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Drought stress negatively impacts crop yield and is a serious threat to the food supply chain. An understanding of how crops like sorghum have successfully adapted to maintain yield under drought stress could provide important clues on how to engineer drought tolerance in other cereal crops. We are using proteomic analyses to identify proteins responsive to osmotic stress, in order to establish the protein/gene networks underpinning the molecular response of sorghum to drought. We identified thioredoxins, proteases, and xyloglucanases as protein families highly represented in proteins differentially expressed when sorghum is exposed to osmotic stress. Detailed gene expression analysis of 3 selected candidates from these gene families in sorbitol-treated sorghum cell cultures indicated activation at the transcriptional level. Arabidopsis homologues were identified and their response to sorbitol treatment also evaluated in a cell suspension culture system. The results showed common and unique changes in gene expression between the drought-tolerant sorghum and drought-sensitive Arabidopsis. On-going research has extended these studies from the *in vitro* cell culture system to soil-grown sorghum plants exposed to drought. Two-dimensional differential gel electrophoresis and isobaric tags for relative and absolute protein quantification technologies are being used for protein analysis. Utility of two sorghum lines with contrasting responses to drought stress will be discussed with reference to proteomics and expression of the same 3 genes responsive to osmotic stress in cell cultures.

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A review on the status of invasions on sub-Antarctic Marion and Prince Edward Islands

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The sub-Antarctic Prince Edward Islands (PEIs), South Africa's southern-most territories, have high conservation value. Despite their isolation, several alien species have established and become invasive on the PEIs. Here we review the invasion ecology of the PEIs. We summarise what is known about the different stages of invasion, namely the introduction, establishment, and spread of alien species, and review what is known about their impacts. Introduction pathways for the PEIs are fairly well understood - species have mainly been introduced with ship cargo and building material. Less is known about the establishment, spread and impact of aliens. Although significant areas of the islands are not subjected to invaders, several invaders have attained circuminsular distributions on both PEIs. Studies on impact have primarily focussed on the effects of vertebrate invaders, of which the house mouse, which is restricted to Marion Island, probably has the greatest impact on the biodiversity of the islands. Because of the risk of alien introductions, strict biosecurity regulations govern activities at the PEIs. These are particularly aimed at stemming the introduction of alien species, and have are likely to have reduced the rates of new introductions, but not entirely prevented them. In addition, some effort is currently being made to eradicating selected range-restricted species. Given the ongoing threat of introductions, and the impacts of invaders, it is essential that future invasions to the PEIs are minimised, that the island's management policies deal with all stages of the invasion process, and that a better understanding of the risks and impacts of invasions is obtained.

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Assessing restoration potential of a critically endangered vegetation type following alien acacia removal

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The Fynbos vegetation of the Cape Lowlands is ecologically distinct from mountain Fynbos within the Cape Region of South Africa, but has been highly impacted by agriculture and urban development, while alien plants have invaded most of the remaining natural habitats. Cape Flats Sand Fynbos is a critically endangered lowland vegetation type containing many endemic and threatened species. 100 ha of this vegetation type which was invaded by alien *Acacia saligna* was cleared in 2012. The standard clearing methods utilised in Lowland Fynbos have resulted in poor native vegetation recovery. Therefore this study aimed to test novel passive (burning) and active (seed sowing) treatments on recovery of native vegetation. After two years all treatments resulted in different recovery trajectories, and modelling treatment responses showed these trajectories to be maintained in the long-term. The passive clearing without burning treatment resulted in herbaceous vegetation dominating, while the active treatment resulted in higher cover, species richness and density of non-sprouting shrubs. A follow-up sowing treatment involving seed pre-treated with smoke and heat improved shrub species richness and seedling density of certain species, especially *Thamnochortus punctatus*, a dominant structural component species. Therefore an active treatment involving sowing pre-treated seeds after clearing and burning results in best Fynbos recovery compared to either of the passive treatments tested. These restoration methods should be adaptable to other lowland vegetation types within the Fynbos region as well as other Mediterranean climate regions.

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Transcribing historical plant data into digital format

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There are thousands of historical museum and herbaria plant specimens which were collected before the time of computers. The information in these records, as well as field notes, is important to understand plant species and their spatial distribution patterns. However, much of the information remains inaccessible to the scientific community because it is stored in hard copies. There is a need to transcribe all museum and herbarium records and field notes into digital format. Transcribing these data will assist to conserve the historical data for future use. The transcribing process involves taking high definition images of records. Images of the field notes or specimen labels are then uploaded onto a website and transcribers help to type the data into a database. The transcribed records are