HOW RESPONSIBLE ARE YOUR SUPPLY CHAINS?

NSF RESPONSIBLE SOURCING: SOLUTIONS AND SERVICES

Agriculture and food face dynamic, complex and interconnected risks that potentially threaten the supply of raw materials and the reputation of brands. NSF’s Responsible Sourcing services assist clients in addressing food security and brand reputation risks by building sustainable, resilient, secure supply chains as well as by demonstrating environmental and socially responsible sourcing practices.

NSF’s responsible sourcing clients move through five stages, and can engage with NSF at any stage:

**UNDERSTANDING & DIAGNOSIS**

**PLANNING FACILITATION**
Enables intensive discussion and activity regarding a client’s responsible sourcing concerns, including how to ensure the client improves on their performance within manageable levels of risk and resources.

**SUPPLY CHAIN MAPPING**
Increases supply chain transparency, knowledge and understanding.

**GAP ANALYSIS**
Compares actual performance in responsible sourcing with potential or desired performance.

**TREND IMPACT ANALYSIS FOR SUPPLY CHAINS**
Systematically examines the effects of possible future events by extrapolating historical data. The events can include technological, political, social, economic and value-oriented changes with respect to business risk.

**HORIZON SCAN**
Detects early signs of potentially important developments through systematic examination of potential threats and opportunities. With emphasis on technological developments, unexpected issues as well as changes in past assumptions regarding persistent problems and trends.

**P-VALUE ASSESSMENT**
Assesses probability as a percentage risk of a fault at one end of a supply chain becoming or escalating into a problem at the other.

**DESIGN**

**SWOT ANALYSIS**
Identifies internal and external influences to help organizations develop a full awareness of the factors involved in proposed responsible sourcing initiatives and policies.

**PEST ANALYSIS**
Focuses on external environmental factors affecting a client by exploring political, economic, social and technological influences on their supply chain.

**OPPORTUNITY PRIORITIZATION**
 Determines the relative opportunity cost, potential impact, and relative importance of a diverse array of options when there are multiple criteria for determining importance to improve supply chain sustainability.

**POLICY AND STRATEGY DESIGN**
Provides development of sourcing strategies, policies, and internal governance policies.

**FEASIBILITY STUDIES**
Analyzes how successfully a proposed project can be completed, accounting for economic, technological, legal and scheduling factors to determine if it is feasible, within estimated costs.

**IMPLEMENTATION**

**PROJECT MANAGEMENT**
Oversees implementation a client’s responsible sourcing strategy, or aspects of that strategy.

**AUTHENTICATION AND VERIFICATION**
Audits recognized sustainable sourcing standards including animal welfare, environmental best practices, and social compliance.
Rosy Glow Success Story for Growers

This mutation of Cripps Pink, discovered by the Mason’s in Australia and licensed around the world by Graham’s FacTree, has been a tremendous success story for growers.

This improved selection shows greatly improved percentage coloured fruit over Cripps Pink, which leads to the benefit of significantly increased pack-outs under the Pink Lady® brand. The increase in pack out ranges from 25% to as high as 60%, making the production of Pink Lady® fruit a much more attractive choice for the grower. Compared to Cripps Pink, the Rosy Glow producer also sometimes has the advantage of a single pick. Convert these benefits into financial terms and the financial benefit of growing Rosy Glow can be as significant as a 100% improvement on Cripps Pink!

The International Pink Lady Association (IPLA), Apple and Pear Australia Limited (APAL), South African Pink Lady® Association (SAPLA) and TopFruit continue to ensure the sustained success of the Pink Lady® brand. Consumer marketing and communication, grower communication and not least the monitoring of quality standards have been pillars to sustain the longevity of the brand. This has helped to ensure exceptional returns to all involved in the Pink Lady® business.

Rosy Glow is an extremely successful mutation which provides the grower with a most compelling argument with which to replace existing Cripps Pink trees. Alternatively the solution may be to simply plant more Rosy Glow trees.

Rosy Glow trees are available from Rosenhof Nursery, Witzenberg Range Nursery and Stargrow Nursery.

The world’s most sought after cultivars come from TopFruit

Please contact Peter Allardman from TopFruit for further information
T 021 874 1033  F 021 874 2110  E petera@topfruit.co.za
W www.topfruit.co.za  PO Box 73 Simondium 7670 South Africa
In only ten years, we at GoReefers have become the leaders in Global Perishable Logistics. It's because we always work hard at thinking differently. We were the first to load ambient citrus, the first to load fruit containers from Maputo and the first to manage the cold chain, from pack house level, with Namibian grapes. Without these and other continuously innovative thoughts we would not be the highly passionate outcomes focused logistics champions that we are today.
PRODUCT CLAIMS
Provides standard and custom certification and auditing programs for supply chains and raw materials, with technical development of assurance programs across areas such as food safety, quality and sustainable sourcing risk management.

ANALYSIS & INSIGHTS
METRICS AND REPORTING
Utilizes data collection and interpretation of responsible sourcing performance metrics to assess program success and prescribe changes if necessary.

BUSINESS INTELLIGENCE
Analyzes large data sets to optimize opportunities for competitive advantage

REVIEW & IMPROVEMENT
BENCHMARKING
Compares client responsible sourcing processes and performance metrics to industry bests and best practices from other companies

SYSTEM FEEDBACK AND ENHANCEMENT
Analyzes responsible sourcing practices and identifies opportunities for continuous improvement and optimization

TRAINING AND DEVELOPMENT
Provides platforms to share knowledge, build relationships and challenge thinking

PERFORMANCE TREND ANALYSIS
Observes how client performance has developed over time, and predicts how it is likely to develop in the future

INTEGRATION SUPPORT
Facilitates alignment of responsible sourcing efforts with overall business strategy, including marketing

For more information, contact: foodafrica@nsf.org or +27 (0) 21 880 2024.

ASSURED FOOD SAFETY
NSF provides assurance through independent audits as well as accredited industry-recognised certification, supplemented by approved public training in global food standards.

CERTIFICATION
• GLOBALG.A.P.
• localg.a.p.
• LEAF Marque
• Nurture
• HACCP
• SIZA Ethical
• BRC Food
• BRC Packaging
• BRC Distribution
• BRC Brokers
• IFS Food
• IFS Broker
• FSSC 22000
• SANBWA
• ISO 22000
• ISO 14000
• ISO 18000
• GFSI MCB

RETAIL CONSULTING & TECHNICAL SERVICES
• Supply Chain Assurance
• Trading Law
• Retail & QSR Inspections
• Crisis Response
• Specification Management
• Recall Plan Review

TRAINING
We offer training in GLOBALG.A.P., Nurture, HACCP, ISO 22000, FSSC, BRC and Internal Auditing. Visit our 2017 Training Calendar at www.nsfafrica.com/training

NSF INTERNATIONAL
Call: +27 (0) 21 880 2024 | Fax: +27 (0) 86 519 0005 | Email: foodafrica@nsf.org
Visit: www.nsfafrica.com
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erwyl ek hierdie maand se stories vir die Sagtevrugtejoernaal bymekaar gemaak het, was daar veral een storie wat my geraak het. Die een van die plaaswerker, Silence Hlathswayo, wie se ouers se droom dit was dat hy soos hulle in landbou betrokke sou bly. Meer spesifiek dat hy soos hulle die geleenthede sal aangryp wat Crocodile Valley Citrus Estate na sy kant toe swaai. (Sien die storie op bladsy 28).

Dit het my so bietjie laat dink aan my eie omstandighede en hoe dinge besig is om in landbou te verander. Ek is mos maar ’n stadsmeisie wat grootgeword het in Bellville. En alhoewel my pa vir die Departement van Landbou gewerk het, was dit wat ek oor die bedryf geweet het gewaarder derde toe ek vyftien jaar terug daaroor begin skryf het. (Ons huis was egter altyd vol vrugte, baie waarvan ons in die straat uitgedeel het. Ek het op ’n stadium toe ek ’n kind was gedink dat ek kon sien of ’n appel goed of sleg was deur net na dit te kyk.)

Die ding is egter dat my ouers nooit regtig voorskriftelik was oor wat ek met my lewe maak nie. Die wêreld was relatief oop voor my, ek kon doen wat ek wou. Tog as iemand vir my op skool gesê het dat ek eendag ’n landboujoernalis gaan word, sou ek myself seker in ’n toestand in gehuil het en alles in my mag gedoen het om dit te verhoed.

Goed het egter anders uitgedraai as wat ek beplan het en baie beter daarby. Ek voel soos wat die fantasieskrywer Terry Pratchett homself op een van sy boeke beskryf het, dat hy sy werk so geniet dat hy bang is mense vind uit en hy dan ophou betaal word daarvoor. En alhoewel dit seker verkeerd is, probeer ek my baie jong kinders nou al so bietjie probeer beïnvloed om ook eendag in die bedryf betrokke te raak.

Hoekom? Want die geleenthede is oneindig en ek is mal oor die mense. Oor die afgelope paar jaar doen ek al hoe meer stories met jong boere. Veral daar in die Hexriviervallei en die Koue Bokkeveld. Wanneer ek hulle vra hoekom hulle boer – of hulle ouers hulle dan nie gewaarsku het oor die politiek nie – dan is die antwoord gewoonlik dat landbou in hulle bloed is. Hulle is ook gewoonlik baie selfverseker en glo dat as daar nie vir hulle ’n toekoms hier is nie, dat Suid-Afrikaanse boere hoog in aanvraag oorsee en in die res van Afrika is. Dieselde met ons navorsers, soos wat ons in die maand se Mzansi Magic Stories sien (op bladsy 24). Baie van hulle word oorsee opgeroep, maar kom weer terug, met die wereldkennis wat hulle dan weer hier toepas.

Dit is ’n opwindende veld en ek kan nie dink aan iets beters wat jy met jou lewe kan doen nie.
Every four years, most of us experience and/or witness a few international events which have the ability to elicit varying responses; ranging from pure emotion to highly calculated opinions - and everything in-between.

These events are mainly focused on sport, such as the World Cup Rugby, Olympic Games, Soccer World Cup and so forth, but also include politics, such as the Presidential elections in the USA or the UK’s decision to leave Europe (Brexit). Some other important events on the international scene occur within shorter intervals. Examples are the Choir Olympics that happens every two years (of which South Africa incidentally is the reigning World Champion!), the Tour de France Cycle Race that happens every year, or some tennis- and golf tournaments.

Whatever the event, it involves active participants, spectators/viewers, commentators, money, logistics and a range of other ingredients to ensure success. The main ingredient regarding the participants (athletes, choristers, golfers etc.) is discipline; primarily self-discipline to ensure that they continue to perform at optimum level. Although, or maybe because the events happen in cycles, it requires true commitment; but despite this, success is not guaranteed and each cycle needs to be tackled as if it is encountered for the first time.

In our industry, we are also acutely aware of the cyclical nature of things. Some cycles are longer than others and each has its own challenges and rewards, requiring different approaches by all involved in the value chain. Some of these require the skill, talent and self-discipline of a chorister, while others require the strategy and tactics of a sportsman or sportswoman. The cycles are prone to changes and these changes might be due to natural causes and/or human actions, leading to big volume and/or high income in one season, followed by the opposite in the next season.

All stakeholders in the value chain should be able to utilise these cycles to their advantage and it seems the best way to achieve this, would be where strategies and plans are put in place where the focus is on mutual benefits.

Consumers worldwide require consistent availability of high quality fruit and meeting these requirements can only be achieved when all parties leverage the cycles; in some instances, it might involve “educating” consumers about the various cycles of the different fruit kinds and in other cases, it might require adapting marketing strategies to proactively manage over- and under supply.

The recent drought in some production areas is an example where the normal cycle was disrupted and thus necessitated adaptation of marketing plans. Such disruptions in or of the cycles, have a financial impact on all role players and communication about it is important.

This cyclical nature should be recognised and action and inter-actions between stakeholders should be guided by it in order to assist in ensuring a profitable and sustainable fresh fruit industry.
Established in 1926, the Perishable Products Export Control Board (PPECB), is South Africa’s official export certification agency for the perishable produce industry. By combining a vast range of expertise and services the PPECB seeks to enhance the credibility of the South African export certificate and support its customers to become the preferred suppliers of perishable products world-wide.
Dis hoe ons rol

Saterdagoggend, end van die maand.
Daar is 'n tou hier voor die toonbank van die onderdeleplek en die verkoopsman se geduld is aan die opraak met die oompie wat nie kon besluit nie.

"Jy moet die hele unit koop, jy kry nie net die shaft nie," verduidelik hy weer. "Dis duisend driehonderd en dertig Rand."


"Hele unit - dis sy prys."


Die verkoopsman skud sy kop. "Jy moet jou mind opmaak," sê hy. "Ons is besig hierso vanoggend."

Die oubaas huiver nog 'n oomblik, dan laat sy magteloosheid hom vou. "Kom," sê hy vir die seuntjie wat aan sy broekspyp klou, "dan moet hy seker maar nóg 'n maand staan."

Ja, dinge is duur. Ons sien dit elke dag. "n Silinderkop, "n tjop, selfs "n skeppie groentesop. Maar, troos ek myself as ek self so sukkel om die Rande uit te haal vir 'n item, dis dan seker maar sy prys. Dinge vind self hulle prys. Dis 'n kwessie van aanbod en aanvraag. As jou perskes te duur is gaan mense dit by iemand anders koop, iemand wat bereid is om net sy pond vleis by sy insetkoste te sit en nie nog 'n dik laag vet ook nie. Dinge vind self hulle waardebalans. Ek vertrou daarop en dan betaal ek maar.

Maar karre?! Newwermaand 'n pond vleis; die prys van 'n nuwe voertuig weeg swaarder as sy tonnemaat. Is hulle mal? Daai, vir 'n doegesitse bakkie? En kyk wat kos sy dienste, en sy onderdele?

Goed, sou jy hom uitmekaar haal en al die honderde stukkies op 'n ry pak sal die som seker nie so buitensporig lyk nie. Dit moet 'n duur spulletjie wees; al die tegnologie en prosesse. So aanbod en aanvraag vind dan seker maar wel mekaar, al dink ek steeds daar’s érens 'n vet luislang in die gras wat SA se motorpryse betref.

Maar wat is die aanbod? Dis sedan, luikrug, sportnute, bakkie of bus. Almal met hul luuks-hede. By elkeen kan jy kies tussen fabrikaat, model, kleur en klatergoud, maar die een is eintlik maar soos die ander. 'n Hilux verskil in beginsel of bekleedsel nie veel van 'n Ranger nie en al dit dat 'n Opel se knoppies aan die ander kant as 'n Nissan s’n, sal 'n besoeker van Mars nie juis die verskil oplet nie. Gewone voertuie is eintlik maar generies. Dis hoe dit is.

En die aanvraag? Ja, natuurlik hou die manne van sulke windgat wiese met alles wat blink en klink en self kan dink. Dis great. Dit wys mos darem wie jy is. Maar wat is mense se behoeftes ràrig? Mense van alle vlakke?

Hoe, byvoorbeeld, sou 'n ryding lyk wat elke dag 'n vrag armes en hul pakkaaks moet dra oor verspoelde modderpaadjies teen die steil kronkels van die Transkei. Of 'n plaasbakkie wat soopings omry doer in die rante van die Moordenaarskaroo. Of 'n karretjie vol mense wat oor skure kletterpaaiie van Kliprand af Betjiesfontein toe. Is iets soos 'n luukse kajuit met 'n rekenaarstelsel en 'n informasieskerm en 'n trukamera dan ràrig nodig? Is selfs net bekerhouers hoegenaamd 'n prioriteit?

Hoekom dan nie maar eerder 'n goeie ou blik paneelbord wat die aanbod van Namakwaland se son kan oorleef nie? Met plek bo-op vir 'n hoed en 'n holte vir 'n pakke padkos. Die motorvervaardigers sal waarskynlik sê dit gaan oor moderne standaarde. Veiligheid en so aan. Wat elektroniese beheerstelsels beteken en lugsakke en al daai.

Ràrig? Het jy 'n rekenaarbeheerde remstelsel nodig as jy nooit vinniger as 70km/h aankruie op plaaspaaiie nie? Wat waar herstel moet word en teen watter prys, vir 'n man wat net nouself sy koel moet gaan melk?

En ligte wat self aanskakel as dit skemer raak en ruitveërs wat self begin werk as die eerste druppels val? Vir wat sal jy dit soek? Jy sal waar-skynlik eerder remskoene wou hé wat langer hou en ligte wat nie die hele hoek van 'n bakkie...
Dis hoe ons rol
VERVOLG VAN BLADSY 5
vol sit waar die stokke en klippe hulle breek nie. En veiligheidsgordels wat nie op jou skree as jy ry waar jy elke paar honderd meter ‘n hek moet oopmaak nie, en geen elektroniese boksies wat jou tussen niks en nêrens gestrand laat en dan is daar nie eens ‘n draad wat jy kan volg om te kyk of hy dalk losgekoms het nie.

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Nutrition according to plant development

**FRUIT**

**FLOWERING AND FRUIT SET**
- During flowering, a combination of GreenGold™, Achilles™, Seniphos, Nitrabor and/or Unika Calisium™ can be used to promote flower initiation and set.
- During fruit set, a combination of Fruit OEMFF® Grow, Bortrac, Stopit and Caltrac can be used to improve yield and inception for quality.

**FRUIT FILL / RAPID FRUIT EXPANSION AND POST-HARVEST**
- During fruit fill/rapid fruit expansion, apply Fruit OEMFF® Flower & Fruit to improve the plant’s performance and to keep the plant green for longer. Also use Foli-Grande™ or Foli-Plus™ for better yield and quality.
- During post-harvest stage, apply Fruit OEMFF® Grow to maintain carbohydrates.

**EARLY VEGETATIVE GROWTH AND FLUSH**
- At the start of the new growth season, use KynoPop™ for a rapid start and use Brio™ as a blend specially formulated for efficiency.
- At first flush of the new growth season, use Nitrabor, GreenGold™ and Brio™ to ensure that the right elements are available for use before flowering.
- At first flush, Fruit OEMFF® Starter is a foliar feed for a vigorous start.

With Kynoch’s innovative and tailor-made products you can apply fertilizer according to the needs and growth stages of your plants. In this way, Kynoch ensures that your fruit get what they need, when they need it the most. Furthermore, you have peace of mind, because you know, with Kynoch on your farm from the outset, you only get the best from your fruit. In addition, you can be assured of enhanced efficiency for quality and yield potential.

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Not trading in Western Cape.
Growers face a high level of risk when planting new orchards as information about the cultivar is often limited. Cases have been documented where entire blocks have had to be taken out due to poor performance, often related to poor climatic adaptability or susceptibility to some or other stress factor. The entrance of Provar into the industry as an evaluator of cultivars and rootstocks has been welcomed by most.

South African growers have also been vocal about the quality of nursery trees available to them, while “happy average” rootstocks are often preferred at nurseries compared to more ‘difficult-to-root’ material. Considering these opportunities for improvement, HORTGRO SCIENCE researchers, Prof Wiehann Steyn, HORTGRO SCIENCE crop production manager, and Prof Karen Theron from Stellenbosch University, accepted an invitation from Institut de Recerca I Tecnologia Agroalimentàries (IRTA) in Spain, which has been using an independent evaluation system with notable success for over twenty years. Dane McDonald spoke to Prof Steyn about the one-week trip and potential lessons or opportunities for the SA industry.

Tell us more about the Institut de Recerca I Tecnologia Agroalimentàries (IRTA) and how it operates?
IRTA is very similar to the Agricultural Research Council (ARC) in South Africa. It is dual private/state type of company. It is not parastatal, but something similar. They are funded by government and they are also funded by projects. They serve the fruit industry in Catalonia and have been running an independent cultivar and rootstock evaluation programme for the past 20 years.

Nursery tree quality has been identified as a stumbling block in South Africa. What opportunities exist for South Africa in this sphere and what can we learn from the Spanish?
There is definitely a big opportunity for tissue culture rootstocks and it is commonly used for stone fruit in Spain and the rest of Europe. It allows you to root ‘difficult-to-root’ material and produce a tree quicker. We visited Agromillora, which is one of the biggest fruit tissue culture laboratories in the world. Agromillora estimated that they would have produced about 80 million plants by tissue culture in 2016. They are in several countries worldwide, though not in South Africa. They were interested in South Africa, but need to produce more than 500 000 trees to make it economically viable, which they could not do in our stone fruit industry. In recent times, however, opportunities for tissue culture has expanded to other fruit types. So they are currently making pears, apples, and various nut trees which are traditionally quite difficult to root. They are also interested in avocados, because avocado trees have such a difficult and long propagation protocol. So tissue culture has much potential.
Tissue cultured Garnem root-stocks nearly ready for budding at VIVERSA nursery. Tree loss has been negligible.

There is a trend towards the production of trees in pots. Grooves in the pots helps to prevent roots from circling.

The great thing about tissue culture, is that the work is done in a sterile environment. So the risk of disease is reduced when compared to having a layer bed in the ground.

We noted a trend in Spain, to go out of the soil. They are going the pot route. For us, it is still cheaper to produce trees in soil, but I don’t think people factor in the loss of trees. When you take trees from the soil, you are always going to lose some of the roots. So, in that process you have an imbalance between shoot growth and root growth. And what happens when you plant the tree? There is normally a lag before it starts to grow properly because it’s got to re-establish a balance. It has to recover from the transplant shock.

When using pots you are also less limited in terms of when you plant. And they’ve got some nice innovations with the pots. The pots are placed above the ground on trays and the pots have little ribs that prevent the roots from circling. All of this makes it much simpler and decreases the risk of disease. The tree is planted and it can grow straight away.

How does their cultivar evaluation work?
The Spanish system works like this: they evaluate the cultivars, nobody pays for it, and the data is freely available. They won’t blast any cultivars though. If something doesn’t perform they won’t say ‘this thing is [bad] don’t plant it’. They would rather say… ‘these are the great ones that you should be planting’.

So, they make positive recommendations, and keep quiet about the rest. These positive recommendations are free of charge, but whoever is interested in more detail about the cultivars need to pay through attendance of full-day seminars and access to booklets with the actual detail. This way, nearly half the costs are recovered.

So the government is doing the evaluation?
Yes, there is a big debate in IRTA about that, such as whether they should be doing it for free. But they see it as a service to industry.

And they see it as their connection, because they don’t have an organised industry like ours. They don’t have a structured industry that pays levies … there is no HORTGRO.

Considering what you observed in Spain, what would you recommend for breeding programmes in South Africa?
If we want to do breeding we will need to do it properly. It is a commercial thing. Breeding is not in the sphere of research. What I mean is that although there is much research involved in understanding tree genetics and improving breeding efficiency, one can breed without necessarily underpinning it with a large research programme.

The focus should be absolutely and ultimately on the product. As far as industry is concerned, the only real thing of value is what is produced. And preferably, whatever is produced should pay for subsequent breeding efforts. In Spain, IRTA has a couple of different partners, including a couple of big, local companies like Nufri and international cultivar development programmes such as ASF in France and Plant and Food Research in New Zealand. It’s not funded by the industry per se.

Do you have any concluding words for fruit growers?
Cultivar evaluation is great, let’s go for it. We can do better with regards to breeding and nursery trees and should consider what is being done in Spain.

