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The role of plant growth promoting microbes in the maintenance of the mysterious fairy circles of Namibia

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The cause and maintenance of the hundreds of thousands of fairy circles in the Namibian pro-desert have not yet been satisfactorily explained. Several diverse hypotheses have been put forward, but none have universally been accepted. We previously found the 'chemical footprints' of toxic *Euphorbia* plants with GCMS analysis in nearly all the fairy circles of the Garub region of Namibia. This implies that these toxic *Euphorbia* species were present, where there are fairy circles today. In our search for the mechanism by which these toxic plants cause and maintain the fairy circles, we found that the *E. damarana* extract has extremely low MIC values against plant growth promoting bacteria isolated from the 'healthy' soil from outside the fairy circles. This indicates that the grasses will not have the benefits of plant growth promoting organisms when colonizing areas where *Euphorbia* species have died in the harsh conditions of the Namib Desert. The MIC values of this extract were also found to be very low against several human pathogenic bacteria. Pot experiments have shown that an inoculum of the rhizosphere from grasses growing outside the fairy circles could reverse the negative effect of the fairy circle soil. This study supports the hypothesis that the fairy circles are caused by *Euphorbia* spp. and maintained by the lack of plant growth promoting organisms.

Biography

Jacobus Johannes Marion Meyer is a Professor of Medicinal Plant Science at University of Pretoria, South Africa. He collaborates with several international institutions, including the ITMO St Petersburg University.

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