

Star-grading of nurseries participating in the South African citrus nursery certification scheme



Michael Nell, Jacolene Meyer and Paul Fourie

Background

- Thys du Toit retired end-March 2021 after 41 years' service
- Michael Nell appointed as CIS Nursery Advisor in April 2020



Background

- Nursery advisory (NA) service and certification scheme started 2002 to technically assist existing and prospective nurseries
- Basic audit criteria
- Ratings given based on experience
- OVER TIME: more audit criteria were added, refined, criteria made more objective



NURSERY CERTIFICATION AUDIT SHEET

Nursery:		Date:					
Criteria	RATINGS						
	Poor 0	1	2	3	4	Good 5	
1. Register with authority							
2. Greening area and structures							
3. Access control							
4. Drainage and rain water control							
5. Media pathogen status and drainage							
6. Raising containers							
7. Water pathogen status							
8. Citrus blackspot control							
9. Nursery sanitation							
10. Quality management systems							
11. Tree status/condition							
12. Non Certified Budwood							
13. Administration							
14. Sales register							
Certification:	Full						
	Con						
	Con						
The nursery must be re-audited by:	Dat						
Audit Report:							

cri citrus research international

Suider Afrikaanse Sitrus Verbeteringskema

Sertifiseer dat

Kwekery

Voldoen aan die standaard gestel vir die Suider Afrikaanse Sitrus Verbeteringskema

Vir die tydperk

1 Julie 2019 tot 30 Junie 2020

SVS Kwekery Adviseur

Audited by: _____

Report received by: _____

Background

- TODAY
 - Nurseries audited bi-annually
 - 25 Audit criteria scored from 0 to 5, with 3 being the minimum standard
 - Final score converted to a 1- to 5-star-grading
 - Star-grading published

Nursery star rating	Final audit score
★★★★★	>80%
★★★★	70-79%
★★★	60-69%
★★	50-59%
★	<50%
New Nursery	-

Advantage of star-grading

- Nurseries differentiated by standard
- Producers/farmers make educated decisions before ordering trees
- Motivates nurseries to improve gradings
- Average nursery score per criterion can be used as benchmark to indicate where/how to improve



Audit guidelines and ratings

8.1 ANNEXURE: NURSERY CERTIFICATION AUDIT SHEET GUIDELINES AND RATINGS

Rating	Description
Nursery layout and structures	
1. Location	
0	Nursery is located adjacent to neglected citrus plantings (< 50 m)
1	Nursery is located in close vicinity (50-400 m) of neglected citrus plantings,
2	Nursery is located in close vicinity (< 400 m) of managed citrus plantings, but effective vector control is not confirmed by insect scouting and monitoring records
3	Nursery is located in close vicinity (< 400 m) of managed citrus plantings, and effective vector control is confirmed by insect scouting and monitoring records
4	As for 3, and the nursery is located in an African Citrus Greening free area
5	Nursery is located > 400 m away from citrus plantings, and with an 800-m vector-free treatment and monitoring zone surrounding the nursery, or as specified in the HLB Safe System
2. Structures	
0	No structures in place
1	Structures in place but are not adequate for citrus nursery tree production
2	As for 3, but some structures not adequate or poorly maintained
3	All structures are adequate for citrus nursery tree production and are well-maintained but not fully insect-secure
4	As for 3, but some structures are insect-secure with double door systems with the aim to convert all structures to the HLB Safe System
5	Well maintained structures and systems as specified in the HLB Safe System



CIS NURSERY CERTIFICATION: AUDIT FORM



Nursery name						
Date of audit						
					Score	CIS
#	Audit criteria	Mx	W	avg	SCORE	Comments / Recommendations
Nursery layout and structures						
1	Location	5	5	4.0	✓ 3	
2	Structures	5	5	3.3	✓ 3	
3	Drainage and rain water control	3	1	2.9	✓ 3	
4	Raising container trees from the ground	5	1	3.6	✓ 3	
5	Security and Access control	5	1	4.0	✓ 3	
Operations and Quality Management Systems						
6	QMS-1: Irrigation water source treatment and testing	5	2	4.1	✓ 3	
7	QMS-2: Potting medium handling, treatment and testing	5	2	3.9	✓ 3	
8	QMS-3: Integrated pest and disease management	5	2	3.7	✓ 3	
9	QMS-4: Management of irrigation and plant nutrition	5	2	3.7	✓ 3	
10	QMS-5: Inventory management and traceability systems	5	2	4.2	✓ 3	

13%

10%





Performance criteria						
11	General nursery appearance	5	3	3.8	✓	3
12	Water pathogen status	5	5	3.4	✓	3
13	Medium pathogen status	5	5	3.6	✓	3
14	Citrus Black Spot (CBS)	5	3	3.2	✓	3
15	Citrus Greening disease control	5	3	3.6	✓	3
16	Citrus bud mite control	3	3	3.0	✓	3
17	Pest and disease control status	5	5	3.9	✓	3

