



and exploring their health benefits using molecular, animal, and human studies. Health benefits were demonstrated, based on several mechanisms such as antioxidant capacity, activation of enzymes, and induction of programmed cancer cell death. Furthermore, triterpenoids and flavonoids inhibit various tumors.

Their research has demonstrated the effects of selected bioactive compounds on the gut microbiome. Among these bioactives, polymethoxy flavones (PMF) regulated the gut microbiome, showing the potential as a prebiotic to support gut health and prevent many chronic conditions. Similar health benefits were reported for major citrus flavonoids such as hesperetin, naringenin, eriodictyol, isosakuranetin, and their respective glycosides. Citrus-derived flavonoids help prevent inflammatory bowel syndrome by balancing gut microbiota. Due to its positive influence on the gut microbiome, especially on microbes that may prevent chronic health conditions and promote absorption of micronutrients, citrus and their phytonutrients may serve as a source of multipurpose nutraceuticals with major clinical benefits. This will require further preclinical and clinical studies.

Climate change and citrus workshop

Citrus plants are one of the most widely grown fruits worldwide. It's mainly grown in tropical and sub-tropical regions that

require a suitable climatic condition for optimum growth and better quality. Citrus plants are highly sensitive to climate change. Abrupt fluctuations in temperature, water stress, soil conditions and other abiotic stresses significantly affect citrus yield. Climate change and agriculture are interrelated, affecting each other in

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multiple ways. Citrus is affected by factors that cause physiological, anatomical, and biochemical changes leading to reduced yield and fruit quality. As the effects of climate change become more evident, it would be prudent to develop models for the future management of citrus. Significant increases in temperature and drought affect citrus plant development and fruit quality, and in citrus producing countries this year, heatwaves led to pre-harvest fruit drop,

reduction in fruit peel thickness and fruit size, and increased fruit acidity in drought stricken areas. With increasing temperatures, the conditions for certain insects become suitable in places they had not previously established, which potentially can cause new infestations and diseases. Similarly, soil biota will be changed, and some viable organisms may shift their locality for survival. Climate change influences water deficiency, and temperature increase causes an increase in stomatal conductivity and transpiration rate. Climate change directly and indirectly, affects citrus yield due to heat stress, drought, and the CO₂ assimilation process through photosynthesis.

Presentations in this workshop focussed on the possible effects and projections of climate change on plant development, its nutrition, possible diseases, and pests that may affect citrus plants. Work on possible rootstock selection against biotic and abiotic stresses, and reduction in disease development were discussed. This is so that selection and choice of suitable scions and breeding strategies against climate change may be achieved in the future. The rootstocks presented are, likewise, also being evaluated in SA.

Of concern was the last-minute withdrawal of the South African plant-breeding contingent from the Agricultural Research Council (ARC) at the ICC, which resulted in several no-shows during proceedings requiring last minute reshuffling of the programme by the organisers. For whatever reasons, the no-shows stuck out and were concerning. I was asked by many why there was so little or nothing to offer in terms of plant breeding from SA, given that we are the second biggest exporter of citrus in the world. Like Spain, Florida, California, Brazil, Israel, Australia, Turkey and the likes, SA is now more than ever in crucial need of a breeding programme that confronts the same challenges of CBS, HLB and other diseases. The title of the ICC, "Reframing Citriculture: Better Connections for the Future", is surely relevant for contemplation by ARC SA. 



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