pathway that involves nitric oxide to enhance antioxidant enzyme activities that reduce salt-induced oxidative stress.

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Oxidative stress-induced autophagy in wheat seedlings

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Autophagy is a self-digestion process that degrades damaged or unwanted intracellular structures. Plants use autophagy as a mechanism necessary for normal development, e.g. during organ morphogenesis, seed development, removal of long-lived proteins, and also essential for stress responses. Despite the great progress achieved recently in the elucidation of autophagy mechanisms in yeasts and mammalian cells, our understanding of this process *in planta* is still limited. In particular, little information is available about the stages of autophagosome formation in plants and also the involvement of specific ATG proteins in this process. In our work, oxidative stress in roots of *Triticum aestvum* L. caused by prooxidants paraquat and salicylic acid resulted in the extensive formation of autophagosomes, similar to those caused by lithium, an inducer of autophagy in mammalian cells. All stages in the formation and turnover of autophagosomes were observed, starting with vesicle nucleation and phagophore expansion, formation of a mature autophagosome and its further fusion with central vacuole followed by digestion of autophagic material. The oxidative stress-induced formation of autophagosomes was accompanied by up-regulation of the expression of *TaATG4* and *TaATG8* genes, suggesting their involvement in the regulation of autophagy. The ubiquitin-like autophagic protein ATG8 plays key roles in the biogenesis of autophagosomes. Among the diverse post-translational modifications regulating ATG8 function are the processing of ATG8 precursors and the deconjugation of the ATG8-phosphatidylethanolamine (PE) complex carried by cysteine protease ATG4. We cloned and sequenced cDNA fragments of *TaATG4* and *TaATG8* and found them to correspond to the authentic sequences. Results suggested that the C-terminus of *Ta*ATG8 undergoes post-translational cleavage by *Ta*ATG4, which exposes the Gly117 residue. In conclusion, the strictly regulated removal of oxidized structures *via* autophagy can be considered as a key component of the complex antioxidative defence mechanisms employed by plants.

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Two decades of vegetation change in the Baviaanskloof Mega Reserve

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Global change factors are impacting on fynbos ecosystems. Unfortunately we have few long-term records of fynbos plant community composition, limiting our understanding of natural temporal vegetation dynamics and constraining our ability to detect and predict change such as that caused by climate or rising CO_2. Here I report some preliminary results and future directions from a 20 year record of vegetation change (1992/3 - 2011/12) across survey plots in the Baviaanskloof Mega-Reserve. The Baviaanskloof Mega-Reserve is in a unique position encompassing boundaries between at least four of South Africa's biomes. This means that it may be particularly vulnerable to small perturbations which could alter system drivers and cause state shifts between biomes. For example, climate models predict increased mean annual rainfall for the region, which could cause Fynbos to transition to non-flammable Forest. Similarly, increased rainfall could allow Nama Karoo to accumulate enough biomass to burn, potentially transitioning to Fynbos or Grassland. Developing long-term records of vegetation dynamics and understanding temporal variation in community structure is essential for predicting how global change will impact the system. We are sampling similar long-term vegetation plots along a climatic gradient from Baviaanskloof to Cape Point and the Cederberg. The hope is that understanding variation in plant responses across spatial and climatic gradients will improve our ability to predict how composition within a site (both in terms of species and their traits) should change as climate changes through time.

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Why do French (*Genista monspessulana*) and Spanish brooms (*Spartium junceum*) not sweep across South Africa?

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The legumes (Fabaceae), *Genista monspessulana* (French brooms) and *Spartium junceum* (Spanish broom) are major invaders in several parts of the world but not yet in South Africa. Despite having been introduced to South Africa more than a century ago, the distribution of both these species is still fairly limited. We report thee current distributions in South Africa and explored possible limiting factors by examining the spatial distribution of invasions, population structure, breeding system, pollination, seed ecology, climatic suitability and mutualisms with nitrogen fixing bacteria. *Genista monspessulana* occurs at seven localities, covering 22.7 hectare (with an estimated condensed area of 0.17 ha). *Spartium junceum* is much more widespread, occurring in 33 quarter-degree cells (3.59 ha condensed area). All populations are in disturbed areas, mostly along roadsides. Despite their specialised flowers both *G. monspessulana* and *S. junceum* still manages to attract - and are not limited by - pollinators. The large number of seeds produced accumulates in persistent soil-stored seed banks. With large parts of South Africa climatically suitable and with neither species severely limited by the lack of rhizobial mutualists they have the potential to significantly expand the current distribution. With high levels of resprouting and large soil stored seed-banks, control is problematic. For *G. monspessulana* with a highly localized distribution, and the possibility to hand-pull most individuals, eradication from South Africa is still feasible. For *S. junceum* management is currently focusing on containment.

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Effect of land-cover change on the vegetation types and ecosystem services of the Tlokwe Municipal Area, North West Province

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