



Prof Hano Maree



Extraordinary Associate-Professor

Citrus Research International
and
Stellenbosch University, Department of Genetics

[NRF-rating: B2](#)

hjmaree@sun.ac.za

+27 21 808 9579

Research Interests

My main research interest is the study of viruses and graft-transmissible diseases of woody perennial crops using molecular approaches. During the past 13 years the bulk of my research focussed on two closteroviruses, namely GLRaV-3 and CTV. The rise in popularity of next-generation sequencing (NGS) resulted in the discovery of several genetic variants of these viruses however the influence of this genetic variation, if any, on symptom development and disease progression remains to be elucidated and is one of my main research goals. The molecular methodology we developed over the past decade can be applied to any crop-disease combination and in these cases we take part in collaborations or start smaller projects.

I am particularly attracted to complex diseases for which the aetiology is unknown or not completely resolved. Most of our projects develop detection and quantitation assays, to track viral spread or determine virus concentration ratios. These assays can be used by the extension services for routine virus screening. The use of NGS has been a leap forward in diagnostics due to its sensitivity and unbiased nature. The implementation of NGS into routine diagnostic or detection procedures is an active pursuit and forms part of my research efforts.

Publications

Scopus Author ID: 23493117700

ORCID: orcid.org/0000-0001-9639-4558

Google Scholar ID: Maree HJ





Journal Articles

1. Maree, H.J., Fox, A., Al Rwahnih, M., Boonham, N., Candresse, T. 2018 Application of HTS for routine plant virus diagnostics: State of the art and challenges. *Frontiers in Plant Science*. 9:1082. DIO: 10.3389/fpls.2018.01082
2. Mostert, I., Burger, J.T., and Maree, H.J. 2018. Characterization of the genetic diversity and identification of putative recombination events in Grapevine rupestris stem pitting-associated virus. *Archives of Virology*. DOI: 10.1007/s00705-018-3883-x *Accepted*
3. Massart, S., Chiumenti, M., De Jonghe, K., Glover, R., Haegeman, A., Koloniuk, I., Kominek, P., Kreuze, J., Kutnjak, D., Lotos, L., Maclot, F., Maglioka, V., Maree, H.J., Molnar, J., Olivier, T., Olmos, A., Pooggin, M.M., Reynard, J-S., Ruiz-García, A.B., Safarova, D., Schneeberger, P.H.H., Sela, N., Turco, S., Vainio, E.J., Varallyay, E., Verdin, E., Westenberg, M., Brostaux, Y., and Candresse, T. 2018 High throughput sequencing of small RNAs and virus detection: do sequence analysis strategies really matter? *Phytopathology*. DOI: 10.1094/PHYTO-01-18-0012-R
4. Pholo, M., Coetzee, B., Maree, H.J., Young, P.R., Lloyd, J.R., Kossmann, J., Hills, P.N. 2018. Cell division and turgor mediate enhanced plant growth in Arabidopsis plants treated with the bacterial signalling molecule lumichrome. *Planta*. 248, 477-488. DOI: 10.1007/s00425-018-2916-8
5. Bester, R., Burger, J.T., and Maree, H.J. 2017. Transcriptome analysis reveals differentially expressed small RNAs and genes associated with grapevine leafroll-associated virus 3 infections. *Physiological and Molecular Plant Pathology*. 100, 220-236. DOI: 10.1016/j.pmpp.2017.10.006
6. Visser, M., Cook, G., Burger, J.T., and Maree, H.J. 2017. In Silico analysis of grapefruit gene regulation in response to CTV and CDVd coinfection. *Virology Journal*. 14:200. DOI: 10.1186/s12985-017-0871-9
7. Jooste, T.L., Visser, M., Cook, G., Burger, J.T., and Maree, H.J. 2017. E-probe based detection of citrus viruses in NGS data. *Phytopathology*. 107 (8), 988-993. DOI: 10.1094/PHYTO-10-16-0379-R
8. Bester, R., Burger, J.T., and Maree, H.J. 2017. The small RNA repertoire in phloem tissue of three *Vitis vinifera* cultivars. *Plant Gene*. 10, 60-73. DOI: 10.1016/j.plgene.2017.05.009
9. Bester, R., Burger, J.T., and Maree, H.J. 2017. Differential expression of miRNAs and associated gene targets in grapevine leafroll-associated virus 3 infected plants. *Archives of Virology*. 162 (4), 987-996. DOI: 10.1007/s00705-016-3197-9
10. Bester, R., Pepler, P.T., Aldrich, D.J. and Maree, H.J. 2017. Harbin: An RT-qPCR analysis tool. *Biotechnology letters*. 39, 171–178. DOI: 10.1007/s10529-016-2221-1
11. Steyn, C., Cook, G., Burger, J.T., and Maree, H.J. 2016. Construction and application of infectious citrus viroids for biological indexing. *Journal of Citrus Pathology*. 3(1), 1-8. <https://escholarship.org/uc/item/0057d2hb>
12. Cook, G., Van Vuuren, S.P., Breytenbach, J.H.J., Steyn, C., Burger, J.T., and Maree, H.J. 2016. Characterization of Citrus tristeza virus single-variant sources in grapefruit in greenhouse and field trials. *Plant Disease*. 100 (11), 2251- 2256. DOI: 10.1094/PDIS-03-16-0391-RE
13. Cook, G., Van Vuuren, S.P., Breytenbach, J.H.J., Burger, J.T., and Maree, H.J. 2016. Expanded strain specific RT-PCR assay used to profile *Citrus tristeza virus* (CTV) sources used for cross-protection in the South African Citrus Improvement Scheme. *Journal of Phytopathology*. 164, 847–851. DOI: 10.1111/jph.12454