66%

3-star grading meets expectations and is GOOD

21	Nursery sanitation	5	5	4.4	✓	3
22	Grower feedback	5	3	3.3	✓	3

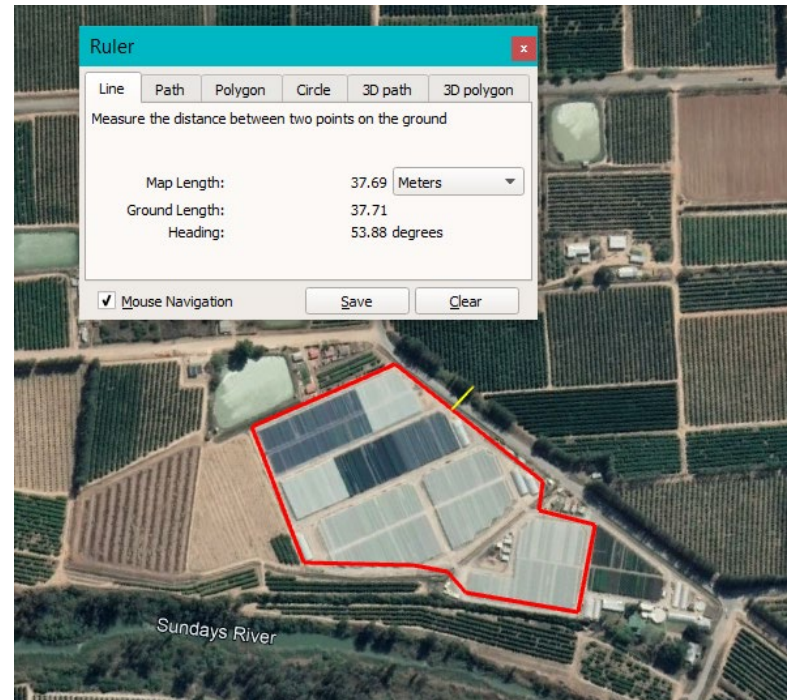
11%

Nursery administration						
23	Registration with authority	3	1	3.0	✓	3
24	General (demand estimates, orders, BCIN, sample analysis)	5	5	3.6	✓	3
25	Sales register and certification	5	5	1.8	✓	3

Nursery audit score				72%	61%	3-star nursery
Certification Report (include re-audit date if applicable)					X	Full CIS certification
						Provisional CIS certification
						Provisionally certified <i>new nursery</i>

Location

- >400m from citrus
- 800m HLB vector free treatment + monitoring zone



Structures

- Structure types in RSA:
 - Shade net
 - Plastic pad/fan
 - Insect secure mesh
- Aim:
 - Insect secure structures (all stages of plant production)



Structures (routine maintenance/integrity checks)



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Drainage and storm water control

- Effective storm water control (ditches, drains)
- No pooling water +4hrs



Raising containers

- Plants raised at least 10cm from ground
- Higher is better!
- Non-soil surface is even better!



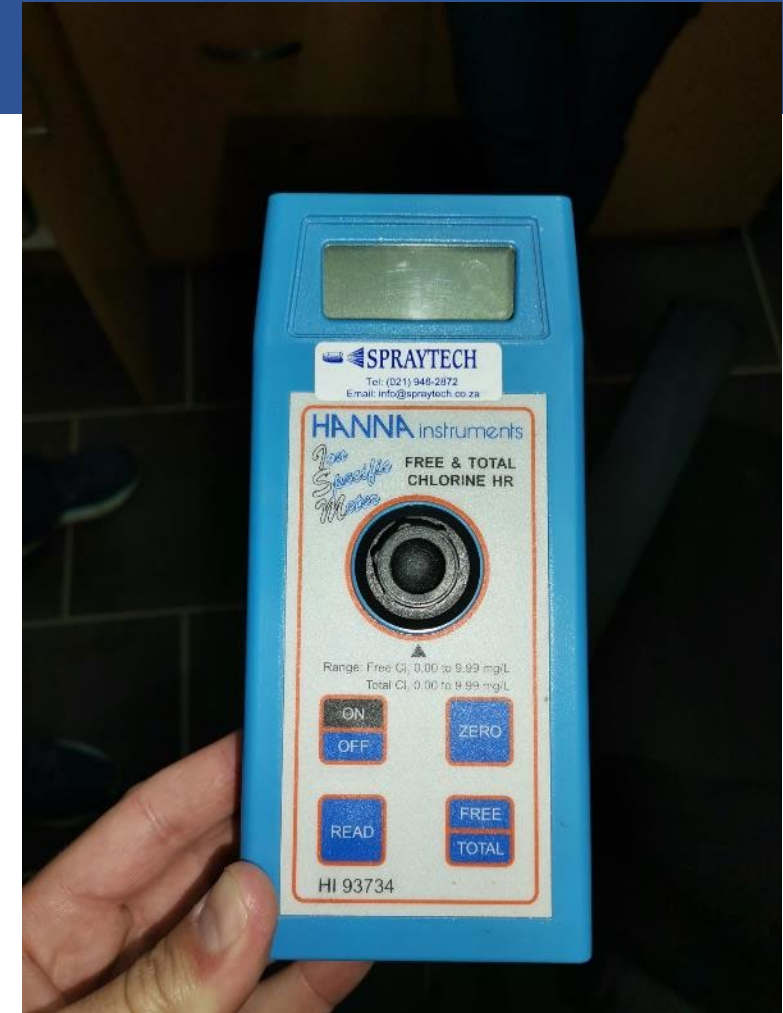
Security and access control

- Controlled movement entering nursery
- Especially persons/ vehicles travelling from citrus orchards



