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Maluma on the Bounty:

A Tale of High Yields and Phytophthora Tolerance

Grower Nick Human (front) and Abraham de Villiers (rear, Allesbeste) show off the incredible yield on a young Maluma tree.

The avocado cultivar Maluma and the rootstock Bounty appear to be a match made in heaven. Both are proprietary South African varieties worthy of testing in California.

Maluma

Maluma began in the early 1990s as a stand-out tree in a Hass orchard belonging to the late Dries Joubert. The tree that would become known as Maluma produced consistently year in, year out. The fruit were large with a small seed, creamy texture and nutty taste.

In the late 1990s, Andre Ernst of Allesbeste Nursery was asked to propagate some trees for Joubert and another grower. With Joubert's permission, he also propagated some trees for himself since he was already beginning his own cultivar development program.

In 2004, Maluma became a patented variety based on its unique characteristics and was named after Joubert's farm. The A.H. Ernst and Sons Company became the assignee for the patent and began the arduous task of commercializing a new variety.

Today about 500 acres of Maluma are planted in South Africa and the variety continues to grow in popularity. As part of its commercialization strategy, Allesbeste started Maluma Day. What began as a couple-of-hours event with a handful of attendees has grown into a two-day program of scientific talks, nursery and grove tours, and discussion of all things Maluma attended by hundreds.

Maluma has been brought to the United States. It is currently in quarantine and should be cleared by early 2020. While in quarantine only limited propagation is allowed, so it will be some time after it is released from quarantine that trees will start to become available commercially.

Trellises

Allesbeste has been trialing various growing methods for Maluma to achieve maximum yield, including plantings on trellises and at high density. The first trellis trials were planted

An immature Maluma fruit showing the variety's large fruit size and small pit.

Maluma trees growing on a vertical trellis with 8-inch wire spacing (left). A close-up view of how the tree is trained to grow along the wires (right).

in 2016. These trials were vertical trellises with wire spacing of 8, 12 and 16 inches. The trees were planted at 6.5 feet between trees and 13 feet between rows.

Tatura (Y-shaped) trellis plantings went in during 2017. Because of the shape of the tatura trellis, the spacing was slightly wider at 8 feet between trees and 16 feet between rows. Allesbeste is testing two planting systems on the tatura trellises — single trees with two leaders trained to a "Y" shape and two separate trees planted on each side of the trellis. The second option doubles the number of trees needed to plant a given trellis, but Allesbeste officials believe it has some advantages.

Both the vertical and tatura trellises are established on berms about 3 feet tall and Allesbeste admits they should be shorter by about one-third on future plantings. In the case of the vertical trellis, all canopy management work (pruning and tying) are done from the row middle and the extra berm height can make it difficult to reach the top of the trellis. For the tatura trellis, all the canopy management is done from on top of the bed (inside the Y). This is where having separate trees on each side of the trellis helps because the workers don't have to step over the split tree.

What Allesbeste researchers have

Maluma trees trained on a tatura trellis. On the left is the single tree training system where one tree is split to have two main stems, one on each side of the trellis. On the right is the two-tree system where separate trees are planted on each side of the trellis. Note how the top of the berm is open and walkable on the right compared with the left.

A sylleptic branch on a Maluma tree. Sylleptic growth is characterized by the lateral shoots growing at the same time as the main branch axis. Note the smooth transition from the main branch axis to the lateral shoot, indicating that a lateral bud and a rest period never occurred before the lateral shoot began to grow.

observed is that Maluma on the trellises produces longer growth flushes. This is likely due to better light exposure. Observers also have seen higher yields on the trellises with the wider wire spacing and hypothesize that it may allow for more efficient pollinator movement in the canopy. Additionally, when trained to the trellises, Maluma releases more sylleptic lateral shoots, which create a more complex canopy structure with small spur-like shoots.

Although very early, the yields on these trellising trials have been impressive. On the vertical trellises, when spaced 13 feet between rows, they have achieved up to 3,200 pounds per acre and when row spacing is reduced to 10 feet, yield increases to as high as 5,600 pounds per acre — at 2 years. On the tatura trellis the yields have been even more impressive, 7,000 pounds per acre at 18 months. These yields are likely the result of Maluma's high yielding nature as well the benefits achieved from the trellis.

Going forward, Allesbeste has selected to continue its trials with the tatura trellis. They are easier to manage than the vertical trellis, fruit are more protected because they hang below the canopy, and between-row spacing is less relevant. By their calculations, the tatura trellis increases their land area by 50 percent because of the greater canopy surface area.

