

MAKE EVERY DROP COUNT

- New technology improves spray coverage, and reduces capital costs

The effectiveness of a selected version of this range of German Air Blast sprayer has been demonstrated and tested in over 50 different types of crops in the Western Cape, over the past three seasons.

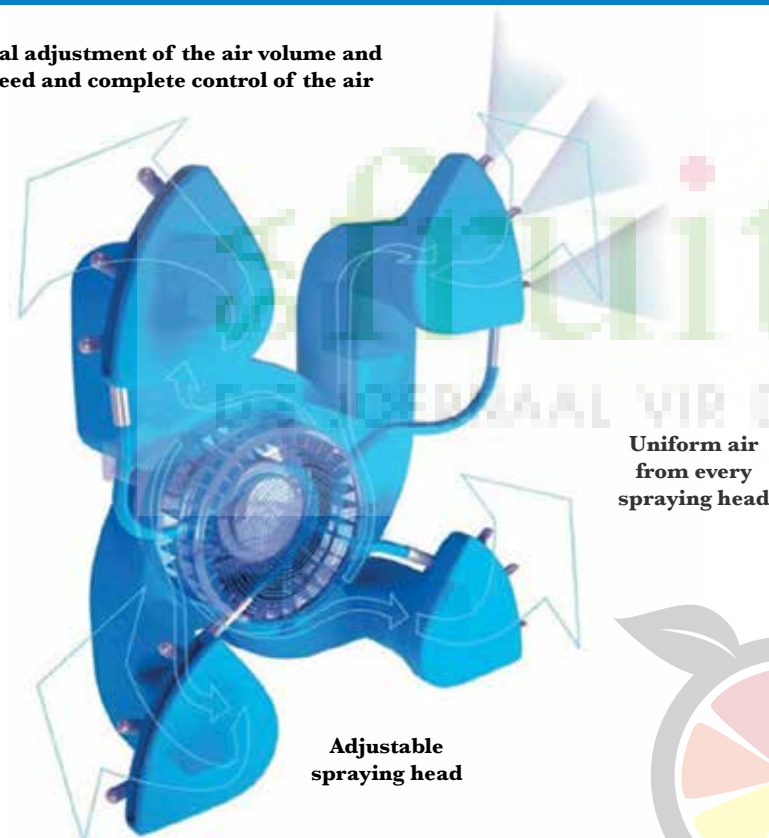
This evaluation was mostly done at night, with luminous dye and precisely calibrated to client requirements.

We have sprayed at higher speeds, in windy conditions and multiple rows, from high to low volumes. This proves the effectiveness of this unique range of sprayers developed over 40 years ago in Germany by the LTS organisation and manufactured in Bologna, Italy. These sprayers are now imported by Ikapa Trading in Grabouw.

As seen in the illustrations, the induction and distribution of the available air in this design sets it apart from other designs. Plus, Vicar has introduced highly efficient, long lasting radial turbines in specially balanced stainless steel, which are superior to the commonly found multi blade axial flow fans. All models of Vicar are mounted on a two-speed gearbox and fiter in speeds according to the application.

The air that is sucked into the patented and unique cast aluminium housing from both sides of the turbine can only get out through calibrated outlets. This ensures in all models a uniform exit speed of the air at 540 pto of 70-80 m/sec (av. 250 – 280 km/h) in the course of moving from the centre of the turbine and through the fixed blades. The radial flow of air fills the whole inside of the aluminium casing and is guided to the

Total adjustment of the air volume and speed and complete control of the air



outlets. This creates a revolutionary sprayer air blast in from, and substance to the air outlet ducts in equal volumes. The outlet choice in terms of shape and number drastically reduces equal volumes, as well as the amount of air required to carry the spray mist and only involve from 6000 to 22000 m³/h. This is less than double – or even three times – that of most Axial Flow designs.

The result in penetration of any space from vegetables, flowers, vines, bushes and trees is done by a shearing action, not the pressure of high volume. In their on-going efforts to comply with

strict German legislation, LTA meets all relevant material and performance criteria and protocols. Of specific importance are testing of Vicar developments done in 2002 and 2015, specifically related to better coverage with reduced over-spraying of products by 90%.



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Jon Roberts

New pigmented varieties – perspectives and potential.
By Jon Roberts

Recently, we hosted a presentation by visiting researcher Dr Jaime Zacarias, who is part of the Biotechnology Department led by Prof Lorenzo Zacarias and Dr Maria Jesus Rodrigo of IATA-CSIC, Valencia, Spain.

The focus of the presentation was “Bioactive compounds and nutraceutical properties of red oranges”, covering these three areas of research by IATA, concerning Lycopene oranges:

- biochemical and molecular bases of colouration
- postharvest quality and disorders, (i.e. chill injury issues)
- bioactive compounds and nutraceutical properties.

Biochemical and molecular bases of colouration

Why carotenoids?

