INVESTIGATING SOIL MICROBIAL INTERACTIONS OF *PORTULACARIA AFRA*

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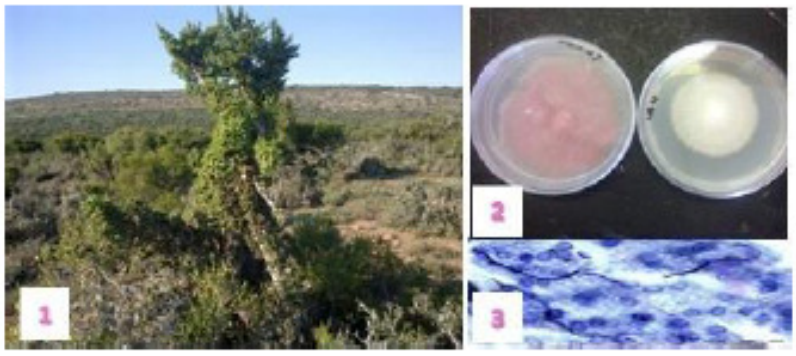
Portulacaria afra commonly known as Spekboom contributes significantly to carbon sequestration and has been widely planted in degraded areas of the Eastern Cape. Approximately 50% of planted cuttings do not survive although the cause of this decline is unknown. Like many indigenous plants, Spekboom forms a symbiotic relationship with mycorrhizal fungi and the interaction with rhizobacteria may enhance and improve plant growth and establishment. Our project aims to investigate these relationships and includes a survey of the arbuscular mycorrhizal (AM) fungal populations associated with spekboom, determination of the causal agent of spekboom decline, isolation and identification of the associated rhizobacteria and investigation of their plant growth promotion properties as well as assessing the ability of arbuscular mycorrhizal fungi and selected rhizobacteria to enhance establishment and growth of spekboom.

Soil and root samples were collected from plantings in the Eastern Cape. AM fungal spores were extracted from soil with an average of 1 spore per gram of soil. Spekboom was confirmed to form an *Arum* type of AM relationship on microscopic examination of the stained root material. Colonisation ranged from 21 to 87%.

Potential fungal pathogens were isolated from declining spekboom from plantings in Addo National Park. Two isolates were verified belonging to *Fusarium* sp. using DNA sequence comparisons. Inoculations of cuttings to confirm pathogenicity were not significant although both isolates reduced the shoot to root ratio after several weeks. Poor rooting of cuttings was observed in these trials indicating that stimulating root production may improve survival.



Figures 1: *Portulacaria afra* (spekboom) **2:** Confirmed *Fusarium* isolates **3:** Mycorrhizal colonisation of spekboom roots

Thirty four rhizobacterial isolates were tested for various plant growth promoting abilities. Of these 6 were able to produce IAA which may promote plant root growth. Four selected bacterial isolates are currently being tested in a pot trial, alone and in combination with AM fungi, to determine their effect on spekboom growth. Some of the rhizobacterial isolates were shown to have antimicrobial activity. Sixteen isolates produced siderophores and 4 isolates significantly reduced *Fusarium* growth *in vitro*. A pot trial is currently in progress to determine the growth promotion ability of these four isolates combined with AM fungi on spekboom growth when challenged with a *Fusarium oxysporum* isolate. Bacterial isolates were identified using DNA sequence comparisons and these belonged to various species residing in the genera *Bacillus*, *Enterobacter*, *Pseudomonas*, *Staphylococcus* and *Microbacterium*.