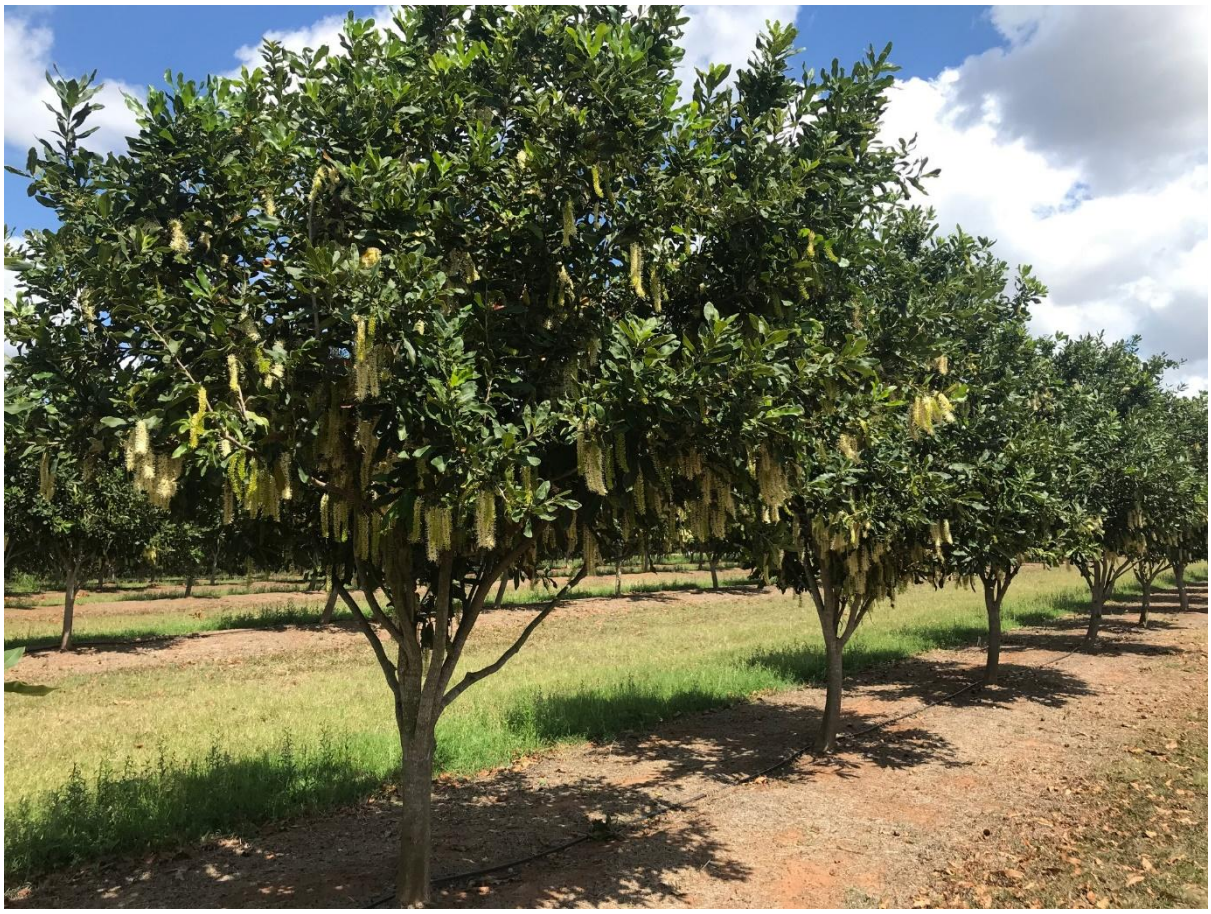
Technology and the macadamia industry

Macadamia is currently the fastest growing tree crop in South Africa. However, compared to other fruit producing industries, the macadamia industry is still in its infancy. The possibilities for development of this industry are endless and immensely exiting, but a lot of work still needs to be done. Research and development on the technological front play a crucial part in taking this industry to new heights.

