

Among the major challenges in invasion biology is to predict the likelihood of naturalisation, and, ultimately, invasiveness, of species from properties which can be assessed in the native range prior to introduction elsewhere. In two experiments, we tested whether reproductive traits of South African species of Iridaceae are associated with their naturalisation elsewhere. In a field experiment, we assessed the importance of autonomous seed production (i.e., seed production without assistance of pollinators) for naturalisation by excluding pollinators from inflorescences in natural populations of 10 congeneric species pairs of South African Iridaceae. All 20 species are used in international horticulture (i.e., they all have been introduced elsewhere) and one species of each pair has become naturalised elsewhere while the other has not. In a common garden experiment, we assessed the importance of seed mass, germination characteristics, and growth and survival of seedlings for naturalisation by comparing 30 naturalised and 30 non-naturalised species of South African Iridaceae. The field experiment showed that naturalised species of Iridaceae have a higher capacity for autonomous seed production than non-naturalised ones. The garden experiment showed that naturalised and non-naturalised species of Iridaceae do not differ significantly in seed mass but that naturalised species germinated faster and with a higher frequency. As a consequence of fast germination, naturalised species reached a larger size early in the season than non-naturalised species. Survival chances of seedlings did not differ between naturalised and non-naturalised species. We conclude that autonomous seed production and easy seed germination play important roles during naturalisation, at least for Iridaceae from South Africa. Therefore, we recommend that the breeding system and germination characteristics of a species be assessed before it is introduced elsewhere.

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The promotion of tomato and okra seedling growth by foliar applications of smoke–water and a smoke-isolated butenolide

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In vegetable crop production, maximum yield is achieved when there is a better emergence and stand establishment of seedlings. There is a suggestion that smoke may improve the growth of vegetable crops. This study investigated the effects of a foliar application of smoke–water and a butenolide isolated from smoke–water on seedling growth of *Lycopersicon esculentum* Mill. (tomato) and *Abelmoschus esculentus* (L.) Moench (okra). Treating okra seedlings with smoke–water significantly increased shoot/root length, shoot fresh/dry weight, number of leaves, total leaf area and absolute growth rate (AGR) compared to the control treatment. However, the seedling vigour

index (SVI) did not improve as there was no significant difference in root fresh weight. On the other hand, foliar applications of smoke–water and butenolide showed a pronounced effect on the seedling growth of tomato. Most of the growth parameters examined for both treatments increased significantly, resulting in a significantly higher SVI and AGR than the control. This study indicates that the foliar application of smoke–water or the butenolide may be a useful and inexpensive technique for enhancing seedling growth of vegetable crops.

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Chemical variation in selected Karoo medicinal plants

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Nine species of medicinal plants from the Karoo region, chosen for their wide spectrum of use and importance in traditional medicine, were studied for possible regional variation in main chemical constituents. These are *Ballota africana* (kattekruie), *Carpobrotus edulis* (suurvy), *Conyza scabrida* (oondbos), *Dodonaea angustifolia* (ysterhouttoppe), *Elytropappus rhinocerotis* (renosterbos), *Galenia africana* (kraalbos), *Oncosiphon suffruticosum* (stinkkruid), *Parmelia* spp. (klipblom) and *Viscum capense* (lidjies tee). Although many traditional uses have been recorded for these plants, there is limited published information on the main chemical compounds and especially their geographical variation. The aims of this pilot study were to: (1) find suitable methods for extraction and thin layer chromatography of the different species, (2) record chemical fingerprints from different geographical areas and (3) decide on sampling strategies for the isolation and identification of main compounds. These results will be presented for each species together with a short summary of ethnobotanical uses.

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Systematic studies of African Apiaceae: A progress report

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The remarkable morphological and anatomical diversity of African and Madagascar genera of Apiaceae, as revealed by several ongoing studies, is discussed and illustrated. Recent revisions and molecular systematic studies have shown that these genera are of critical importance in understanding the early evolution of the subfamilies Saniculoideae and Apioideae. An overview is presented of (1) interesting new morphological, anatomical and chemical characters and character states not previously known or used in classification and (2) current ideas and hypotheses relating to phylogenetic relationships, as suggested by novel (cladistic) interpretations of the patterns of character state changes and also by recent molecular systematic studies. Southern Africa appears to be the region of origin of the two major subfamilies of Apiaceae (Saniculoideae and Apioideae), since practically all the basally divergent lineages are predominantly southern African.

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Can national occupancy patterns predict landscape-level invasion risk of an invasive species?

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Predicting the future range-expansion potential of invasive species is vital for decisions regarding the management of these species. Unfortunately, only coarse scale occurrence data is usually available, which in itself is confounded by several factors such as habitat suitability, propagule pressure and human influence. *Acacia longifolia* Wild was once (late seventies) regarded as the second most invasive plant in the Western Cape, prompting the release of a bud-galling wasp, *Trichilogaster acaciaelongifoliae* Froggatt (Hymenoptera: Pteromalidae), in 1982. The literature proclaims this case of weed-biological control as a text book example of successful control. However, until now, no study has measured *A. longifolia*'s current distribution and abundance in South Africa, roughly 25 years after the agent's release. Here, we make use of scale area curves to predict the current status of *A. longifolia* in South Africa, across several scales. The quarter degree grid occupancy of the weed was used to select approximately equal sized areas within the centre, range margins and climatically unsuitable areas within different zones of the national distribution. These areas were surveyed from a linear resolution of approximately 25 km to 2.5 m. Resulting scale area curves indicated greater occupancy in the core than edges in parts of the national range with continuous suitable habitat, while patterns were reversed when suitable areas were more fragmented. In addition, scale area curves

suggest that the potential for *A. longifolia* to increase its distributional range is limited. The possibility that this pattern is due to highly effective biological control by *Trichilogaster acaciaelongifoliae* is discussed. We encourage future use of scale area curves to assess the landscape-invasion potential of invasive species.

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Gastrointestinal stability and absorption of natural products

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Most investigations (usually of a screening nature) on the biological properties of plant species, commonly used by traditional healers, are conducted on crude aqueous and solvent extracts. This approach, although important, ignores pharmacokinetic aspects which includes absorption and metabolism of potential active substances. Once ingested, plant material may interact with gastric enzymes and thereby become more potent. Alternatively, the gastric environment may degrade the active ingredient, resulting in partial or total loss of activity. The objective of this study was to expose selected traditional remedies to simulated gastric and intestinal conditions and to compare the antimicrobial activity to that of the same remedies not exposed to such conditions. In some cases (e.g. green tea) there was a loss in antimicrobial activity once exposed to simulated gastrointestinal conditions. The antimicrobial activity of 'buchu', however, was increased once exposed to simulated intestinal conditions. Efficacy is also determined by the rate and extent of absorption of the phytoingredient when orally administered or topically applied. Despite the historic and current use of rooibos tea and various claims made on the health properties of this indigenous beverage, no research has hitherto been conducted on the bioavailability of the molecules to which the health benefits are ascribed. Using the Caco-2 cell model, the intestinal transport of rooibos extracts and aspalathin (the major flavonoid in the tea) was investigated. The aspalathin transport from the rooibos extracts showed total movement of the dose across the human intestinal cells, while the aspalathin solutions exhibited pronouncedly lower transport values. The powerful antioxidant properties ascribed to rooibos tea has resulted in the cosmetic industries developing topical formulations for the prevention of skin disorders. This application prompted our investigation on the percutaneous transport of aspalathin using vertical Franz diffusion cells and