QMS-1: Irrigation water source treatment and testing

- Determine safety of irrigation water source
- Apply appropriate sanitising treatment against pathogens (Phytophthora)
- Chlorination at 6ppm free-Cl for minimum 3 hours
- Real-time testing of Cl



QMS-2: Potting medium handling, treatment and testing

- Safe handling of medium preventing pathogen contamination



QMS-2: Potting medium handling, treatment and testing



- Pathogen testing of each new medium batch (pre- and post treatment)
- Treatment of pathogens in potentially unsafe medium
 - Chemical: Metam-sodium (methyl bromide no longer permitted)
 - Steam: 60°Celsius for 30min



QMS-3: Integrated pest and disease management

- Regular (weekly) scouting with record keeping



QMS-3: Integrated pest and disease management



QMS-4: Management of irrigation and plant nutrition

- Needs-based applications
- Controlled monitoring (preferably real-time)
- Record keeping of EC, pH (preferably real-time)
 - Source, fertigation water, leachate



QMS-4: Management of irrigation and plant nutrition

- To avoid...



QMS-4: Management of irrigation and plant nutrition

- And ensure...



QMS-5: Inventory management and traceability systems

- Maintain traceability of rootstock seed and budwood from receipt until tree delivery
 - Vary from basic paper-based systems to advanced Excel-based systems

Tulbagh Kwekery BK		Voortplantingsmateriaal Sertifikaat		SITRUS GRONING ESBL0K					
Posbus 99 TULBAGH 6820		Afleringsnota 10062		In Ouderafdeling van					
Bredell Roux 082 214 2520 admin@tulbaghnursery.co.za		Datum 14-Dec-17		Citrus Research International (Edms) Bpk Reg No 2001/007745/07 BTW Nr. 4530194002					
		Debiteur Nr. TUL001		Posbus 2945, Uitenhage, 6230 Suid-Afrika					
		BTW Nr. 4410223061		Tel: +27 41 9925300 (Kantoor)					
		Bestel Nr.		Faks: +27 41 9227416					
		Afslag teen 0%		E-pos: 082 889 2363 (Thys) of 083 290 2048 (Dag)					
Kultivar	Kode	Verw.	Verw. heid	Eenhed Koste	Tantiem	Produk	Agent	Tipe-eg Status	Kommentaar
Bearss Lemmetjie	LIB	L/01/009/P05	12/12/17	100	1.37	Ogies		Ja	
Bearss Lemmetjie	LIB	L/01/009/P05	12/12/17	1500	1.37	Ogies		Ja	
Witkrans 3 Nawel	NWI-3	N/62	13/12/17	6400	1.37	Ogies Citrogold		Ja	
Witkrans 3 Nawel	NWI-3	N/62	12/12/17	2300	1.37	Ogies Citrogold		Ja	
Witkrans 3 Nawel	NWI-3	N/62	12/12/17	500	1.37	Ogies Citrogold		Ja	
Witkrans 3 Nawel	NWI-3	N/62/P01-6	14/12/17	2500	1.37	Ogies Citrogold		Ja	
Witkrans 3 Nawel	NWI-3	N/62	14/12/17	1000	1.37	Ogies Citrogold		Ja	
Witkrans 3 Nawel	NWI-3	N/62	14/12/17	2000	1.37	Ogies Citrogold		Ja	
Witkrans 3 Nawel	NWI-3	N/62	14/12/17	2000	1.37	Ogies Citrogold		Ja	
Witkrans 3 Nawel	NWI-3	N/62	14/12/17	2600	1.37	Ogies Citrogold		Ja	
Witkrans 3 Nawel	NWI-3	N/62	12/12/17	3300	1.37	Ogies Citrogold		Ja	

WITKRANS 3 NAWEL

N/62/P01-6 CFB:10062

CARRIZO

CODE:0/06/103/04

PROCESSED:21/05/2016

LAAIE GESAAI:04/08/2016

LAAIE GEPLANT:19/09/2016

POTJIES GEPLANT:09/06/2017

OKKULEERDATUM:28/12/2017

SAKKE GEPLANT:23/03/2018

Totaal:164

137

Performance criteria

- **66%** of audit score
 - General nursery appearance
 - **Water pathogen status**
 - **Medium pathogen status**
 - Citrus Black Spot (CBS) control
 - Citrus Greening disease control
 - Citrus bud mite control
 - **Pest and disease control status**
 - **Seedling status** (all seedling stages prior to budding)
 - **Tree status** (tree stages from budding to delivery)
 - **Root development status** (inspect at least 10 nursery trees ready for delivery)
 - **Nursery sanitation**
 - Grower feedback