LIST OF COMPANIES:
IRTA
NURSERIES
• Agromillora
http://www.agromillora.com/eng
• Certiplant
• Grard Iberia SL
http://www.pepinieres-grard.com/
• VIVERSA
• NUFRI

Na voltooiing van sy graad in 2002 het Iwan by die Landbouuarsingsraad (LNR) aangesluit, waar hy vir agttien jaar as appelteler gewerk het. Hy het ook verdere bedryfsbydraes gemaak as kernvrugte-teler by Colors Fruit. Alhoewel Provar tans baie van sy tyd in beslag neem, probeer Iwan sy kreatiewe kant koester deur met olieverf te schilder en keramiekbeeldhouwerk te beoefen. Sy werke is al in verskeie kunsgalerye uitgestal en hy werk tans aan ‘n opdrag vir ‘n Kaapse binnehuisversieringsmaatskappy.

Dr. Iwan Labuschagne, die bestuurder van Provar, het jare se ondervinding in kultivar evalusie. Hy het vir 18 jaar by die Landbouuarsingsraad as ‘n appelteler gewerk.

Provar ondernem die algemene onafhanklike evaluasieproses van nuwe kultivars en onderstamme vir die Suid-Afrikaanse vrugtebedryf. Provar ondersteun alle kliënte se kliëntele en produsente, om ingelige besluite te kan neem.

‘n Nuwe era vir Kultivar Evalusie

Beide kliënte en produsente sal bemagtig word, om ingelige besluite te kan neem.

Die onafhanklike evaluasie van nuwe kultivars en onderstamme vir die Suid-Afrikaanse vrugtebedryf is van kritieke belang om risiko’s vir produsente daadwerkelik te verminder en só ‘n gesonde en kompetende bedryf te versterk.

Die behoefte aan ‘n onafhanklike evaluasieproses, verwyderd van ander bedryfsgroepinge, bestaan reeds ‘n geruime tyd en het tot die toetstandkoming van Provar in 2013 geleid. Bedryfsorganisasies soos die Suid Afrikaanse Appel en Peer Produsente Vereniging (SAAPP), Suid Afrikaanse Steenvrug Produsente Vereniging (SASP), Inmaakvrugte Vereniging (IPV) en Droëvrugte Tegniese Dienste (DTD), ondersteun Provar om as onafhanklike kultivar- en onderstam-evalusiediensverskaffer vir die bedryf op te tree. (Voorheen was hierdie iniisiatief as Evaluco bekend.)

Provaat Intelektuele Eiendom-eienaars, insluitend kultivartelers, bestuurders en lisensiehouers, uitvoerders en ander rolspeilers, verwelkom Provar en is optimisties oor die rol wat Provar kan speel om plantmateriaal onafhanklik van ander bedryfsgroepinge, te ontleed. Die sagtevrugtebedryf sal tydens die aanvanklike onafhanklike evalusieproses (‘n drie jaar periode) bydraes maak en faciliteer waar nodig, maar geen inbreuk op Provar se onafhanklikheid hê nie. Kliënte kan intussen van Provar se dienste op ‘n vrywillige ‘verbruikersbetalingbasis’ gebruik maak.

Provar het as dryfveer vir die Suid-Afrikaanse vrugtebedryf die volgende diensdoelwitte:
• Objektiwiteit
• Geloofwaardigheid
• Onafhanklikheid
• Deursigtigheid
• Gestandardiseerde inligting

Provar onderneem dat alle inligting oor kultivars en onderstamme verkry sal word, na ‘n straawwe data-insamelingsproses en verge-lyking vanuit verteenwoordigende evaluasie-blokke. Data-insameling sal geskied op grond van wetenskaplike beginsels en protokolle wat deur spesialiste en internasionale ‘beste-praktyke’ onderskeiding word. Hierdie ‘beste-praktyke’ is aangepas vir plaaslike toestande. Hierdie inligting sal die potensiaal van nuwe kultivars/onderstamme met reeds bestaande, kommersiële (standaard) materiaal vergelyk.

Provar ondersteun die beginsel dat alle plantmateriaal onafhanklik geëvalueer moet word, voordat dit aan produsente beskikbaar gestel word. Hierdeur sal produsente bemagtig word om die “regte vrae” aan kultivar-eienaars en lisensiehouers te vra, veral rakende aansprake wat oor sekere plantkenmerke gemaak word.

Só kan produsente duur foute vermy wanneer hulle nuwe aanplantings mak.

“Ons diens aan kliënte en aan die Suid-Afrikaanse vrugtebedryf sal op integriteit, en ‘n oop en geloofwaardige verhouding gebou word. En natuurlik op suiwer, wetenskaplike data gegrond op deeglike kennis van elke kultivar onder evalusie,” het Dr. Iwan Labuschagne, Provar bestuurder gesê.

Provar se kantore, laboratorium en koelkamerfasiliteit is in Zandwykpark (langs die Ou Paarl Pad, R101) buite Paarl, geleë, en sal binnekort gereed wees om kliënte vir die komende seisoen te bedien.

Vir meer inligting, kontak dr. Iwan Labuschagne by 071 685 8857 of iwan@provar.co.za
Waardeproposisie aan Kliënte (5 Aanbiedings)

<table>
<thead>
<tr>
<th>Onafhanklikheid</th>
<th>Geen botsing van belange met enige ander bedryf of speler en geen direkte verbintenis met telers en eie kultivars</th>
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<tr>
<td>Beste in Klas Evalueerings-metodologie (Internasionale Evalueeringsprotokol)</td>
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<td>Kompeteerde Pryse/ Koste effektief</td>
<td>Verhoogde keuse van volledig (onafhanklik) geëvalueerde kultivars in spesifieke areas om duur plantfoute te verminder</td>
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<tr>
<td>Waarborg/stempel van goedkeuring</td>
<td>Gemoedrsus dat die voorgestelde kultivars heel waarskynlik die verwagte en vereiste finansiële opbrengste sal lever</td>
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<tr>
<td>Risikoverligting</td>
<td>Gemoedrsus dat die voorgestelde kultivar heel waarskynlik die vereiste finansiële opbrengs lewer</td>
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Wie is die Begunstigdes

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<tr>
<th>Produsente/ Produsente Groeperings (&quot;A&quot;)</th>
<th>Intellektuele Eiendom Eienaars, Telers en Uitvoerders (&quot;B&quot;)</th>
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<td>Geen botsing van belange met enige ander bedryf of speler en geen direkte verbintenis met telers en eie kultivars</td>
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<tr>
<td>Verhoogde betroubaarheid in die kwaliteit van dienste/data/inligting wat verskaf word aan kliënte</td>
<td>Vermindering in oorhoofse koste, dit wil sê ‘n verbeterde vermoë om af te skaal op interne/eie evalueringkostesentrum, te skaal op interne/eie evalueringkostesentrum, met verhoogte geloofwaardigheid van inligting aan produsente</td>
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In Julie vanjaar is HORTGRO se uitvoerende direkteur, Anton Rabe, vereer vir sy bydrae tot die landboubedryf in suidelike Afrika. Anton is benoem vir die kategorie landbou vir die South African Development Community CEO Titans Awards. Hierdie toekennings word jaarliks gegee aan bedryfleiers wat aan die voorpunt van hul onderskeie bedrywe staan en besondere bydraes lever wat ander se lewens, en die bedryf, verbeter. Die toekennings, wat al die afgelope 16 jaar toegeken word, dek 23 ekonomiese sektore.

Anton is spesiaal vereer vir sy uitstaande werk in die landboubedryf. Valdi Pereira, direkteur van CEO Global, wat die glansgeleentheid aanbied, het gesê dat slegs finaliste wat bo 80% behaal het tydens die beoordelingsproses spesiaal vereer word. Vanjaar is slegs drie uit die 23 kategorieë op so ‘n wyse vereer, wat dui op hoe groot eer dit is. Anton kon ongelukkig nie self sy toekenning ontvang nie, maar Dr. Konanani Liphadzi, hoof uitvoerende beambte van FruitSA, het namens hom die glansgeleentheid bygewoon.

HORTGRO sê: “Baie geluk Anton. Ons is trots op jou!”

HORTGRO Groete vereer!

Anton Rabe is aangewys as finalis in die kategorie vir landbou in die Titans Awards.
Tien finaliste het tydens ’n gala-aand op die Kronenburg-landgoed net buite die Paarl, met hart en siel gesing om die beoordelaarspaneel te beïndruk, maar uiteindelik was dit Neville Fortuin van Little Oaks by Villiersdorp wat die trofee huis toe geneem het. Neville wat maar ’n skrale 19 jaar oud is, sê musiek is sy lewe. “Ek studeer musiek net waar ek gaan... op die TV, internet ... oral waar die geleentheid homself voordoen. As ek die heeldag oor musiek kan praat, is ek gelukkig,” sê hy.

Neville het ’n kontantprys van R5 000 gewen en sal oor die volgende jaar die geleentheid kry om by landbou-geleenthede op te tree. Abraham Erasmus van Zandvliet Indigo Fruit Farming buite Ashton was in die tweede plek, en Josephine Karelse van Robertson Winery, by Robertson, was derde. Die beoordelaars was dit eens dat die kompetisie vanjaar uiters straf was, met elke finalis wat duidelijk baie talent het.

Agri’s got Talent is ’n sangkompetisie vir landbouwerkers in die vrugte- en wynbedryf. Dit was die derde jaar wat die kompetisie gehou is, en is vanjaar gesamentlik deur HORTGRO, die VinPro Stigting en die Wes-Kaapse Departement van Landbou geborg.


Die finaliste is uit 75 video-inskrywings gekies en het in die Paarl bymekaar gekom vir intensiewe sang- en verhoogopleiding onder die bekwame hand van Frieda van den Heever en haar span. ’n Lewensvaardighedekomponent, wat deur Procare Wes-Kaap aangebied is, het interpersoonlike vaardighede, asook konflik-en stresbestuur ingesluit.

“Die Agri’s got Talent projek bied aan vrugte- en wynbedryfwerkers ’n platform om hul talent ten toon te stel, en terselfdertyd deur lei van weggewerkte, waarmee hulle ’n verskil in hul onderskeie gemeenskappe kan maak,”
sê Anton Rabe, uitvoerende direkteur van HORTGRO, wat ook eerste met die idee van ‘n talentkompetisie vir plaas- en pakhuis/kelder-werkers vorendag gekom het.

Rabe se visie is dat hierdie kompetisie mettertyd na die breër landboubedryf op nasionale vlak kan uitbrei. Dit is volgens hom ‘n voorbeeld van die multi-dimensionele aard van die sektor waardeur die landbou en landelike gemeenskappe as geheel kan bydra tot die ontsluiting van die land se volle potensiaal.

“Gegewe die gewildheid van realiteittelevisie en die geleentheid wat agterna vir finaliste oopgaan, is ‘n volgende droom om ‘n CD van die laaste drie jaar se top 3 wenners te maak. Wie weet wat daarna kan gebeur en waar die kompetisie kan eindig?”

Rabe het werkgewers bedank wat plaaswerkers die geleentheid bied om hulle ander talente te ontwikkel en daardeur hul groei, menswaardigheid en selfvertroue te bevorder.

Volgens Jana Loots van VinPro en organiserer van die projek, is Agri’s got Talent ‘n projek wat op verskillende vlakke deur grense breek. “Van die vorige jare se finaliste het ware ambassadeurs vir hul plase en gemeenskappe geword, en maak werklik ‘n verskil deur onder andere musiekprogramme vir die jeug of ander opheffingsprojekte op die been te bring.”
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We create chemistry
There is a secret world in the fresh produce industry that ‘normal’ people who buy their fruit at the local supermarket know nothing about. A clandestine affair that makes ‘agent’ Uthmaan Rhoda get out of bed at 3 am in the morning, put on his warmest coat as he heads out to his bakkie and drives toward Epping in the pitch black early morning. The road is empty, but he is ready for the challenges that the morning might bring.

Uthmaan enters the Cape Town Market between 04:00 and 04:30 am. There is already a chaotic scrambling and cacophony of sounds. At about 4 am trading starts. He has to be at the top of his game.

It is a hard, pressured and competitive environment, he says, maybe that’s why there are almost no females around. “It is a very male dominated environment. Everything is about making the sale as quickly as possible and at the right price. There is an urgency and energy that is difficult to explain.”

But even given the harsh environment, he loves every minute of the day, since he first joined his dad at the market as a little boy.

Rhoda opened the first black owned market agency at the Cape Town Market, and is currently the only 100% black owned market agency. He believes that being a good market agent is all about being good with relationships: “There is no contractual arrangement. Everything between the grower and the agent is based on trust. Therefore you need to deliver what you promise.”

Establishing such a relationship is not easy when there are cultural and language barriers that you need to break down first.

The second aspect of becoming a good market agent is respect. “When you take the fresh produce from a grower’s farm, you take his livelihood. The produce is probably worth more than the vehicle that it is loaded on. You have to handle it with care.”

A third aspect is product knowledge. “Agriculture is a seasonal business, influenced by many factors. Familiarise yourself with agriculture. Know what the challenges are. Be on top of current economic trends.”

He mentions the ‘banting trend’ that saw the price of cauliflower jump from R3 per head to R25 within a three year period. You have to know what the end-user wants. This kind of knowledge is only acquired over time.”

Lastly Rhoda says you need perseverance and a passion for the industry.

According to Rhoda, the National Fresh Produce Market system we have in South Africa can only be described as a national treasure. “It plays a huge role in food security and provides work to thousands of informal traders. We hardly ever need to dump commodities.”

He emphasised the importance of Project Rebirth – which was established to address the deterioration of the National Fresh Produce Markets. One of the key strategic objectives of Project Rebirth is ‘trust building’ to help with the transformation of national markets and to help BEE agents break into the national markets.
The roadshow kicked off in Franschhoek, followed by events in Ceres, Robertson, the Langkloof and lastly in Modimolle. “One of the goals of the roadshow is to get a roadmap for the next ten years,” said Jacques du Preez, HORTGRO Manager: Trade & Markets. “As an industry we have major challenges ahead, of which climate change is just one, and we have to prepare strategically for the future. The stone fruit industry has many facets and it is often seen as fragmented – therefore we need to work together to ensure that all the players in this dynamic field pull in the same direction.”

Du Preez said growers need to take control of their fruit and participate in the value chain. “The fruit is not just your responsibility when it is in the orchard and is being picked. It stays your fruit until it reaches its destination and is consumed. You have to know what is happening to it, every step of the way.

“Stone fruit growing is a huge and long term investment. Planting costs could easily be R250 000/ha with orchards lasting up to 25 years. Consumer preferences can, however, change quickly and can bring down the commercial lifespan of an orchard to 18 years. Therefore you have to start your business with the consumer in mind. Know what they want to eat and produce that fruit type.”

According to Du Preez, quality and the right cultivars are the two things that matter most. “If we can ensure good quality fruit, we don’t have to be scared of other Southern Hemisphere fruit producers, such as Chile. Our eating quality is our biggest trump card. But quality needs to be consistent.”

He urged growers to choose cultivars wisely and to make sure that there is a market out there for their fruit. “There are concerns that we have too many nectarine cultivars on the market. We have to ask ourselves, if this is not too much? Are we over-complicating things?”

Du Preez said the stone fruit industry has to prepare for the future as the profitability of other industries like wine grapes and citrus, coupled with climate change can alter the industry dramatically. “Current trends indicate that wine grapes are being replaced by plum and citrus orchards in the Klein Karoo and Worcester areas. We have to prepare for this...
and as an industry have a strategy ready.
“For instance, if we want to increase consumption of plums in Europe, we need to address the eating quality to get the fruit ready to eat at time of marketing. We have to get our cultivars and handling protocols right, and produce plums that our sophisticated markets want to eat.”
SASPA Chairman, André Smit, echoed Du Preez and said that growers should become involved and informed. “Make sure you know what is happening in every aspect and especially with cultivar development. There is still good money to be made from producing stone fruit, however the financial pressure on the average to below-average producer is increasing. Hence, productivity and performance is key in maintaining the profitability of the industry. It is all about quality, consistency and the eating experience for the consumer. SA fruit is still held in high regard for its excellent taste experience.”
Smit warned that growers were gambling with their future if they did not comply with Globalgap and MRL (maximum residue limits) requirements. “There is zero tolerance in the market for non-compliance. Make sure your chemical advisor knows his game and gives you the right advice.”
He urged growers to support the SIZA ethical trade initiative and said that every grower has to support the transformation process and share their knowledge with new era growers. “I believe that there are still golden years ahead for the SA stone fruit industry. There are fantastic opportunities and I am confident that we are going to experience a growth period over the next five to ten years.”

“Start your business with the consumer in mind. Know what they want to eat and produce that fruit type.”

WHAT LIES AHEAD?
Dawie Maree, FNB Head of Information and Marketing, shared these thoughts about agriculture during the roadshow:
• Our economy is not in a good space. Business confidence is declining. Worldwide, and also in South Africa, the number of farming units are declining. The financial world looks at tractor sales as an indicator of the economic health of the agricultural sector, and since 2012 tractor sales have steadily declined.
• Storm clouds are gathering in SA with massive labour unrest, lack of leadership, ongoing poverty, crime and corruption, government policy uncertainty, climate change challenges, water security and soil loss.
• There are some unanswered questions: How will the weather play out? How will legislation change? How will politics influence the market value of farmland?
• FNB still see agriculture as a good investment opportunity. It won’t be smooth sailing and there are many economic uncertainties – and these will be with us for some time to come. But we are still positive about agriculture and will continue to invest in this industry.
• Even though there is a general perception that the average age of the South African farmer is 63, we see a lot of young people moving into agriculture, and for us that is always a good sign.
New book shows how watching dragonflies can help to monitor SA’s water

Stellenbosch University dragonfly experts have compiled a manual that shows how to use dragonflies to assess the state of dams and rivers.

South Africa’s 162 sun-loving dragonfly species are not only beautiful to watch, but also helping conservationists, water managers and farmers get to grips with the state of local freshwater sources, such as rivers, streams and dams. To show how this can be done, two Stellenbosch University (SU) researchers have written a new book which sets out how these insects can be used as freshwater monitors.

The new 224-page full colour Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index is written and compiled by Prof Michael Samways, renowned insect conservationist at the SU Department of Conservation Ecology and Entomology, and water ecologist Dr John Simaika, a research fellow at the SU Department of Soil Science.

“Using dragonflies in freshwater assessments is so simple, because they are relatively easy to identify,” says Prof Samways. “All you need is a good guide, a pair of close-focus binoculars, and a sunny day.”

The book synthesizes the research they have been doing together over the past decade to compile an easy-to-use biotic index relevant to South African water systems. In the process they have found new species or re-discovered ones thought to have been extinct.

The manual, which contains full-colour photographs and line drawings, can also be used as a field guide to locate and identify dragonfly species. Many of the photographs were taken by the authors themselves during the course of their research work on dragonflies, a broad term used for the true and familiar dragonflies as well as the small and usually more slender and delicate damselflies.

Dr Simaika describes the book as an easy read: “It is easily accessible, as anyone can download it, print it or share it, anywhere in the world.” The manual is available as a book or on CD, and will also be made available to download for free in the near future. It is published by the South African National Biodiversity Institute (SANBI), as part of its Suricata series.

“Books such as this one, are a great starting point for getting people to care about something. If only one in ten readers were to think more deeply about freshwater conservation, then we would have done a good job,” adds Dr Simaika. “I hope it will also encourage people already working in the water sector, particularly in the water resource arena, to think differently about freshwater biodiversity conservation, which all too often takes a back seat to providing water for human uses.”

Why use dragonflies to assess freshwater systems?

Dragonflies are found in all parts of the world, except in the Polar Regions. Some are highly sensitive to any human impact, while others are real opportunists that are able to live in the most artificial of habitats, such as cattle troughs and even bird baths. “This range of sensitivities makes dragonflies very useful as indicators of freshwater quality and conservation,” says Prof Samways. “When a water system becomes degraded through, for instance pollution or damming, there is always a change in the species found in an area, with a shift from sensitive specialists towards more generalists that are not that particular,” he elaborates. “If you know which species are present in and around a water source you are able to measure the extent to which a freshwater body is, for example, returning to its original condition after being polluted or after the clearing of alien plants.”

How does the scoring system in the manual work?

Prof Samways and Dr Simaika developed their dragonfly biotic system over the course of the
past decade. “One of the advantages of the dragonfly biotic index is that you do not have to wade into water to collect samples when you want to do an assessment, but can do so from the reasonable comfort of a streambank or the edge of a dam,” Prof Samways adds on a practical note.

The index takes three main features of each of the 162 South African species into account. Scores are given to each species, and these can be weighed up when weighing up the state of different water sources. The features used are:

• The general distribution of a species (for instance if it is commonly found over a wide area, or only in a few localities);

• Its threat status (whether it is rated as threatened or near extinct on the so-called ‘Red List’ of the International Union of Conservation of Nature and Natural Resources); and

• Its sensitivity towards changes by humans to the water sources around which it is found. When a system deteriorates there is a shift in the total scores of all the species present, from high to low. When the system improves again, there is a subsequent shift in the other direction. “In short, we can use dragonflies to determine whether we should be worried about a system which is going downhill, or how well we are doing to improve another,” adds Dr Simaika.

“Using dragonflies in freshwater assessments is so simple, because they are relatively easy to identify. All you need is a good guide, a pair of close-focus binoculars, and a sunny day.”

Did you know?

• 162 species of dragonflies have so far been recorded in South Africa.

• Of these, one in every five is endemic and found nowhere else in the world.

• Most South African species prefer full sunlight conditions.

• Alien plants and pollution are among the threats posed to our local species.

Manual of Freshwater Assessment for South Africa: Dragonfly Biotic Index is available as a book or a CD. The book is sold in most bookshops of the South African National Biodiversity Institute (bookshop@sanbi.org.za), or can be ordered from Prof Michael Samways at samways@sun.ac.za. It will be free to download soon from http://biodiversityadvisor.sanbi.org/literature/4327-2/suricata/

Notogomphus praetorius is a yellow and black dragonfly that can be found in high lying areas of the Drakensberg.

PHOTO: DR JOHN SIMAIKA
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Insect-killing fungi could soon be added to growers’ toolbox

The constant battle against orchard pests means that the fruit grower can never have enough tools in his pest control toolbox. In fewer than five years, another tool is likely to go mainstream if research and the rigorous trial testing phases are successful, according to Stellenbosch University insect biological control researcher, Dr Antoinette Malan.

With intelligent and targeted use, entomopathogenic fungi (EPFs) or insect-pathogenic fungi can be deadly in the fight against crop pests. A fungus which is “entomopathogenic” is not only able to parasitise insects, but also has the ability to kill them in the process.

Dr Antoinette Malan, insect biological control researcher at Stellenbosch University says that the use of EPF in South Africa is in its infancy, with the leading role being played by the citrus industry looking at the potential of local EPF to control false codling moth and fruit fly. “In South Africa, in general, very little work has been done on EPF as a biocontrol agent,” she says, with a hint of excitement in her voice. According to Malan, a product called Eco-Bb is one of the few commercial insect-pathogenic fungi to have been developed in South Africa thus far.

To further kick-start work on EPF in South Africa, the Stellenbosch University Integrated Pest Management Initiative hosted a workshop by world insect pathology expert Prof Lawrence Lacey. Malan describes Lacey as a “lion in the field” and points to her bookshelf which holds a copy of “Field Manual of Techniques in Invertebrate Pathology” written by the man himself.

