| DATA SCIENCE | LINLEY JESSON |
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| Outcome More sustainable and profitable systems Impact Indicators  * Maintained and/or increased crop volumes, value and profitability * New Zealand’s productive environments sustained or enhanced, generating products with verifiable reduced footprints to maintain and/or increase market access  Science Targets  * Whole systems modeling and prediction platform. * Tools developed for eco-verification, footprinting and traceability (water, carbon, greenhouse gases, soil, biodiversity, pesticides, social equity). * Improved production technologies and cultivars based on scaled up knowledge from molecular, physiological, soil, water and environmental science, integrated with system science.  Impact Highlight We are investigating natural language processing techniques for extracting relationships from unstructured data. For example, analysing comments from sensory tests on kiwifruit cultivars to reveal underlying linkages between crop genotypes (e.g. Gold3) and their associated sensory terms (e.g. bitter, grainy, sweet, berry-like). This involves parsing the textual data into the form of a triple-store (subject-predicate-object), producing a constrained graph network, and then clustering the nodes in the network.  Although this research is preliminary, initial prototypes are promising; an example from the 2019 Stage II Gold Kiwifruit testing is shown. Coupled with interactive visualisation platforms, this research will provide industry partners like Zespri with new and insightful knowledge about their sensory data. Further, it sets the foundations for including additional metadata, such as the chemical composition of a fruit or the genetic hierarchies between pedigrees. The hope is to connect various data types to obtain a deeper understanding of Plant & Food Research’s crops.  Figure 1: Example directed acyclic graph of sensory concepts.  C:\Users\CFLBWL\AppData\Local\Microsoft\Windows\INetCache\Content.Word\dag1.png  C:\Users\CFLBWL\Desktop\dag2.PNG  Figure 2: Example directed acyclic graph of sensory concepts (zoomed). OutputsPeer-reviewed Publications  * Mathew L, Burritt DJ, McLachlan A, Pathirana R (2019) Combined pre-treatments enhance antioxidant metabolism and improve survival of cryopreserved kiwifruit shoot tips. Plant Cell, Tissue and Organ Culture 138(1): 193-205. * **Julie Dalziel, Jason Peters, Kelly Dunstan, Catherine McKenzie, Nick Spencer, Neill Haggarty, Nicole Roy. Alteration in propagating colonic contractions by dairy proteins in isolated rat large intestine. Journal of Dairy Science September 2019,** [DOI: 10.3168/jds.2019-16790](DOI:%2010.3168/jds.2019-16790) * Jaeger SR, Roigard CM, Le Blond M, Hedderley DI, Giacalone D (2019) Perceived situational appropriateness for foods and beverages: consumer segmentation and relationship with stated liking. Food Quality and Preference, 78, 103701. * Motoi L, Morgenstern MP, Paredes D, Wilson AJ, Hedderley DI, Wade C, Tartaglia JM, Green C (2019) The effect of flavour modulators on chewing gum flavour duration. International Journal of Food Science and Technology, 2019, <https://doi.org/10.1111/ijfs.14248> * Ran, W., Guerin-Laguette, A., Lan-Lan, H., Xiang-Hua, W., Butler, R., Yun, W. & Fu-Qiang, Y. 2019. Mycorrhizal syntheses between *Lactarius* spp. section *Deliciosi* and *Pinus* spp. and interaction with grazing insects in Yunnan, China. Canadian Journal of Forest Research 49(6), 616-627. <https://doi.org/10.1139/cjfr-2018-0198> * Sullivan, N.J., Butler, R.C., Salehi, L., Twidle, A.M., Baker, G. & Suckling, D.M. 2019. Deployment of the sex pheromone of Pseudococcus calceolariae (Hemiptera: Pseudococcidae) as a potential new tool for mass trapping in citrus in South Australia. New Zealand Entomologist, 13. DOI: 10.1080/00779962.2019.1596503 * Walter, M., Manktelow, D., Campbell, R.E., Turner, L., Voster, L., Patrick, E., Butler, R.C. & Northcott, G. 2019. How much captan is required for wound protection of Neonectria ditissima conidium infections in apple? New Zealand Plant Protection 72, 95-102. * Harker, F. R., Feng, J., Johnston, J. W., Gamble, J., Alavi, M., Hall, M., & Chheang, S. L. (2019). Influence of postharvest water loss on apple quality: The use of a sensory panel to verify destructive and non-destructive instrumental measurements of texture. Postharvest Biology and Technology, 148, 32-37. * Balaei, B., Wilkinson, S., Potangaroa, R., Adamson, C., & Alavi-Shoshtari, M. (2019). Social factors affecting water supply resilience to disasters. *International Journal of Disaster Risk Reduction*, *37*, 101187. * de Jong, H., Reglinski, T., Elmer, P. A., Wurms, K., Vanneste, J. L., Guo, L. F., & Alavi, M. (2019). Integrated Use of Aureobasidium pullulans Strain CG163 and Acibenzolar-S-Methyl for Management of Bacterial Canker in Kiwifruit. *Plants*, *8*(8), 287. * Cook, Denham, Karen Middlemiss, Peter Jaksons, William Davison, and Alistair Jerrett. "Validation of fish length estimations from a high frequency multi-beam sonar (ARIS) and its utilisation as a field-based measurement technique." *Fisheries Research* 218 (2019): 59-68. * Ashton, D.T., Hilario, E., Jaksons, P., Ritchie, P.A. and Wellenreuther, M., 2019. 