virus (HSV) type 1. In this study, a metabolomic investigation of the *Helichrysum* species was undertaken, to establish which active constituents are responsible for anti-HSV activity. The cytotoxicity of 12 *Helichrysum* species was investigated and the IC_{50} values ranged from <3.125 μg/ml to 277.8 μg/ml. In addition, the bioassay results on HSV-1 will be used to determine correlations with nuclear magnetic resonance and multivariate data analyses to predict which constituents are responsible for the anti-HSV activity. *Helichrysum* species that show anti-HSV activity are hypothesised to have the same constituent or group of constituents responsible for the activity. These constituents should have distinctive grouping patterns that will be observed when using the principle component analyses plots. The constituent(s) responsible for the grouping (s) will then be further investigated.

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Plant growth promoting substances

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Numerous compounds exist in nature which, although not falling into any of the traditional plant hormone categories, are able to influence plant growth. These include substances produced by bacteria, fungi and other plants, such as lumichrome, alkamides, volatile organic compounds, fulvic acid and plant-derived smoke. Unlike the traditional plant hormones, very little is known about their modes of action at either the physiological or the molecular levels. We are currently investigating the effects of several of these compounds on model plant species such as *Arabidopsis thaliana*, *Lotus japonicus* and *Nicotiana benthamiana*. The considerable genetic resources available for these plants will be of benefit in trying to analyse the mechanisms by which these growth promoting substances exert their effect on the plant. Plant growth promoting substances such as these have been shown to affect a wide variety of plants, including several economically and agriculturally-important species. If the mechanisms that result in increased plant growth can be elucidated and understood, it may be possible to genetically modify crop plants for increased productivity and yield.

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Edge effects on plant composition and functional type distribution in renosterveld fragments of the Tygerberg

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For the definition of meaningful conservation strategies in fragmented areas it is important to establish the extent of edge effects, both for potential prioritization of conservation targets as well as for the establishment of stepping stones or corridor width to conserve matrix plant species and the animal species dependant on them. In this context, we examined ten edge to centre gradients on five renosterveld fragments in the Tygerberg up to a distance of 200 m into the fragment. We found a high species turnover among common shrubby species levelling of at about 50 m, with the four most dominant species showing little to now effect to distance from the edge. Understorey species and functional composition are still under investigation. Preliminary results from our work therefore suggest that all fragments over 100 m diameter are of particularly high importance for conservation and that stepping stones and corridors should be over a 100 m wide to ensure continued survival and mobility of all matrix species.

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The leaf anatomy of ethnobotanically important *Pteronia* species

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The name of the San people is thought to be derived from the original Khoi name for *Pteronia onobromoides* (Asteraceae), namely *Son* (singular) and *San* (plural). Curiously, almost nothing is known about the biology, chemistry and traditional uses of *Pteronia* species. The name "boegoe" usually refers specifically to *Agathosma betulina* (Rutaceae) but may also be applied to certain *Pteronia* species and many other aromatic plants. According to Marloth, the Buchuberg derived its name from aromatic plants known as "buchu or bookoo", such as *P. onobromoides*. *Agathosma* species have many medicinal uses and are widely used as general health tonics in South Africa. A summary of all known ethnobotanical information on southern African *Pteronia* species is provided. The leaf anatomy of *Pteronia onobromoides* and *P. camphorata* was studied and compared with that of *Agathosma betulina* with special emphasis on the oil glands. Transverse sections of the leaves show that the structure of the oil glands is similar in all species but that the two genera can be distinguished by the position of these glands. They are found below some of the vascular bundles close to the phloem in the *Pteronia* species but in *Agathosma* they occur nearer the outside surface of the leaves with larger glands that occur adjacent to the leaf margin. Leaves of the two genera can also be readily

distinguished in transverse section by, for example, the presence of palisade parenchyma on both sides of the leaf in *Pteronia* and a conspicuous hypodermis in *Agathosma*.