14. Visser, M., Bester, R., Burger, J.T., and Maree, H.J. 2016. Next-generation sequencing for virus detection: covering all the bases. *Virology Journal*. 13:85. DOI 10.1186/s12985-016-0539-x
15. Visser, M., Burger, J.T., and Maree, H.J. 2016. Targeted virus detection in next-generation sequencing data using an automated e-probe based approach. *Virology*. 495,122-128. DOI: 10.1016/j.virol.2016.05.008
16. Oosthuizen, K., Coetzee, B., Maree, H.J., and Burger, J.T. 2016. First Report of Grapevine Syrah virus-1 in South African Grapevines. *Plant Disease*. 100(6),1252. DOI: 10.1094/PDIS-12-15-1408-PDN
17. Molenaar, N., Burger, J.T. and Maree, H.J. 2015. Detection of a divergent variant of *Grapevine virus F* with next-generation sequencing. *Archives of Virology*. 160(8), 2125-2127. DOI: 10.1007/s00705-015-2466-3.
18. Naidu, R.A., Maree, H.J., and Burger, J.T. 2015. Grapevine Leafroll Disease and Associated Viruses – A ‘Unique’ Pathosystem. *Annual Review of Phytopathology*. 53, 613-34. DOI: 10.1146/annurev-phyto-102313-045946.
19. Maree, H.J., Pirie, M.D., Bester, R., Oosthuizen, K., and Burger, J.T. 2015. Phylogenomic analysis reveals deep divergence and recombination in an economically important grapevine virus. *PLoS ONE*. 10(5): e0126819. DOI: 10.1371/journal.pone.0126819.
20. Jooste, A.E.C., Molenaar, N., Maree, H.J., Bester, R., De Koker, W.C. and Burger, J.T. 2015. Identification and distribution of multiple virus infections in grapevine leafroll diseased vineyards. *European Journal of Plant Pathology*. 142, 363–375. DOI: 10.1007/s10658-015-0620-0.
21. Bester, R., Pepler, T., Burger, J.T., Maree, H.J. 2014. Relative quantitation goes viral: RT-qPCR assay for a grapevine virus. *Journal of Virological Methods*. 210, 67–75. DOI: 10.1016/j.jviromet.2014.09.022.
22. Visser, M., Maree, H.J., Rees, D.J.G. and Burger, J.T. 2014. High-throughput sequencing reveals small RNAs involved in ASGV infection. *BMC Genomics*. 15:568. DOI: 10.1186/1471-2164-15-568.
23. Visser, M., Van der Walt, A.P., Maree, H.J., Rees, D.J.G. and Burger, J.T. 2014. Extending the sRNAome of apple by next-generation sequencing. *PLoS ONE*. 9(4): e95782. DOI: 10.1371/journal.pone.0095782.
24. Maree, H.J., Almeida, R.P.P., Bester, R., Chooi, K.M., Cohen, D., Dolja, V.V., Fuchs, M.F., Golino, D.A., Jooste, A.E.C., Martelli, G.P., Rayapati, N., Rohwani, A., Saldarelli, P. and Burger, J.T. 2013. Review: *Grapevine leafroll-associated virus 3*. *Frontiers in Microbiology - Virology*. 4, 82. DOI: 10.3389/fmicb.2013.00082.
25. Espach, Y., Maree, H.J. and Burger, J.T. 2012. The complete genome of a novel endornavirus assembled from next-generation sequence data. *Journal of Virology*. 86(23), 13142. DOI: 10.1128/JVI.02538-12.
26. Bester, R., Jooste, A.E.C., Maree, H.J. and Burger, J.T. 2012. Real-time RT-PCR high resolution melting curve analysis and multiplex RT-PCR to detect and differentiate *grapevine leafroll-associated virus 3* variant groups I, II, III and VI. *Virology Journal*. 9:219. DOI: 10.1186/1743-422X-9-219. (Highly accessed)
27. Lamprecht, R., Maree, H.J., Stephan, D. and Burger, J.T. 2012. Complete nucleotide sequence of a South African isolate of *Grapevine fanleaf virus*. *Virus Genes*. 45, 406–410. DOI: 10.3390/v5071815.
28. Meiring, T.L., Salimo, A.T., Coetzee, B., Maree, H.J., Moodley, J., Hitzeroth, I.I., Freeborough, M.-J., Rybicki, E.P. and Williamson, A.-L. 2012. Next-generation sequencing of cervical DNA detects *Human papillomavirus* types not detected by commercial kits. *Virology Journal*. 9, 164.