General nursery appearance

- Neatness, orderliness and weed control
- Tricky and sometimes a sensitive criteria
- Photos of impressive nurseries
(scoring 5 for general nursery appearance)





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Water pathogen status

- Ideally, water used in nursery should be sourced from a reliable pathogen-free source
- In the case of an unsafe source, effective treatment and sanitisation before use is required
- Regular spore trap analyses (at least every 3 months) should demonstrate pathogen-free status of water and/or effective treatment and sanitation



Water pathogen status

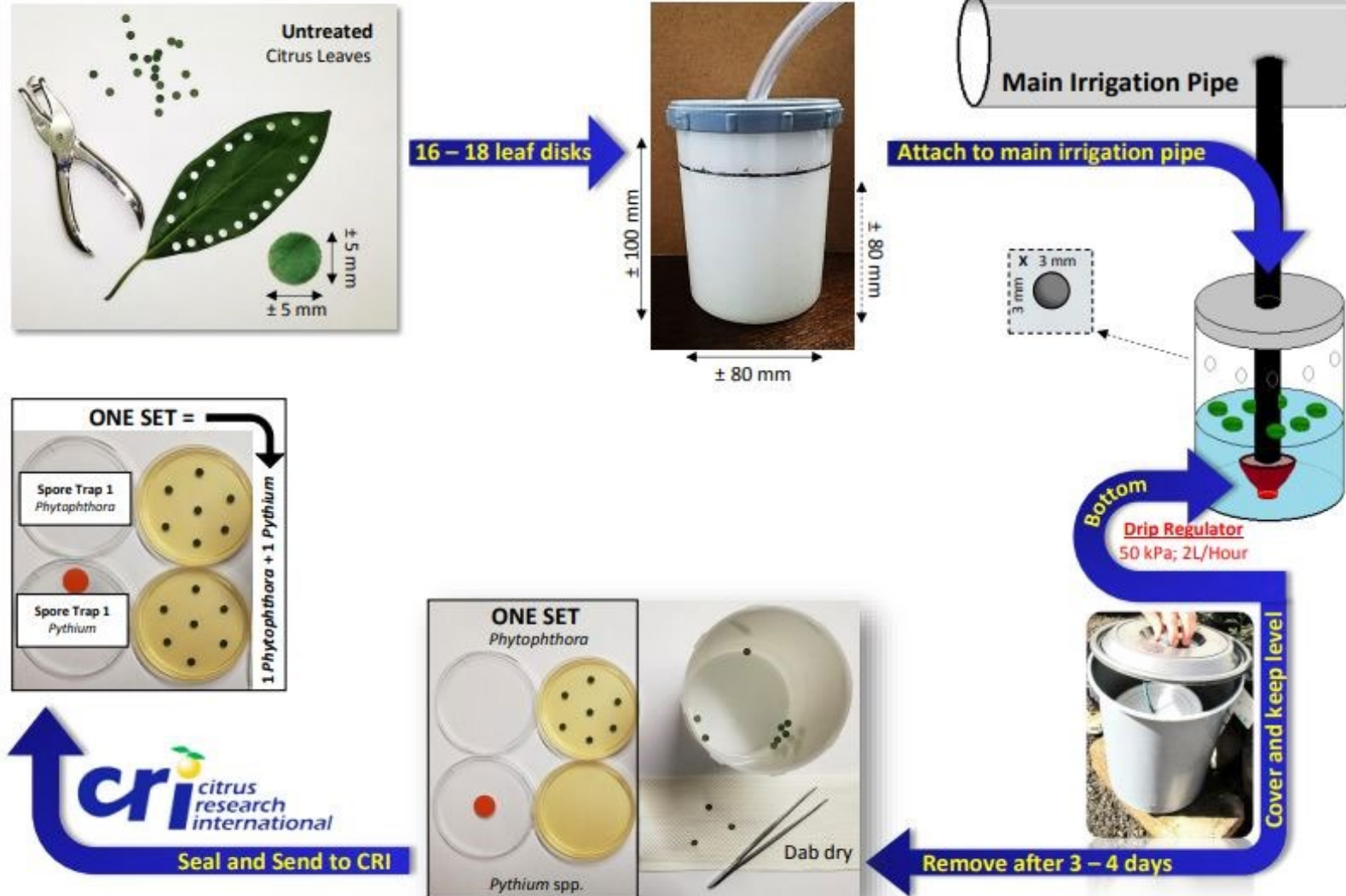
- Method for pathogen testing:
 - Phytophthora + Pythium spore trap (leaf bating technique)
- Results should show complete sanitation