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Cluster roots of Proteaceae exude acid phosphatase enzymes as an adaptation to low-P soils, facilitating access to soil organic phosphate

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Proteaceae are adapted to the nutrient-poor soils of the Cape Floristic Region (CFR). These soils are generally acidic and low in plant-available phosphorus (P), with a significant proportion of soil P occurring in organic form. Soil P acquisition by Proteaceae is largely facilitated by cluster roots which are composed of densely branched determinate lateral roots and root hairs. Cluster roots are known to exude P-solubilising compounds into the rhizosphere, notably organic acids and phosphatases. It is known that phosphatase hydrolyses organic phosphate esters to produce orthophosphate (Pi), but the extent to which this makes soil organic P available for plant uptake is poorly understood. Phosphatase activities in cluster roots of wild populations of Proteaceae (*Leucadendron foedum*, *Ld. salignum*, *Ld. meridianum*, *Leucospermum praecox*, *Protea obtusifolia*, *P. repens*) were measured in limestone, acid sandstone, alkaline sand and clay sandstone soils. Cluster root phosphatase activity ($\mu M\ P_i g^{-1}\ min^{-1}$) differed ($p<0.001$) between soil types, where average phosphatase activity in limestone soil was 16.25±3.07; alkaline sand was 69.52±6.54; clay sandstone was 79.36±7.31; and acid sandstone was 92.83±16. Cluster roots isolated from alkaline calcareous soils had lower activity than those from acidic soils, including those of *P. repens*, which occurred in all soils. From this it was concluded that the activity of exuded phosphatase makes a significant contribution to plant phosphorus nutrition in certain soils, and is of variable importance according to plant species and soil type. Data from pot trials and hydroponic experiments, depicting the relationship between cluster root phosphatase activity and availability of P, are presented and discussed.

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Reproductive potential and seedling establishment of the invasive alien tree *Schinus molle* (Anacardiaceae) in South Africa

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Schinus molle (Peruvian pepper tree) was introduced to South Africa more than 150 years ago and was widely planted, mainly along roads. Only in the last two decades has the species become naturalized and invasive in some parts of its new range, notably in semi-arid savannas. Research is being undertaken to predict its potential for further invasion in South Africa. We studied pollination, seed production, dispersal and predation, and seedling establishment in relation to land uses at three sites, namely ungrazed savanna once used as a military training ground; a savanna grazed by native game; and an ungrazed mine dump. Pollination experiments demonstrated that seed set was greater in female flowers exposed to natural pollinators than in those from which pollinators were excluded. Some seed set in treatments protected from pollinators and not treated with pollen may indicate that some *S. molle* flowers might be bisexual and capable of self-pollination. Seed production and seed-rain density of *S. molle* varied greatly between study sites, but was high at all sites (384,864 - 1,233,690 seeds/tree/year; 3,877 - 9,477 seeds/m^2/yr). Seeds were dispersed to distances of up to 320 metres from female trees, but most seeds were deposited within 50 m of putative source trees. *S. molle* seed rain below canopies of *Acacia tortillis*, the dominant native tree at all sites, was of significantly better quality than seed rain below conspecifics which was much reduced by endophagous predators. The seed wasp *M. transvaalensis* typically develops inside the seeds of indigenous *Rhus* species but has formed a new association with *S. molle* was identified as the main predator of *S. molle* seeds. To predict patterns of future invasion in semi-arid savannas, we investigated the effects of soil type, microsite condition (microsite), and herbivory by large mammals on growth and survival of *S. molle* seedlings. Results suggest that protection provided by canopies of large indigenous *Acacia* trees facilitates *S. molle* invasion into semi-arid savanna. Whether exposed or protected from large herbivores, no seedlings planted in open grassland survived the first winter.

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The incredible journey of an *Albuca* pollen grain

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We studied the pollination biology of several *Albuca* species in the Western Cape and KwaZulu-Natal. Flowers in this genus are highly unusual on account of their tightly closed inner tepals with glandular hoods. Observations showed that nectar-seeking bees