DOI: 10.1186/1743-422X-9-164. (Highly accessed)

29. Bester, R., Maree, H.J. and Burger, J.T. 2012. Complete nucleotide sequence of a new strain of *Grapevine leafroll-associated virus 3* in South Africa. *Archives of Virology*. 157, 1815-1819. DOI: 10.1007/s00705-012-1333-8.
30. Jooste, A.E.C., Maree, H.J., Bellstedt, D.U., Goszczynski, D.E., Pietersen, G. and Burger, J.T. 2010. Three genetic *Grapevine leafroll-associated virus 3* variants identified from South African vineyards show high variability in their 5'UTR. *Archives of Virology*. 155(12), 1997-2006. DOI: 10.1007/s00705-010-0793-y.
31. Maree, H.J., Gardner, H.F.J., Freeborough, M-J. and Burger, J.T. 2010. Mapping of the 5' terminal nucleotides of *Grapevine leafroll-associated virus 3* sgRNAs. *Virus Research*. 151, 252-255. DOI: 10.1016/j.virusres.2010.05.011.
32. Coetzee, B., Maree, H.J., Stephan, D., Freeborough, M-J. and Burger, J.T. 2010. The first complete nucleotide sequence of a *Grapevine virus E* variant. *Archives of Virology*. 155, 1357-1360. DOI: 10.1007/s00705-010-0685-1.
33. Coetzee, B., Freeborough, M-J., Maree, H.J., Celton, J-M., Rees, D.J.G. and Burger, J.T. 2010. Deep sequencing analysis of viruses infecting grapevines: Virome of a vineyard. *Virology*. 400, 157-163. DOI: 10.1016/j.virol.2010.01.023.
34. Maree, H.J., Freeborough, M-J. and Burger, J.T. 2008. Complete nucleotide sequence of a South African isolate of *Grapevine leafroll-associated virus 3* reveals a 5'UTR of 737 nucleotides. *Archives of Virology*. 153, 755-757. DOI: 10.1007/s00705-008-0040-y.
35. Maree, H.J., Van der Walt, E., Tiedt, F.A.C., Hanzlik, T.N. and Appel, M. 2006. Surface display of an internal His-tag on virus-like particles of *Nudaurelia capensis* ω virus (N ω V) produced in a baculovirus expression system. *Journal of Virological Methods*. 136, 283-288. DOI: 10.1016/j.jviromet.2006.05.014

Book Chapters

36. Burger, J.T., Maree, H.J., Gouveia, P., Naidu, R.A. 2017. Grapevine leafroll-associated virus 3. *Grapevine viruses: molecular biology, diagnostics and management*. Eds. Meng, B., Martelli, G.P., Golino, D.A., Fuchs, M.. Springer Science and Business Media, New York. 167-195. ISBN 978-3-319-57704-3
37. Saldarelli, P., Giampetruzzi, A., Maree, H.J., and Al Rwahnih, M. 2017. High-throughput sequencing: advantages beyond virus identification. *Grapevine viruses: molecular biology, diagnostics and management*. Eds. Meng, B., Martelli, G.P., Golino, D.A., Fuchs, M.. Springer Science and Business Media, New York. 625-642. ISBN 978-3-319-57704-3
38. Burger, J.T. and Maree, H.J. 2015. Deep sequencing analysis of viruses infecting grapevines. *Plant Pathology - Techniques and Protocols, Methods in Molecular Biology*. Ed. Christophe Lacomme. Springer Science and Business Media, New York. Volume 1302, 315-330. DOI: 10.1007/978-1-4939-2620-6_23.





