GRADE 11 UP WITH SCIENCE PROGRAMME 2014

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The UP with Science Programme is an initiative by the University of Pretoria that enriches senior secondary school learners and exposes them to various disciplines in science. The initiative allows learners to experience research first hand, where they complete a research project over the course of 6 months. This year's Centre of Excellence in Tree Health Biotechnology (CTHB) outreach team included Amy Wooding (team leader), Juanita Avontuur, Godfrey Kgatle, Teboho Letsoalo and Khumbuzile Bophela. The project for this year was based on the health of the Jacaranda trees in Pretoria, which has been a hot topic in the media in the past year.

The CTHB outreach group enlisted the help of the "double 'O' tree squad," whose members were Boitshoko Rammuki, Kaylen April, Ayesha Khan, Alicia Koekemoer, Nadia Verster and Ashiyah Darki. The project started off with a field trip to the streets of Pretoria, known globally for their Jacaranda trees. Samples of roots, bark and fruiting bodies were retrieved from healthy, symptomatic and diseased trees. The "tree squad" then headed to the laboratory to process the samples.

Top left photo: Boitshoko collecting a fruiting body sample. Top right photo: Alicia viewing a slide on a microscope

Both bacteria and fungi were isolated from the samples by plating them out on two types of media; MEA to culture to fungi, and LB to culture bacteria. The learners were exposed to various subculturing methods including single mycelium culturing using a dissecting microscope, and obtaining single, pure colonies of bacteria through serial plating. Molecular and phenotypic techniques were used to identify the fungal and bacterial isolates obtained from the samples. In the process the learners were exposed to PCR, sequencing,

microscopy, and multiple bacterial phenotypic tests such as Gram staining.

Through a process of elimination, based on the morphological and molecular results, the learners were able to identify two possible pathogens of Jacarandas, namely *Ganoderma* spp. (fungi) and *Pseudomonas japonica* (bacteria). The next step was to conduct a pathogenicity trial in order to fulfil Koch's postulates. A plant species related to the Jacaranda tree, the Cape Honeysuckle, was chosen as this is a plant native to South Africa. Stem cuttings of the Cape Honeysuckle were inoculated with solutions of the identified fungal and bacterial pathogens, using sterile water as a negative control. Based on the learners' observations from the trial, they deduced that the fungal species (*Ganoderma* spp.) and not the bacterial species, was a true pathogen as the cuttings inoculated with it developed lesions.

The project was a great success, with the learners being exposed to the world of scientific research, more specifically biological research. The learners have acquired a variety of skills such as following the scientific method, basic laboratory and molecular techniques, field work, and how to communicate scientific findings to the general public. We would also like to thank the exceptional young ladies of the "double 'O' tree squad' for their enthusiasm throughout the project.

The "double 'O' tree squad"
Back row: Nadia, Ayesha, Ashiyah and Kaylen. Front row: Boitshoko and Alicia