

and 141.10 ppm in spinach. Mn ranged between 20.27 and 23.88 ppm in onion, between 12.50 and 132.72 ppm in cabbage and between 62.27 and 126.35 ppm in spinach. Cu was below detectable levels in all the three vegetables. The results further show that there is Zn and Mn contamination in some of the gardens especially those close to traffic roads and those collected from soils whose fertility was boosted by application of fertilisers.

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In vitro propagation and secondary metabolite production of *Boophone disticha*

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Boophone disticha (L.f.) Herb. (Amaryllidaceae) is distributed throughout southern Africa and is widely known for its poisonous and medicinal properties. *B. disticha* is of considerable ethnobotanical interest in traditional medicine because of its hallucinogenic alkaloids. It is in high demand and is commonly found in 'muthi' shops and traditional plant markets. Although it is not considered threatened in South Africa, this is likely to change due to high harvesting rates. In Lesotho *B. disticha* is already endangered. Twin-scale explants were placed on solid Murashige and Skoog media containing 2 g/l charcoal, 150 mg/l ascorbic acid and supplemented with various concentrations of NAA and BA. Cultures were placed in a 16 h light/8 h dark regime at 25 °C. Bulblets formed on media supplemented with 0:0, 5.37:44.4, 26.85:44.4 and 53.7:44.4 µM NAA:BA. Seasonal variation in biological activity of various plant parts is currently being investigated. Extracts from roots, inner scales and outer scales of *B. disticha* bulbs collected in winter were evaluated for antibacterial activity. The dichloromethane extract of roots showed a minimum inhibitory concentration (MIC) of 1.56 mg/ml against *Staphylococcus aureus* and *Bacillus subtilis*. Outer bulb scales showed higher activity than inner bulb scales. Screening for antibacterial and antifungal activity is currently being carried out with *B. disticha* bulbs collected in spring.

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Going back to our roots: Orchids and the ancestors

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This is an investigation into the antimicrobial activity and secondary metabolite profile of seven orchid species; *Ansellia*

africana, *Bulbophyllum scaberulum*, *Cyrtorchis arcuata*, *Eulophia petersii*, *Eulophia speciosa*, *Polystachya pubescens* and *Tridactyle tridentata*, traditionally used for medicine in South Africa. Aqueous, petroleum ether, dichloromethane (DCM) and 80% ethanol extracts were evaluated for antimicrobial activity. Antibacterial and antifungal capacities were determined using separate bioassays, where the antibacterial test organisms included two Gram-positive bacteria (*Bacillus subtilis* and *Staphylococcus aureus*) and two Gram-negative bacteria (*Escherichia coli* and *Klebsiella pneumonia*). *Candida albicans* served as the fungal agent in the antifungal bioassay. Only *Eulophia* species, root extracts, exhibited significant activity (scored at less than 1 mg/ml) against Gram-negative bacteria (from 0.65 to 0.78 mg/ml) while Gram-positive bacteria were susceptible to most extracts. *C. albicans* was most susceptible to *Eulophia (isaha)* DCM stem and pseudobulb extracts, with fungicidal concentrations of 0.78 mg/ml and 0.65 mg/ml respectively. *T. tridentata* DCM and aqueous extracts produced the highest inhibitory activity against Gram-positive bacteria (<0.097 mg/ml). Methanol extracts were used to determine the chemical profiles of these species. Total phenolic content which includes gallotannin, condensed tannin and flavonoid content were quantitatively determined while thin layer chromatography was used to determine alkaloid content. The determination of total phenolics using the Folin-Ciocalteu method revealed *E. petersii* pseudobulb extract as containing the highest total phenolic content (24.73 ± 0.57 mg gallic acid equivalent (GAE)/g dry matter). Condensed tannin (syn. proanthocyanidin) content was highest for *C. arcuata* leaf extract (1.36 mg leucocyanidin equivalent/g dry matter). Hydrolysable tannin (gallotannin) content varied among species with *E. speciosa* root extract containing the highest amount (1.40 mg GAE/g). The highest flavonoid content was recorded at 1.24 mg catechin equivalent/g dry matter for *C. arcuata* stem/root extract.

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Plant diversity patterns of a settlement in the North-West Province, South Africa

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In recent years the composition of urban vegetation has become far more complex than that of the surrounding natural vegetation. This is mainly due to the influence that humans have on the creation of new plant communities and the management of urban green spaces. Green spaces are fundamental to the restoration and maintenance of biodiversity in areas that have been severely impacted by urban development. The most important and understudied green space is homegardens. Homegardens contribute greatly to the species composition of urban and rural settlements. The aim of this study was to determine to what extent the