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Plant & Food Research Client Report: SPTS 18125. * Mauchline N, Dent S, Dobson S, Puketapu A, Stirling J, McKenzie C. July 2019. Efficacy of Proclaim® Opti against brownheaded leafroller on avocados. A Plant Food Research report prepared for: Syngenta Crop Protection Limited. Milestone No. 81232. Contract No. 36734. Job code: P/334061/01. SPTS No. 18272. July 2019 * McKenna C, Dobson S, Rogers P, Herrick J, McKenzie C. July 2019. CP19012: Safe oil use in summer on Gold3 kiwifruit crops. A Plant and Food Research report prepared for: Zespri Group Limited. Milestone No. 80299. Contract No. 36660. Job code: P/310012/01. SPTS No. 18269. July 2019 * McKenzie M, Chen R, Martin H, Hedderley D (2019) HN1937: The effect of postharvest storage and dry matter on the content of health-beneficial compounds in Actinidia chinensis var. deliciosa Hayward in 2018–2019. A report prepared for: Zespri. 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June 2019 * Seal A, Muschamp B, Popowski E, Lowe R, Gea L, Hoeata K, Paterson T, Wood M, Murphy S, Nath A, Cheng C-H, Sutton P, Saei A, Krebs A, Waiariki T, McCallum J, Bogers S, Pepperell D, Hernandez-Grijota G, Anderson L, Blackmore A, Sekhon J, Taufa N, McKenzie C. June 2019. NS1901 Stage 1—Crossing, germination and seedling screening. A Plant and Food Research report prepared for: Zespri Group Limited. Milestone No. 81048. Contract No. 35521. Job code: P/166181/01. SPTS No. 17874. * Vereijssen J, Watkins L, Butler R (2019) Assessment of Actigard® on the effect of Candidatus Liberibacter solanacearum in potato. A report prepared for Syngenta Crop Protection Limited. Plant & Food Research Client Report: SPTS 17981. 22 p * Vereijssen J, Watkins L, Kean A, Butler R, Blyth R (2019) Testing future proof and reduced insecticide programmes to reduce zebra chip disease in potato. A report prepared for Potatoes NZ Incorporated. Plant & Food Research Client Report: SPTS 18037. 29 p * Woolley R, McLachlan A, Mundy D (2019) Evaluation of VitiSeal™ as a grape wound protection against *Eutypa lata* spores 2019. A report prepared for Arysta LifeScience Limited. Plant & Food Research Client Report: SPTS 18044. * Wood P, Agnew R, Fisher BM, Neal S, McLachlan A (2019) Grape PM – models, life cycle and genetics. A report prepared for Wine Leadership Team. Plant & Food Research Client Report: SPTS 18234. * Wurms K, Agnew R, Ah Chee A, Neal S, Vorster L, Campbell R, Turner L, McLachlan A, Walter M (2019) Biofungicides for powdery mildew control. A report prepared for New Zealand Winegrowers Research Centre Inc.. Plant & Food Research Client Report: SPTS 18101. * Vanneste J, Hong T, Cornish D, Yu J, Schipper M, Hedderley D, Alavi M, Oldham J, Esposito A, Jones D (2019) Copper resistance in Pseudomonas syringae pv. Actinidiae. A report prepared for Zespri Group Limited. Plant & Food Research Client Report: SPTS 18636  Software R-package: Jaksons, R. PFRgeospatial: A package for geospatial helper funtions useful for research at PFR. PFR internal application. Invitations to participate on Editorial Boards Ruth Butler has been appointed as a statistical advisor/ editor to the Phytopathologia Mediterranea journal. Invitations to present Keynote Addresses at Significant International or National Conferences or MeetingsNational Invitations to present Keynote Addresses  * Linley Jesson has been invited to give a keynote address at the New Zealand Government Data Summit * Peter Jaksons has been invited to give a keynote address at MobileTech 2020  International Presentations  * Kalamorz, F., S. Addison, R. Butler, R. Frampton. (2019). High Resolution Analysis of the Temporal and Spatial Localisation of Candidatus Liberibacter in Infected Potato Plants. German Botanical Society conference, Rostock, Germany. * Woods C, Jesson L, Laurenson M (2019). Establishment of team-based Data Stewards in a large NZ research institute. eResearch Australisia 2019, 21-25 October 2019, Brisbane, Australia.  Capability Developed  * Heather Jenksins has started as a new Statistical Scientist November 2019. * Rodelyn Jaksons has started as new Statistical Scientist August 2019 | |