Other publications

Technical

39. Olmos, A., Boonham, N., Candresse, P., Gentit, P., Giovani, B., Kutnjak, D., Liefting, L., Maree, H.J., Minafra, A., Moreira, A., Nakhla, M.K., Petter, F., Ravnikar, M., Rodoni, B., Roenhorst, J.W., Rott, M., Ruiz-Garc, A.B., Santala, J., Stancanelli, G., Van der Vlugt, R., Varveri, C., Westenberg, M., Wetzler, T., Ziebell, H., and Massart, S. 2018. High-throughput sequencing technologies for plant pest diagnosis: challenges and opportunities. *Bulletin OEPP/EPPO Bulletin* (2018) 48(2), 219-224. DOI: 10.1111/epp.12472

Conference proceedings

40. Al Rwahnih, M., Klaassen, V., Stevens, K., Arnold, K., Maree, H.J., Westrick, N., and Golino, D.A. 2017. Molecular characterization of divergent Grapevine leafroll-associated virus 3 isolates in California, USA. *Phytopathology* 141:S5.1. DOI: 10.1094/PHYTO-107-12-S5.
41. Pholo, M., Coetzee, B., Maree, H.J., Young, P.R., Peters, S.W., Lloyd, J.R., Hills, P.N., and Kossmann, J. 2017. How does lumichrome affect plants? An omics approach to understanding plant growth enhancement. *South African Journal of Botany*. 109, 363. DOI: 10.1016/j.sajb.2017.01.157
42. Coetzee, B., Freeborough, M.-J., Maree, H.J., Celton, J.-M., Rees, D.J.G., and Burger, J.T. 2014. Metagenomic deep-sequencing: A promising tool to elucidate etiology. *Acta Horticulturae*. 1046, 335-340. DOI: 10.17660/ActaHortic.2014.1046.45
43. Visser, M., Maree, H.J., Rees, D.J.G., and Burger, J.T. 2013. Investigation of the role of small RNA in plant-virus interactions in apple trees. *Acta Phytopathologica Sinica* 43 (SUPPL.) p.308.
44. Maree, H.J., Nel, Y., Visser, M., Coetzee, B., Manicom, B., Burger, J.T. and Rees, D.J.G. 2012. The study of plant virus disease etiology using next-generation sequencing technologies. *Petria (Giornale di Patologia delle Pianta)* 22(3), 283.

Popular Articles

45. Jooste, A.E.C., Maree, H.J., Burger, J.T. 2017. Multiple viruses identified in Grapevine leafroll diseased vineyards. *Winelands*. March 2017. p57-60.
46. Molenaar, N., Engelbrecht, M., Maree, H.J., Burger, J.T. 2017. Virus diversity associated with Grapevine leafroll disease. *Winelands*. April 2017. P63-65.





STUDENTS

Postdoctoral fellows

2017/2 - current: Rachelle Bester

2018/3 - current: Beatrix Coetzee

PhD

2013 - current: Glynnis Cook

2017 - current: Dirk Aldrich

2018 - current: Ilani Mostert

MSc

2017 - current: Lucan Page

2015 - current: Elré Taai

BSc Honours

2018: Maryam Karaan



ALUMNI

Postdoctoral fellows

Marike Visser
Lubabalo Macingwana

Nicholas Molenaar
Faira Suidgeest
Yolandi Espach (neé Nel)
Rachelle Bester

Lucan Page
Lucas Oberholster
Chanel Steyn
Ilani Mostert

PhD:

Beatrix Coetzee
Rachelle Bester
Marike Visser

Wenhelene de Koker
Beatrix Coetzee

Ané van der Vyver
Julian Andre Le Keur
Dirk Jacobus Aldridge

BSc (Hons):

MSc:

Ilani Mostert
Kristin Oosthuizen
Nadine Lee (Neé Visser)
Dirk Aldrich
Tracey Jooste

Matthew Gary van Niekerk
Allison Anne Stander
Yolandi Swart
Caitlin Thistleton
Gulia Barnard
Nicola du Toit
Rebecca Mae Tunstall

Marthinus Jacob Rossouw
Kristin Oosthuizen
Natalie Smyth
Rachelle Bester
Yolandi Nel
Beatrix Coetzee