PFR SPTS No. 19724

Seminars and workshops 2019–20

Agnew R

July 2020

1 Seminars organised by Plant & Food Research in conjunction with the Marlborough Research Centre between July 2019 and June 2020

In the year from 1 July 2019 to 30 June 2020, seven seminars were held by The New Zealand Institute for Plant and Food Research Limited (PFR) at the Marlborough Research Centre (MRC). These seminars fell into the following three categories: 1) presentations by researchers visiting from overseas; 2) presentations by Marlborough PFR staff to groups visiting the MRC or in the community; and 3) in-house presentations for PFR staff. Some of the seminars were advertised through the MRC and PFR email distribution lists and also in the Wine Marlborough newsletter and in VineFacts Newsletter. Fewer seminars were held in the past year than in previous years. This was partly because of the COVID-19 lockdown from March to May 2020 and partly because of fewer national and international visitors to PFR in Marlborough.

The details of the seven seminars are as follows:

1. National Phenology and VineFacts. Presentation by Rob Agnew to Nelson Marlborough Institute of Technology Viticulture & Wine degree students. 6 August 2018.
2. Grapevine Trunk Diseases. Wine industry presentation by Dion Mundy – PFR. 13 August 2019.
3. Wine Chemistry. Wine industry presentation by Maria Perez Jimenez – Institute of Food Science Research (CIAL), Madrid, Spain. 14 November 2019.
4. Presentations to PFR Marlborough staff by two PFR Summer Students. Reconstructing plant architecture from point cloud – Aarthy Badrakalimuthu, and Calibrating a mechanistic carbon transport model through Gaussian emulator – Fareeda Bagum. 28 January 2020.
5. Integration of remote scanning data and crop models for the development of computer-aided vineyard design and management tools. Wine industry presentations by Dr Brian Bailey, Department of Plant Sciences, University of California, Davis, USA, and Dr Junqi Zhu, PFR. 12 February 2020.
6. PFR in-house research presentations. A one day meeting at which PFR Marlborough staff gave 26 five minute overview presentations of research projects they were working on. 19 February 2020.
7. Blenheim climate 2019, trends and possible climate change effects. Presentation by Rob Agnew to Marlborough District Council Environment Committee meeting. 12 March 2020.

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2 Details of four public seminars from local and international scientists

2.1 Grapevine trunk diseases

Speaker: Dion Mundy

2.1.1 Overview of presentation

Dion presented the talk that he gave at the 11th International Workshop on Grapevine Trunk Diseases in Penticton, Canada, in July 2019. He also presented advancements in detection methods for grapevine trunk diseases.

2.1.2 International workshop on grapevine trunk diseases

Grapevine trunk diseases (GTD) are a complex known to be caused by a wide range of taxonomically unrelated fungi. Diseases within this complex are responsible for a broad diversity of vascular and foliar symptoms, which result in an overall decline and eventual death of the grapevine. GTD are thought to be as old as vine cultivation; however, it has been relatively recent that their significance and impact on vine health have been fully recognised. Today, GTD are considered one of the main biotic factors reducing both yield and lifespan of vineyards, which results in substantial untenable economic losses to the grape and wine industry worldwide.

The emergence of these diseases in the early 1990s, and the urgent need by growers and industry for effective management strategies, gained the attention of scientists around the world. As a result, the inaugural meeting pf the International Council on Grapevine Trunk Diseases (ICGTD) took place in California in July 1998 at which the organisation's structure and objectives were developed. Since then, the primary goal of the ICGTD has been to promote science, and encourage collaborations and exchange of information among scientists and industry partners, on issues pertaining to GTD.

2.1.3 Biography

Dion Mundy has worked for PFR in Marlborough for the last 20 years on a range of projects related to grape diseases. Currently most of Dion's work is in the area of GTD as well as some botrytis bunch rot research.

2.2 Evolution of aroma in mouth during wine consumption

Speaker: Maria Perez Jimenez

2.2.1 Overview of presentation

Aroma is one of the main attributes in wine quality and consumer preference. Previous research carried out at the Institute of Food Science Research (CIAL), Madrid, Spain showed that the metabolic transformation of different types of aroma compounds occurs in the mouth due to the activity of saliva enzymes, and new volatile metabolites are also produced from the activity of oral microbiota. The aim

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of our work is to determine how wine composition and human physiological and biochemical factors, especially saliva composition, affect aroma release and perception during wine consumption. CIAL have developed in vivo methodologies (intra-oral solid phase microextraction, in-mouth stir-bar sorptive extraction) that allow the monitoring of in-mouth aroma release during wine intake. They also analysed the volatile fraction of expectorated wine and saliva composition in order to study the changes in aroma compounds during wine oral processing using a targeted chemical analysis. In addition, a dynamic sensory study was also performed to evaluate the aroma intensity of target attributes to compare the relationship between in vivo approaches and sensory data. Results showed that both wine matrix composition (polyphenols, ethanol content), aroma compound characteristics (molecular structure, hydrophobicity) and human oral physiology (saliva composition, age, gender) and biochemistry significantly affect wine aroma perception during consumption. Through these approaches they have a better understanding of wine aroma perception processes and consumer choices. Now Maria will be using an untargeted volatile profiling approach to determine as many volatile metabolites as possible to investigate the effect of saliva on changes in wine aroma composition during consumption.

