides* (kapok), *Tetragonia spicata* (klappiesbrak), *Drosanthemum lique* (skaapvygie).

Veld dominated by poisonous and thorny plants

Veld Resting

Poisonous plants are a valuable part of Karoo veld. They hold the soil and protect other plants because they are not eaten by game and sheep. But where veld has had a history of heavy and continuous grazing they increase in number – filling the spaces left by more palatable plants that have died. In veld where palatable plants have been eaten down to small stumps but are still alive – resting will allow their rapid recovery and the seeds they set will make seedlings and allow the veld to improve over a period of 3-5 years of rest or light grazing.

Where poisonous plant cover is dense, thinning plant may improve survival of reseeded plant species.

Partial clearing

Any removal of existing plants should be done cautiously, on a small scale. Shrubs and karoo bossies take decades to grow in arid climates. No matter what kind of plant they are they protect the soil and provide shade and shelter for other plants as well as many small animals such as beetles, cicadas, scorpions, lizards and mice that keep the soil loose and help rain to penetrate. Possible benefits of clearing should be carefully weighed against the dangers of exposing the soil to wind and water erosion, and of destroying possible refuges for forage plants and soil-building microbes and animals.

Partial clearing of unpalatable bossies by uprooting them by hand or with a tractor-drawn cultivator, makes more of the rainfall available to seedlings of other species and improves survival of grass or forage plant seedlings. Large-scale mechanical or chemical clearing is not recommended in dry climates. Clearing treatment should therefore be limited to strips (20 to 30 metres wide) or patches of veld, and not applied to large blocks of veld.

Uprooted bushes should be left scattered in the veld because their branches protect new forage plant seedlings from desiccation, trampling and browsing.

Clearing and brush-cutting to reduce poisonous plant density and improve veld diversity is most effective when the problem plants are large-seeded and have few seeds in the soil. Small-seeded species, such as kraalbos (geelbos) and blasiebrak, have abundant viable seeds in the soil, and such plants generally increase in abundance following seedling germination after soil disturbance or fire.

Brush-cutting of poisonous shrubs does not kill them, but can temporarily reduce their root volume and improve seedling survival. To use brush-cutting effectively, you need to know when the poisonous plants flower and set seed. Brush-cutting when the plants are in flower (but not seed) is most effective as it destroys their entire seed crop. If the poisonous plants shed seed just before being cut, it will be their seedlings (and not the plants you want) that will benefit from competition reduction.

Herbicides that kill bossies do so unselectively. They will kill the unpalatable bossies and the remaining palatable ones as well. For this reason herbicide should be avoided or used with extreme caution in veld rehabilitation.

Partly cleared and reseeded areas should be protected from grazing for at least three years to allow the new seedlings to establish and release their first seeds.



Palatable shrubs establishing in skeletons of uprooted poisonous plants

Bare ground/kaal kolle

A first step in restoration of degraded veld, where both vegetation cover and soil animal activity has been severely reduced, is to trap runoff water and nutrients. Techniques include mechanical breaking of the soil surface to trap runoff water, and packing of stones, tyres or brush along contours to trap mulch, slow down water movement and reduce the impact of raindrops on bare soil.

Resource Traps

Basins resembling aardvark diggings in shape and size can be dug by hand or using a pitter plough or happloeg. Hand-dug basins employ more people and have the potential to be orientated and shaped to face upslope so that they trap rainwater more effectively. These kinds of water traps work very well on fine-textured soils. Ripping the soil to a depth of 25 cm deep with a vlekploeg or ripper has given promising results on sandy soils in the Brandvlei, Beaufort West, Nieuwoudtville and Middelburg areas. Both pitting and ripping trap organic matter (litter) and seeds as well as water and this usually leads to rapid colonisation of the basins and riplines by plants after rain. Addition of locally collected seeds such as bushman grass, ganna or soetdoring hastens vegetation establishment. Planting of Australian “oldman” saltbush into the veld is not recommended because it delays the return of indigenous plants and makes the soil surface brak.



Plants establishing in hand-dug pits. Photo: Ken Coetzee

Soil surface protection and water infiltration

On clay-rich soil, mechanical disturbance of the surface is not advisable as it might increase erosion. Instead, stones or tyres can be packed along contours with the addition of geotextile traps, brush packs against barriers of salvaged mesh fencing or planted truncheons of local shrubs such as spekboom to trap litter and increase water retention. Application of gypsum (CaSO_4) at 3–5 t/ha can improve water absorption into capped, saline soil; this has been successful, for example, in the Ceres Karoo where it has improved water absorption into the capped, saline soil of bare patches (kaal kolle). It can be obtained from Kynoch and other large fertiliser companies.

The impact of raindrops on bare soil causes the soil aggregates (crumbs) to break down. This disperses the clay fraction in the soil that settles into, and blocks, soil pores on the soil surface, sealing it so that water cannot penetrate. Mulch and brush reduces the force of the raindrops, reducing the dispersion of clay and the extent of soil crusting. Mulch also traps dust, sand and seed, facilitating plant establishment. Brush packing works best for veld rehabilitation if it is packed loosely enough to allow some light to reach the soil surface and is pegged to the ground so as to allow some light to reach the soil surface and is pegged to the ground so as to withstand the force of runoff water during rainstorms.

For more information on revegetating bare ground

Esler, K.J., Milton, S.J. & Dean, W.R.J. 2006. *Karoo Veld - Ecology and Management*. Briza Press, Pretoria. 224 pages. ISBN 1 875093 52 4 (English), ISBN 1 875093 55 9 (Afrikaans)

Erosion

Donga rehabilitation needs to be top down. Investigate the source of the problem. Is the donga the result of runoff from a hardened surface or a culvert? If so install a gabion that will break the force of the water. To repair the donga, begin with the bare soil just uphill of the donga and then work downhill, installing structures that slow water movement and trap silt and organic matter.

When constructing a gabion, or any other erosion-control structure, it is important that the structure should trap silt, but allow for continued flow of water.

Solid structures divert, rather than slow down, water flow. The effect of water diversion is to initiate a new donga. This can happen on a small or large scale. For example, a scatter of stones in the tracks of a road that is to be closed will cause water to rush between the stones, carving out miniature dongas and worsening erosion. To prevent this, stone packs in road should be placed on reeds, straw, branches or geotextiles that will reduce the rate of water flow while trapping silt.



For more information on erosion repair

Coetzee, K. 2005. Caring for natural Rangelands. University of KwaZulu-Natal Press. (order book from books@ukzn.ac.za or contact author Ken Coetzee, Conservation Services el 044 –870 8472, consken@mweb.co.za)