Water pathogen status

DIAGNOSTIC CENTRE Dr. J. van Niekerk • M.C. Pretorius • E. Basson • C. Olivier

SPORE TRAP GUIDELINES



Medium pathogen status

- Medium from containers of seedlings/trees (subsamples from every row in nursery) must be tested for Phytophthora every 3 months
 - Phytophthora positive blocks should not comprise >10% of nursery
 - Treatment and re-test records should demonstrate effective control



Medium pathogen status



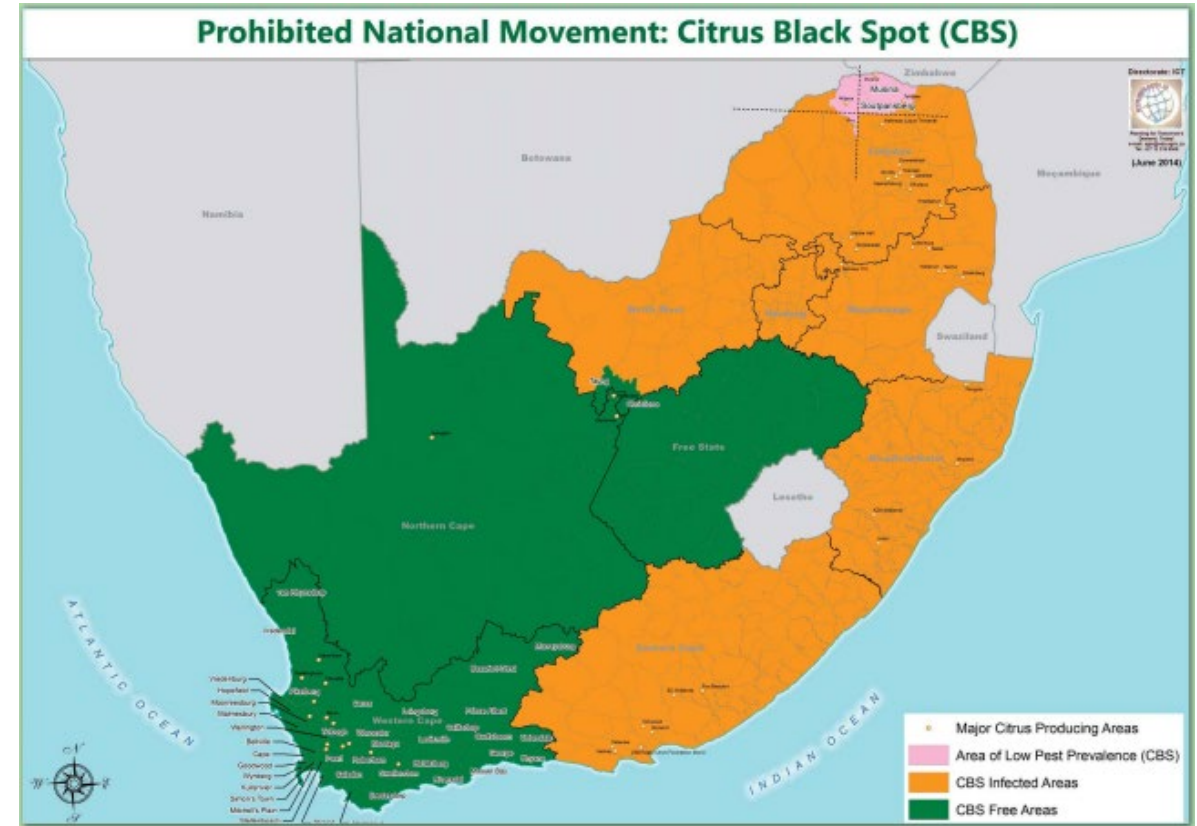
Treatment of Phytophthora positive blocks

- Drench treatments:
 - Mefenoxam (Ridomil Gold) - 0.1mL per plant bag
 - Captan (Thor WP, Captab WP) – 5g/L drench
 - NB: Drench treatment must fill complete bag volume



Citrus Black Spot (CBS) control

- Nurseries in CBS areas must follow preventative contact fungicide spray programme on trees and seedlings from September through March



Citrus Greening disease control

- Nurseries in African Citrus Greening areas:
 - should propagate inside insect-secure structures, or
 - follow a preventative insecticide programme



Citrus bud mite control

- Mandatory sprays for citrus bud mite required in autumn (1 Mar - 31 May) and spring (1 Sep - 30 Nov)
- Active ingredients:
 - Bromopropylate
 - Fenpyroximate



Pest and disease control status

- Citrus diseases and insect pests must be effectively controlled
 - Trees should be free from living insect pests, disease symptoms, and damage should be minimal



Seedling status

- Seedlings in blocks should be 80-100% uniform and conform to expected CIS standards
- Strong uniform seedlings is a recipe for success



Tree status

- Trees in blocks should be 80-100% uniform and conform to expected CIS standards



Root development status

- Well-developed root system, evenly filling volume of growth medium
- No root rot symptoms caused by pathogens or root damage caused by abiotic factors
- No severe goose-neck or bench-rooting of the main tap root or major lateral roots



Root development status

- Desired:



Root development status

- Problematic...



