

Solanaceous Crops Psyllids & Liberibacter



**Proceedings of the Workshop held 26 March 2009
Christchurch, New Zealand**

“Issues and Opportunities for Collaboration”

Solanaceous Crops – Psyllids & Liberibacter
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“Issues and Opportunities for Collaboration”

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Foreword

A workshop of this nature does not come together without a lot of help and interest from many people. A few deserve particular mention.

Joe Munyaneza volunteered to come to New Zealand to present the North American experience of psyllids and *Liberibacter*. In short order, the programme grew and the attendance list started to balloon, from an original estimate of 20-30, to over 80 actually attending. On hearing of these plans, Sonia Whiteman and Ron Gall, in spite of being fully involved in the main Congress planning, offered a venue and planning assistance. Without their endorsement and enthusiasm, my role would have been onerous.

Thanks also to our other overseas speakers: Gary Secor, who has been involved in Zebra Chip issues longer than anyone, Gerhard Bester who kindly offered the important role of summarising the day and then volunteered to lead the informal question and answer session, and Paul Horne who offered an interesting Australian perspective and insights into IPM practices of potatoes different to our New Zealand practices.

Thank you also to the rest of our speakers who found time to prepare a presentation in the busy season and to the many growers and research people who attended and participated so openly.

And finally, to our sponsors who offered without prompting.

For many of us, the eight months since the announcement in June 2008 of *Liberibacter* being shown to be associated with psyllid yellows, followed by documentation of Zebra Chip in New Zealand-grown potatoes and also associated with *Liberibacter* (in July 2008), have been a whirlwind of activity and learning. A few of us attended the ZC workshop in Dallas, Texas in December. Planning and executing research projects, trying to discover the likely differences between the US experience and what we can expect here, and planning information and response activities to support our growers, has been a dramatic experience in a normally more staid approach to research activity.

Just two weeks before this Workshop, we discovered evidence of *Phytoplasma* in some potato crops with foliar symptoms very similar to *Liberibacter*. While we know very little about this yet, we thought it useful to include some reference to what is known. Particular thanks to Lia Liefing, Joe Munyaneza and Gary Secor who modified their presentations at short notice.

From the early planning stages for this Workshop, I intended to ensure a record of the information would be available. My preference was to put together formal proceedings with the presentations in the form of papers. This was not to be – there is simply too much else happening and in some cases the presentation material will be published formally elsewhere. Rather than delay further, I felt it better to simply offer the presentation slides as is. Thank you to those who prepared written formats as these do make the content of presentations very much more accessible.

Warrick Nelson
Plant & Food Research, Lincoln, New Zealand
May 2009

Welcome Address

Warrick Nelson

Plant & Food Research, Lincoln

A big welcome to our speakers and to all of you for coming to participate in this workshop. I'm pleased to welcome so many from locally, but also so many from overseas. I note a number from the North Island, the West Island, the Eastern Pacific Island (north and south), the southern North Sea Island and the western Indian Ocean Island.

While our primary focus today is likely to be on potatoes, it is as well to note that we can learn from those battling with psyllids and *Liberibacter* in other solanaceous crops, for example tomatoes, capsicums, tamarillos, and even gardening and native plantings.

When we look at the difference in populations and resources between the USA and NZ, it is hard to believe that we few in New Zealand can make a difference. However, I believe we can offer a lot towards understanding of this insect/pathogen problem. The small size of our population and industry essentially forces even our specialists to take a far broader view and develop a wider range of expertise than is likely to occur in a bigger economy. We are used to developing co-operative links with others, especially in the research front. Our growers are seldom able to specialise exclusively in one crop, and their experiences are therefore taken from a broader range of crops and climates than might be the case in a larger country.

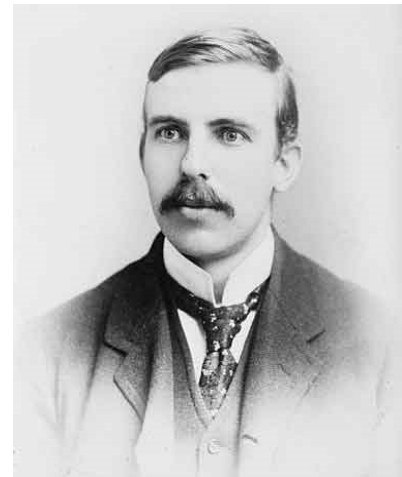
I've wanted to use this quote from Lord Rutherford for many years, and now is my chance. Research takes a lot of money to conduct. We need to ensure we use it wisely and effectively, but also not to treat them as interchangeable commodities.

I hope you will find the presentations today useful and I ask you to bring and share your experiences and expertise.