Zacarias explained that red and blonde oranges mature similarly. And the levels of other quality compounds such as sugars, Vitamin C, Vitamin E and flavonoids are much the same. He noted that, as one of the largest horticultural crops in the world, citrus is recognised as an important source of Vitamins C, A, and E, as well as carotenoids, amongst others. But there is a marked difference in the carotenoids. Regular intake

Re-evaluating citrus properties and benefits

This research has sought to determine the effects of higher concentrations of carotenoids.

of carotenoids in the diet has been associated with the key health benefits of reducing the risk of developing degenerative diseases, cardiovascular issues, and obesity. By informing consumers of these health benefits, as well as recent findings of the carotenoid composition of red (lycopene) oranges, the work of this research team is helping to address the unfortunate decline in citrus consumption.

A high antioxidant capacity is needed to “quench” singlet oxygen, which is a highly reactive form of oxygen that causes oxidative damage to biological molecules like lipids, proteins, and DNA. The antioxidant capacity of red oranges was measured as twice that of blonde oranges, showing a relationship between the higher carotenoid content and antioxidant capacity.

Colour matters

This research has sought to determine the effects of higher concentrations of carotenoids. And findings show that the carotenoid concentration in the red varieties (lycopene) of oranges are similar. However, when compared to traditional oranges (blonde oranges), the studies show a carotenoid concentration that is five times higher in red oranges. Interestingly, they have also discovered that red oranges accumulate very high levels of colourless carotenoids – Phytoene and Phytofluene – representing 80% of the total carotenoids. Zacarias added that, according to current findings, these red orange varieties are the richest source of these two compounds, compared to any foodstuff they have encountered.

Lycopene is absent in blonde oranges while there is around 6% lycopene in red oranges. Although they have a low level of β carotene (Vitamin A precursor), red oranges have up to 60% higher Provitamin A activity.



Avoiding too much detail around the biochemical differences for colouration, Zacarias explained that, compared to blonde oranges, red oranges appear to have a “blockage” at the point of conversion from lycopene to carotene.

The juice

The juice of red oranges reflects a carotenoid concentration that is three times higher than blonde oranges. This is all due to the high levels of Phytoene and Phytofluene, as well as higher concentrations of lycopene and β carotene.

Postharvest quality

He touched on postharvest quality disorder, noting that research shows similarities in the effects of postharvest cold storage on red and blonde oranges. However, red oranges can withstand chilling injuries better than blonde oranges. He recommends further research in this area.

Bioactive compounds and nutraceutical properties

In 2023 the team started in-vitro research with Dr Ma Carmen Collado at the IATA-CSIC Department of Biotechnology. They evaluated the effects of orange juice and pulp on gut microbiota. In-vitro colonic trials showed that the digestion of pulp and juice from red oranges induced higher growth of beneficial Bifidobac-

teriums and Bacteroids, while both blonde and red oranges equally reduced colonic populations of detrimental Enterobacteria.

With in-vitro studies being limited in scope, they initiated an in-vivo clinical study with Dr Cecilia Martinez at the Department of Gastroenterology and Paediatric Nutrition at the University Hospital in Valencia. In a control group of normal-weight children, they studied the effect of red vs. blonde oranges included in the diets of eight- to 16-year-olds with moderate to severe obesity.

The study split the group with moderate to severe obesity into two groups: one group was supplemented with a blonde orange and the other with a red orange (CaraCara) in their diets. Both groups continued with this dietary intervention of an orange every day for four weeks.

Samples of stools, urine, and blood were collected before and after the intervention to evaluate a potential improvement in different clinical parameters, like triglycerides, cholesterol, inflammatory indicators, and antioxidant activity in the blood. They also studied microbiota modulation before and after the four weeks.

The study is on-going, as it has been difficult to recruit the required number of children for a robust clinical study with these conditions. They aim to complete this work in 2025.

Preliminary results

Preliminary data of the study has been very encouraging. Children supplemented with blonde oranges showed no significant change of carotenoids in stools or blood. However, children supplemented with CaraCara showed increased Phytoene levels of up to 20 times more in stools and

Red oranges can withstand chilling injuries better than blonde oranges.

Red lina cultivar
compared to Palmer



five times more in blood. This proves that Phytoene – which is soluble – is accessible to the bloodstream, and can potentially expose the body to its antioxidant benefits.

In the preliminary results of the effects on the microbiota, there was an increase in the species associated with a healthy gut microbiota, in the group supplemented with the red oranges. And the species associated with an unhealthy microbiota reduced. This experiment has shown very similar results between the in-vitro and in-vivo experiments in this human clinical study.

Likewise, an improvement in some clinical parameters was observed with the group supplemented with blonde oranges. But the improvements were even greater with the group supplemented with red oranges. Both groups showed a reduced insulin resistance index, as well as improved levels of triglycerides, to acceptable levels. This is encouraging, as these are the conditions associated with obesity.

The same trial was started in 2024 with normal-weight children focusing only on microbiota modulation. The final results of these two studies will be compiled in 2025. ▶

Regular intake of carotenoids in the diet has been associated with key health benefits.

