Climate threats spark exciting research into drought tolerant crops

In Africa, and globally, food crops are expected to be under much-increased threats over the next couple of decades as climate change intensifies, demanding that scientists explore creative new ways to protect these crops.

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Among these innovations are the identification and breeding of more drought-tolerant crops, and the use of microbial biofertilisers. Work on these techniques are being led, respectively, by Professor Ndiko Ludidi and Associate Prof Marshall Keyster, both affiliated with the DSI/NRF Centre of Excellence in Food Security (CoE-FS) at the University of the Western Cape (UWC).

The two researchers offered potted introductions to their research in the 'Zero Hunger and Clean Water' session of the *UWC Research Week 2020*, hosted online from 28 September to 2 October. They were joined in the session by close collaborators from the University of Missouri (MU) in the USA, Prof Robert Sharp and Associate Prof David Mendoza-Cózatl.

In his talk, Ludidi spoke on the genetic diversity that underpins crop and plant variations, and which could also explain why some crops and plants are better able to weather extreme conditions than others. For instance, differences in the root architecture of plants appear to influence how some plants cope well with droughts.

To test this theory, Ludidi is comparing the drought tolerance of a host of food crops, including maize, sorghum, millet, soybean and cowpea.

There are crucial benefits to studying genetic variation for breeding drought-tolerant crops, he explained.

> *“Improved drought tolerance will not only reduce the negative impact of drought on food security, but will also reduce water consumption.”*

In turn, Keyster explored the role that microbial biofertilisers – fertilisers that incorporate naturally occurring microbes – could play in building plants’ resistance to heavy metals. Industrial and other human activities have, along with modern agricultural practices, led to heavy metal contamination of the environment. Such metals, some naturally occurring, are now present at excessive levels in the ground, retarding plant growth and quality.

Keyster’s work is focused on the use of endophytes, organisms such as fungi and bacteria that live within plants themselves, as biofertilisers. It’s believed that through a symbiotic relationship with the plant cells, these endophytes could improve the ability of plants to cope with – among other stresses – 'salt stress', i.e. the uptake of excess salts present in the soil.

Early studies on the use of such endophytes with a legume known as black medic, are promising. The plants have already shown to have improved tolerance to nitrogen and phosphorus deficit.

One highlight out of this research, reported Keyster, has been the building – at UWC – of a robot that assists with this work. The robot – a project that was considered “impossible” a year ago – springs from the collaboration with MU and Mendoza-Cózatl.