Nursery sanitation

- Nursery sanitation measures are aimed at preventing the introduction or spread of pests, diseases or weeds in the nursery:
 - People and vehicle sanitation
 - Cutting tool sterilisation
 - Management of non-certified material in the nursery
 - Sanitation of irrigation equipment, surfaces where trees stand
 - Weed control



Nursery sanitation

- Foot- and wheel sanitation
 - Copper oxychloride
 - Sporekill (quaternary ammonium compound)



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Nursery sanitation

- Cutting tool sterilisation
 - 50% house-hold bleach (\pm 1.5% sodium hypochlorite)



Nursery sanitation

- Clearly mark non-certified blocks



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Nursery sanitation

- Sanitise irrigation equipment and surfaces where trees stand
 - Sporekill
 - Bleach
 - Copper




Nursery sanitation

- Effective weed control prior to seeding



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Grower feedback



File Message Help Tell me what you want to do

Ignore Delete Archive Reply Reply All Forward IM Meeting Filed Team Email Done To Manager Rule

Delete Respond Quick Steps

cfb.cri@cri.co.za Michelle le Roux

Tree Certificate

Tree Certificate (No. 13496).PDF 348 KB

Dear/Beste **Gonjah Boerdery (Edms) Bpk**,

Please find herewith your tree certificate for trees supplied by /
Vind aangeheg die boomsertifikaat vir kwekerybome gelewer deur

PAKSAAM KWEKERY

Certificate Number/Sertifikaatnommer **13496**

Tree Delivery Date/ Boom leweringsdatum	Cultivar/ Kultivar	Rootstock/ Onderstam	Qty/ Aantal	Special Condition/ Spesiale Voorwaarde
Feb 2017	Nova Mandarin Hybrid	SC	300	None

Are you happy with your trees? /
Is u tevrede met u bome?

[Yes/Ja](#) or/of [No/Nee](#)





Please contact Michael Nell, CIS Nursery Advisor (michael@cri.co.za 073 750 9659) for further
Kontak asseblief vir Michael Nell, CIS Kwekery Adviseur (michael@cri.co.za 073 750 9659) vir


For more information /
Vir meer inligting:

- [Tree Certificate overleaf](#)
- [Tree Standards](#)
- [Certified Nurseries](#)
- [Not Genetically Modified](#)

Kind regards/
Vriendelike groete,

CIS Infosystems Administrator
SOUTH AFRICAN CITRUS IMPROVEMENT SCHEME
Citrus Foundation Block, G44 Kruisrivier, Kariega, South Africa
PO Box 2945, Kariega, 6230, South Africa
Phone: +27 41 9925 366
Mobile: +27 83 4655 197
Web: www.cri.co.za



Reasons for dissatisfaction

- Scion/rootstock combination ☒
- Uniform batch of trees ☐
- Tree standard ☒
- Phytopathological status ☐
- Root development ☐

Other

Any relevant information

Your contact details

Name

Cell

Email

Please submit your feedback and CRI will contact you



Thank you!

Thank you for taking the time to fill out the survey.

Your feedback was successfully received.

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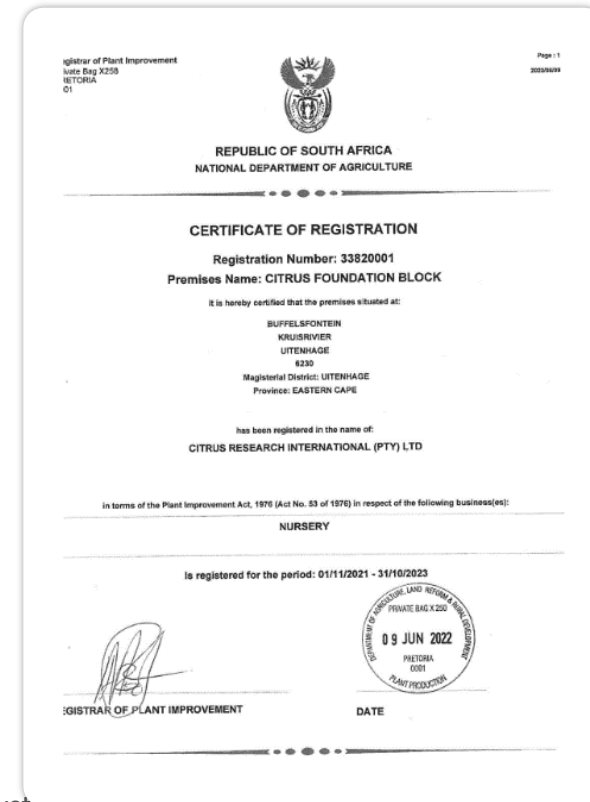
Nursery administration

- 11% of audit score
 - Registration with authority
 - General (demand estimates, orders, BCIN, sample analysis)
 - Sales register and certification