Before introducing our first speaker, I would like to raise four issues that may not arise otherwise or may derail more fruitful discussion.

Firstly, I would like to give a warning about single point bias. By this I mean a single point of view that takes on a greater relevance than perhaps is warranted. An example is the issue of insecticide resistance where a gene conferring a degree of resistance has been discovered in one population of the psyllids. However, the alternate view is demonstrated by another paper where farmer reports of widespread resistance are demonstrated to not be the case¹. It is easy to see resistance when a spray application has not worked, but in this instance, is it not more likely that the psyllids are simply very hard to reach with standard spray equipment?

A second example of single point bias is the assumption that symptoms are caused by a toxin injected by the psyllid nymphs during feeding. This has become almost standard to report even though some of the very first reports last century strongly indicated some sort of pathogenic organism, a virus in the terminology of the day².



"We haven't got the money, so we have to think."

Ernest Lord Rutherford

¹ Compare Liu & Trumble 2004 with Vega-Gutierrez et al 2008.

² Compare Binkley 1929 with Richards 1933 – Binkley referred to "viruliferous" psyllids and no transovarial transmission, while Richards concluded a toxin was present, especially as plants recovered after removing psyllids. The view of Richards prevailed.

Secondly, taxonomy of 'our' *Liberibacter* is important for the wider scope of research and links to other areas of research. It is also important for us to refer clearly to the organism we are concerned about and therefore we need an unambiguous name. Unfortunately for us, not only are we dealing with a Candidatus status genus, but two species names are also being used. For the purposes of our discussion today, we need to merely recognise two names exist currently and hope that this anomaly will be resolved soon.



“Candidatus Liberibacter psyllauros/solanacearum” - the 16s rDNA fragments are identical. Number 834130 is from New Zealand (the bottom one), the others are from California.

Thirdly, while we are not directly concerned with the citrus industry, there is a lot we can probably learn from their research. They have three species of *Liberibacter* associated with Huanglongbing (HLB)³, another yellows-type disease and vectored by two species of citrus psyllid. From their perspective, demonstration that tomato/potato psyllids can survive up to 10 days on citrus leaves indicates a potential route for infection for the solanaceous *Liberibacter* to spread to citrus. Equally, it offers a route for the reverse and to introduce the citrus *Liberibacter*s into solanaceous crops. An extensive citrus and citrus psyllid survey in the USA has so far failed to find any solanaceous *Liberibacter* in citrus.

Fourthly, we recognise there are other areas of concern even if we are not explicitly covering them today. In particular, I refer to Maori interests, especially as regards Kumara and native plants of cultural significance such as poroporo. What else are these psyllids doing in our natural environment, and what impact can this environment have on the spread of pests and disease to crops? We will be covering briefly the recent discovery that a native *Phytoplasma* has jumped to potato crops where it appears to cause very similar symptoms as *Liberibacter*. Is there likely to be any impact on the native psyllids, especially those potentially impacted by controls aimed at the tomato/potato psyllid?

I encourage you to practice crowd-sourcing, where small units of information, when collated, take on a greater degree of significance and usefulness. An example is Wikipedia where Zebra Chip already has its own page. Together, we can accomplish far more than acting independently and I encourage you to participate fully today and as we progress our research plans and develop practical means of protecting our crops.

3 Also known as citrus greening.

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Zebra chip

From Wikipedia, the free encyclopedia

Zebra chip, also known as **papa manchada** and **papa rayada**, is the term for both an as-of-yet unidentified **pathogen** and the **disease** it causes in **potatoes** and their derivative products.^{[2][3]} **Potato chips** exposed to the Zebra chip pathogen develop unsightly black lines resembling the stripes of **zebras** that render the chips unsellable.^[4] No health risks have been connected with consumption of infected potato chips.^[4]


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Emergence [edit]

Zebra chip was first identified in 1994 near **Saltillo, Mexico** and was originally named "papa manchada" ("stained potato").^[5] In the early 1990s, **Texas** potato farms reported afflictions, though the disease was not identified in the state until 2000.^{[3][6]} Soon after, Zebra chip has been reported in the U.S. states of **Arizona**, **California**, **Colorado**, **Kansas**, **Nebraska**, and **New Mexico**. Since 2000, **Guatemala** reported a disease known as "papa rayada" ("striped potato"), which has been identified as Zebra chip.^{[6][7]} **New Zealand's** first suspected case of Zebra chip occurred in May 2008, when an **Auckland** greenhouse reported similar symptoms.^[4] Eastern Europe and southern **Russia** may also be currently experiencing the disease.^[5]

Cause [edit]



Potato chips (crisps) have a higher percentage of visible infection than raw tubers, given the same batch of potatoes.^[1]

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