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Allesbeste Boerdery, Kwekery and Padstal

In 1927, Dr. Adalbert Henry Ernst, a medical doctor, moved his family from Ceylon (modern day Sri Lanka) to South Africa where he purchased 200 hectares (ha; about 500 acres) of farm land in the Lataba region of Limpopo province. Dr. A.H. Ernst produced citrus, timber, cattle and vegetables, laying the foundation for A.H. Ernst and Sons.

In the mid-1960s, under the direction of son Chicot Ernst, the citrus was removed due to citrus greening disease and the first avocado and bananas were planted. Today, led by the third generation, Dr. Andre Ernst, the farm continues to evolve and is slowly removing the banana trees and expanding its avocado production.

Andre took over the farming operations from his father in 1980 and established the modern company known as Allesbeste Boerdery, Kwekery and Padstal — literally translated to "All Best Farm, Nursery and Shop."

Nursery Operations

Allesbeste is one of three major avocado nurseries in South Africa producing trees on clonal rootstocks. Allesbeste propagates their trees using a method they developed, which they refer to as "micro clones." The technique is a modification of the Brokaw method (commonly referred to as the Frolich method in South Africa). They believe the micro cloning technique, which is described below, has several advantages over the Brokaw method, including:

- The ability to produce more than one clonal plant per nurse seed
- Repeated use of the nurse seed until it is exhausted
- Reduced propagation cost due to efficiencies of the technique
- Reduced shipping costs for micro clone trees
- No risk of nurse seed survival in finished trees
- Improved tree uniformity

The micro cloning technique begins with a nurse seed just like the Brokaw method. Allesbeste likes to use 'Edranol' seeds because of their large size, but also use 'Velvick'; they produce about 50 percent of their nurse seeds in their own groves. Large seeds can be split in two, through the embryo, resulting in two nurse seeds from one.

Nurse seeds are sterilized in hot water (122 °F) for 30 minutes before being sown in community flats. The flats are held at 77 °F with humidity of about 95 percent; germination usually occurs in 12 to 15 days. As the seeds germinate, they are removed from the community flat, sorted and transplanted into liner bags about 2.5 inches in diameter and 6 inches deep. When the seedlings reach a diameter about the size of a pencil, they are ready for the rootstock graft.

The rootstock of choice — 'Dusa', 'Duke 7', 'Bounty' — is grafted to the nurse seed using a whip graft. The grafted nurse seeds are moved to an etiolation room, where the rootstock grows in darkness, producing a blanched (white) shoot or shoots that are ready to be rooted.

The etiolated rootstock shoots are slightly wounded and treated with rooting hormone. A small micro clone container, which is about 1-inch square and 4 inches long, is slipped over the etiolated rootstock stem and filled with potting media. Some of the rootstocks produce more than one shoot during the etiolation process and when this occurs both shoots will be rooted. The plants are moved to a heated greenhouse with a minimum temperature of 68 °F for rooting.

Once rooted, usually in about 20 days, the micro clones (still attached to the nurse seed) will be grafted with the scion variety of choice. Typically, when the rootstock has produced more than one sprout, one will be stronger. The stronger shoot will be grafted and the

weaker one will be removed from the nurse seed and allowed to grow for an additional week or two to catch up before being grafted.

After the scion graft has produced a shoot and the first flush of leaves has hardened off, the micro clone is severed from the nurse seed and transplanted into seven-liter grow bags to produce a finished tree. The nurse seed with rootstock is returned to the etiolation room to produce another one or two shoots to repeat the process a second time. With this method, Allesbeste is producing at least two trees from each seed and at least four in the case of split seeds.

Allesbeste considers traceability to be crucial to maintaining a quality product. Throughout the propagation process, the nurse seed mother tree, the rootstock budwood mother tree and the scion budwood mother tree are tracked and every tree's origins can be fully traced. In addition, the identity of the rootstock and scion grafter also is tracked up until the micro clones are transplanted into the large grow bags.

In recent years the nursery has undergone several expansions and is getting ready for another one. Their current capacity is 200,000 clonal trees per year and they are sold out through 2026!

In the spirit of innovation that defines Allesbeste, its in-house IT department is working on an RFID (radio-frequency identification) system to allow for easier tree tracking. The hope is that this system could be extended one day to the field and be used to track individual trees for their entire life.

