

# Collaboration between ARC and the South China Agricultural University continues

With the 2015 National Litchi and Longan Symposium at the South China Agricultural University (SCAU) in Guangzhou, China, a Memorandum of Understanding (MoU) between the Agricultural Research Council (ARC) and SCAU was signed.

**Regina Cronje**

ARC-TROPICAL AND SUBTROPICAL CROPS

**THE MOU FORMS** the foundation for close collaboration between the institutions in the form of bilateral projects in various disciplines, training and exchange of students and researchers, amongst others. In 2016, a joint project between the institutions with the title “Adaptive strategies to surviving climate change stress: using molecular responses to understand adaptation in litchi as a model crop” was identified encompassing litchi crop physiology and biotechnology.

In order to discuss and plan the project, Prof Houbin Chen, Dean of the College for Horticulture at SCAU, invited Mrs Regina Cronje (ARC) to visit SCAU in March 2017. Part of the project is an in-depth study on flower and dormancy regulation mechanisms in litchi using molecular biology. This sub-project will slot in with Mrs Cronje’s current ethephon research.

The aim is to use gene expression profiling (transcriptomics) and specific gene identification (Real-Time PCR) to identify which environmental factors promote or inhibit flowering. Together with knowledge on changes in other physiological parameters, such as carbohydrate reserves, photosynthesis, respiration and certain plant hormones, a better understanding of the complex flowering mechanisms in litchi can be achieved. This will assist in adapting farming practices to mitigate changes in seasonal weather patterns as a result of climate change in order to maintain sustainable litchi production.

During her visit, Mrs Cronje was trained in correct sampling and RNA extraction methodology for gene expression profiling and identification of specific genes regulating flowering, so that she can use it for her studies in South Africa. Collaborating with SCAU on molecular research opens a new avenue for litchi research in South Africa.



**Figure 1. Poor flowering in Guiwei (left) compared with excellent flowering in Nuomici at Xili Orchard near Shenzhen, China.**



**Figure 2. Flowers and flush on the same shoot in the cultivar Guiwei at the South China Agricultural University in Guangzhou, China.**



Figure 3. Flower panicle shortening in Fay Zee Siu by means of panicle pruning (left) and application of uniconazole (right).



Figure 4. The very late cultivar Lingfengnuo top-worked on a 300-year old rootstock with good flowering (left). Top-working is mainly done by bark grafting to reduce incompatibilities (right).

**EFFECT OF CLIMATE CHANGE VISIBLE**

During her visit, Mrs Cronje visited a few litchi orchards in Guangzhou and Shenzhen. Most of the litchi cultivars were flowering in mid-March. Third Month Red already showed fruit set. The effect of change in seasonal weather patterns due to climate change was clearly visible on the trees. While early and late cultivars, such as Fay Zee Siu and Nuomici, were flowering well, mid-season cultivars, such as Guiwei, were struggling to produce good flowers due to high temperatures during mid-winter (Fig. 1). Mixed panicles with flowers and flush in one shoot were also observed (Fig. 2).

**FLOWER PANICLE SHORTENING IN FAY ZEE SIU**

The early cultivar Fay Zee Siu tends to produce long flower panicles which use most of the carbohydrate reserves so that there is little left for fruit set. In order to improve fruit set, Fay Zee Siu flower panicles are traditionally pruned at first male flowering to reduce panicle size for better fruit set. However, this practice is labour intensive. Therefore,

many growers in China now apply uniconazole (50 ppm at 10-15 cm flower panicle length) to reduce flower panicle size. The difference between flower panicle pruning and application of uniconazole is displayed in Figure 3.

**NEW CULTIVAR AND ITS PROPAGATION**

At Xili Orchard, near Shenzhen, many trees are top-worked to the new cultivar Lingfengnuo (see also *Subtrop Journal* Vol. 11, 2015 ). Compared with Nuomici, a popular and premium litchi cultivar, Lingfengnuo matures later, has excellent taste (similar to Nuomici), small seed and is cracking resistant.

Due to its good fruit characteristics, Lingfengnuo has become very popular and demand for planting material has increased rapidly. Figure 4 shows a flowering Lingfengnuo top-worked on a 300-year old rootstock. Top-working in China is mainly done by bark grafting in order to avoid and reduce grafting incompatibilities which are more pronounced when grafting on a shoot. ❖