Registration with authority

- Nursery registered with:
 - Citrus Improvement Scheme (CIS)
 - Dept. Agriculture, Plant Improvement Act



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General administration

- Budwood demand estimates for high-demand cultivars
- Timely placement of orders
- Administration of private cultivars
- Diligent administration of the BCIN system
- Adequate completion of sample analysis forms, including block plan information



Sales register and certification

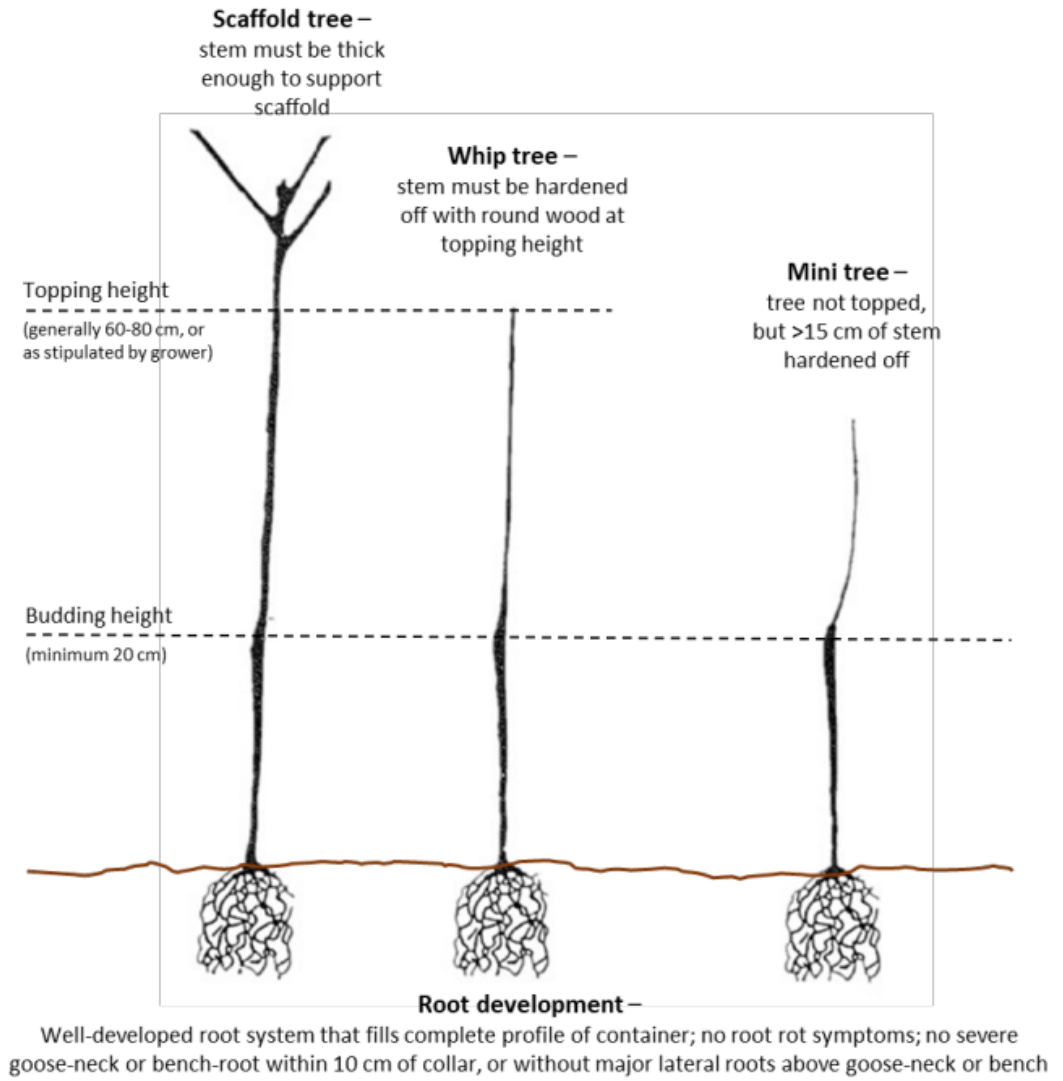
- Sales register with adequate traceability records
- The CIS is a certification Scheme, and certifies nurseries, as well as trees meeting the certification requirements
 - Tree certification criteria:
 - Tree must meeting physical quality standards (mini, whip or scaffold tree)
 - Made from CIS certified budwood and rootstock seed
 - Tested for Phytophthora every 3 months (quarterly)
 - May not test positive for Phytophthora more than two times during quarterly tests and also not test positive in quarterly test prior to delivery
 - Trees must not be older than 30 months after budding date
 - 80% Tree certification benchmark