“Larry”, as he is known to his scientific peers, has travelled the world over during an illustrious career that mainly focused on medically important insects like mosquitoes and black flies. In addition to over 200 peer-reviewed journal articles, he received an International Honour Award from the USDA Foreign Agriculture Service and a Public Service Award from the University of California, Riverside Alumni Association.

**KILLING MECHANISM**

Lacey, a relatively short and slender greying man with intense blue eyes, speaks slowly when describing the mechanism by which EPF decimate the insects on which they parasitise. “The spores, being a little negatively charged, uses electrostatic forces to adhere to the wax of the insect. It then creates a germ tube that terminates with a structure called an appressorium, which penetrates the insect’s body by both physical pressure and enzymatic activity,” he says while gesturing with his hands.

Once the appressorium has infiltrated the insect with its worm-like “infection peg” the action begins as it moves through the main body cavity and releases “germplasm”, which according to Lacey “ramifies” through the insect (See figure). This marks the starting point in the development of the insect-pathogenic fungi and the “beginning of the end” for the insect.

While there is not yet widespread use of fungi, Lacey says that many growers in Washington State in the US have adopted codling moth granulovirus (CpGV), particularly organic growers. He says a “tremendous amount” of science is being carried out in genetic engineering, and particularly the toxins produced by Bacillus thuringiensis (Bt), naturally occurring soil-borne bacteria.
The Bt toxin is used in genetically modified cotton, corn, and soybean. According to Lacey, the use of 800 million tons of insecticides per year has been avoided. “I think it’s much safer to use and much safer to eat,” he says.

“If, as curriculum it can be increased and as the products get sold – farmers see the product and farmers talk to farmers, and they get good efficacy, then I think it will take off.”

Closer to home Lacey says that the field of insect pathology is building constantly in South Africa. “If, as curriculum it can be increased and as the products get sold – farmers see the product and farmers talk to farmers, and they get good efficacy, then I think it will take off.”

“I am optimistic about the future, because we are increasingly concerned with insecticide resistance, insecticide residues, and other environmental consequences, which we don’t see with entomopathogens.”

Lacey says there is a lack of insect pathology courses and industry applications available. “The adoption of insect-pathogenic fungi and biological control in general is important, because we are polluting the environment and we are prohibiting the use of some insecticides. As in the case with orchards, there was Guthion that’s been taken off the list (of insecticides) in the US, because it is so toxic to mammals,” Lacey says.

**DEVELOPMENT IN SOUTH AFRICA**

Malan, who has done extensive work on entomopathogenic nematodes for biological control, says the goal is to use fungi in combination with nematodes, as an additional biocontrol tool in the toolbox. “We are currently in the early stage of laboratory and glasshouse trials, mostly basic research projects,” she says.

Malan says that challenges to widespread uptake of insect-pathogenic fungi include getting a strain of fungi to work and then all the processes around registration, including the need for good field trials in different areas. The latter is a “long process”, she says.

Agricultural Research Council (ARC) researcher Dr Justin Hatting, who was instrumental in the isolation of a virulent *Beauveria bassiana* strain which was commercially developed into the Eco-Bb biological control product, says the biggest obstacles in the commercialisation of the latter was the “development of an industrial-scale mass production protocol and viable formulation with adequate shelf-life, followed by quality control of the end-product”.

Accordingly Lacey’s workshop included a component in which he showed participants how to “mass culture” insect-pathogenic fungi.

“In the first week it did not work,” Malan says crestfallen, but recovers her optimism as she points to two darkly coloured bags containing barley. “Now that he [Lacey] is gone we have bags with masses of spores”.

Malan says her biological control research is well-supported by growers and encourages the industry to “watch this space”.

**BENEFITS OF INSECT-PATHOGENIC FUNGI**

- Some species are highly host specific, such as *Nomuraea rileyi* against lepidopteran pests, such as African bollworm, loopers and semi-loopers.
- Unlike most chemical insecticides, these fungal-based products can be safely handled by human operators without imposing health risks.
- There are no toxic residues left on sprayed surfaces allowing for applications close to harvesting time (compared to lengthy withholding periods associated with many chemicals).
- Secondary infection through re-cycling of the fungus on insect cadavers can sustain the pathogen in an orchard/field, thereby limiting the need for additional applications.
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The Stories of Mzansi Citrus Magic highlights the journey of some Citrus Academy Bursary Fund Students over the years. With more than 500 bursaries awarded over ten years, many students, studying towards a range of qualifications, have moved on and are working within the industry, both locally and abroad. In this issue, we follow the journey of Theron Maphanga, Dr Arno Erasmus and Mareli Kellerman.

“I am grateful to the Citrus Academy for their help. Without them I would not be where I am today.”

Theron Maphanga is a senior supervisor at Crocodile Valley Citrus Company near Nelspruit and has been in this post for a year.

Theron grew up in Barberton and matriculated from Barberton Comprehensive School in 2009. Financial constraints prevented him from studying in 2010 and 2011, but in 2012 he was able to enrol at the Lowveld College of Agriculture to do a National Diploma in Plant Production.

“I love agriculture. It was one of my subjects at school. I enjoyed the opportunity to study and these have been the most enjoyable years of my life so far. I started studying in 2012, and in 2013 I was appointed by the college as a mentor to the first year students,” Theron said.

“During my first year I did not pay for my studies, just registration fees. To raise the funds for the registration fees, I had to ask for contribu-
Theron Maphanga is a senior supervisor at Crocodile Valley Citrus Company near Nelspruit.

Theron Maphanga


Qualifications: National Diploma in Plant Production, BTech in Agricultural Management

Academic Institutions: Lowveld Agricultural College, UNISA

Internship: 2014 – Crocodile Valley Citrus Company, Nelspruit

Ready-Steady-Work: 2014

Special Awards: 2015 – AgriSETA Excellence Award Winner Best Performance: Internship
Dr Arno Erasmus recently resigned as the Plant Pathologist at CRI Head Office in Nelspruit, and is now the in-house plant pathologist at Wonderful Citrus in Delano, California.

Arno grew up in Worcester in the Western Cape and later moved with his family to George, where he matriculated from Outeniqua High School in 1994. After school he spent two years with Service for Christ. In 1997 he enrolled at the University of Stellenbosch to do a BSc Agriculture, in the hope of following his dream of becoming a flower farmer. Financial difficulties however prevented him from finishing his studies and led to him working in Ireland as a labourer for a landscaping company.

“After my time there, my father’s financial situation improved so that I had the choice to complete my studies. As I was used to earning, it was very tempting not to go back to studying, but good sense prevailed and I resumed my studies at Stellenbosch. I completed my BSc Agriculture at the end of 2003, and am truly thankful to my father who saw it as his duty to help us at least to tertiary level,” Arno said.

“I completed my studies and had not yet graduated when I saw a job advertised at Experico, the Research and Development arm of CapeSpan at the time. The company was looking for someone with higher qualifications than I had, but I applied, more with the view of getting my CV up to date and to practice the job application process than with the hope of success. My mother was more hopeful and even bought me a new jacket for the interview!”

“To my surprise and joy, I got the job as a Junior Researcher at the beginning of 2004. My work involved registration and development trials on various products on behalf of companies.”

Arno got married during his time working at Experico, and his oldest child was born in 2006. In 2007 he resigned to follow his dream of establishing a florist business, called the Flower Factor, but despite his enthusiasm had to cut his losses after just seven months. He then decided to pursue another dream and complete his in MSc Agriculture. The Plant Pathology Department at Stellenbosch University referred him to Dr Paul Fourie from CRI.

“I did not know much about citrus before I met Dr Paul Fourie, but his passion and enthusiasm inspired me into thinking that I could make a difference in the industry,” Arno said.

Arno started his MSc in 2008 working on a project called ‘The optimisation of Imazalil application in South African packhouses for the control of citrus green mould’. During this time he applied for funding from the Citrus Academy, and received a bursary during 2008.

“We started presenting information from the project’s findings at CRI functions in 2009, where I received exposure to CRI and the citrus industry. I was supposed to complete my MSc by the end of 2010, but the project had grown much larger than what was envisaged. I planned to enrol to do a MBA the following year, but it was decided that I would stay and complete the project, and my MSc was upgraded to a PhD. I completed the project in 2013”

During this time Arno, his wife and three children moved to Nelspruit, where he took up a position as a Postharvest Plant Pathologist at CRI in Nelspruit in June 2011. In this position Arno also assisted post graduate students, which forms part of a collaborative arrangement between the CRI, to assist postgraduate students with research projects, the Plant Pathology Department of the University of Stellenbosch, where the students are enrolled, and Citrus Academy, providing the funding. Several students are currently going through this system, with one having successfully completed her MSc in Plant Pathology.

Arno is currently the in-house Plant Pathologist for a Californian company called Wonderful Citrus, a position he began in December 2015. He lives with his family in Bakersfield, California.

**DR ARNO ERASMUS**

Citrus Academy Bursary Fund: 2008

**Qualifications:** BSc, PhD (Plant Pathology)

**Academic Institution:** University of Stellenbosch

**Industry Exposure:** 2008 – allFresh!
Mareli Kellerman has been working for the CRI since 2014 and is based in the AgriScience Faculty at the University of Stellenbosch. She is currently working on her PhD in Plant Pathology, doing research in Citrus Black Spot (CBS), which represents a huge challenge to South African citrus exports.

Mareli grew up in Pretoria and matriculated from Eldoraigne High School in 2006. She attended the University of Pretoria to do a BSc degree in Plant Pathology, and was able to complete the four year course while still living at home.

“In Matric I knew I wanted to do something that involved biology and science. I was attracted to Plant Pathology particularly, because of the causes of diseases and their effects on plants. Plant pathology is both highly technical and highly applied, so it presents a good combination. I enjoy this, because I get to work in the laboratory as well as spend time outdoors,” Mareli said.

In 2011 she began her MSc in Plant Pathology at the University of Stellenbosch. During her first year, her supervisor suggested she apply for a Citrus Academy bursary as her project was on the fungicide application and green mould control of citrus. The Citrus Academy provided her with bursary funding for the duration of her MSc, which she completed at the end of 2013. During 2014 and 2015 she worked as a researcher for the CRI, which also assisted with her continued studies during this time.

The initial assistance from the Citrus Academy helped secure her position with the CRI, and gave her the opportunity to establish herself within citrus research.

“I was given a research project on Citrus Black Spot and my responsibility was to research as much as possible about the disease, as well as train undergraduate students in research skills and data analysis. Prof Paul Fourie was the Head of Disease Management at CRI, as well as my supervisor, and assisted with my project. Working for the CRI for those two years was a great experience.”

Sponsored by Citrus Academy to attend an American Phytopathology Society conference in Texas, Mareli met the international colleagues that she currently collaborates with on CBS. One of these people was Prof Megan Dewdney, one of the chief citrus pathologists at the University of Florida, who she spent six months working with in her laboratory in Florida. She officially enrolled for her PhD in January 2016, with a focus on Citrus Black Spot.

“Citrus Black Spot is a huge issue for the South African citrus industry. The industry is gathering as much data on the disease as possible, to prove that the presence of the disease in South Africa does not need to present a phytosanitary barrier to the export of South African citrus to other citrus production countries. As part of my project I am working with CBS experts in the United States and Australia. These findings will be presented to the World Trade Organisation. Within the scope of my PhD topic there are many other related issues that could warrant further research, and I would like to continue with research in this field, after I have completed my PhD.

“Without the assistance of the Citrus Academy I would have stopped studying after my BSc degree, as I did not have funding to continue. The Academy were always very passionate and excited about assisting students with their studies, and they are still continuing to do this today. I would like to thank them for enabling me to live my dream to become a researcher, and in the process make a difference to other people’s lives.”

“I would encourage young people to develop themselves as much as they can. The agricultural sector provides good career opportunities for those who are interested in science.”

MARELI KELLERMAN
Citrus Academy Bursary Fund: 2011-2013
Qualifications: BSc MSc Agriculture (Plant Pathology), MSc Agriculture (Plant Pathology)
Academic Institution: Universities of Pretoria and Stellenbosch
Industry Exposure: 2013 – American Phytopathology Society, Texas
2012 – Citrus Research Symposium

“I would like to thank them (Citrus Academy) for enabling me to live my dream to become a researcher, and in the process make a difference to other people’s lives.”
Farmworkers thrive at Crocodile Valley Estate

NANCY O’FARRELL

Farmworkers do not often get into the limelight, so it was refreshing to speak to two workers at Crocodile Valley who explained how their diligence paid off and how they are enjoying the fruits of their hard work.

FROM QUIET BEGINNINGS TO GREAT THINGS
A quiet man who gets things done . . . meet Boy Nyapele. Boy started working at Croc Valley in 1988 when things were very different to today’s farming practices. He started as a general labourer or citrus picker. He recollects how they had to dig “basins” around the trees and these were in turn filled with buckets of water – not like today with micro sprayers. In the Lowveld summer mornings, he would start very early to place the rows and rows of sprinklers according to the markers, to make sure the entire crop was always irrigated.

Because Boy was hands on and always busy in the orchards, he became interested in the pests and eventually became Pest Control Scout, identifying the “good” and “bad” bugs, then submitting the data he collected to the Officers for Pest Control.

Boy started attending the various training opportunities supplied by Croc Valley and worked himself to his current position of Senior Section Supervisor, where he supervises 90 ha’s of citrus as well as different teams of employees. One of his most important tasks is to oversee the irrigation of the estate.

When asked to share a fond memory, he got a shy smile on his face. “Long, long ago when I

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For more information, contact MOST’s Southern African representative:
Anton Robertson | robertson.anton@gmail.com | 078 3044 934
Far left: Boy Nyapele supervises 90 ha’s of citrus as well as different teams of employees. One of his most important tasks is to oversee the irrigation of the estate. Left: Silence Hlathshwayo’s is the HR Officer of the Crocodile Valley Estate.

was a young man, we used to get rations from the estate. These rations would be given to a lady who works in the kitchen and she would cook us a nice warm plate of food. Now things have changed, now I have to shop and cook for myself!”

This gentle man has lived at Croc Valley, since he started working there in 1988 and still has so much he wants to learn and do, but “ah”, he says, “the time and the age keeps rolling away”. What an inspiration it was to meet Boy Nyapele, a man with some ambitions to improve himself, but also so grateful for the opportunities he was afforded, to achieve what he has and the chance he has been given to learn even more. He says he is not done yet!

A HUMBLE WISH BECOMES A REALITY

Silence Hlathshwayo’s story started with his grandparents ‘wish’. They were general labourers at Crocodile Valley Citrus Estates at the time. Silence’s grandfather had one big wish - that his grandson would achieve great things through Croc Valley. His grandparents told him that Croc Valley looks after their own and with this humble wish, Silence started his journey.

Silence grew up in Mayfern, the labour village of the Estate, and attended the local schools and later High School in the nearby township. After receiving his Matric Certificate he started as an export clerk at the Estate. It wasn’t long before he felt he needed to expand his horizons more and became a Pest Control scout. After obtaining his drivers’ licence, he started working in the Technical Department, taking various samples of the soil and leaves and sending them off to be analysed. He then pursued a diploma in Personnel training through Damelin.

While busy with this diploma a position became available in the HR Department and Dennis Solomon, the Managing Director of the Croc Valley, asked if he would be interested. Silence knew that this was what he wanted to pursue, but also knew that he didn’t have the necessary qualifications or training. Dennis recognised this and assisted Silence with his further development through the various training options, until he succeeded and became the HR Officer of the Estate.

Silence went on to obtain various diplomas from institutions like the Technicon in Pretoria and UNISA. What impresses the most about this man, is his enthusiasm for what he is doing. He is humble, but ambitious and self-assured, with a strong sense of appreciation and loyalty for what has come his way in the 27 years he has been with Croc Valley. His life has come full circle as he himself is now a grandfather, and so the dream that started with his grandparents, will continue for his children and grandchildren.
Development through transformation initiatives is the key

The establishment of the Citrus Growers’ Association-Grower Development Company (CGA-GDC) was one of the best initiatives that the citrus industry has embarked on. The company’s mandate is to ensure the aggressive implementation of transformation targets and the development of up and coming citrus producers in the country. Since the establishment of the company, a lot of work has been done to ensure that we drive this agenda collectively with other stakeholders in the agricultural sector and other development agencies and institutions.

EXECUTIVE
The CGA-GDC executive, as mandated by the chamber, undertook to provide leadership on behalf of the chamber members. Since the establishment of the CGA-GDC, the executive have been working close with the CGA-GDC board and the operational staff to ensure that the needed support is made available.

The chamber tasked the CGA-GDC to present its corporate and business plan reflecting initiatives that will make sure that the company achieves its goals. The chamber wants to provide all the necessary support as they believe that collectively, we can make a difference. The corporate and business plan of the CGA-GDC were presented and the executive of the chamber approved the approach and committed to support the company.

STAKEHOLDER ENGAGEMENT
Since the launch of the company on 18th March 2016, a number of engagements have taken place with various stakeholders. Other engagements were done as a follow-up with the stakeholders who attended the launch, to maintain the momentum. This is critical in ensuring better coordination between the different stakeholders whose mandates are to support the small-holder producers.

At national level, the company met with the Department of Trade and Industry and Department of Agriculture, Forestry and Fisheries, so the various incentives could fit into the goals of the company. The company also participated in high-level government initiatives like the pre-Phakisa consultative session and the consultation on the development of a policy on Comprehensive Producers Development Support. The purpose was to have a voice in the development of policies that support small producers. At the pre-Phakisa session the aim was to highlight the challenges faced by the growers and identify aspects that need immediate attention.

At provincial level, the CGA, through the original transformation desk, had MoU’s with the different provincial departments to commit resources towards the development of small growers. Since the CGA-GDC is now the transformation arm of the CGA, it will take over these responsibilities, hence the engagements with the provinces. It is envisaged that resources will be committed through Service Level Agreements. Furthermore, the company has encouraged the provinces to develop five-year development plans to support the growers, of which only the Eastern Cape has finalised at this stage.

BUSINESS SUPPORT
The CGA-GDC is rolling out initiatives to assist the business plans of growers. This project is coordinated by Yolanda Ntlakaza, who is heading up the Business Support Unit at CGA-GDC.

We hope to take all ten business plans of these farms and lobby financial support to different institutions that may be interested in supporting our growers.

TECHNICAL SUPPORT
Study groups and information days are taking place, as planned, in different areas and regions, and farmers are encouraged to attend these meetings. Government extension officers are also encouraged to attend these sessions. The study groups act as platform for reporting all initiatives done by the CGA-GDC and all citrus growers are expected to attend the study groups, information days and pest management workshops and planned tours.
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A typical conversation with fruit producers usually leaves one thinking that there is significant interest from producers to “go greener” (in other words, to adopt practices and technologies that enhance and improve natural resources, while reducing any negative impacts of their business on the environment), but this enthusiasm is drowned out by other pressing and urgent needs. These conversations are not superficial either, as the growers working intimately with the environment on a daily basis reflect on where the pressure points are and what they would like to do about it. Producers might also tell you about what they have done so far, and how they believe going “greener” will probably have a material impact on the sustainability and bottom line of their business.

At this point in the discussion, it also becomes apparent that many producers need help to take the next steps, as new initiatives on farms, packhouses and cold stores usually require overcoming knowledge and resource barriers before adoption. In times of drought, as faced by many farmers across the country presently, financial resources become even more limited – ironically as the evidence of climate change and water scarcity are so apparent.

At roadshows across South Africa in February 2016, citrus producers indicated their support for Citrus Growers’ Association (CGA) to bring in capacity to help producers to “go green”. Funding for this capacity is included in the new CGA levy application, but that application must still be approved by the Minister of Agriculture, Forestry and Fisheries and will only apply from 2017 if approved.

In anticipation of new resources becoming available and to help self-motivated producers to make a start, the intention behind this article is to lower barriers to technology uptake, especially where these barriers relate to information and knowledge gaps. The hope is that the article will then kick-start thinking about the possibilities and options available to growers for later implementation.

What follows is a list of three places where one can start the process of finding more information:

Many farmers want to employ more environmentally friendly production practices, but don’t really know where to start. Here are three resources that might help.
GreenAgri Web Portal

The Western Cape Department of Agriculture in collaboration with GreenCape launched the GreenAgri web-based portal in September 2015. Although focused primarily on the Western Cape, this resource seeks to provide a “one-stop shop” for all farmers, researchers and agencies (private and non-government) interested in climate smart agricultural practices and getting into the green economy space. The breadth and depth of the resources available through the portal is growing continuously. Producers should look at the “Tips and Tools” section where more specific information can be found around Energy, Soil Health, Water Management, General Sustainability and Sustainable Technologies in Agriculture. Producers will also be surprised by the significant number of online tools available to businesses to start to measure and manage their efforts in environmental management. Details and links to private and government applications listed on the tool include: Cape Farm Mapper, Fruitlook; Water Stewardship Web Tool, and the Confronting Climate Change: A Fruit and Wine Initiative’s carbon footprinting tool. Another useful section of the portal is that of SmartAgri. The Western Cape Climate Change Framework and Implementation Plan for agriculture (known better as SmartAgri) project was completed during March 2016 and developed a road map for actionable and prioritised initiatives that will take the agricultural sector towards greater resilience in the face of climate challenges. Of specific interest to the sector is the status quo report, the full plan and the citrus commodity brief. Fifteen other commodity briefs, as well as six case studies were also published, and can be downloaded. The presentations delivered at the recent Drought Dialogue of the Western Cape Department of Agriculture are also available on the SmartAgri page and will assist farmers with some valuable information. What is probably one of the most important resources on the GreenAgri portal is the section on Funding and Incentives. Here a number of government and other programmes are listed and more detail provided on how to access funds related to climate smart agriculture. By doing so producers can overcome or at least offset the financial burden of implementing some technologies.

www.greenagri.org.za
Contact: Leann Cloete-Beets
Email: Leann-CB@elsenburg.com
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SIZA Environmental Standards

Fruit South Africa has been working closely with the WWF to create appropriate and relevant environmental standards for fruit production in South Africa. This standard and accompanying set of tools guide producers to determine their current level of activity and the suitability of their farming practices in relation to sustainable natural resource use, highlighting “hot spots” where more urgent attention is needed. Just working through the material is a great start to getting an overall understanding of what “going green” really means.

Contact: Shelly Fuller
Email: sfuller@wwf.org.za
Tel: +27 021 882 9085

Confronting Climate Change:

A Fruit and Wine Initiative

Citrus growers will be familiar with the CCC-tool, as citrus producers are currently the largest group of users on the system (although the percentage of citrus users could still grow significantly). The relevance of the CCC, is that it allows producers to compare their key parameters around energy consumption against each other and understand energy-use drivers. A resource section also provides guidance on how to reduce energy consumption and is working on how farm businesses are likely to be impacted upon by the carbon tax that will come into effect in 2020.

Website: www.climatefruitandwine.co.za
Contact: Anél Blignaut Tel: 082 751 9596
Email: anel@bluenorth.co.za

It is hoped that in 2017 additional support can be provided from the CGA office to actually see greater uptake of available technologies and practices to build a robust industry that is proud to be leaders in environmental stewardship.
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Avoid cold treatment shipping problems with these recommendations

An assessment of in-transit cold treatment container shipments of citrus fruits from South Africa to The People’s Republic of China and South Korea, have yielded some valuable insights that could help producers reduce these incidents.

Although there is no clear indication of the number of container shipments deemed non-conforming across the intensive in-transit cold treatment markets, there is a perception that it is a higher than acceptable number; particularly when it comes to shipments to the People’s Republic of China and South Korea. The CGA, in partnership with participating exporters and stakeholders, therefore embarked on an assessment of the probable causes contributing to the potential non-conformances.