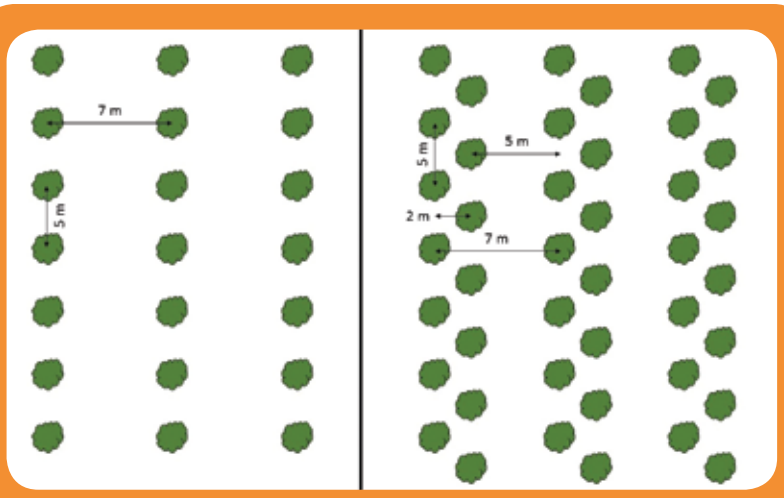
It will be interesting to see how these trials progress. Will they be able to continue to manage the canopy effectively as the trees age? Will the additional labor costs for canopy management be offset by higher yields?

High Density

Allesbeste has been trialing high density plantings for more than a decade. Their oldest groves are similar to old groves in California with about 50 very large trees per acre. Today, a standard planting density is about 16 feet by 16 feet (170 trees per acre). For Maluma (and Gem) most growers are reducing the between-tree spacing to about 8 feet (341 trees per acre). Standard high density plantings are going in at 6.5 feet between trees and 13 feet between rows (525 trees per acre). Ultra-high density plantings are being trialed at 8 feet by 8 feet spacing (681 trees per acre).

Allesbeste also has trialed what is known as a tramline planting — a double row of closely spaced trees offset from one another with a wider between row spacing between the double rows. For example, a block originally planted at 5 meters between trees by 7 meters between rows (118 trees per acre) effectively became 5 meters by 5 meters with 236 trees per acre when a second row was planted 2 meters away from each original row. However, they have found this to be an inefficient means of increasing planting density. The closely spaced trees in the double row become difficult to manage, and if/when they grow together production is lost on the touching sides. In their experience, it is more efficient to plant the grove at 4 meters by 4 meters and achieve the same planting density while being able to manage each tree.

An 8 feet by 8 feet high density planting of Maluma trees.



A cartoon representation of a tramline planting system. A 5 meter by 7 meter planting (left) is effectively turned into a 5 meter by 5 meter planting (right) with the addition of a second offset row of trees 2 meters from the original rows.

Vigorous, healthy roots of the Bounty rootstock.

Bounty

Bounty rootstock is a survivor tree that was found at the Bounty Farm in Kiepersol, South Africa. It has outstanding phytophthora tolerance outperforming Dusa rootstock in side-by-side plantings in heavily infested soil and in replant situations. In addition, it appears to have good tolerance to heavy soils and does not suffer from waterlogging like Dusa. Some reports have suggested that Bounty should not be planted on good soil as it will result in too vigorous of a tree.

Although Bounty is well-liked in South Africa, it has been poorly managed commercially. The variety is patented and has two owners — the Agricultural Research Council Institute for Tropical and Subtropical Crops in Nelspruit (a government research institute) and the Fruit Farm Group — neither of whom has apparently made a major effort to promote the use of this promising rootstock. Allesbeste is trying to work with the owners to help get Bounty distributed around the world for testing.

South Africa has essentially no issues with salinity in its primary growing area around Tzaneen, so it is unknown what, if any, tolerance Bounty will have to saline conditions until it is tested. However, its phytophthora tolerance alone makes it worthy of pursuing for testing in California. The California Avocado Commission will continue to communicate with the various parties to try to bring Bounty's bounty to our growers.

A replant trial in phytophthora infested soil with three different rootstocks. Bounty is in the foreground (left), followed by Duke 7 and Dusa is at the far end. The Bounty trees are about 30 to 40 percent larger than the Duke 7 and Dusa trees.

Maluma and Bounty are two impressive cultivars that appear to be a perfect match for production under heavy phytophthora pressure. Maluma's compact, upright structure and regular bearing make it well suited to high density plantings and the use of Bounty as a rootstock allows for good production in replant situations.