Long-term effect of some restoration techniques on bare patches in the Nama Karoo, South Africa.

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Introduction:
Poor grazing management is seen as one of the most important causes of land degradation in South Africa (Hoffman et al., 2001) and has resulted in vast areas of the Nama Karoo being totally denuded of any vegetation. When vegetation and soils have been degraded to the extent that the removal of animals alone does not assist in recovery, active restoration interventions are necessary (Visser et al., 2007).

The aim of this paper is to report on the effect of different restoration interventions on the recovery of vegetation on denuded rangelands 10 years after the interventions.

Material and Methods:
The study was conducted on a denuded area of approximately 100 ha on the farm Hillmore (32°31’08’’ S; 22°50’00’’ E) in the Western Cape Province, which receives an average annual rainfall of 190 mm. The soils are clay-loam with a low organic carbon content (0.19%). The study started in November 1999 and six treatments were applied namely Seeding (S), Seeding+Brush packing (SB), Tilling (T), Tilling+Seeding (TS) and Tilling+Seeding+Brush packing (TSB) and a control. Seeds of 5 indigenous species were over-sown. Vegetation surveys were done annually in December from 2000 until 2004 and again in February 2010.

Results and Discussion:
There was a significant increase (p=0.0042) in the total density of plants from 2000 to 2010 in all treatments (Figure 1). This increase was significantly more in the SB and TSB treatments than the other treatments. Plant density was significantly greater in 2010 (p<0.0001) in TSB (9.5 plants/m²) than in all the other treatments, except SB (8.4 plants/m²) (Figure 2). This suggests the importance of soil disturbance to break the soil crust that forms on these clay-loam soils, to facilitate the germination and establishment of plants and the collection of rainwater. Brush-packing also provides cover of organic matter that protects young plants against the harsh environment and potentially traps wind-blow seed. Of the over-sown species, C. dregeanus was the most successful, occurring in all the treatments. Four of the 5 over-sown species were recorded in the TSB treatment in 2010 (Figure 3). Tilling-Seeding-Brush packing treatment also had the highest species richness of all treatments (Figure 2).

Conclusions:
Soil disturbance plays an important role in promoting the success of restoration attempts in the clay-loam soils found in the Nama Karoo and the results are enhanced through the provision of cover and organic matter. In the long term, while plant density of denuded areas can be improved by seeding and brush-packing only, soil disturbance is necessary for improving plant density and species richness of degraded vegetation and soils in the Nama Karoo.

References: