remain unexplained. It is well recognised that interactions between plants, humans, the environment, insects and micro-organisms are complex and difficult to characterise. Pilot studies of declining *A. erioloba* and *E. ingens* have revealed a number of undescribed fungal genera, emphasizing the lack of knowledge regarding fungi in Africa. Likewise, apparently undescribed insect species have been found associated with these dying trees. There is clearly an urgent need to increase our understanding of the interacting factors associated with the wide-scale mortality of native South African trees that is occurring in various parts of the country. Solutions, and a chance to save some species that are apparently threatened with extinction will require inter-disciplinary research initiatives and also different approaches to those that have been used to understand tree health problems in the past.

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Comparison of secondary metabolite content and antimicrobial activity of four *Hypoxis* species used in traditional medicine

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Hypoxis (African potato) is a genus of the family Hypoxidaceae. The rootstocks of *Hypoxis* species are used in traditional medicine for the treatment of different ailments such as urinary tract infections, prostate cancer, wounds etc. Several visits have been made to the Faraday medicinal market in Johannesburg to check the prices and availability of *Hypoxis*, however, it was discovered that different *Hypoxis* species are harvested and sold under the same name i.e. African potato. This is a concern where plant preparations are taken orally and the information regarding the plants being used not correct. This might be dangerous in the event where secondary metabolites of these plants are not the same. The aim of this study is to compare the secondary metabolite content and microbial activity of four *Hypoxis* species namely, *H. acuminata*, *H. hemerocallidea*, *H. iridifolia* and *H. rigidula*. Thin layer chromatography and high performance liquid chromatography were used to analyse secondary metabolite content of the plant extracts. Different bioassays were used to determine the antibacterial, antioxidant and cytotoxicity activity of these species. Column chromatography was used to isolate the compounds. Compounds observed on the TLC fingerprints were similar in all four species. There was one compound that was present in *H. rigidula* and *H. acuminata* which was absent in *H. hemerocallidea* and *H. iridifolia*. The antibacterial activity also showed a similar profile against three microorganisms, namely *Escherichia coli*, *Enterococcus faecalis* and *Staphylococcus aureus*. All four species showed no toxicity when tested *in vitro* on Vero cells however, the plant extracts seemed to be toxic to cancer cells (U937 cells) in particular *H. iridifolia*. Hypoxoside was isolated and identified as the purple band on TLC fingerprint. The HPLC results showed major differences in fresh material. After the material was stored, the results showed the same profile in all the species.

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Protective effect of the anti-ozonant, ethylenediurea (EDU), on development and photosynthesis of *Glycine max* under ambient and elevated ozone levels in an OTC system

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Tropospheric ozone (O_3) is one of the most important phytotoxic air pollutants. Due to the growing energy demand and increasing industrial activity, O_3 levels are expected to rise in southern Africa. Ozone affects natural vegetation, forests and crops due to the oxidative stress it imposes on biochemical level. Ozone affects photosynthetic capacity, patterns of carbon distribution and leaf senescence. It also promotes foliar injury. These effects are reflected by loss of chlorophyll, change in chlorophyll a fluorescence kinetics and gas exchange parameters. The anti-ozonant, N-[2-(2-oxo-1-imidazolidinyl) ethyl]-N′-phenylurea (EDU) is known to prevent ozone damage in many plants, which makes it a key research tool in assessing the effects of O_3 on plants. A field study was conducted with soybean plants (*Glycine max)* grown and exposed in an open-top-chamber (OTC) system to controlled different levels of O_3. Non-EDU-treated plants were markedly affected by the O_3 treatment. The effects of O_3 on PSII and PSI function and photosynthetic gas exchange of the treated plants were analysed and interpreted. Apart from visible symptoms and reduced yield induced by elevated O_3 levels, the CO_2 assimilation rate (A) was reduced by 26%, mainly due to a corresponding 36% decrease in the carboxylation efficiency (CE). Parallel chlorophyll *a* fluorescence data indicated that a concomitant decrease occurred in the photosynthetic performance index (PI_{ABS}), which was mainly due to inhibition of the quantum yield of reduction of end electron acceptors of PSI. The study clearly demonstrated that EDU alleviates the unfavourable effects of O_3.

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Morphological and anatomical adaptations of *Boerhavia* L. and *Commicarpus* Standl. to survive in arid environments of Namibia

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