The assessment specifically focused on shipments to The People’s Republic of China and South Korea, as it was deemed that container shipments to these markets resulted in more non-conformances than other markets. The assessment was conducted on a stream of shipments from the Durban port over a period of weeks. Key findings related to, but were not limited, to the following:

1. Certain carton types were identified that possibly restrict airflow throughout the cartons and specifically to the critical positions of the probes placed in the cartons. The restricted airflow could lead to the pulp/probe temperatures failing to maintain temperature, therefore exceeding the required protocol temperature.

2. Pallet bases being used that do not comply with the CRI Packaging Guidelines. In many cases the pallet base slats obstruct the airflow into cartons, because ventilation holes on the first row of cartons are being blocked. The restricted airflow could lead to the pulp/probe temperature failing to maintain the required protocol temperature.

3. In some instances, the pre-cooling temperature of pallets did not achieve the required protocol temperature (the guidance temperature range is -0,8°C to -1,2°C).

4. Containers packed for in-transit cold treatment shipments are not pre-cooled prior to packing the container (the guidance temperature range is +1,5°C to -1,5°C being recorded on the container probe readings). A container that is not precooled, potentially destabilizes the pulp temperature therein, exceeding the required protocol temperature. The container is therefore unable to commence the in-transit cold treatment process.

5. Pallets packed into containers, where the probe temperature exceeds the required protocol temperature at time of packing the container. In many cases the pulp/probe temperature does not subside and decrease to the required protocol temperature. The container is therefore unable to commence the in-transit cold treatment process.

6. A number of power off and defrost cycles occur within the first 24 hours after packing the container. This potentially destabilizes the pulp temperature therein exceed the required protocol temperature. The container is therefore unable to commence the in-transit cold treatment process.

The assessment critically evaluated current and historical shipments which failed to initiate the in-transit cold treatment process. After evaluating the conditions during the first week of the

“…an Integral Reefer container is not designed to cool cargo, it is designed to maintain the cargoes pre-cooled temperature.”

Dawid Groenewald of the CRI Post Harvest Forum & Co-ordination Packaging Work Group investigates whether citrus is being cooled correctly.

STAAL DU PLESSIS
coldchain@polka.co.za
MITCHELL BROOKE
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assessment, stricter measures and controls were applied to certain shipments. The results of those shipments was that each container successfully engaged the in-transit cold treatment protocol directly after the container was packed. None of the containers packed under strict control, reported a non-conformance up to the point that the containers were loaded on-board. It should however be remembered that there are a number of factors that could lead to a non-conformance; particularly in the case where a pulp/probe temperature fails to maintain the required protocol temperature.

KEY RECOMMENDATIONS

Since the export agent or producer carries all the risk of a non-conformance, it’s up to the export agent or producer to manage the risk by applying best practice (SOPs) through the entire process. Based on the findings of the assessment, the following key general recommendations can be made. First of all it should be understood that there are three critical phases in the in-transit cold treatment engagement process:

1) the pre-cooling phase – conditioning the pallets to an acceptable uniform temperature range, thus providing a good base for the container to stabilize,

2) the container packing phase – the transfer of the pallets from the pre-cooling chambers into the container with the probes being placed into the pallets, and

3) the pulp/probe temperature stabilization phase – at which time the pulp/probe temperature remains stable at an acceptable level ranging between -0,6°C to -1,2°C, with a constant DAT of -1,5°C (remaining unchanged).

If all 3 phases are implemented correctly and strictly without any deviation to the recommendations to follow, the in-transit cold treatment process will most likely be signed off by the PPECB.

After the container has been packed and the doors of the container have been closed, the pulp/probe temperature needs to stabilize to within the required protocol temperature range of -0,6°C to -1,2°C. The stabilization of the pulp/probe temperature should be achieved from the onset, without further manipulation of the DAT being set lower than the required protocol of -1,5°C or to close the container air vents. It was found that if the container did not have a good base temperature to start from, the possibility of a non-conformance occurring is quite high.

It must be emphasised that the belief is that an Integral Reefer container is not designed to cool cargo, it is designed to maintain the cargoes pre-cooled temperature. To ensure a container starts off from a good base temperature and that the pulp/probe temperature remains at a range from -0,6°C to -1,2°C (given that the container could experience numerous power disruptions and defrost cycles within the first 24 hours), the following is recommended as critical to avoid a potential non-conformance:

1. Pre-cooling Phase

Although the protocol requirement stipulates that the pre-cooling phase should be conducted over a period of 72 hours to achieve a uniform fruit pulp/probe temperature of -0,6°C to -1,2°C it is recommended to increase the pre-cooling phase to 96 hours with the last 24 hours in which all the fruit pulp/probe temperatures are uniform within a range of between -0,8°C to -1,2°C.

The recommended pre-cooling temperature range of the pallets should ensure that after the container is packed, the container stabilizes within 24 hours with all the pulp/probe temperatures remaining lower than -0,6°C as required. There should be no compromise to this recommendation.

Figure 1: The 3 Phases to the In-transit Cold Treatment Engagement Process
2. Container Packing Phase

As a critical component to the pulp/probe temperature stabilization phase, it is recommended that, prior to packing the container, the container should be operating at full power mode from the time the container is collected from the container depot to when the container arrives and is about to be packed at the cold storage facility.

The container DAT set point should be at -1,5 °C as per the protocol set point. The probe temperature should be in range of +1,5 °C to -1,5 °C prior to packing the container. If a container is not sufficiently pre-cooled, the cooling applied to the container will first be required to remove the latent heat from the container interior panels before maintaining the fruit temperature. This could destabilize the fruit temperature leading to a non-conformance, as heat from the container is more than likely transferred through to the fruit.

It was found that the container interior panels were sufficiently cooled after running the container at high speed for three hours prior to packing, with the probe temperatures reflecting a range of +1,5°C to -1,5 °C. The sidewalls and interior of the container were deemed to remain sufficiently cooled after 40 minutes, during which time the containers were packed to completion. No evidence of moisture could be detected on the container inner sidewalls, while the containers were being packed during which time the power to the container was turned off.

Another aspect that should be considered is the container cross docking area. This area should be a sealed air locked area, with cooling applied to the area being targeted at a maximum temperature of +8,0°C. The area should have sufficient curtaining and sealing mechanisms to ensure no warm ambient air enters the cross docking area while containers are being packed. Container bay doors should also be closed when not in use at time of packing a container. The container should be packed and the doors to the container closed in as short a timeframe as possible to ensure the fruit pulp temperatures do not increase beyond -0,7 °C.

As each probe is placed into the respective pallet, the probe temperature, as reflected on the container panel, should not be warmer than -0,7 °C. In the case where a container is packed for the Peoples Republic of China, the pallet where probe P2 and P3 are placed should be side shifted slightly away from the container sidewall (this to allow airflow to move upwards between the pallet and the container sidewall in order to remove any heat infiltrating through the container sidewall).

It is recommended to leave a small space between the pallet with probe P2 and P3 and the pallet at the door end of the container (this is done to allow airflow to move from the T-bars upwards between the two pallets to ensure airflow is being delivered to the probe areas). A void plug must be placed to close the void between the last row of pallets and the container door. No spaces and gaps should be left open above the floor T-bars and the sections between the face of the two pallet bases.

3. Pulp/probe

RECIPE FOR SUCCESSFUL COLD SHIPMENT

It seems that the guiding principle for a successful cold treatment shipment, is:

1) that the cold treatment process must start from a good base temperature,

2) the delivery air must be able to flow freely to all areas of the pallets, particularly to the critical area where the probes are placed, and

3) the container must be able to stabilize in the first 24 hours after packing, without power off and defrost cycles disrupting the delivery air flow and protocol temperature.
**Temperature Stabilization Phase**

It is important that, as soon as the container doors have been closed, the container is powered immediately by the Genset\(^1\) unit. The container’s defrost cycle setting should be adjusted (if set to Auto mode) to 8 hourly intervals for the first 24 hours after the container has completed packing. The defrost setting may be left at a setting of 8 hourly intervals or the operator may adjust the setting to Auto after the initial 24 hour temperature stabilization period, and at which time the in-transit cold treatment process has been engaged. There should be only a single power off and power on disruption to the container cooling unit, when the container is being delivered to the container terminal to be stacked in the reefer area. The container should remain on power whilst in stack at the container terminal and power supply must not be disrupted after the container is stacked (especially in the first 24 hours).

The power supply to the container should not be disrupted for a period longer than 30 minutes while the container is moved from the stacking area to on board the vessel, at which time power supply to the container must be restored immediately. If the power supply to a container is disrupted for a period longer than 30 minutes, the pulp/probe temperatures may increase potentially resulting in a non-conformance. If all goes well the container pulp/probe temperatures should stabilise allowing the in-transit cold treatment process to commence and remain successful.

It must be noted that not a single non-conformance was reported to have occurred during the assessment period in which the above measures were strictly controlled and applied for certain of the shipments. This does not imply that there will be no non-conformances if the recommendations are applied, as there are factors relating to but not limited to airflow restrictions through certain carton types and packaging that needs to be rectified.

If the correct pallet base specification is used in conjunction with the correct carton specification, and all ventilation holes are unobstructed (providing optimum vertical and horizontal ventilation through the entire pallet) and the above measures are applied, there should be limited reasons for a non-conformance relating to temperature deviations occurring.

If a temperature deviation non-conformance has been detected after the above measures have been applied, it needs to be thoroughly investigated to determine the probable causes.

**A copy of the full report is available on request from mitchell@cga.co.za.**

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 MAIN REPORTED ISSUES

Numerous issues have been reported pertaining in-transit cold treatment container shipments of citrus fruits from South Africa to The People’s Republic of China and South Korea; which causes either failure to engage the cold treatment protocol once the container has been packed, or failure to maintain the in-transit cold treatment protocol once engaged. The main issues that have been sited are that:

1. **The pre-cooling temperature of the fruit to be shipped, is not within the required protocol temperature at the time of packing the container.**
   - The container was therefore not packed.

2. **The container delivery air temperature (DAT) is required to be adjusted to below the required protocol DAT for a period of time, to reduce the fruit pulp/probe temperature to within the required protocol temperature.**

3. **The container vent setting is adjusted and closed for a period of time or closed erroneously for the duration of the shipment voyage.**

4. **The container was unpacked prior to shipping as the protocol temperature could not be achieved to engage the in-transit cold treatment process.**

5. **Additional cold treatment days were added to a shipment, thus increasing the in-transit cold treatment period, in accordance to the requirements of the in-transit cold treatment protocol for a specific market.**

6. **The delivery air temperature (DAT) was not adjusted after the in-transit cold treatment process had completed the required in-transit cold treatment duration, as outlined by the requirements of the in-transit cold treatment protocol for a specific market.**

7. **Fruit quality problems were detected on a shipment once received in the market.**

8. **The in-transit cold treatment process failed outright, thus an additional in-transit cold treatment cycle was conducted.**

9. **The in-transit cold treatment failed outright, where the shipment had to be diverted to an alternative market destination.**

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\(^1\)A void plug is a sheet of cardboard that is inserted under the last row of pallets and extends to the container doors. All open areas on top of the T-bars are covered. A strip of cardboard is used to cover the open spaces on the face of the two side by side pallet bases. All voids and spaces must be closed and the cardboard stapled to the pallet base at various points to secure the cardboard to the pallet bases.

\(^2\)A Genset unit is a specific type of Diesel generator that is fitted to the underneath of a trailer. The Genset supplies power to the reefer container whilst being transported.
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gedeel die lug gesien het, het hierdie
pressie strooier nie net sy stempel
op die mark afgedruk en ‘n merkbare
markaandeel verwerf nie, maar ook
merkbare veranderinge onderaan. Alhowel
AIR PRO al kan spog met verskeie kliente wat
2 en 3 eenhede aangeskaf het, is daar al twee
landbou groepie wat spog met 5 elk. Daar was
ook hard gewerk aan bemarking en AIR PRO
word tans direk en deur 7 agente wat gesa-
mentlik 18 vrukte verbouings areas bedien,
bemark en ondersteun. Die strooier self is ook
guen vordering en ontwikkeling gespaar nie.
Die voorheen geverfde trekstang en onder-
stel word nou uit duursame 3CR12 gemaak.
Behalwe dat die bak, deksel en uitaat stelsel
nogsteeds van tipe 304 vlekrye staal is het die
alle oute, moere en wassers ook vlekry geraak.
Skarniere en knippe is ook met die beste
vervang en daar is n handige numatiese silinder
wat die deksel vashou in sy oop posisie. Aan die
teknologiese kant het AIR PRO ook voorwaarts
beweeg. Deur die toevoeging van ‘n tweede
stel ratte as addiesionele opsie kan AIR PRO
nou ook met gemak slakpille vanaf 5 Kg/Ha
toedien. Op aanvraag van Sitrus-, Makadamia-
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word om, of die strooi van kunsmis te moni-
tor of die strooi proses heetemal daardeur te
beheer. Dit stel nou die vrukteboer in staat om
tie net akkuraat per hektaar of blok te werk nie
maar ook om varieerende dosis toedienings
in dieseldie ry te doen volgens
die spesifieke grondbehoeftes
in daardie blok. Dan is daar
ook nou n opsie wat binne-
kort standaard sal raak om
die linker- en regter uitgooi
afsonderrlik vanaf die trekker te
beheer om optimale toedien-
ing op dwars aanplantings en
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- Het onafhanklik hoër kwaliteit nylotron uitgooiers;
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sonder verweet;
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Left: ARAG Electromechanical valves with remote switching control unit.
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This is extremely important in a production scenario where climate change may play an increasing role in what apple growers can plant in future.

Gala apples has become one of the preferred apples in the world, due to its bright looks, lovely aroma and easiness for consumers to eat. It is so popular that 12% of all apples in the world are Galas, with the exception of China for which data is not available. In South Africa Gala plantings are above 16% of the total apple hectares and growing fast, while in New Zealand it is at more than 27 percent.

Increased demand for better coloured Gala’s has however resulted in lower pack-outs into a carton and therefore lower net income back on the farm. The fortunes of Gala is changing because of the natural process of mutation, when, under natural processes a tree or branch-es on a tree, spontaneously produce fruit of different characteristics.

One such mutation was the Buckeye Gala which was founded by the Simmons family in the United States, who registered a trademark for the variety as Buckeye™. The rights to the Buckeye Gala™ is managed by International Plant Management (IPM), a company based in the United States. They have licensed re:inc Innovation as their exclusive South Africa partner to commercialize the variety.

Today Buckeye Gala is the most planted Gala varieties in the USA, with plantings of between 1.5 million and 2 million trees per annum, with 900 000 trees of Buckeye Gala also planted annually in Europe. According to IPM the biggest benefits of Buckeye Gala is that it colours early and very well in warmer areas and it is a very stable and true to type variety with almost no ‘reverting back’ to the original Gala.

In South Africa the Buckeye Gala has been evaluated since 2010 in three evaluation orchards of re:inc innovation, namely Theewaterskloof (Villiersdorp), Northridge (Ceres) and Matjiesrivier near Ceres. Research has shown that the Buckeye Gala consistently colours very well in the warmer areas such as Villiersdorp.

Post-harvest trials in 2016 by Experico, where Buckeye Gala was tested against Royal Beaut Gala, found that after storage of 84 days at 0,5°C and a shelf life period of 7 days at 20°C that the Buckeye Gala was more red and less striped than Royal Beaut Gala. “The taste rated the same and the sugar acid ratio (brix) was between 13.2 and 15.9 during evaluation, at firmness of 7,4 – 8,5 kg,” says Robert Buchanan of Experico.

“The Buckeye Gala has no marketing limitations,” says Liezel Kriegler of re:inc innovation. “Growers can export the fruit through their own channels. There is no carton royalties, with the only royalty being a planting royalty of $0.77 (US$) per tree. A special discounted rate of $0.50 (US) will be levied on the first 75 000 trees purchased by growers.”

Re:inc innovation has appointed Witzenberg Nurseries to be one of the nurseries to make the trees. A limited number of trees will be available for 2017.

Further information, contact
Liezel Kriegler of re:inc innovation on 082 373 4773 or liezel@reinc.co.za or Ferdi Ungerer of Witzenberg Nurseries at 082 879 6818 or ferdie@redhillagri.co.za

BUCKEYE GALA
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Buckeye Gala provides a solution for apple growers who want to plant the Gala variety in warmer regions.

re:inc Innovation is the exclusive South Africa partner for a Royal Gala variety which offers solutions to growers who have struggled to grow Gala varieties in warmer regions.

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Soft citrus trends and the European market

The European Union (including the U.K.) is the world’s largest market for easy peelers. The EU imports 46% of the total volume of citrus marketed in the world and is also the main destination of the easy peelers for Southern Hemisphere producers, absorbing 35% of the volume exported.

Easy peelers consumption in Europe varies greatly between winter and summer and Southern Hemisphere countries represent only 9% of the total volume of easy peelers consumed in the EU annually. Southern Hemisphere exports are mainly to the UK and Northern Europe.

The European winter season (from October to April) sees a consumption of 1.6 million tons supplied by Spain, Italy, Greece, Morocco, Israel, Turkey, Cyprus, Portugal, Pakistan and Egypt. In contrast, their summer season (April to September) sees imports of approximately 160 000 tons of easy peelers, making up only 3% of the total volume of citrus fruit marketed in the EU and 9% of all easy peelers marketed in the EU. Of the Southern Hemisphere soft citrus exports, South Africa is the main supplier with almost 60% share, followed by Peru with almost 30%. (Graph 1) Uruguay with 6% is followed by Argentina, Chile and Australia. For South Africa the UK is the most important market taking about 40% of our total export volume in 2015 whilst the EU took 27%.

Graph 2 illustrates the transition from Northern Hemisphere to Southern Hemisphere supply of soft citrus.

PRODUCTION CHANGES

In recent years, oversupply of easy peelers during the ‘peak’ period of the European winter season (November to December) has resulted in low prices. The move to late varieties is seen as a remedy for farmers who suffer from low profitability during the peak of the winter season. For now, more profitable sales prices and smaller volumes characterise this segment but the situation is changing.

There have been several growth initiatives in Northern Hemisphere countries to adopt late varieties. In Morocco the “Green Morocco” plan was launched to double production of late oranges and easy peelers and broadening the range of varieties targeted for the European market, which represents only 30% of their sales. Turkey is also concentrating on new selections and improving quality planting, mainly with easy peelers, W. Murcott varieties.

In recent years, oversupply of easy peelers during the ‘peak’ period of the European winter season has resulted in low prices.

JOHN EDMONDS

Source: Comtrade
Tango and so forth.

In Spain, Nules which are oversupplied during peak production are being replaced by late varieties. Israel has undergone a total renovation of the citrus industry since 2 000; using recycled water (covers 80% of agricultural needs) and concentrating on easy peelers which, at 8 600 ha now represent 45% of total citrus hectares. Five thousand hectares are planted to the Or variety alone. Grapefruit areas are being replaced and new varieties tested.

The creation and adoption of new varieties has seen the Northern Hemisphere supply window increase from three months in the 1980s to seven months in 2015.

The trend towards late varieties has seen the relative mix change over time in both the Mediterranean producing countries and Southern Hemisphere countries. Whilst Clementine still makes up the bulk of the easy peeler production in the Mediterranean countries, the growth in South African production had been almost exclusively in the later varieties, which now dominate although Clementine exports have remained relatively static. Large investments in research and development have led to the discovery of new varieties with superior qualities and late varieties in the Northern Hemisphere are increasingly present at the start of the summer season. Thus the window for the start of the season in the Southern Hemisphere is being reduced. The export boom of easy peelers in Southern Hemisphere has seen total exports reaching about half a million tons; a growth of 72% in 10 years.

OTHER BARRIERS

Southern Hemisphere soft citrus not only have to compete with encroaching late northern hemisphere mandarin varieties, but also the growth of late orange varieties and the European summer season fruits. There has been a renewal of apricot orchards in France, Italy and Spain in the past five years. The new varieties have high yields and expand the season which starts in April and ends in October. Peaches and nectarines show stabilizing volumes after strong growth in recent years. Periods of oversupply are resulting in low prices of these commodities, adding pressure on Southern Hemisphere soft citrus.

Added to these challenges are the increasing number and magnitude of other barriers, such as phytosanitary regulations in the form of quarantines for fruit from areas affected by fruit fly, threats of market closure for five positive detections of the Citrus Black Spot (CBS) spores, more restrictive limits for pesticide residues and the proliferation of private standards in the form of “voluntary” accreditation certificates.
relating to manufacturing, social factors and environmental considerations.

In the midst of a vibrant, profitable and booming soft citrus industry, growers from both hemispheres look apprehensively at the likely tsunami of late mandarin supply and its consequences. Progressive industry participants are taking note of the trends and formulating strategies for the future. These may take the form of increased cooperation between producers in the Northern Hemisphere and Southern Hemisphere in terms of development of customer supplier relationships to facilitate a smooth transition of supply between the seasons.

Promotions are increasingly being looked to as an essential tool for facilitating the increased consumption of late mandarins that must occur to ensure the profitability of these products in the future. The interests and priorities of growers are varied and complex and the business of promotions requires specific skills and resources. Thus the nature, scope, method and funding of future promotions will require thorough investigation and consultation to arrive at a successful outcome.
UK retailers in awe of South African table grape

The locally developed red seedless table grape cultivar, Joybells, received lots of praise from top UK retailers, following technical tastings and exclusive sales this season.

Joybells was bred and developed by Phyllis Burger of the Agricultural Research Council (ARC) Infruitec-Nietvoorbij and commercialised by the private company Culdevco (Pty) Ltd. After the development and initial planting of seedlings on the ARC experimental farms, the variety was grown on the Clovelly Farm of Anthony Hill in the Hex River Valley. Hill introduced Joybells to the export company, Global Pacific Produce South Africa, to initiate the marketing and tastings of the cultivar in the UK. The process started two years ago, when Joybells was incorporated into the Global Pacific sampling plan with the aim of getting Joybells on the “approved variety list” of Morrisons.

A semi-commercial volume (eight pallets) of Joybells were, therefore, shipped to Morrisons during the 2015/2016 table grape season. The sample was packed at Clovelly and arrived in the UK on 29 February 2016. A sample box was presented to a taste panel, consisting of commercial and technical staff, at Morrisons on 3 March 2016.

According to Ewan Smit of Global Pacific, "Joybells received high praise from everyone present and was referred to as the red version of Sable, which the retailer holds in very high regard. The panel was unanimous that they would be happy to receive the variety as a regular or signature line," Smit said.

The cultivar was also well received by Marks & Spencer, with their tasting panel being especially impressed by the crisp and juicy eating quality of the variety. The tasting panel reported that the Joybells samples arrived in good condition, bunches had good colour and large berries. Joybells received positive reports, especially concerning its excellent sugar to acid balance, in comparison with other red seedless varieties.

The locally developed red seedless table grape cultivar, Joybells, received lots of praise from top UK retailers, following technical tastings and exclusive sales this season.
naturally large berries. Berries were firm and presented excellent eating quality attributes. The tasting panel concluded that they would be pleased to have Joybells on their shelves.