CIS tree standard



Schematic description of the CIS nursery tree standards



Audit report



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CIS NURSERY CERTIFICATION: AUDIT FORM					
31/05/2022					
#	Audit criteria	Score Mx W	CIS avg	SCORE	Comments / Recommendations
Nursery layout and structures					
1	Location	5 5	4.0	✓ 4	
2	Structures	5 5	3.3	✓ 4	
3	Drainage and rain water control	3 1	2.9	✓ 3	
4	Raising container trees from the ground	5 1	3.6	✓ 3	
5	Security and Access control	5 1	4.0	✓ 4	
Operations and Quality Management Systems					
6	QMS-1: Irrigation water source treatment and testing	5 2	4.1	✓ 4	Besproeiingswater teen 6dpm gechlorineer. Minimum 3dpm CI teen tyd van besproeiing.
7	QMS-2: Potting medium handling, treatment and testing	5 2	3.9	✓ 5	
8	QMS-3: Integrated pest and disease management	5 2	3.7	✓ 4	Weeklikse scouting deur real IPM en deurlopende monitoring deur Augsburg Kwekery.
9	QMS-4: Management of irrigation and plant nutrition	5 2	3.7	✓ 4	Bome lyk gesond en het goeie kleur. Nie-gereelde blaaronfledings wanneer tekorte opgelet word.
10	QMS-5: Inventory management and traceability systems	5 2	4.2	✓ 5	
Performance criteria					
11	General nursery appearance	5 3	3.8	✓ 3	
12	Water pathogen status	5 5	3.4	✓ 3	Skoon vir die laaste 4x kwartale.
13	Medium pathogen status	5 5	3.6	✓ 3	Gem. Phytophthora oor laaste 4x kwartale = 7.78%
14	Citrus Black Spot (CBS)	5 3	3.2	✓ 5	CBS vrye area.
15	Citrus Greening disease control	5 3	3.6	✓ 4	Vergroening vrye jare.
16	Citrus bud mite control	3 3	3.0	✓ 3	Maart 2022 - Lesson gespuit.
17	Pest and disease control status	5 5	3.9	✓ 4	Pesbeheer het verbeter vanaf Nov 2021. Ligte RDL gesien by klein potte.
18	Seedling status (all seedling stages prior to budding)	5 10	3.3	✓ 3	Min onderstamme uitgeplant na groot sakkies. Onderstamme in klein potte is univormig maar ou onderstamme wat reeds terug gesny is moet nie vir die tweede keer afgesny word nie.
19	Tree status (tree stages from budding to delivery)	5 10	3.6	✓ 3	Daar is krom bome in die kwekery wat nie gelewer moet word aan kliente nie.
20	Root development status (inspect at least 10 nursery trees)	5 10	3.6	✓ 3	Gesonde wortels. Geen kromwortel gevind. Kleiner bome in besendings het klein wortelvolume.
21	Nursery sanitation	5 5	4.4	✓ 4	M7 bome is gemerk.
22	Grower feed back	5 3	3.3	2	JC Erasmus Octubrina - gedeelte van besending bevat sub-standaard bome (krom en klein). Hierdie is 'n problematiese klagte.
Nursery administration					
23	Registration with authority	3 1	3.0	✓ 3	Aansoek gedoen maar nog nie sertifikaat ontvang nie.
24	General (demand estimates, orders, BCIN, sample analysis)	5 5	3.6	✓ 3	Een "demand estimate" gemis.
25	Sales register and certification	5 5	1.8	✓ 3	82% sertifisering met aansoeke binne 0.5 maande na boom lewering, oor laaste 6 maande.
Nursery audit score				72%	70% 4-star nursery
Certification Report (include re-audit date if applicable)				X	Full CIS certification
Selekteer slegs sterk, univormig en reguit saailing/onderstamme met 'n goed ontwikkelde wortelstelsel vir die uitplant na groot sakkies.					Provisional CIS certification
					Provisional certification, new nursery
				Audit conducted by:	
				Michael Nell, Jacolene Meyer	
				Nursery representatives present:	

Nursery results



Nursery star rating	Final audit score	Audit round	
		Nov-21	May-22
★★★★★	>80%	9	11
★★★★	70-79%	6	10
★★★	60-69%	17	12
★★	50-59%	2	2
★	<50%	1	0
New Nursery	-	-	2
Average audit %		69.6%	71.8%
Nurseries certified		36	37

Conclusion

- Updated CIS certification guidelines for citrus nurseries
 - Clear guidelines for propagating top quality nursery trees
- Star-grading system is effective in benchmarking nurseries and motivating them to improve
- “The proof is in the pudding”
 - Highest weighting for seedling-, tree- and root status
 - Irrespective of nursery size and technologies, it is still possible to score 4- or 5-star for a nursery with good conventional management systems
- Citrus Improvement Scheme will soon become a compulsory statutory scheme
 - Our aim is therefore to continue to develop the nursery advisory and certification services as an inclusive and constructive value proposition to all citrus-producing nurseries, and to sustain grower confidence in the Citrus Improvement Scheme and the CIS-certified nurseries





Michael Nell

CIS Nursery Advisor

Citrus Research International

Citrus Foundation Block

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THANK YOU

