



Short communication

Portulacaria afra is constrained under extreme soil conditions in the Fish River Reserve, Eastern Cape, South Africa

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Abstract

Restoration of degraded thicket landscapes can be achieved by planting *Portulacaria afra* (spekboom) cuttings. The factors determining *P. afra* abundance in thicket types not dominated by *P. afra* are of interest to restoration practitioners because they could influence restoration protocols using *P. afra* cuttings in these landscapes. We consequently investigated the relationship between *P. afra* cover and soil properties, namely pH, EC, organic C, particle size distribution and total content of 26 elements at 78 sites in the Fish River Reserve, Eastern Cape province, South Africa. *P. afra* cover showed a consistent pattern of constraint at extreme levels (both high and low) of subsoil EC, organic C, sand content, Ca, Zn and Al. The results suggest that *P. afra* is most competitive in intermediate edaphic environments in the Fish River Reserve. It remains to be investigated in restored landscapes whether *P. afra* cutting survivorship and growth are greater in such soils.

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1. Introduction

Large scale restoration of degraded thicket landscapes in South Africa is being undertaken by planting *Portulacaria afra* Jacq. (spekboom) cuttings (Mills and Cowling, 2006; Mills et al., 2007; Sigwela et al., 2009). Most of this restoration work has taken place in thicket types that are dominated by *P. afra* in their intact form. There is, however, scope for using *P. afra* cuttings to restore degraded thicket landscapes that were not previously dominated by *P. afra*. In such landscapes, the following questions need to be tackled: i) what is the appropriate planting density? ii) will *P. afra* function as a 'pioneer' or 'cover crop' which improves the microclimate and soil environment to enable other thicket species to establish through time? iii) will *P. afra* cuttings show patchy establishment, mirroring the distribution of *P. afra* in the intact

system? and iv) if the establishment is patchy, what soil or environmental conditions are responsible for the patchiness? A critical step towards answering the above questions is to acquire a basic understanding of the influence of biophysical factors on *P. afra*. To this end we investigated the relationship between *P. afra* cover and a range of soil properties in the Fish River Reserve, Eastern Cape.

2. Material and methods

Vegetation data and soil samples were collected from 78 monitoring sites across seven different vegetation types in the Fish River Reserve (Vlok et al., 2002; Vlok et al., 2003; Fig. 1). The vegetation was monitored according to a modified Point Centred Quarter Method (PCQ) that prevents oversampling of small trees in the dense thicket vegetation (Trollope et al., 2004).

At each site, data were collected from 25 sampling points, situated 10 m apart on two parallel line transects 25 m apart and

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