AVAILABILITY
There has been a shortage of plant material due to the huge demand shortly after the release of the cultivar in 2014. “Up until the winter of 2015 there was only sufficient material available for 24 hectares. This increased to another 57 hectares this winter, while orders for 2017 are around 216 hectares. Culdevco foresees that there will be no limitation on the provision of plant material for Joybells as of 2018,” said Dr Leon von Mollendorff, general manager of Culdevco. Joybells can be ordered from Divan Venter from SAPO Trust at Divan@saplant.co.za.

According to Von Mollendorff, the gradual release of information and plant material to industry was to ensure a proper evaluation and feedback process over multiple seasons. The objective of both the South African Table Grape Industry (SATI) and Culdevco, is to work with the ARC Infruitec-Nietvoorbij to develop and release unique table grape cultivars to all South African table grape growers at an affordable price.

Willem Bestbier, CEO of SATI, confirmed that this collaborative effort was in line with SATI’s vision to improve the competitiveness of the South African table grape producer: “SATI ultimately believes that the competitive edge in the market is invariably technology driven and one of the most critical technologies to have in this highly competitive environment is novel, profitable and well adapted cultivars. Nothing beats a home-grown success.”

IMPORTANCE OF PRODUCERS AS EVALUATORS
Producers as evaluators played an important role in the commercialisation of Joybells, according to Dr Leon von Mollendorff, general manager of Culdevco. “They played a huge role in helping to determine planting protocols as well as the ideal harvest time. Besides the many informal field days, two formal ones were also held in the Hex River Valley in January 2014 and 2015 to give interested producers an opportunity to see and discuss the cultivar,” Von Mollendorff said.

During 2014 the storage capacity of Joybells was evaluated by Experico, an independent organisation. The cultivar was harvested over a period of 4 weeks (week 3 to 7) and placed in cold storage for periods of 28 to 42 days. “The cultivar fared very well during this process, copies of the report are available from Culdevco,” stated Von Mollendorff.

According to Willem Bestbier, CEO of SATI, the producer driven evaluation of promising new crossings and cultivars is a newly agreed strategy that helps to shorten the time to the “commercial role out of a new cultivar” and thus the “time to market”. The planning is well under way to run the de-centralised evaluation simultaneously in all producer regions to ensure that informed planting decisions can be made sooner.

Culdevco and SATI decided to make Joybells available to all interested South African table grape growers as well as Culdevco registered export or marketing companies. All interested companies have to register annually before the end of September to obtain rights to export Joybells from South Africa. Email Culdevco at leon@culdevco.co.za or SAPO Trust at Burgerw@saplant.co.za for application forms.
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EXPORT OPPORTUNITIES FOR TABLE GRAPES

The world order in terms of production, exports and imports

SATI has identified the need to survey new export market opportunities to relieve supply pressure in the traditional table grape markets.

The South African Table Grape Industry (SATI) commissioned a survey which formed part of an effort to explore future market dynamics and, in the process, support the development of market strategies for the table grape industry. This article will cover the current market order and will be followed up with articles on:

- Global trade and economic trends
- Global trade gaps
- A trade opportunity analysis
- Barriers to entry
- A model for calculating future market potential indexes

PRODUCTION

Global production of table grapes is currently being dominated by the temperate, winter rainfall regions of the world as depicted in Figure 1, where the size of the circle represents the approximate share of world production.

Production has been growing with an average of four percent over the past six years, with current annual global production amounting to about 17 million tons.

China has been by far the largest producer of table grapes in the world over the past decade (37% of world production) and their production has grown with 30% since 2008/09 due to favourable production conditions as well as improved production techniques and management. Growth has been driven by growth in China’s national consumption.

Turkey and the EU-27 countries are next in line in terms of production volumes with Turkey experiencing the most significant growth since 2008.

Brazil, Chile, India and the USA are ranked in the third tier of production.

Argentina, Ukraine, Australia and South Africa complete the list of the top ten producing countries.

“Global production of table grapes is dominated by the temperate, winter rainfall regions of the world.”
IMPORTS
As is the general trend with fruit imports, grape imports are dominated by Northern Hemisphere countries (Figure 2).
The top 15 importers by volume are mainly located in the traditional markets in Northern Europe and North America, but it is important to note that Far-Eastern countries are “climbing the import ladder”. There is also a vast differences in the average value per imported ton in the various importing countries (Table 1).

EXPORTS
Global exports are dominated by Chile, the USA and Italy, with South Africa ranking in the sixth place (Figure 3). Once again, it is important to note the highly variable value per tonne achieved by the top 15 exporters, with South Africa achieving 83% of the global value per tonne, but only 61% of the value per tonne of Peru – one of our main competitors.

Having now established the world order of table grape production, imports and exports, the next article will provide a picture of global trade and economic trends affecting the South African industry.

Table 1: The top 15 importing countries of table grapes and the average value of an imported tonne.

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Table 2: The top 15 exporting countries of table grapes and the average value of an imported tonne.

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---|---|---
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Chile | 869928 | 1963
USA | 474264 | 2287
Italy | 508018 | 1604
Netherlands | 279289 | 2784
Peru | 176048 | 2555
South Africa | 283239 | 1559
Spain | 140439 | 2251
China | 105152 | 2554
India | 148521 | 1303
Turkey | 203286 | 923
Egypt | 88144 | 2080
Australia | 78475 | 2230
Greece | 90821 | 1906
Mexico | 149647 | 1004
Brazil | 43181 | 2385

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Die studie van planthormone en die rol wat hulle speel in plantontwikkeling, onder andere vrugrypwording en -kleurontwikkeling, is ‘n komplekse, maar ‘n uitsers interessante veld. Hierdie kompleksiteit het waarskynlik tot gevolg gehad dat ‘n relatief klein groepie navorsers oor die jare daarby betrokke was en dat daar vandag nog baie vrae is oor die metode van werkning asook die variasie in uitkoms na die aanwending van die hormone. Die studie van planthormone, ook bekend as plantgroeireguleerders, word bemoeilik deur die feit dat hierdie verbindingse sedel in isolasie werk. Dikwels word die effek van een hormoon deur die teenwoordigheid van ‘n ander verberg of selfs omgekeer. Hierdie interaksies word verder beïnvloed deur sekere snellerverbindings waarvan suikers een is.

Oor die algemeen word ‘n hormoon beskou as ‘n verbinding wat iewers in die plant (of dier) gesintetiseer word en elders – weg van die sentrum van sintese – in uitsers klein hoeveelhede aktief is, deurdat dit biochemiese prosesse aan die gang sit of inhibeer. ‘n Beperkte aantal planthormone, waarvan die bekendste sekere indool-asynsuur in die ouksien-groep is, is oor dekades heen in plante geïdentifiseer. Ander bekende groep is die sitokiniene, gibberelline, etileen, brassinosteroïdes. In geval van tafeldruisie is die gebruik van verskeie sintetiese plantgroeihormone deur die jare verfyn om onder andere die bemerkbaarheid van die vrugte te verbeter. Een van die traditionele aanwendings van planthormone is die gebruik van gibberelline en sitokiniene om korrelvergroting te bewerkstellig.

**DIE ETILEEN GEVAL**

Die afgelope paar jaar het die gebruik van etileen – toegedien as die gesintetiseerde voorloper van etileen, ethephon, as ‘n alleenstaande behandeling of in kombinasie met absissiensuur – baie aandag getrek. Hierdie fokus op etileen is verskerp deur die verandering in die regulatoriese en kommersiële residu-ontledings (toleransies) van ethephon wat internasionaal ingestel is. Die toegelate vlakke van ethephon is reeds etlike kere verlaag tot vlakke wat die gebruik daarvan geweldig beperk het, met ‘n gepaardgaande verhoging in die risiko dat die vrugte nie bemarkbaar sal wees nie weens onvoldoende kleurontwikkeling.

Die probleem word vererger deur die feit dat ethephon uitsers stagnant in die plant is en die vlakke daarvan in die vrugte deur die toedieningsdosis bepaal word eerder as die tydsverloop tussen toediening en verbruik van die vrugte. Die biologies aktiewe vlakke is so na aan die toegelate residu-vlakke dat ‘n klein fout met die toediening van ethephon die bemerkbaarheid van die druwe kan vernietig, met gepaardgaande enorme ekonomiese verliese vir die produusent.

Die algemene gebruik van ethephon in druie is die laatseisoensese versnellings van kleurontwikkeling by rooi druie.
Druiwe word normaalweg as nie-klimateriese vrugte beskou (vrugte wat nie verder na oes gaan ryp word nie omdat hulle óf nie etileen produseer nie, óf etileen teen te lae vlakke produseer om enigsins ’n invloed op die rypwording van die vrugte te hê). Daar is egter aanduidings uit die literatuur dat druiwe wel ’n minimale hoeveelheid etileen tydens die na-deurslaanfase produseer.

Die gebruik om sintetiese etileen vanaf die deurslaanfase op rooi druiwe wat sukkel om vanself te kleur toe te dien is dan ook goed gevestig. Voor die verlaging in die internasionale toleransies vir etileen is die druiwe rondom en na deurslaan met hoë dosisse van ethephon behandel, wat vinnige vrugkleurontwikkeling tot gevolg gehad het sodat die verlangde kleurstandaard vir die uitvoermark bereik kon word.

Druiwe is in staat om sonder die gebruik van enige ondersteuning wel die verlangde kleurstandaard te ontwikkel, maar dit duur soms so lank dat die raklewe van die vrugte ernstig deur die vertraagde oestyd benadeel word. Dit raak ook arbeidsintensief en die risiko vir verliese deur siektes of peste en voëls neem eksponensieel toe tydens hierdie periode.

Met die koms van die lae residutoleransies van ethephon in die Europese Unie (voorheen was dit 3 mg/kg en tans wissel dit tussen 0.32 tot 1 mg/kg afhankend van die mark en bestemmingsland) is produsente gekonfronteer met die uitdaging om die hoeveelheid produk wat toegediend word so te manipuleer dat die maksimum voordeel uit die gebruik van etileen verkry word, sonder om die residuvlakke te oorskry.

Ongelukkig is daar nie ’n liniêre verband tussen die voorkoms van etileen residue in die vrugte en die dosis materiaal wat gebruik is nie en word hierdie verband hoofsaaklik op die ondervinding van die produsent en adviseurs gebas. Daar is ook nie duidelike redes waarom behandelde druiwe soms baie lae residu vlakke vertoon en in ander jare weer baie hoër vlakke met dieselfde behandelinge toon nie. Oor die jare was daar baie spekulasies, maar enkeles het die toets van die tyd deurstaan en dit is hierop waar ons moet fokus om die gebruik van etileen in die praktyk te maksimeer.

### MOONTLIKE REDES VIR DIE VARIASIE

Eerstens moet in gedagte gehou word dat die talle residu-ontledings deur die jare getoon het dat die vlakke van etileen in druiwe geweldig kan varieer. Variasie kom voor tussen kultivars en die literatuur bevestig dat daar verskille tussen kultivars in die opname van die produk is.

Verder kom beduidende variasie binne ’n wingerd voor: tussen stokke in dieselfde wingerd, tussen trosse aan dieselfde stokke, en helaas selfs tussen die korrels van die boonste en onderste gedeeltes van dieselfde tros.

Hierdie variasie in ethephon-vlakke is moeilik om te verduidelik, maar ’n sinvolle teorie wat deur ondervinding ontwikkel is, kan as riglyn gebruik word:

*Ethephon word deur die trosse en blare van die wingerdstok opgeneem en hoewel daar beperkte translokasie tussen die blare is, is daar wel translokasie vanaf die blare na die trosse.*

Die verhouding van blare tot trosse speel dus ’n belangrike rol in die uiteindelike voorkoms van ethephon-residue in die vrugte.

*Indien daar ’n groot blaarmassa rondom die trosse is, kan dit aanleiding gee tot hoër as verwagte residue in die trosse wat met die blare geassosieer is. Indien die trosSlading hoog is, kan ’n mens verwag dat die toegediende ethephon oor meer trosse versprei sal word. Gevolglik sal die effek van ethephon op kleurontwikkeling kleinere wees en laer residu vlakke per tros kan verwag word.*

*Korrelgrootte* kan ook ’n rol speel in die voorkoms van wisselende residu vlakke. Klein korrels het ’n groter soortlike oppervlakte as groter korrels en sal dus in vergelyking meer ethephon tydens toediening absorbeer as groter korrels.

Die byvoeging van ’n versuringsmiddel of groot hoeveelhede benattingmiddels by die ethephon-mengsel sal ook lei tot ’n verhoging in die residu vlakke in die vrugte. Dit is bekend dat meer ethephon deur die plant opgeneem word wanneer die spuitmengsel versuur is en wanneer die oppervlakspanning verbrek is deur die byvoeging van benatters. Vroeër, toe die residu vlakke van ethephon nie krities was nie, is hierdie metode juis gebruik om die effek van ethephon te verbeter.
Die gebruik van **hoë watervolumes** tydens die toediening van ethephon verhoog ook die hoeveelheid residue wat in die trosse sal agterbly. Hierdie situasie vererger wanneer verdere gewasbeskermingsmiddels na die aanvanklike ethephon-behandelings op die plantes toegedien word. Daar bestaan ‘n baie sterk vermoede dat die herbenatting van die spuitresidu op die vrugte die effek en die residue van ethephon in die vrugte verhoog.

**Temperatuur** tydens en na toediening van die middel speel ‘n beduidende rol in die voorkoms van residue in die trosse. Wanneer baie lae nagtemperatuur voorkom, word hoër residu-vlakke van ethephon as by warm nagtemperatuure waargeneem.

Verder spreek dit vanself dat daar groot variasie in die humiditeit en temperatuur in ‘n wingerd is, asook tussen die bo- en onderkante van die stok as gevolg van grond, aspekt en topografiese variasie in die wingerd.

**Stadium van oes** kan ook ‘n rol speel in die variasie in residu-vlakke.

Nadat ethephon volgens die beste landboupraktyk op die vrugte toegedien is, begin die residue in die korrels versamel en terselfdertyd begin die afbreekproses daarvan. Etileen toon ‘n vreemde afbreekkurwe en die verskynsel kon tot dusver afhanklik van uit die laboratorium dui nie. Dit doet wys dat daar groot variasie binne die eerste sewe dae na toediening van ethephon relatief vining verminder. In die periode van 10 tot 14 dae na toediening styg dit en net daarna begin dit weer afneem totdat die vrugte geoes word. Hierna bly die etileenvlakke in die vrugte feitlik onveranderd.

In die periode van 10 tot 14 dae na toediening van ethephon relatief vining verminder. In die periode van 10 tot 14 dae na toediening styg dit en net daarna begin dit weer afneem totdat die vrugte geoes word. Hierna bly die etileenvlakke in die vrugte feitlik onveranderd.

**DIE ROL VAN DIE ONTLEDINGSLABORATORIUMS**

‘n Argument wat dikwels gevoer word, is dat die ontledingslaboratoriums vir die variasie in die residu-vlakke verantwoordelik kan wees. Almal maak foute en hierdie moontlikheid is sekerlik nie uitgesluit nie, maar gebaseer op die afgelope aantal jaar se ondervinding is die foute wat by laboratoriums voorkom baie minder as wat op plaasvlak kan voorkom.

Die geweldige lae residu-vlak waarvoor getoets moet word, leen hom tot variasie en dit kan maklik gebeur dat variasie binne dieselfde residumonster by dieselfde laboratorium voorkom, maar dit minder as wat op plaasvlak kan voorkom.

Die spelreëls vir laboratoriums wat internasionaal geakkrediteer is, bepaal dat ‘n variasie van tot 100 % bo of onder die grens nie noodwendig op ‘n fout nie. Dit is uiteraard baie moeilik om die uitske van hormoon-manipulasie met sintetiese groeireguleerders by plante akkuraat te voorspel en variasie in die effek van die hormone en die residue daarvan in die plant is aan die orde van die dag. Die gebruik van ethephon, wat die hormoon etileen in die vrugte vorm, is sekerlik een van die kenmerkens van afbeelding.

Moontlik is die beste raad aan produsente om hul adviseurs te vertrou en seker te maak dat hul die beste produkte beskikbaar gebruik.
INTEGRATED PEST MANAGEMENT
T.G. GROUT & S.D. MOORE

Thrips management
During October and November, citrus fruit are highly susceptible to damage from citrus thrips and orchards should be scouted at least once a week for this pest, being sure to look under the sepals. Citrus thrips larvae cause more serious damage than adult thrips, so low numbers of adults in the absence of larvae may not require immediate intervention. The intervention threshold for citrus thrips larvae on fruit is 2% for the first four weeks after petal fall, 3% for five to six weeks after petal fall and 4% for seven to eight weeks after petal fall. These thresholds can be approximately doubled if the population comprises mostly adults. Citrus thrips are genetically predisposed towards developing resistance to pesticides, so avoid spraying two consecutive sprays of the same active ingredient. Treatments that give six to eight weeks thrips control will eliminate natural enemies of false codling moth (FCM), mealybug and scale insects for a month or more. So if this degree of control is required, it is best to spray these at petal fall and follow up with softer options when necessary.

Parasitoid releases
Growers planning to augment parasitoids for mealybug (i.e. Coccidoxenoides perminutus or Anagyrus sp.) or FCM (i.e. Trichogrammatotidea cryptophebliae) control, should initiate releases as early in the new season as possible. Augmentative releases of parasitoids are not a corrective option, and growers should therefore not wait until the pest reaches a problematic level. Research trials with both mealybug and FCM parasitoids indicate that better suppression of the pest is achieved with releases initiated as early as October.

Preventative sprays for mealybug
Pre-harvest blemish analyses or winter inspections of trees might have indicated that preventative spraying for mealybug is unnecessary. This can be confirmed or refuted by inspecting fruit in October and November for the presence of mealybug. Sprays applied before calyx closure will most likely be more effective than those applied thereafter. An infestation level in excess of about 5% at petal fall, or up to 20% six weeks after petal fall, requires immediate chemical intervention. Anything short of an absolutely thorough full cover film spray will compromise the effectiveness of a chemical treatment. If citrus mealybug is not the dominant species, augmentative releases of Coccidoxenoides perminutus should be considered unsuitable.

Bollworm
In many regions, it might already have been necessary to treat bollworm during September. However, routine spraying for bollworm is generally not necessary. By monitoring the percentage of blossom clusters infested, it will be possible to determine whether a spray is necessary. A treatment should be applied when more than 20% of blossom clusters are infested with larvae or mature eggs. Enlarged navel end problems in Navel oranges can be further exacerbated by bollworm attack. In such an instance, a threshold of 11% of clusters infested should be used. Four biocontrol options are available. These are DiPel (Bt), Helicovir, Bolldex and Graboll (all viruses). To be effective, these biological products should be applied immediately after egg hatching and certainly not once larvae are longer than a centimetre in length.

Lemon borer moth
Moths of the lemon borer moth (or citrus flower moth), Prays citri, are attracted to lemon blossoms. Growers should inspect these blossoms in spring to determine whether they are infested with larvae or pupae. These can be identified by their colouration, which is usually greenish and the association of webbing with pupation. Even if the damage to, and loss of blossom is not considered sufficiently severe to justify control measures, no intervention will allow the development of a second generation. It is the moths of this second generation that lay their eggs on the lemon fruitlets. Hatching larvae can potentially cause severe damage. It is therefore more effective to control the first generation. No plant protection products are registered for use.
against the lemon borer moth. However, there are a number of pesticides which are registered for other pests on citrus that are effective, including Bt (DiPel) and mevinphos.

**False codling moth**

N.B. Effective control of false codling moth (FCM) from early in the season is critical! If this is not done, FCM could escalate to undesirable levels which will be far more difficult to bring under control. As soon after harvesting as possible, all out of season fruit should be removed from trees and destroyed. These fruit can act as a reservoir for FCM and fruit flies, enabling particularly the former to carry over onto the new crop set in spring.

**Do not neglect orchard sanitation early in the season.** Infested fruitlets can contribute significantly to the buildup of FCM populations later on and any extra labour required is well worthwhile.

FCM pheromone traps should be hung during October. It is imperative that these traps be hung strictly according to the recommendations on the label. Growers wishing to control FCM with Cryptogran, Cryptex or Gratham (FCM granulovirus) should apply the first treatment no later than the end of November or early December – applied shortly after the flight peak which occurs at this time in all production areas.

Recommendations for the use of Isomate (mating disruption) are that it should be hung during early October, followed by a second hang during early January. Checkmate should be applied at a very low volume to the top third of trees at three to four-weekly intervals. As with any mating disruption product, it is essential that an application precede a moth flight peak and that large areas (at least 5 ha) are treated.

**CROP AND FRUIT QUALITY MANAGEMENT**

O.P.J. STANDER & P.J.R. CRONJE

**Fruit set** treatments according to cultivar requirements need to be applied. Treatments include the application of gibberellic acid (GA3) and girdling, especially for parthenocarpic cultivars. General guidelines cannot be given as fruit set treatments differ by cultivar and orchard.

Moisture stress should be avoided during full bloom, fruit set and early fruit growth.

**Fruit growth** must be optimised during Stage 1 of fruit development with optimal nutrition and irrigation practices. During this phase of fruit development, the rind (flavedo and albedo) is formed. It is essential to ensure optimal uptake of essential nutrients such as Calcium (Ca) and Magnesium (Mg), which play an important role in the structural integrity of cell membranes.

Fruit thinning practices also need to be applied to reduce inter-fruit competition and optimise fruit growth.

The **acidity** of fruit at harvest is largely determined within the first six weeks of fruit growth and development. Thereafter, only minor modifications to acidity can be achieved. Under conditions of anticipated high acidity mono-ammonium phosphate (MAP) or mono-potassium phosphate (MKP) can be applied at 1%, i.e. 1 kg per 100 litres of water, six weeks after full bloom. Please note that these phosphate sources have not been tested on all citrus cultivars; until now 1% MAP or MKP has reduced acidity on Valencia orange and Temple tangor, but not on grapefruit.

**Pruning** of late cultivars should be done as soon as possible after harvest. All of the following should be removed during pruning: old, broken and dead shoots/twigs; weak and entangled shoots crossing each other or hanging downwards; as well as any rootstock regrowth. Regrowth on the inside of the tree should be thinned out, cut back or removed.

Light levels above 30% are necessary for optimal photosynthesis. Enough windows should be cut to allow adequate light distribution and improve bearing wood within the tree. This will lead to increased fruit size and internal fruit quality (Brix°), better fruit colour, increase in rind integrity, as well as a more uniform fruit size distribution.

**Pruning** can be used as a thinning technique: prune more heavily after a light crop when the orchard has a history of alternate bearing. A follow-up prune of regrowth in the summer is of critical importance. Pruning tools should always be sanitised with 10% Jik.
Aalwurms Grond- en wortelmonsters kan nou in die lente getrek word en na die Diagnostiese Sentrum in Nelspruit gestuur word vir ontleding, sodat die status van die aalwurmpopulasiie in die wortels bepaal kan word. Die resultaat sal dien as 'n bestuurshulpmiddel vir 'n koste-doeltreffende aalwurmbesturingsstrategie.

Die gebruik van chemiese aalwurnmildoders vir die beheer van die sitrusaalwurm word nie aanbeveel alvorens ten minste 30 mm reën geval het (Oktober). Elke aalwurmdodertoeding behoort op nat (veldkapasiteit) grond toegedien te word en met 'n behoorlike besproeiing opgevolg te word om te verseker dat die middels deeglik in die grondprofiel ingewas word. Toedienings behoort slegs volgens etiketaanbevelings toegedien te word. Afwyking van die geregistreerde dosisse, om kos te bespaar, is glad nie 'n effektiewe benadering nie.