They also have recently opened four satellite locations throughout South Africa. Ungrafted micro clone trees are shipped — 100 per box — to the satellite locations where a contracted grower grafts and finishes the trees to Allesbeste standards. This system significantly reduces the transportation costs associated with getting trees to other growing regions and allows Allesbeste to charge the same price for trees wherever they are sold.

Speaking of selling, finished tree prices went up 33 percent in 2017 and are likely to go up another 25 percent next year. Currently Allesbeste sells finished clonal trees for about $10.

Farming Operations

In total, Allesbeste now has four different farm locations with a total of about 230 ha (568 acres) of avocados and the ability to plant another 100 to 130 ha. The original 200 ha farm now has about 130 ha (230 acres) of avocados, with timber, bananas and preserved areas making up the balance of the acreage. Allesbeste intends to replace the bananas with avocados as tree availability allows.

The fourth generation of Ernsts, Andre's sons Zander and Edrean, oversee the farming operations. Zander specializes in farming practices and Edrean oversees the company's technology department, applying modern technology to the farming operations. Just as in the nursery, Allesbeste's farming operations are marked by innovation and testing with more than a decade of substantial trialing and testing.

- 2006: First high density 'Maluma' trial planted, 4.5 ha
- 2009: High density commercial block planted, 12.5 ha
  - Dusa, Duke 7 and Bounty rootstock trial planted
- 2010: First high altitude (1,200 meter, 4,000 feet) 'Maluma' trial, 1.8 ha
- 2012: First ultra-high density trial planted, 1 ha at 2.5 x 2.5 meter spacing
- 2014: 'Dusa', 'Duke 7' and 'Bounty' 4.8 ha trial
- 2015: Rootstock trial, 'Maluma' on 28 different rootstocks, 1.2 ha
  - First drip irrigation trials started
  - Improved stump grafting method applied to 25+ ha
- 2016: First trellises installed with 60 trees on Bounty and Dusa rootstocks
  - Drip irrigation moves to commercial scale
  - Precision orchard development implemented
- 2017: Commercial scale trellis trial, 1.9 ha
  - Top-work 1000+ trees to four new semi-commercial varieties

To manage tighter tree spacings, Allesbeste utilizes mechanical hedging equipment followed with hand pruning. Their theory is to use the hedger to establish the overall size of the canopy, but the hedger produces random heading cuts. Therefore, they follow the hedging with hand pruning to clean up the random heading cuts and prune limbs back to lateral branches. This disrupts the hedged "wall," creating an irregular shaped canopy with holes where light can penetrate. They prune annually, and the method is proving to be quite effective.

In a recent planting on a steep slope, Edrean used a drone and RTK (real-time kinematic) mapping software to develop a detailed topographic map of the hillside. Software was then used to determine precisely where to make cuts in the hillside to develop terraces, following the natural contours, with 1 to 2 percent pitch to direct runoff. The terracing essentially turned a 45-degree slope into a planting with an effective grade of no more than 5 percent. They are continuing to look at how else drones and various imaging technology can be used to improve their grove management operations.

Allesbeste is actively seeking new rootstock and scion varieties for use in South Africa and elsewhere. They have been instrumental in bringing the

1. Nurse seeds graded and ready for rootstock grafting; 2. Nurse seeds grafted with rootstock; 3. Etiolated rootstock shoots with the micro clone containers in place to induce rooting; 4. Micro clones being grafted with scion variety; 5. Finished micro clones ready for transplanting to 7-liter grow bags; 6. Micro clones being transplanted into the 7-liter finishing containers; 7. Zander Ernst discusses Allesbeste's trellising trials with Avocado Brainstorming 2018 attendees; 8. Finished trees ready for sale; 9. Tags identifying the nurse seed, rootstock budwood and scion budwood mother trees; note that the tags stay with the finished trees; 10. A terracing trial mapped and designed using drones and imaging software technology.

Maluma cultivar and Bounty rootstock into common use, and a future *From the Grove* article will look at these two selections in detail. Currently, they have four scion cultivars in semi-commercial trials and are getting ready to plant a rootstock trial with 60 different rootstock selections.

In addition to nursery and farm operations, Allesbeste also is the majority owner of the Afrupro packinghouse and runs a high-end farm store (padstal) that sells fresh produce from their own orchards and local farms, as well as various locally made jams, jellies, preserves, pickles and candies.

Allesbeste is a four-generation strong farming enterprise that is poised to be a major player in the South African avocado industry for years to come. Their innovation and drive to continue moving the avocado industry forward is impressive and can serve as a model for other major avocado producers.