The focus on developing new technologies should be on enhancing the performance and productivity of existing crops.



New genetics, such as the new and improved macadamia variety, MCT-1, drastically improves performance and productivity of crops. (Photo courtesy of Anfic Ltd)

Once substantial shifts in economic systems and social structures are introduced by technology and world views, it is an indication that an industrial revolution is underway. The Fourth Industrial Revolution (4IR) entails the fusion of the physical and the virtual world, and will have a great impact on the agricultural sector. The 4IR differs from the past three industrial revolutions in the sense that it is more holistic – its origin does not solely lie in technology, but also in demographic and socio-economic drivers such as climate change and the environment, economics, consumer ethics, changing demographics in emerging markets, urbanisation, social change and more. It puts an emphasis on ethical actions, morality and sustainability.

Part of the revolution in the agricultural industry, are large scale technological changes, referred to as megatrends, which have a profound influence on the future of agriculture. Klaus Schwab, Founder and Executive Chairman of the World Economic Forum, divides technological megatrends into the physical (autonomous and unmanned vehicles and robotics), the digital (internet and artificial intelligence) and the biological (genetics, recycling and waste management, food preservation technology, etc). Each of these technological megatrends have application in the agricultural sector, and also specifically, in the macadamia industry.

Farmers are nowadays able to improve yields and quality, and optimise their inputs whilst reducing labour, all thanks to technologies including remote sensing, precision seeding, in-field sensors, drones, robotics and satellites which can be used to measure soil conditions, plant health, manage water and nutrition and monitor crops. Drone technology is used to identify underperforming trees, by measuring plant health in the context of the photosynthesizing ability. Risk factors such as the threat of diseases, nutritional deficiencies can be identified and addressed at an early stage.

Precision farming makes use of geographic information systems, GPS tracking systems and remote sensing technologies that can measure plant vigour, canopy density and size, water status as well as nutritional status. Such measurements can be used to adapt short term practices such as tree

manipulation practices, fertilizing and irrigation to the requirements of the specific orchard.

New and innovative integrated methods to monitor and combat pests and diseases are increasingly applied to sustainably optimize plant health and productivity. The obvious answer to a pest infestation is to apply pesticides, but synthetic chemicals also have an adverse effect on a plant, causing it stress and lowering its energy levels. Where chemical intervention is required, technology in combination with best orchard practices is the solution to optimise spray efficiency and thus reduce excessive chemical application. Certain tracking systems enables growers to spray at night, which posed challenges in the past due to the difficulty of monitoring the spraying process sufficiently. Drone technology can also be used to monitor the spray efficiency, since it will be able to pick up if parts of trees are unaffected by the sprays. Sprays may be deemed inefficient where canopy density is not controlled by correct canopy manipulations such as pruning, and best practices should be implemented to compliment the technology used as tools.

On the biological front, new genetics are crucial in the context of climate change, and research resulting in new and improved varieties, able to withstand biotic and abiotic threats are of paramount importance. New macadamia varieties with dwarfing characteristics may facilitate management and increase spray efficiency. Such new genetics, best practices (canopy management, weed control, irrigation, fertilization etc) and technology should all compliment each other to take the macadamia industry to new heights.

New varieties such as MCT-1 can deliver on improved productivity and therefore profitability. MCT 1 promises improved productivity of up to 40% to 50%. (Photo courtesy of Anfic Ltd)

The use of this advanced technology in the strive towards farming more sustainably, may lead to higher productivity due to higher yields, cost reductions and an increase in the quality of the product. Investment in technology does not need to break the bank, and should complement day to day best cultivation practices, taking into account the natural environment and how it can be used to the farmer's benefit to achieve the desired results.

Change may be challenging, but it is inevitable. In the words of HG Wells: "Adapt or perish, now as ever, is nature's inexorable imperative".

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