**Phytophthora** Phytophthora wortelvrot – die gebruik van fosfonaat produkte wat sistemies is, is 'n uiterst effektiewe en bekostigbare beheermaatreël wat suksesvol deur produente gebruik word. Dit is van uiterste belang dat die etiket deeglik bestudeer word en asook die waarskuwing van die produk gebruik word om effektiwiteit te verseker en fitotoksiteit te voorkom. Indien kraagvrotletse voorkom kan 'n stamverf of blaarpieseling aangewend word, drie aanwendings per seisoen met ses tot ag weke intervalle. Vir wortelvrotbeheer word 'n blaarpieseling van ten minste twee of drie blaarpieselinge met ses tot ag weke intervalle aanbeveel. Fosfonaat-behandelings behoort jaarliks op nie-draende bome toegedien te word.

**FRUIT AND FOLIAR DISEASES**

G.C. SCHUTTE

**Alternaria core rot** Alternaria core rot, also known as navel-end rot and black rot, occurs...
Alternaria core rot is linked to large fruit-navels or to the abnormal growth of the secondary fruit into primary-fruit locules, which provide points of entry through which fungi can penetrate to form infections that remain quiescent until favourable conditions stimulate further fungal growth.

The style and stigma of navel blossoms are milky white at first and then turn light brown in colour and abscise cleanly. This happens one week after petals have dropped and young fruit are ± 8 mm in diameter. The two sets of stylar tissue present in the primary and secondary fruit locules can be injured during the blossom period if harsh weather conditions prevail for one or more days (hot days >25°C and low relative humidity <20%) followed by heavy dew during the night. This causes the outer or primary style to turn brown and dry out, while the inner or secondary style remains unaffected inside the outer style and continues to develop and swell in size to result in longitudinal cracks in the outer tissue. The longitudinal cracks enlarge as the orange increases in size. The inner ovary projects even more as the orange approaches maturity. This results in a large, irregular-shaped navel-end and creates an ideal site for Alternaria infections.

Score (50 ml/100 ℓ water) and Folicur (80 ml/100 ℓ water) are registered for control of the disease.

**POSTHARVEST PATHOLOGY**

W. DU PLOOY, K. LESAR & P. FOURIE

By now most of the crop has been harvested, packed and shipped. Now is the time to consider what changes need to be done to improve disease management next season. Here are a few factors to consider.

• How long did it take from harvest to the first fungicide treatment? The shorter this period the less rotten fruit will arrive at the packhouse, which will reduce the strain on your sanitation protocol.

• Was the flow of your drench applicator strong enough? Were you able to apply at least 250 ℓ per minute? A more effective drench application will lead to less rotten fruit arriving at the packhouse, and again less pressure on the sanitation protocol.

• Is there enough space in the very first part of the packline just after tip for removal of rotten fruit? Most packhouses have insufficient sorting in the beginning of the packline and this allows for rotten fruit to enter the packhouse and to contaminate the rest of the packline.

• Consider installing a second sanitation treatment. This should be a total loss system and it should be situated in the packline after rotten fruit has been removed from the export fruit. This will protect the packline from contamination.

• Sanitation of dip tank. Do you have a pasteurization protocol (heating overnight)? Heating the solution to 60°C and letting it cool down overnight will reduce the buildup of bacteria and Rhizopus spores in the solution.

• There should be time now to thoroughly sanitise the entire packhouse from roof beams to the floor, but this should be after all fruit (rotten or healthy) are removed from the packhouse environment. A quaternary ammonium product can be used, after which it should be ensured that the surfaces where fruit will make contact are rinsed off with clean water.
The rapid expansion of citrus plantings across South Africa will have a definite and significant impact on the South African citrus industry. Whether markets will absorb the increased fruit supply and what the subsequent repercussions on the current profit margins in the next five to ten years will be, is unclear and somewhat unsettling.

Another more worrying problem, is the issue of climate change and its effects on citrus production, as South Africa has been identified as an area to be significantly affected by the current projections (Midgeley, 2016). During the past few years, high temperature extremes have increased, while low temperature extremes have decreased significantly (Midgeley, 2016). Some of the warmest monthly temperatures were recorded in the 2015/16 season, and even higher temperatures and more frequent warmer days are predicted. Small fruit size problems will increase, as well as orchard water usage (~10% by 2050), and fruit cosmetic damage due to wind, hail, and sunburn (Bijzet and Weepener, 2016).

Long-term strategic planning and embracing the latest research findings and subsequent novel on-farm technologies, will be the main determinate of producer wealth and competitiveness of our industry. Shade netting is one such technology that could provide significant solutions to fruit quality related problems, as well as increase producer competitiveness in future potentially-saturated markets. Shade nets could enable citrus production in areas traditionally considered unsuitable for production of citrus, as well as buffer against negative impacts of climate change.

**POTENTIAL FOR USE OF SHADE NETS IN CITRUS PRODUCTION**

The use of shade nets is a familiar commercial agriculture practice – specifically for use in tree nurseries and the production of annual fruit crops, but more recently also in perennial fruit trees. The most commonly desired effects from shade netting are reduced light intensity and wind speed, as well as buffering of temperature extremes and increasing relative humidity (Wachsmann et al., 2014) (See Table 2). Desired plant responses include hastened plant vegetative development, fruit protection against cosmetic damage by wind, hail and sunburn, as well as protection against damage by birds (Raveh et al., 2003; Wachsmann et al., 2014). Prominent findings on the effects on orchard micro-climate include increased minimum and reduced maximum temperatures, an increase in relative humidity, and up to 85 to 90% reduction in wind speed (Raveh et al., 2003; Cohen et al., 2005). Shade nets increase leaf stomatal conductance during hot summer days (a factor of transpiration and sap-flow) by reducing photo-inhibition caused by extreme irradiation, and mitigating the mid-day depression (Cohen et al., 2005). Overall, in terms of horticultural plant responses, shade nets favour the development of vegetative tissues (shoots and leaves) instead of reproductive and root growth (measured in seasonal gain in dry mass) (Raveh et al., 2003).

However in experiments on ‘Orri’ mandarin trees, shade nets resulted in an up to two-fold increase in fruit yield (kg fruit per tree) and significantly increased tree water usage efficiency (WUE) and fruit quality (Wachsmann et al., 2014). Between red (25%), yellow (24%), white (18%) and transparent (13%) shade nets, trees under 18% white nets consistently performed better (Wachsmann et al., 2014). Trees under dark nets (red and yellow) exhibited increased vegetative growth and reduced yield, while water consumption under dark nets.
Shade netting could provide significant solutions to fruit-quality-related problems, and increase producer competitiveness.

was somewhat higher than under bright ones (white and transparent) (Wachsmann et al., 2014).

The use of non-permanent drape nets is also popular among Israeli citrus producers for protecting fruit against hail storms in late autumn and early winter (personal correspondence, Dr. Avi Sadka), as well as in California and Australia to restrict cross-pollination and development of seeds in mandarins. The use of non-permanent drape nets is also popular among Israeli citrus producers for protecting fruit against hail storms in late autumn and early winter (personal correspondence, Dr. Avi Sadka), as well as in California and Australia to restrict cross-pollination and development of seeds in mandarins. (Wachsmann et al., 2014).

The cost comparison between permanent and drape nets favours the use of drape nets, as the lifetime of the nets is longer, with no costs for poles, cables and so forth. However, there are some worrying questions on the coverage and efficacy of medium and full-cover foliar fungicide and insecticide sprays, as well as the effects of drape nets on fruit set, considering that Foliar GA3 sprays may also be impacted. Wind damage due to abrasion between drape nets and outside fruit could also reduce the benefits under drape nets, if they remain on the trees after petal fall.

Although the use of shade nets is rapidly expanding in the various South Africa citrus production areas, many critical research questions on the effects of shade nets on tree physiology and fruit quality are unanswered and require urgent attention (see Table 1).

Also, many practical issues regarding production logistics and management of orchards under nets are neglected (see Table 2). The first author visited various citrus producers making use of shade nets to find out their first-hand experiences on the effects of shade nets on citrus production.

**EXPERIENCES OF PRODUCERS**

In September 2015, Riaan Van Zyl of Loveren Boerdery outside Kakamas, planted 35 hectares of ‘Nadorcott’ mandarin trees – 12.5 ha under permanent 20% white nets and 12.5 ha outside (See photo 2). During spring and summer, they struggled with very strong winds and were forced to consider erecting permanent netting structures over some of their new plantings of high-value cultivars. Young trees under nets are now (May 2016) almost double in size, compared to those outside.

**Table 1. Critical questions requiring research attention**

<table>
<thead>
<tr>
<th>Question</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effects of shade nets on tree water requirements and irrigation</td>
<td></td>
</tr>
<tr>
<td>Fertilizers and mineral nutrient norms</td>
<td></td>
</tr>
<tr>
<td>Pruning and tree manipulation</td>
<td></td>
</tr>
<tr>
<td>Effects of shade nets on flowering and fruit set</td>
<td></td>
</tr>
<tr>
<td>Efficacy of currently available PGRs (Maxim, Corasil P and Progibb) under nets, as well as new PGRs such as Uniconazole and Paclobutrazol (growth retardants).</td>
<td></td>
</tr>
<tr>
<td>Effect of shade nets on fruit quality (pre- and post-harvest)</td>
<td></td>
</tr>
<tr>
<td>Efficacy of current chemicals and impact of nets on preharvest intervals to meet MRLs</td>
<td></td>
</tr>
<tr>
<td>Phytosanitary insect pest and pathogen control</td>
<td></td>
</tr>
<tr>
<td>The effect of different coloured nets (red, blue etc.)</td>
<td></td>
</tr>
<tr>
<td>Permanent shade nets vs drape nets</td>
<td></td>
</tr>
</tbody>
</table>
A nearby farmer, Junior Aggenbag, erected 6.5-metre-high permanent shade nets over some of his ‘Star Ruby’ grapefruit and ‘Nadorcott’ mandarins (See photo3). During spring and summer, they first apply foliar nutrient and pesticide sprays to orchards under nets, because there are almost no winds. Shade nets increased his pack-out of ‘Star Ruby’ by 12% due to reduction in sunburn alone, and enabled a 20 to 30% reduction in water requirements for irrigation.

In Citrusdal, Jannie Toerien was one of the first citrus producers to make use of shade nets and covered a block of ‘Satsuma’ mandarins with permanent 20% white shade nets at a height of 3.2 m above the orchard floor. He paid off his nets in the first two years. Shade nets reduced his tree water requirement by 20% and for the last five years his pack-out was consistently higher by 15 to 20%, mainly due to reduction in wind blemishes and sunburn. Under shade nets, his time of harvest is earlier by about two weeks but control of citrus red mite is his biggest problem.

Doepie Van Zyl at Kanetvlei in the Hexriver valley has ‘Nadorcott’ mandarins under 20% white shade nets, and a significant reduction in sunburn and wind blemishes are clearly visible (Fig. 4). However, control of woolly whitefly in these cool and wet areas seems to be a major problem under shade nets.

In the Eastern Cape, Steve Lloyd from Dunbrody Estates outside Kirkwood, recently covered adult B17/Valley Gold mandarin trees with 20% white shade nets. Ambient canopy temperatures are higher under nets, compared to outside, and mealybug, red scale and citrus red mite control under nets is much more difficult. In terms of fruit quality, fruit size appears larger and more uniform.

Willem Kieviet from Indigo Farms in Nelspruit is farming with ‘Nadorcott’ mandarins under shade nets. Fruit colour development there is somewhat slower under nets, and his harvest is delayed by about three weeks. At time of harvest, however, fruit colour is more intense, fruit size distribution is shifted up by one calibre, and fruit are free of sunburn and wind blemishes. Time of flowering is similar, flowering is more intense, and percentage fruit set is higher under nets. Although chemical residue levels in general are higher under his nets, they still comply with the MRL standards.

**CONCLUSION**

What to plant, where, and how to optimally apply which technologies will be of critical importance to avoid exposure to the future threats of climate change and increased competition in the markets. Shade nets could provide significant benefits against these threats, but much practical information and answers to critical research...
questions on their use must still be obtained. Currently a co-funded project between the Department of Science and Technology (DST) and Citrus Research International (CRI) in the Research for Citrus Exports programme is under-way (See photo5) to answer questions related to the impact of shade nets on the various aspects of citrus production, in order for producers to make informed and sound choices in the near future.

Table 2. Important practical considerations for the use of shade nets

<table>
<thead>
<tr>
<th>BEFORE PLANTING</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind directions</td>
<td>Sides of net structure should be closed</td>
</tr>
<tr>
<td>Row-orientation</td>
<td>Shade nets favour vegetative growth and might lead to excessive tree height.</td>
</tr>
<tr>
<td>Orchard spacing</td>
<td>Keep in mind when considering scion x rootstock combinations as well as orchard tree spacing.</td>
</tr>
<tr>
<td>Cultivar choice</td>
<td></td>
</tr>
<tr>
<td>Rootstock choice</td>
<td></td>
</tr>
<tr>
<td>Vehicle turn and maneuverability</td>
<td>Netting structures could influence vehicle access in and around the orchards.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AFTER PLANTING</th>
<th>Implication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insect pest control</td>
<td>Control of red scale, mealybug, red mite and woolly whitefly is more challenging under nets.</td>
</tr>
<tr>
<td>Pathogens</td>
<td>Considering reports of increased RH (relative humidity) and reduced airflow, cultivars sensitive to <em>Alternaria</em> might be exposed to increased risk under nets.</td>
</tr>
<tr>
<td>Foliar sprays</td>
<td>Reduced wind speed might reduce drift, but also increase the time required for droplets to dry. With some chemical mixtures, this might lead to phytotoxicity. A reduction in UV (ultra violet) rays entering the canopy could also influence the preharvest interval for certain chemicals.</td>
</tr>
<tr>
<td>Insect pest control by air</td>
<td>Shade nets may hamper insect control techniques such as sterile insect release. Make sure measures are in place to compensate for this and that orchards under nets still receive adequate insect pest control.</td>
</tr>
<tr>
<td>Harvesting</td>
<td>Considering reports of increased RH and reduced airflow, fruit under nets could stay wet for longer periods and delay harvesting and/or increase the risk of oleocellosis.</td>
</tr>
</tbody>
</table>

REFERENCES CITED


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The benefits of using certified, virus-tested, true-to-type plant material

The benefits to the primary fruit producers of establishing orchards and vineyards of certified, virus-tested, true-to-type plant material are not well understood. This article summarises the results of a research project which assessed the lifetime economic and non-economic benefits for fresh stone and pome fruit orchards, table and raisin grape vineyards, as well as canning peach orchards in South Africa (Midgley and Vermeulen, 2015; Midgley et al., 2015 and 2016).

Apple and pear trees are prone to infection with a range of viruses, of which the most important in South Africa are Apple mosaic virus (ApMV) and Apple chlorotic leaf spot virus (ACLSV). Both viruses can exist in trees for long periods without showing visible symptoms, i.e. they are latent (especially ACLSV). Visible symptoms of ApMV occur with virulent strains of the virus, or in sensitive cultivars, such as Golden Delicious and Granny Smith, and in old orchards. Rapid emergence of visible impacts can be triggered by conditions leading to stress in the orchard, such as drought and disease. Where trees are affected, fruit tend to be smaller leading to yield reductions and price reductions. Both viruses are spread by grafting with infected plant material. The virus incidence can be managed by planting only certified virus-tested trees, removing infected material from orchards, strict sanitary practices, and using only certified material for re-planting and top-working.

Plum and peach trees, on the other hand, are susceptible to Prune dwarf virus (PDV) and Prunus necrotic ringspot virus (PNRSV). A wide range of symptoms can occur, including poor yield and fruit quality. Co-infection between PDV and PNRSV may intensify the symptoms. Both viruses can spread by grafting with infected plant material, or using infected seeds to develop rootstocks, while natural spread can occur during pollination by honeybees (although this is a lower risk in peaches than plums). The viruses can be managed by planting certified virus-tested trees and by preventing spread within and between orchards by removing diseased plants, avoiding the use of commercial beehives recently used in other infected stone fruit orchards, avoiding the propagation of peach rootstocks from uncertified seeds, and using only virus-free material for top-working. For grapevines the most important viruses are Grapevine leaf-roll associated viruses (GLRaV’s). The GLRaV-3 is the main strain of this virus responsible for Grapevine leafroll disease (GLD) in South Africa. There is a progressive reddening and rolling of the leaves in red cultivars as the season progresses, often beginning in mid-summer when vines are under water stress. Very few of the white cultivars show noticeable symptoms, but may do so if very heavily infected for a long time. Most vineyards in the Western Cape are infected with GLRaV and the disease spreads very rapidly. If left unmanaged, all plants may become diseased within 10-13 years due to the exponential spread. The GLRaV’s can be transmitted by grafting and several insect vectors, such as mealybugs and soft scale insects. GLD can be managed by controlling insect vectors with a combination of systemic and contact insecticides. This is seen as the primary response, together with the planting of certified virus-tested vines. Roguing can be performed based on a visual selection of symptomatic plants in red cultivars. When infection levels are high (>ca. 25%) the removal of the entire vineyard can be considered.

Estimates of incidence and impacts in the Western Cape

Limited information is available on the extent of infection and impacts on production in the Western Cape.
South African apple and pear orchards. Infection rates of ApMV in apples are believed to reach 30% (sometimes 100% in old Golden Delicious orchards), yield losses up to 30%, and price reductions of up to 35% due to smaller fruit sizes. For pears, ApMV infection levels are likely to be lower (<1%), although they could also be up to 30%, with yield losses up to 20%, and price reductions up to 35%. ACLSV in apple and pear orchards is generally unknown by industry role players, or considered to have a low incidence and impact, probably due to a lack of visible symptoms.

The incidence of PDV in plum and peach trees is considered low (<1%) and that of PNRSV low, but possibly higher than PDF (<10%). However, it is thought that both viruses can spread quickly in peach orchards compared to plum orchards because bees are not typically used for pollination of peaches.

The usual rate of spread within plum and peach orchards is likely to be 2-30% per year, and between neighbouring orchards 1-5% per year. Yield losses due to PDV and PNRSV in plums can reach 30% or higher, although there are wide differences in estimates; yield losses in peach orchards are not known. Smaller, misshapen and blotchy fruit caused by PNRSV, can reduce prices by around 20%. There appears to be no knowledge on the impacts of PDV infection in stone fruit.

In table grape vineyards the incidence of GLRaV’s can be up to 30% and sometimes higher. Yield losses are estimated at approximately 21-30%. The quality of the table grape bunches may be reduced by berries being less pigmented, smaller, and on smaller bunches with poor form. Bunches may have larger off-cuts to improve the bunch form, leading to loss of productivity in packing and yield reductions.

Price reduction could be up to 80%. The price may also be reduced in cases where an early market window is not achieved due to delayed ripening associated with GLRaV infection. The potential loss in raisin grape production and value due to virus infection is not known, although it is thought that the raisins from infected grapevines are smaller, because of a lower sugar content in the berries. The price reduction for smaller raisins could be about 50%.

For all five viruses there is a lack of data supported by laboratory virus tests to support an accurate understanding of the extent of the problem in commercial orchards and vineyards, and in uncertified plant material used by a small minority of deciduous fruit producers. The industry should consider moving away from the term “visually free” by adopting future testing of all plant material for the viruses identified in the Certification Scheme.

Using a modelling approach to assess impacts of viruses and benefits of certified material

Against this background, the long-term (orchard/vineyard lifetime) financial benefit to the producer of using certified virus-tested plant material was estimated by comparing various scenarios under a model. The model of Fuller et al. (2013) for grapevine production in California was used as a basis; see also Fuller et al. (2015). The model was set up for fresh apples, pears, plums and table grapes, for canning peaches, and for raisin (dried) grapes and their key viruses, and is not at this stage cultivar- or area-specific. A wide range of scenarios was modelled to capture the range of possibilities and identify the most critical factors, rather than to depict the current situation in the industry.

To estimate the value of losses incurred by fruit growers as a result of virus-related diseases, and the benefit from using certified virus-tested plant material, we estimated differences in net income from a representative hectare of fruit between several scenarios. For each host-virus combination, we compared scenarios for various aspects of disease pressure: initial disease incidence linked to whether or not the orchard/vineyard was planted using certified virus-tested plant material, rate of disease spread, yield loss in diseased trees/vines, and reduction in price obtained for fruit harvested from diseased trees/vines (reflecting reductions in fruit quality due to the disease). Details of the model are presented in Midgley et al. (2016).
Results of modelling

For ApMV, the cumulative 25-year benefit of planting certified virus-tested trees (not adjusted for inflation) can be up to R2 811,819 per hectare for fresh apples and R1 642,755/ha for fresh pears. For ACLSV it can be up to R3 110,224/ha for apples and R2 061,739/ha for pears. The greater benefit for ACLSV compared to ApMV, relates to the assumption of a slightly higher infection incidence in uncertified planting material, since this virus is latent and not as well controlled using visual assessment methods.

In fresh plums, the cumulative benefit can be up to R1 540,755/ha for PDV and up to R1 736,995/ha for PNRSV. The greater benefit for PNRSV compared to PDV relates to the assumption of a slightly higher yield loss in uncertified trees infected with PNRSV. For both PDV and PNRSV in canning peaches, the cumulative benefit can be up to R627,974/ha.

In the case of table grapes or raisin grapes and GLRaV, infection and spread rates can rapidly reach 100% in a number of scenarios and the cumulative benefit can be up to R2 414,732/ha (table) or R1 957,528/ha (raisin). It is important to note that the results of the modelling study need to be verified with field data from commercial nurseries and orchards/vineyards.

Financial benefits to the producer are maximised primarily where the difference in initial virus incidence between certified and uncertified plants is greatest, and secondarily where the rate of spread is high. A minimum hypothetical difference in infection level at planting between 0.5-1% (certified) and 2-5% (uncertified) already yields benefits, but the benefits are significantly increased as this difference widens. This can be explained by the compound nature of the impacts over the orchard/vineyard lifetime.

The model results show an increase of 34-65% of the financial benefit of using certified virus-tested material, given the expectation that at least one stressful year will be experienced over the orchard/vineyard lifetime giving rise to a doubling of infection impacts. This would be expected to multiply with every additional “stress year”.

Currently, most (estimated 90%) apple and pear producers, and around 80% of plum and peach producers are using certified virus-tested material, because they perceive a financial gain from doing so, both in the medium (10 years) and longer term (25 years). Other reasons include that certified material is readily available, it is more likely true-to-type, it is generally also free of pests and other disease-causing agents, and because it gives better yield and fruit quality.

Diseased underperforming trees should be removed and replanted with ‘clean’ trees; however, in orchards and older than a few years the replacement trees struggle to reach their full potential due to competition with large neighbouring trees. The orchard then loses its uniformity and ease of management. On the other hand, not replacing individual diseased trees means that they require more attention which is costly in terms of labour and chemical inputs, in

Figure 1: Modelled results for Table Grapes where rate of spread of virus is 20% per annum.

A and C: Modelled annual net income (blue) and loss from disease (red) as affected by initial incidence of virus in planting material.

B and D: Modelled cumulative net income (blue) and loss from disease (red) as affected by initial incidence of virus in planting material.

A and B: certified virus-tested planting material used (0.5% incidence).

C and D: uncertified planting material used (10% incidence).
addition to the cumulative loss of income. It is far better to establish the orchard with healthy certified trees.