2.2.2 Biography

Maria is a PhD student in the Wine Applied Biotechnology group at CIAL. Before joining this group, she completed her master's degree researching the influence of polyphenols on wine aroma release and perception. The main aim of her PhD research is to evaluate how inter-individual differences in oral physiology and biochemistry affect aroma release during wine intake. She is working towards understanding the role of wine aroma perception variability in consumer preference. Maria was visiting PFR to complete her overseas training with Dr Farhana Pinu and Dr Emma Sherman. Using a flavouromics approach, she analysed odorant metabolites to determine the potential evolutionary mechanisms of aroma compounds during wine consumption.

2.3 Integration of remote scanning data and crop models for the development of computer-aided vineyard design and management tools

2.3.1 Title of presentation

Integration of LiDAR scanning data and 3D crop models for the development of computer-aided vineyard design and management tools.

Speaker: Dr Brian Bailey – Assistant Professor, Department of Plant Sciences, University of California, Davis, USA

2.3.2 Overview of presentation

Design and analysis of vineyard systems using traditional field experiments or trials is typically expensive and slow, requiring years to decades of data in order to formulate robust conclusions. This creates a bottleneck in the innovation pipeline, leading to a significant delay between changes in climate and market conditions and the corresponding development of sustainable solutions. We are working to develop computer-aided vineyard design and management tools that allow for rapid testing of potential design or management practices in a detailed three-dimensional simulation environment,

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before making the decision to conduct a long-term trial/experiment that is costly in terms of time and money. This presentation summarised our work to date, which has most intensively targeted the development of new biophysical models (e.g. light, microclimate, plant hydraulics, photosynthesis) that better represent underlying physical and physiological mechanisms. In order to provide robust structural inputs for these models, we have also developed a number of tools to process LiDAR point cloud data into accurate leaf-level canopy reconstructions that can feed directly into 3D models.

2.3.3 Biography

Dr Brian Bailey has an interdisciplinary background that spans the fields of engineering, computer science, and plant biology. Since joining the Department of Plant Sciences at the University of California, Davis, in 2016, his research programme has focused on merging his interests in biometeorology and plant physiology in order to develop next-generation 3D perennial crop models that can help to facilitate sustainable systems design and management practices.

2.3.4 Title of presentation

Growing grapes on a virtual plant.

Speaker: Dr Junqi Zhu – Plant & Food Research, Marlborough Research Centre

2.3.5 Overview of presentation

How to achieve the target berry composition and yield is a question in each vintage. A 3D functional-structural grapevine model was developed to help us hit the n-dimensional target and test the effects of source-sink manipulation, water deficit and climatic conditions on berry growth and composition under different training systems. Besides our progress on the grapevine model, Junqi gave a brief summary of his work on carbon allocation and yield prediction.

2.3.6 Biography

Dr Junqi Zhu joined PFR at the MRC in September 2016. He was educated as an agro-meteorologist and plant eco-physiologist with strong emphasis in quantitative plant modelling. After his PhD on plant plasticity at Wageningen University, he switched to grapevine modelling and did his postdoc in the Institute of Vine and Wine at Bordeaux, France. Junqi's main research interest is to study and model the effects of the environment and vineyard management on yield components, e.g. bunch number and on berry quality, e.g. sugar accumulation.

2.4 Blenheim climate 2019, trends and possible climate change effects

Rob Agnew was invited to give a presentation to the Marlborough District Council's Environment Committee on the topic of Blenheim's climate trends.

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2.4.1 Overview of presentation

The presentation highlighted the following with regard to Blenheim's weather data for 2019 compared with the long-term average and also regarding the possible effects of climate change in Marlborough.

Two months in 2019 were the hottest on record (January and July) and two further months were the second hottest on record (May and November). 2019 was Blenheim's equal warmest year on record. Blenheim's annual temperature has warmed by 1.08°C from 1933 to 2019. The ten warmest years on record in Blenheim (between 1932 and 2019) have all occurred since 1990 and 7 of those 10 years have occurred since 2010. Winter temperatures in Blenheim have warmed markedly, e.g. June's mean temperature warmed by 2.24°C between 1932 and 2019. The number of ground frosts recorded in Blenheim has plummeted from an average of 109 per annum in 1932 to 36 per annum in 2019. While average annual rainfall has shown little change over 80 years, rainfall is highly variable from month to month and from year to year.

National Institute of Water and Atmospheric Research (NIWA) climate predictions for Marlborough were summarised as follows: Marlborough is likely to experience increasing average temperatures, more extreme high temperatures, fewer extreme low temperatures, a general decrease in spring and summer rainfall, larger rainfall events and increased drought potential.

2.4.2 Biography

Rob Agnew has worked for PFR in Marlborough for the last 34 years in a wide range of research areas. One of Rob's primary focus areas is the monitoring and reporting of climate data in Marlborough. Rob oversees the Blenheim climate station and he also operates 10 PFR weather stations on vineyards. Data from the Blenheim weather station are presented on the MRC website and in Wine Marlborough's monthly magazine Winepress.

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