Currently, only about half of table and raisin grape producers are estimated to be using certified virus-tested material. There is a belief that this technology is cost effective within 10 years of establishment, but not over the lifetime of the vineyard due to high levels of disease pressure from infected neighbouring farms. This is partially supported by the results of the scenario based on 0.5% incidence in planted certified vines and a high spread rate of 20% per year. These show a reduction in annual profit from around R292 000 (table) or R311 000 (raisin) in Year 13, to R191 000 (table) or R229 000 (raisin) in Year 25 (Figures 1 and 2).

Uncertified vines (10% starting infection, 20% spread per year) reached 100% infection in Year 14 and had a final annual profit of R48 000 (table) or R112 000 (raisin), since diseased plants still produce marketable fruit. The annual benefit of using certified vines peaked in Year 14 at R241 000 (table) or R197 000 (raisin) and decreased thereafter to R143 000 in Year 25 (table) or R117 000 (raisin) (Figure 1). However, the lifetime cumulative benefit kept increasing to R3 600 000 (table) or R2 991 000 (raisin).

There may be an opportunity cost in not replacing the entire vineyard with fresh plants every 15-20 years in response to market pressures, as indicated by some industry experts. This could be modelled in future.

This study has provided some initial quantified analysis showing that the use of healthy certified virus-tested plant material in the deciduous fruit industry, is the basis for an integrated strategy for managing viruses, together with best practice monitoring and orchard/vineyard management. Given the expected increase in climatic stress in future, brought about by climate change, it is becoming even more important to manage orchard/vineyard stress and at the same time ensure that virus levels are as close to zero as possible at the outset.

**Genetic deterioration**

The challenge of genetic (cultivar) deviation and reversion (not true-to-type) within some deciduous fruit orchards (particularly apples) is widely acknowledged, but there exists no data on which to base a quantification of the financial and other impacts. Red/blushed apple cultivars known to be prone to deviation include Royal Gala (estimated level 5-50%), Royal Beaut (estimated level 20%), Fuji, Early Red One, Panorama Gold (estimated level 5-20%) and Starking (estimated level 5-15%).

A loss of red fruit colour can reduce the price fetched by approximately 75%. The reverted Panorama Gold has a later harvest date and the fruit is smaller. The income of the producer may be reduced by 80% due to the altered market window. Other benefits of maintaining true-to-type orchards, according to expert opinion, include easier farming with respect to spraying and pruning, predictable farming and peace of mind.

The pear cultivar Early Bon Chrétien (EBC) has reversion rates to the
parent Bon Chrétien (BC) cultivar estimated at between 5% and 50%. BC within a block of EBC has a later harvest date compared to EBC, but maturity levels of EBC and BC are difficult to distinguish, which makes harvesting more difficult and costly. EBC trees are often marked during bloom so that the fruit can be harvested according to labels, which also adds costs. Fruit from the later harvest fetches a much lower price and is sometimes sent for juicing, leading to a financial loss of approximately 71% per bin, according to one estimate.

The stone fruit cultivars do not usually have the challenges associated with genetic deviation and reversion (not true-to-type). Deviation is, however, found in Laetitia and Sungold plums, but there exists no data or expert estimates on which to base a quantification of the possible impacts.

Peach cultivars known to experience deviation fall under the Kakamas types, the primary type used for canning. It is believed that the Kakamas cultivar has changed over the years resulting in an estimated yield loss of 30-40 t/ha. In addition, in one case the shape of the fruit appears to have changed (more pointed end), which leads to easier bruising and incomplete de-pipping by processing machinery. The loss was approximately 30% in this case. Oom Sarel is another peach cultivar that is known to have deviating trees.

**Conclusion**

At an industry level, all producers together with the nurseries and the plant improvement organisations are collectively responsible for the genetic and phytosanitary status of plant material, and the maintenance of high plant quality over a long time period. Since viruses cannot be treated and cured, and the process involved in supplying clean plant material at the start of the orchard or vineyard lifetime is long and costly, a lack of attention to this will eventually set the deciduous fruit industry back many decades as the quality of trees and vines gradually degenerates. It has been shown over decades of research globally that this leads to reductions in the quality and size of the fruit, the yield, the longevity of the trees/vines, the sensitivity to stress and other adverse environmental factors. Ultimately the producers will pay the cost.

Since the main viruses of plums and grapevines are easily transmitted between farms there is an added imperative for every producer to do everything possible to minimise infections, thereby benefiting not only his own financial success but also that of his neighbours and the production region. Otherwise the efforts of some producers and the plant improvement organisations will become ineffective.

Similarly, and equally concerning, is the gradual loss of income from premium red/blushed apple cultivars, early pear cultivars and canning peach cultivars through genetic deterioration. Focused monitoring of the problem, research, and the continued provision of genetically ‘true’ plant material and replacement of deviated or reverted trees should remain a key industry priority.

Although the main focus in this study was on viruses it is important that the economic influences of other organisms such as bacteria (for example fireblight in grapes) are also investigated in future.

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By adding ethical audits to its certification offer, NSF now offers a full house of assurance services to the agriculture, food and beverage sector in Sub-Saharan Africa. According to Wouter Conradie, NSF Managing Director for Africa Operations, this success is maintained through the competent and experienced team of auditors who are proud ambassadors of the brand. Conradie says: “We have managed to further differentiate ourselves in the field of food assurance as a blue-chip brand with the utmost integrity and high ethical values. This is quite apparent when you look at the list of South African producers and brands that want to associate themselves with the NSF mark.”

**NSF SIZA audits get GSCP recognition**

GSCP (the Global Social Compliance Programme) has given recognition to SIZA (Sustainability Initiative of South Africa) audits conducted by NSF. The aim of GSCP is to promote cross-industry collaboration to drive improvements in social and environmental practices for more sustainable supply chains through continuous improvement, training and capacity building. It is similar to the GFSI (Global Food Safety Initiative) programme and it is also owned by the Consumer Goods Forum.

SIZA audits were originally developed for South African fruit farms and pack houses to promote sound and ethical labour practices, but are applicable to all agriculture industries in South Africa. SIZA was developed as a single ethical standard and programme that would meet all retailer requirements and harmonise all ethical code requirements into one system with one audit for all.

**TESCO recognition of NSF’s high standards**

All growers supplying Tesco are required to have an ethical audit. Currently they will only recognise SIZA audit reports from NSF and Interek, but other certification bodies can also be recognised if they receive GSCP recognition. This has opened up an opportunity for NSF’s GLOBALG.A.P. and BRC clients to have a one-stop shop for all their certification needs. NSF’s robust systems and procedures as well as the standard of their auditors and audit reports contributed to this achievement and global recognition.

**SIZA/WIETA**

Other good news is that SIZA has agreed to acknowledge WIETA (Wine Industry Ethical Trading Association) audits of wine grape producing growers. A training and calibration session was held in February for WIETA and SIZA auditors, where WIETA selected NSF to be the only certification body to be approved to conduct both WIETA and SIZA combined audits for growers with both wine grapes and fruit crops.

**SMETA**

Some South African growers have opted not to be part of the SIZA program but rather have SMETA (Sedex Members Ethical Trade Audit) audits which NSF is competent to offer. SMETA was developed by the Sedex Associate Auditor Group (AAG) to provide a best practice reference framework for social auditing and reporting.

**GRASP**

GRASP (GLOBALG.A.P. Risk Assessment for Social Practices) is not an ethical audit, but a risk assessment that could be combined with a GLOBALG.A.P. audit and serves as a much cheaper indicator of social compliance. All NSF GLOBALG.A.P. auditors are qualified to conduct these audits. Several retailers in Europe are now insisting on this audit.
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It has been a really dry summer in many parts of the country, mostly due to El Niño causing a serious drought. Many fruit producers are still counting the cost of related water stress during critical phases of crop development. The need to use reliable information tools and best practices to enhance producers’ ability to inform farming decisions, is clear. Luckily, becoming a “water smart” farmer is already possible with FruitLook, says André Roux of the Western Cape Department of Agriculture. FruitLook helps producers to understand how their crops respond as part of the bigger water cycle of their region. By knowing more about the transfer of moisture from the earth to the atmosphere producers are better placed to efficiently manage their farms. Many producers are using this online tool to provide insights into water use on their farms, helping them to become more resource efficient.

Almost half of the producers using FruitLook have indicated they have cut their water use with a tenth. One in every ten says they are now using almost a third (30%) less water than before. The majority have also indicated it is very useful in the detection of over- or under-irrigation, with over half of them highlighting that it could be used to detect irrigation problems (for example pipe leaks).

“Cameras mounted on satellites capture characteristics of the crop which cannot be seen by the naked eye, providing farming intelligence normally not available to the farmer.”

In future farmers will have to produce more with less, especially when it comes to fresh water supplies. We take a closer look at how an online tool called FruitLook is helping farmers to better manage their “open-air factories”.

"Cameras mounted on satellites capture characteristics of the crop which cannot be seen by the naked eye, providing farming intelligence normally not available to the farmer."
But how does it work? “Basically, FruitLook employs the latest satellite technology to help farmers manage crop productivity, growth and water use more precisely,” explains Dr Caren Jarmain. She is an independent researcher and Research Associate at the Centre for Geographical Analysis at Stellenbosch University.

This cutting edge data service provides remote sensing derived data products to the deciduous fruit producers in the Western Cape, currently free of cost. “Cameras mounted on satellites capture characteristics of the crop which cannot be seen by the naked eye, providing farming intelligence normally not available to the farmer. It can help producers to better understand how their crops use water and how much is needed where,” Dr Jarmain says.

The satellites can, for instance, tell you how well your crop is growing, how much water it is using and also how effectively it is doing that. This allows for a more targeted approach to irrigation with farmers able to monitor their water use. “It is a system then enables you to identify farm specific areas with weak growth or even pinpoint the particular area in your orchard or vineyard with water shortages,” Dr Jarmain says.

FruitLook integrates the latest in remote sensing technologies by satellite with weather data and complex algorithms and offers three water-related datasets. These relate to actual evapotranspiration, evapotranspiration deficit and biomass water use efficiency in orchards and vineyards. Data about the evapo-transpiration deficit, for instance, can give clues whether plants are under-watered or stressed in some way (see graphic on page 78). This helps to take some of the guesswork out of farming and could save producers lots of money, especially on irrigation costs.

Many users say this tool has proven useful to analyse the “bigger picture”, especially when it comes to their water needs.

Farmers know that irrigation schedules and probes have their limitations and that you need to adjust your “recipe” according to specific conditions, including plant development and stress factors. This is where FruitLook has often proven useful to check irrigation system performance, says soil scientist Nelius Kapp. Kapp, director of Soil2Root Technologies, has been using FruitLook for several years. He, for example, looks at its data on biomass production along with its datasets on evapotranspiration deficit (an indicator of water stress in plants) to unravel what is happening in a problem area.

Anton Müller, Kromco’s technical advisor, considers FruitLook especially useful to detect irrigation issues, for the placement of soil moisture probes, the detection of drainage problems and to evaluate just how efficient irrigation regimes were during a “post-mortem” of the season. “FruitLook also helps clarify what the effect is of irrigation scheduling on crop growth,” he adds.

Both under- and over-irrigation have a negative impact on water use efficiency and yield, thus it is important that users understand and improve on both. “FruitLook allows growers to see where in the orchard trees have been over- or under- irrigated. This information helps farmers understand the actual crop water use over the season, water efficiency on their farms and fields and how crops respond to changes in irrigation and climate. Thanks to FruitLook producers also have farm-specific data compiled over past growing seasons that can act as a reference point. I find that very useful,” Müller says.

Some farms in the Grabouw region have, for example, been able to reduce their early-season water use with up to 30%. This was done using FruitLook in combination with soil moisture probes.

Sometimes issues related to irrigation in an orchard are first noticed thanks to unusual changes flagged by FruitLook’s growth data. Müller gave an example of a 5 ha apple orchard in the region that developed a real problem with red spider mite infestation late January:
FruitLook data showed that biomass production was lower during December, a crucial time for pear development. What caused the drop?

The evapotranspiration deficit was very high over the same period. Taken together, the FruitLook data suggests the pear orchard experienced water stress at this crucial growth stage.

Additional calculations for crop water requirements showed that the existing drip irrigation system could not provide enough water in high-demand periods. Nelius advised the farmer to invest in a microsprinkler system that would provide adequate water in future.

FruitLook growth and water use data helped Nelius Kapp and the pear farmer to identify and resolve the cause of a low crop yield, thereby preventing an unnecessary loss of income for the farmer.
“The evapotranspiration deficit data showed clearly that the trees were under stress during early January. Considering integrated pest management on the farm, the problem was resolved by biological control after it was decided to adjust water scheduling, rather than spray en masse. Adjusting water management helped reduce stress in the orchard. The pest issue at hand was an irrigation issue.”

Jaco Engelbrecht, a viticulturist from Boland Cellar, has had similar experiences. He often also considers FruitLook’s evapotranspiration data. Engelbrecht uses it to identify event-based problems within the vineyards. “FruitLook helps us to adjust our management practices when the plants need it the most,” he says. “We adjust our irrigation accordingly to avoid spikes or drops in biomass production.”

Kapp often employs FruitLook’s biomass data in conjunction with its moisture parameters. He also uses it in conjunction with information from soil profiles to decide where to for instance place soil moisture probes. “FruitLook is useful to identify areas that are experiencing evapotranspiration deficits, but it won’t tell you the reason. Sometimes there are other reasons why this dataset would for instance show changes in your orchard. This could be because of the wind, pests or atmospheric stresses like a heat wave. Relying on a satellite image alone will not necessarily give you the answer. You still have to interpret the data.” The data must be assessed given unique block, farm and regional conditions, he emphasises.

The real value of FruitLook, Kapp believes, emerges when used in collaboration with soil moisture probe data, information from weather stations and hands-on investigations on the ground. “FruitLook not only helps you understand the current season, but also to look back at conditions in the seasons. To interpret decisions around water scheduling you have to think farm specific and integrate all your measurements and observations,” he says. (See graphics on page 80 for some practical examples from Kapp.)

Len van der Merwe, who manages the Ratelfontein Boerdery near Villiersdorp, agrees. He has been using FruitLook for about two years to inform farm management decisions. “FruitLook offers me the opportunity to look back over the season and to assess some of the irrigation decisions we made. I access the data weekly and adjust scheduling accordingly, along with soil moisture probe readings.” The probes give detailed information over time and the depth of soil and the other provides a picture of the entire orchard.

He considers FruitLook as a “handy” tool to use in pursuit of more precision type agriculture. It is also valuable when trying to calibrate irrigation scheduling and helps to visualise trends in soil drying. “FruitLook offers a nice way to check if what you have been doing last week and earlier in the season are having the desired results. Our farms have different soil conditions. We have to consider factors like slopes and drainage to make sense of why one section grows slower or dries out quicker. It has proven useful to compare different areas with each other.”

FruitLook reflects farm specific and regional conditions. And therein lies the beauty of using this kind of remote sensing tool that can look back in time and space. “A better picture emerges of what is happening on the whole farm when you integrate this with your existing farming practices,” Müller concludes.

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DID YOU KNOW?

- Eight percent of South Africa’s landscapes provide more than half of its fresh water.
- Two-thirds (66%) of all water consumption countrywide is by farmers.
- Water issues are compounded by the fact that demand outstrips supply in many parts of the country.
- In the Western Cape, 43% of the available water resources are used for irrigation.
- Fruit crops need between 7 000 m³ and 11 000 m³ water per hectare, depending on the type of crop and locality.
- Approximately 240 6000 ha is under irrigation in the Western Cape. This includes 186 400 ha under fruit crops and 8 000 ha under vegetable crops.
- Rain-fed agriculture is also considered important in the province. About 468 000 ha dryland grain crops (like wheat, canola and barley) are annually planted in the Western Cape. Another 400 000 ha lucerne is produced on dryland and with irrigation.
- Last year’s drought caused an estimated loss in wheat production of about 200 000 ton.
- FruitLook measures evapotranspiration (the sum of evaporation and plant transpiration from the surface to the atmosphere) in mm per week.
- 1 mm evapotranspiration per day is the same as 10 m³ per hectare per day.
- 1 litre evaporation per second per hectare is the same as 8 640 mm per day.

SOURCE: FRUITLOOK, WWF-SA, DAFF, FAO.
The Orchard of the Future (OoF) project was launched five years ago when HORTGRO Science challenged the apple industry to design an unconventional orchard for future apple production. The goal was, not only to utilise more dwarfing rootstocks, but also to create exhibition sites where people from various disciplines involved in production could get together to experiment and learn. Accordingly, Fruitways, Two-a-Day and Dutoit Agri groups stepped up to the plate and three orchards were planted in three different locations, Graymead, Oak Valley and Paardekloof (South African Fruit Journal, July 2015).

The Oak Valley orchard is enclosed in shade netting (canopy 20%, skirting 40%) to limit the effect of sunburn on Granny Smith apples. Planting detail is given in Table 1. The original part of the orchard was planted with G222 rootstocks in April 2012, after the soil had been fumigated with methyl bromide. Since then, methyl bromide has been phased out, with the soil for subsequent plantings having been fumigated with 1,3-dichloropropene-chloropicrin in April 2013. The two new plantings of the same size consisted of M7 rootstocks and M9 rootstocks. G222 rootstocks were chosen, mainly because they tend to be less dwarfing than M9. Enclosing the orchard in shade netting alters the entire orchard environment, which can be either conducive or suppressive to certain pest insects and diseases, including nematodes.

Why use nematodes as soil health indicators?
Nematodes occupy key positions in the soil food web (See box 1). Consequently, the evaluation and interpretation of the abundance and ecological function of the nematode community structure, provides an assessment of factors that are responsible for disrupting the natural environment. A solitary lone assessment of the Oak Valley site provided snapshots of conditions in their soils. Sequential soil sampling and analysis, using the shift in nematode population structure and functional guilds as an indicator of soil health, is likely to reveal information regarding the degradation or remediation of the soil environment. The analyses of nematodes at family level provide valuable information regarding the nature of soil enrichment, coupled with the nature of the decomposition pathways (See box 2). These analyses provide the foundation for establishing the effects of agricultural practices on the functioning of the soil food web, in addition to facilitating the taking of decisions related to remediation, environment and conservation.

Box 1. Levels in Trophic the soil environment. Nematodes on the left compared to various arthropods etc. on the right.
**How did we do it?**

Soil samples were randomly collected throughout the orchard from all eight blocks. Nematodes were extracted and then counted and grouped into plant- (herbivores), hyphal- (fungivores), and bacterial-feeding groups, as well as carnivores and omnivores. Families were assigned coloniser-persister values (cp values, see Box 3).

**What did we find?**

On analysing the results obtained for each block, the data were grouped according to rootstock and preplant treatment. The average number of nematodes for each rootstock was calculated (see Fig. 1). From the results, it is clear that G222 had the lowest overall number of nematodes present, with fewer than 1 500 nematodes per 250 ml of soil. The nematodes were most abundant in the M7 sites, with just over 8 000 per 250 ml of soil, followed by M9, with just under 7 500.

The drastic difference in nematode abundance might have been due to the preplant application of methyl bromide, opposed to the 1,3-dichloropropene-chloropicrin used for the M7 and M9 blocks. However, it could be speculated that the difference in nematode numbers could be due to either the fumigant used, or to the rootstocks planted. Comparison with preplant nematode soil analysis data, indicating the shift in nematode population structure over time, could have shed light on these results.

The most dominant family in G222 was Rhabditidae (cp-1, bacterial-feeding, enrichment opportunists), followed by Cephalobidae (cp-2, bacterial-feeding, general opportunists) (Fig. 3). The opposite result was obtained for M7 and M9, in relation to which Cephalobidae were found to be the most dominant, followed by Rhabditidae. The M7 blocks had the overall highest number of Cephalobidae.

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**Table 1.** Oak Valley Orchard of the Future background summary (SOUTH AFRICAN FRUIT JOURNAL, JULY 2015).

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Granny Smith</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacing (m)</td>
<td>3.5 × 1.2</td>
</tr>
<tr>
<td>Trees/ha</td>
<td>2381</td>
</tr>
<tr>
<td>Height (m)</td>
<td>3.5</td>
</tr>
<tr>
<td>Training system</td>
<td>Solaxe “Sud-Tirol” type</td>
</tr>
<tr>
<td>First harvest</td>
<td>Incomplete</td>
</tr>
</tbody>
</table>

**Table 2.** Various indices calculated for OoF Oak Valley (descriptions of indices in Box 4).

<table>
<thead>
<tr>
<th>Indices</th>
<th>G222</th>
<th>M7</th>
<th>M9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enrichment Index (EI) %</td>
<td>83.5</td>
<td>47.5</td>
<td>17.1</td>
</tr>
<tr>
<td>Structure Index (SI) %</td>
<td>21.7</td>
<td>1.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Channel Index (CI) %</td>
<td>0.3</td>
<td>5.8</td>
<td>15.5</td>
</tr>
<tr>
<td>Basal Index (BI) %</td>
<td>15.8</td>
<td>52.1</td>
<td>82.9</td>
</tr>
<tr>
<td>Plant-parasitic Index (PPI)</td>
<td>0.1</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Maturity Index (MI)</td>
<td>1.4</td>
<td>1.8</td>
<td>2.0</td>
</tr>
<tr>
<td>Shannon’s Diversity Index (DI)</td>
<td>1.1</td>
<td>0.8</td>
<td>0.4</td>
</tr>
</tbody>
</table>

**Box 2.** Why nematodes constitute good bio-indicators.

- Nematodes occur in any environment
- Source of organic carbon is essential
- Amongst the most straightforward Metazoa
- Permeable cuticles provide direct interaction with environment
- Occupy key positions in the soil food web
- Influence vegetation succession
- Identification can occur without biochemical procedures
- Nematodes are transparent, internal characteristics can be observed without dissection
- Well-defined association between structure and function
- React rapidly to changes in their environment
- Increased microbial activity results in fluctuations in percentage bacterial-feeding nematodes in a community

**Figure 1.** Number of nematodes present per 250 ml of soil for each rootstock.
Results obtained from the G222 blocks indicate low numbers of ring nematode (*Criconemoides xenoplax*) and lesion nematode (*Pratylenchus sp.*) (Fig. 1 and 3). The M7 blocks had very low numbers of lesion nematodes present. In general, the low number of plant-parasitic nematodes, especially lesion nematodes, could be an indication of the initially clean nursery material used, or to the rootstocks being relatively resistant. A possible risk exists of an increase in numbers in the future. The questions concerned should be answered through future soil sample analysis.

Fungal-feeding nematodes were found to occur in low numbers in all samples taken. The families Aphelenchidae, Aphelenchoididae and Paraphelenchidae, which feed on fungal hyphae (cp-2, fungal-feeding nematodes), were most abundant in soil collected from the M7 rootstocks. This could perhaps indicate the presence of a ‘healthier’, more balanced soil in comparison to those that were fumigated with methyl bromide.

Mononchidae (cp-4, carnivorous/predatory nematodes) were present in G222 and M7 samples, with the highest numbers occurring in the former. The occurrence of these nematodes, which are sensitive to disturbance, cannot, as yet, be explained. Their presence tends to give a distorted impression of the condition of the soil food web present at the sites. The issue could have been resolved through preplant sampling data, together with future sampling over time.

Indices (or functional guilds) utilising nematode community compositions have been specifically developed as a measure of environmental disturbance. These indices include the Maturity index (MI), representing free-living soil nematodes, while the plant-parasitic index (PPI) is representative of only plant-parasitic nematodes. These concepts were later improved by classifying the Enrichment Index (EI), Structure Index (SI), Basal Index (BI) and Channel Index (CI). These indices provide more insight into the effects of enrichment, disturbance and contamination of the soil ecosystems.

The SI and EI are based on the indicator importance of functional guilds of soil nematodes and are descriptors of the condition of the soil food web. Structure does not imply soil physical structure, but the configuration of the soil food web. These indices are graphically represented and the position of the data point in the diagram is the faunal analysis. The diagram provides a method to understand characteristics of the environment and condition of the soil food web. This provides context to enable testing, recalibration, validation and implementation.

Diversity indices used to determine the evenness; biodiversity and richness of the nematode community are commonly used in many ecological studies and are not exclusive to the interpretation of soil nematode communities. The
Shannon index ($H'$) is explained further in Box 4. The MI values (Table 2) for all of the sites indicate values of ≤ 2.0, indicating the existence of nutrient-enriched disturbed soil systems. The PPI (Table 2) was found to be very low for G222, and non-existent for the other sites. This finding was to have been expected, considering the low number of plant-parasitic nematodes present in the samples. The Shannon’s Diversity Index values were roughly 1.1, or lower, which indicates the presence of little diversity (Box 4). Blocks planted with M9 were particularly low in diversity.

The Basal Index (BI) for M7 and M9 exceeded 50%, indicating a nematode assemblage composed of perturbation-resistant nematodes, consisting mainly of relatively low trophic levels (Cephalobidae). The values indicated the presence of a stressed system. The CI for all the sites was below 50%, indicating the existence of bacterial-dominated decomposition pathways. This result was anticipated, in view of the high numbers of bacterial-feeding nematodes (Rhabditidae and Cephalobidae) found at all of the sites.

Fig. 4 is the faunal analysis (with a key) of the soil food web conditions present in Oak Valley. The results indicate that G222 had a highly disturbed soil food web, and that it was nutrient-enriched, with bacterial decomposition pathways. The results for M7 and M9 indicate the existence of stressed, nutrient-depleted conditions, with a degraded soil food web. Had there been more fungal-feeding nematodes present, the results would have shifted into Block B indicating a more developed soil food web with low to moderate disturbance, nutrient enrichment and decomposition pathways which is balanced, neither dominated by fungi or bacteria.

**Box 3. Nematode taxa colonizer-persister (cp) values.**

<table>
<thead>
<tr>
<th>Cp</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cp-1</td>
<td>Rapid colonizers, bacterial feeding, enrichment opportunists with short generation times.</td>
</tr>
<tr>
<td></td>
<td>Gonads with substantial capacity, high egg production rates, very mobile, elevated metabolic activity, virtually continuous ingestion of the microbial suspension in their soil environment.</td>
</tr>
<tr>
<td></td>
<td>Nematodes have the ability to go into survival mode by entering a non-feeding, inactive survival stage (dauer larva) when resources are scarce</td>
</tr>
<tr>
<td>Cp-2</td>
<td>General opportunists. Feeding on bacteria appears more methodical</td>
</tr>
<tr>
<td></td>
<td>No dauer larval stage.</td>
</tr>
<tr>
<td></td>
<td>Their productivity characteristics are less extreme.</td>
</tr>
<tr>
<td>Cp-3-5</td>
<td>Bacteria are less likely to be the primary food source in higher cp-value groups.</td>
</tr>
<tr>
<td></td>
<td>Productivity characteristics are less pronounced</td>
</tr>
<tr>
<td></td>
<td>Generate fewer eggs and have a narrower ecological scale than nematodes with lower cp-values</td>
</tr>
<tr>
<td></td>
<td>Very susceptible to environmental disturbance and shifts.</td>
</tr>
</tbody>
</table>
Block C is the most desirable position since the soil food-web is structured, the system is undisturbed and enrichment is moderate. The soil food web is also more matured and the soil environment is potentially suppressive for plant diseases which could negatively impact plant health. The results obtained from the faunal analysis correspond with the MI results.

**Conclusion**

The results obtained from the Oak Valley soil analysis provide us with only a snapshot of the current soil conditions. Subsequent assessments are needed to allow for accurate environmental soil monitoring. It is advisable to sample at least twice a year, in order to establish the changes that occur in the nematode faunal community structure over time. The current limited number of samples taken, means that only limited information could be gained, with the conclusions drawn being mostly speculative. Preplant sampling and the existence of a control site would have been of great value in determining the effect of shade netting combined, with the various treatments on soil health. From the results obtained it is clear that the soil environment was not balanced. The low numbers of fungal-feeding nematodes were indicative of low fungal activity in the soil, which supports the existence of an unbalanced system. More frequent sampling intervals are needed to ascertain whether a more balanced environment can be achieved over time. The addition of mulch to the tree row might lead to greater nematode diversity and to a more balanced soil food web than were present at the time of the current study. The addition of organic material should serve to stimulate microbial activity and supply resources for opportunistic nematodes, which is likely to lead to subsequent succession in the soil food web (Box 1).

The inclusion of adequate cover crops could also greatly improve the soil environment and, thus, the soil health of the orchard. When deciding which cover crops to plant, it is important to consider their susceptibility to lesion nematode, so as to prevent the build-up of these nematodes over time. As lesion nematodes are an important pest in apple orchards, if they are not adequately suppressed their presence can lead to poor tree performance.

In order to achieve resilient and sustainable production it is not only the plant width, shade netting and cultivars (rootstocks or bearing cultivars) that will ultimately play a role in the success of the orchard surveyed, but also the nematodes and the role that they play in soil health. The presence of greater nematode diversity would lead to an abundance of organic matter due to decomposition by nematodes, the mineralisation of nutrients for uptake by the apple tree roots, as well as the regulation of plant pest and disease pathogens.

**Acknowledgements**

Ken Pringle for valuable comments and input on the article.
SUGGESTED ACTIONS FOR OOF OAK VALLEY

• Future sampling must occur at least twice a year (March and September).

• The host status of cover crops needs to be evaluated thoroughly before application. Canola and rye should not be considered, due to their susceptibility to lesion nematode species.

• A cover crop mix should be considered for improving diversity in the soil ecosystem.

• EPN applications for the control of such insect pests as banded fruit weevil should be considered as part of the IPM programme and maintaining resident EPN.

• A weather station, including soil temperature readings, would give valuable information regarding the soil environment and possible outbreaks of plant-parasitic nematodes and other pests and diseases.

• Information regarding the management practices followed in the orchard is likely to form a crucial part of the interpretation of the sampling analysis.

• The application of mulches such as applewood chips should be considered, since they might come to play an integral role in water retention in the orchard, as well as in the general health of the soil.

Further reading


Fruit size is an important marketing and quality parameter and has a significant impact on the economic value of fruit. There are two commercial thinning practices commonly used in apple trees, chemical and hand thinning. Recently, research has shown that it is possible to use mechanical thinning machines to effectively thin stone fruit (S.A. Fruit Journal 2015 (June/July): 72–73). However, for the tractor driven machines, such as the Darwin™ to work effectively, the tree training system and the orchard floor needs to be adapted to the machine. Very few pome fruit orchards are currently suitable for such machines and we therefore decided to evaluate a hand-held thinning machine.

What we did?
We decided to evaluate the Bloom Bandit™ (Automated AG Systems, 999 Road M S.E., Moses Lake, WA 98837 - https://www.youtube.com/watch?v=nG7hEHv0ybI) (Fig. 1), which we received from Karin Lewis of Washington State University. The Bloom Bandit™ was compared to the standard chemical thinning programme the grower was using as well as a hand-thinned control. The treatments were as follows:

1. Hand thinned control
2. Farm chemical thinning programme *
3. Thinning with Bloom Bandit™ for 1 min (30 sec. per side of tree)
4. Thinning with Bloom Bandit™ for 2 min (60 sec. per side of tree)

The chemical thinning tank-mix treatment was 700 mg•L-1 carbaryl (1-naphthyl methyl carbamate) (Sevin XLR, Villa Crop Protection, Kempton Park, South Africa) and 5 µL•L 1-naphthaleneacetic acid (NAA) (Planofix, Bayer SA, Paarl, South Africa) and was applied to ‘Fuji’ 11 days after full bloom (DAFB) (7 mm fruitlet diameter) and ‘Cripps’ Red’ 10 DAFB (6 mm fruitlet diameter).

The mature, full-bearing ‘Fuji’ (tree spacing 4 x 1.4 m) and ‘Cripps’ Red’ trees (tree spacing 4 x 1.5 m) on M793 rootstock were on the farm Eikenhof in the Elgin area. ‘Cripps’ Pink’ at 50% is the cross pollinizer. All trees were hand thinned commercially on 11 November. Fruit set per cluster was determined on two scaffold branches per tree, prior to hand thinning. During hand thinning, fruitlets thinned were collected and counted to determine efficacy of the thinning.
treatment. At commercial harvest, all fruit were weighed to determine yield per tree and estimate yield per hectare. Average fruit weight was determined on a sample of 30 fruit per tree. Treatments were randomised in 10 blocks with single trees per plot and buffer trees between treated trees.

What did we find?
The average fruit set per cluster on two scaffold branches in the lower part of the tree canopy of ‘Fuji’ and ‘Cripps’ Red’ was significantly reduced by all treatments compared to the control, except for the 1 min thinning with the Bloom Bandit™ in ‘Fuji’ (Fig.1).

In the case of ‘Cripps’ Red’ the three thinning treatments were equally effective, while in the case of ‘Fuji’ chemical thinning (carbaryl plus NAA tank-mix) was as effective as the 2 min Bloom Bandit™ treatment. In both cultivars, the hand thinning requirement was significantly reduced by the chemical thinning treatment and the 2 min Bloom Bandit™ treatment, but not the 1 min treatment (Fig.2). The effect of the Bloom Bandit™ can be seen in the photo opposite on page 88 - some flowers were thinned completely while others only lost their petals and could still potentially set.

The yield in ‘Fuji’ was not significantly reduced by any treatment, but in the case of ‘Cripps’ Red’ all thinning treatment significantly reduced yield (Fig.3). The reduction in yield, even though not significant in the case of ‘Fuji’, led to an increase in average fruit weight at harvest of all thinning treatments in ‘Fuji’, but in ‘Cripps’ Red’ this was only the case for the more aggressive thinning treatments, viz., chemical thinning and the 2 min Bloom Bandit™ treatment (Fig.4).

Conclusions
The Bloom Bandit™ showed promise for thinning apples and could be used as effectively as chemical thinning. It could therefore replace chemical thinning when conditions for chemical thinning are not optimal. Combining use of the Bloom Bandit™ with platforms may prove beneficial from an ergonomic and efficiency perspective. Chemical thinning remains a viable option and currently the best technique for growers to reduce hand thinning requirements, optimize yield, fruit size and return bloom,

Further evaluations can explore the possibilities of combining mechanical and chemical thinning.

Acknowledgements
We would like to acknowledge the financial contribution of SAAPPA towards the research which was conducted as part of the Reproductive Biology working group of the Crop Production programme at HORTGRO Science as recommended by the Crop Production Technical Advisory Committee.
TECNIDEX
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The move will result in large scale fruit production, based on innovation in production technology and cultivars, to meet future market demands. SGAI is a South African agricultural holdings company, investing in diverse value chains focusing on adding value to products to optimize farm income. It will hold 75% of the shares in Colors. The balance of the shares will be held by the founders of Colors, Riaan van Wyk and Ian Carstens.

According to Paul Vorster, one of the directors of Colors, the initial focus will be on large scale fruit farming, with the emphasis on innovation to meet future market demands as well as new production technology. Colors will be a fully integrated company involved in production, packing and marketing of their fruit. The marketing of the fruit will be done in partnership with the two export companies, stART Fruit and Real Citrus, says Riaan van Wyk, one of the directors of Colors. “The advantage for stART and Real Citrus is that Colors will invest in production along with its producer shareholders who want to expand their farming activities. This will include investment involving US fresh produce company, Limoneira USA, in citrus fruit production.”

“Colors have already made three investments,” says Paul Vorster. This includes gaining the majority shareholding in the farm Magaliesberg, near to Rustenburg in the north-western parts of South Africa. One of the current shareholders, Carel van der Merwe, will remain a partner grower and the farm will focus on very early peaches and nectarines, as well as very early apple varieties from the Agricultural Research Council (ARC). “This also includes the purchase of three farms from the Carstens Brothers in Paarl where the focus will be on early stone fruit and citrus fruit. Furthermore Colors has acquired a 50% share in the farming business of Eric Brown of Konstabel, 20 km north of Touwsrivier. Mr Brown retains ownership of the farm which has been leased to the partnership. The enterprise will focus on the production of very late plums, apricots, peaches and nectarines in the future.” Mr Vorster says the farm is also well known for the production of onions and carrot seed. The total current production of plums and apricots has recently been placed under nets to secure the crops from possible adverse climatic conditions.

Mr Vorster says the business plan of Colors is to invest along with top quality growers who have strong technical and entrepreneurial skills. “Colors believe strongly that farming cannot be done from a head office and that our grower partners should live on the farm to make a success thereof.”

According to Mr Vorster, Colors would be interested to link with energetic like-minded producers who would like to enter into partnerships with the aim of achieving three goals. They are extending their farming activities through additional plantings or replanting of existing orchards, focusing on modern technology of production methods and to produce fruit varieties that will in future be in market demand.

“Colors is the ideal partner for a producer with these aims and who are interested that Colors co-invest in their farm or only co-invest in their business on top of the farm,” he says.
Sunflowers for the Garden

My husband, Kobus, always surprised me with interesting seeds – and I always eagerly planted them, not knowing exactly what to expect. The sunflower seeds are a case in point - I got a variety of flowers: pale yellow and small, bright red and dark orange. The best was a bright yellow with a multitude of petals. I liked the double-double yellow sunflowers so much, that I collected the seeds and gave them as presents to fellow-garden-lovers.

I have decided to plant a collection of sunflowers this year – and will make it a project that my grandchildren can join in, as sunflowers are easy to plant and grow. The joy of the flowers will stay in your memory forever. Some interesting facts:

- An annual plant, sunflowers have big, daisy-like flower faces of bright yellow petals (and occasionally red) and brown centres that ripen into heavy heads filled with seeds.
- Tall and coarse, the plants have creeping or tuberous roots and large, bristly leaves. Some sunflowers grow over four meters in height, though there are varieties that have been developed for small spaces and containers.
- Most sunflowers are remarkably tough and easy to grow as long as the soil is not waterlogged. Most are heat- and drought-tolerant.
- They make excellent cut flowers and many are attractive to bees and birds.

**HISTORY**

Sunflowers provoke strong feelings and say “summer” like no other plant. The wild sunflower is native to North America, where the Incas worshipped its image as a symbol of the sun god. Commercialisation took place in Russia. By the early 19th century, Russian farmers were growing over two million acres of sunflower. During that time, Russian sunflower seed found its way into the United States. The first commercial use of the sunflower crop in the United States was silage feed for poultry.

Canada started the first official government sunflower breeding programme in 1930. And the acreage spread because of oil demand. Acreage increased in the United States with commercial interest in the production of sunflower oil. It was hybridized in the mid seventies providing additional yield and oil enhancement as well as disease resistance.

**HEALTH BENEFITS AND USES**

Sunflowers were used in many ways by various American Indian tribes. Seed was ground or pounded into flour for cakes, mush or bread. Some tribes mixed the meal with other vegetables such as beans, squash and corn. The seed was also cracked and eaten for a snack. There are references of squeezing the oil from the seed and using the oil in making bread.

Traditionally, non-food uses include purple dye for textiles, body painting and other decorations. Parts of the plant were used medicinally ranging from snakebite to other body ointments. The oil of the seed was used on the skin and hair. The dried stalk was used as a building material. The plant and the seeds were widely used in ceremonies.

As you know, sunflower seeds are edible. They can be eaten raw, cooked, roasted or dried. They are a popular, nutritious snack containing a good source of protein, vitamins A, B, and E, calcium, nitrogen and iron. The petals are also edible; they can be cooked and eaten like artichokes.

The seed heads are a source of food for birds and animals, with sunflower seeds being a major ingredient in commercial birdseed.

The leaves are used as feed for livestock.

Sunflower oil is a popular vegetable oil known for its light colour, mild flavour, low levels of saturated fats and ability to withstand high cooking temperatures. The oil can be added to soap, lubricants and candles. Sunflower oil can help relieve skin conditions, haemorrhoids and ulcers.
**Sunflower roots** can remove radiation from soils and water. They were used to clean up the Chernobyl disaster. The root is used in traditional herbal medicine to treat snake and spider bites. The leaves can be made into tea to relieve fevers, lung ailments and diarrhoea.

**The flowers** can be used to make a natural dye.

**The stalks** are used to make paper and clothes.

**GROWING TIPS**
Sunflowers belong to the *helianthus* genus, which has 67 species including the Jerusalem artichoke.

**PLANTING**
It’s best to sow sunflower seeds directly into the soil after the danger of spring frost is past. Ideally, the soil temperature has reached 15°C.

Give plants plenty of room, especially for low-growing varieties that will branch out. Make rows about a meter apart. (For very small varieties, plant closer together.) Plant the large seeds no more than 1 cm deep and about 15 cm apart. You can plant multiple seeds and thin them to the strongest contenders when the plants are 15 cm tall. A light application of fertilizer mixed in at planting time will encourage strong root growth to protect them from blowing over in the wind. Experiment with plantings staggered over 5 to 6 weeks for continuous blooms.

**CARE**
While the plant is small, water around the root zone, about 10 cm from the plant. Put snail or slug bait around the stem. Once the plant is established, water deeply though infrequently to encourage deep rooting. Unless the weather is exceptionally wet or dry, water once a week. Feed plants only sparingly; over-fertilization can cause stems to break in the fall. You can add diluted fertilizer into the water, but avoid getting the fertilizer near the plant’s base; it may help to build a moat in a circle around the plant about 50 cm out.

Tall species and cultivars require support. Bamboo stakes are a good choice for plants with strong, single stems that need support for a short period.

**HARVEST/STORAGE**
For indoor bouquets, cut the main stem just before its flower bud has a chance to open to encourage side blooms. Cut stems early in the morning. Harvesting flowers during middle of the day may lead to flower wilting.

Handle sunflowers gently. The flowers should last at least a week in water at room temperature. Arrange sunflowers in tall containers that provide good support for their heavy heads, and change the water every day to keep them fresh.

To harvest seeds, keep an eye out for ripeness. The back of the flower head will turn from green to yellow and the bracts will begin to dry and turn brown; about 30 to 45 days after bloom. Seed moisture should be about 35%. Generally, when the head turns brown on the back, seeds are usually ready for harvest. Cut the head off the plant (about 10 cm below the flower head) and remove the seeds with your fingers or a fork.

To protect seed from birds, cover the flowers with a light fabric such as cheesecloth and a rubber band, or cut the flower head early and hang the heads upside down until the seed is dry. Hang indoors or in a place that’s safe from birds and mice.
What you put into your land today – your hard work, passion and AgCelence® – determines the future for generations to come.

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AgCelence® - helps you fulfil the promise of a legacy you are shaping today.
What is your background and how did you become involved in the table grape industry?

“I grew up in Cloetesville in Stellenbosch. After attending Cloetesville High, I studied Industrial Electronics. Unfortunately, that didn’t guarantee me a job or satisfaction. The following years were quite interesting as I did a range of jobs including taxi guard, delivery assistant on a truck and pricing of wine in bottle store. Eventually I ended up doing wine tours at a Vinoteque in this job the tourists stimulated my interest in agriculture. I then studied Agriculture at Elsenburg followed by a 3-year work contract within the Viticultural Table Grape Research team as a technician at the Agricultural Research Council. Elsenburg offered great opportunity for learning and development and provided excellent exposure to me.

“I have also learned valuable lessons from my family as many of my September family members still work and reside on farms as general agricultural workers. Even my late dad (Willem) was a tractor driver and my mom (Irma) grew up under difficult circumstances on a farm but became my role models.

“Joining SATI is like returning to where I belong.”

What does your job involve?

“The main focus of my job is clearly to drive transformation and this entails determining and supporting the needs of the new producers as well as guiding and supporting empowerment initiatives in the industry to address these needs. This also involves the facilitation of

Wilton September is the Transformation Manager for SATI. Wilton has been in this position since mid-2016.

He is passionate about this position and answered the following questions.
extension services, training, and mentorship initiatives. On the important issue of land reform, I am also responsible for liaising with various stakeholders and role players to provide support to land reform programmes."

What do you see as the major challenges and opportunities for transformation in the South African Table Grape industry in the future?

“The biggest challenge is “Trust” between race/farmer and government and industry, and understandably due to our past, but we will need to overcome thus very quickly. A further challenge is access to resources which include land, water, and development finance. I’m of the opinion that the right “jockeys” are out there. We can’t use a one-size-fits-all approach for agrarian reform as different models are needed and can work. Lack of industry exposure of our new entrants is also one of the biggest obstacles that we must overcome. Building the business skill set of our black-owned businesses is vital for success. The lack of innovative and supportive extension and financial help to our farmers also represents a large challenge. Often farmers or partners have brilliant and workable ideas but the support network and their criteria dooms the business to a failure if it doesn’t qualify for support. We don’t allow the farmers to take responsibility for their own destiny."

“I believe that should be our focus to include the new entrants throughout the entire value chain. Our industry is well positioned to create jobs. No machines can be used to prepare a bunch of table grapes for harvest and thus we need skilled human hands. Our product can and does generate foreign currency. The National Development Plan includes plans to expand irrigation schemes and several of these opportunities will be in areas where table grapes are produced. The focus should be on inclusive growth new and current producers, black and white."

How has your current position impacted your personal life?

“Visiting other production areas has broadened my horizon and meeting influential people are always interesting. My children have had the opportunity to visit table grape farms with me in my spare time and have seen the difference between wine grapes and table grapes. The interest that was stimulated and they might one day enter the agricultural sector. Samantha, my wife understands her support is important to me as I’m passionate about development and farming. This position has confirmed my passion for the table grape industry and it will remain one of my dreams to become a farmer one day.

Have you had any particularly memorable experiences in your career in the fruit industry?

“Yes. To see individuals such as Warren Bam prospering in his 100% black-owned business but also in a partnership gives me hope. Businesses such as Vergelegen at Robertson has been highly successful and mall producers with limited resources that are exporting successfully are also an inspiration. Everybody wants a track-record before doing business with the new entrants. Our people don’t have track records mostly because of the past. The above mentioned businesses were fortunate to receive the correct opportunities as without this they still would not have a record of accomplishment. "I’m not from an agricultural community but learned to love it. Exposure to the sector has triggered my passion and love for the industry. I know there are many more urban youths longing to become part of the sector and I would like to help them accessing the sector and industry specifically.”

Do you have any message with regards to transformation in the Table Grape Industry?

“Transformation is a process of change that must and will take place. Don’t transform your business for compliance shake, transform your own and somebody’s life socially and economically. Both white and black should be part of this process. Take charge of the process, because if you are going to wait for somebody else or consultants to do this it might be too late. Treat the process and individuals with respect, be honest and always be open and transparent. "In conclusion I would like say the following to our farmers, industries, and government: Difficult roads often lead to beautiful destinations. Let us not regret the changes we didn’t make.”