



**Fig. 1.** Tomato-potato psyllid feeding damage and liberibacter infection symptoms in a potato crop (a); tuber symptom showing necrosis (b); after cooking zebra chip symptoms (c). Photo credits F Mulcahy.

**Common Name:** Zebra Chip

**Disease:** *Candidatus Liberibacter psyllaeus*

**Classification:** K: Bacteria, P: Proteobacteria, C: Alpha Proteobacteria, O: Rhizobiales, F: Rhizobiaceae

*Candidatus Liberibacter psyllaeus* is vectored by the tomato-potato psyllid (*Bactericera cockerelli*). The complex has caused considerable financial hurt to the potato industries of North America and New Zealand. Tomato-potato psyllid is yet to be found in Australia. Consequently *Candidatus Liberibacter psyllaeus* is also yet to be discovered in Australia.

**Host Range:**

- Capsicum annuum* L.
- Capsicum frutescens* L.
- Lycopersicon esculentum* Mill
- Physalis peruviana* L.
- Solanum betaceum* Cav.
- Solanum tuberosum* L.

**Impact:**

Tomato-potato psyllids acquire “*Candidatus Liberibacter*” species through feeding on infected hosts and are then able to transmit the bacterium to additional hosts as they feed and inject saliva (Bové 2006). Once the plant is infected there is no control; the plant succumbs to the infection partially or completely. Tuber yields reduce and quality is impacted. The term “Zebra Chip” describes the symptoms that occur after the potato is fried. Dark “burnt sugar” symptoms occur throughout the tuber. The tuber is rendered useless. The impact to the potato industry is huge due to, a) the yield and quality loss and, b) in the case of the french fry and crisping industries the unknown of infected potatoes until they have been processed. Considerable downstream losses occur with product rejection.

**Key Distinguishing Features:**

Foliar symptoms of potato include stunting, chlorosis, and swollen nodes causing a “zig-zag” appearance of the upper growth, proliferated auxiliary buds, aerial tubers and leaf scorching leading to early dieback (Gudmestad and Secor 2007).

Below-ground symptoms include enlarged lenticels of the underground stem, collapsed stolons, brown discoloration of the vascular ring and necrotic flecking of internal tuber tissues (Gudmestad and Secor 2007). Symptoms also include smaller tubers, an increase in the number of tubers and shorter stolons. Tubers tend to be misshapen, have a rough skin and suffer a loss of dormancy resulting in premature sprouting. Tuber chaining and internal sprouting are common. Sprouts are spindly, hairy and very weak. These tubers are unacceptable for planting (UNL 2009).

**Control:**

No chemical control methods are available for *Liberibacter*. There are chemicals available for controlling the vector, but these are expensive and not totally effective. Integrated systems are being developed in New Zealand. Control of the vector is paramount.

**Further Reading:**

- Texas A & M University (2006) Economic impacts of zebra chip on the Texas potato industry. Center for North American Studies, Texas A & M University. <http://cnas.tamu.edu/Zebra%20Chip%20Impacts%20Final.pdf> (Accessed 10 September 2008)..
- Munyaneza JE, Crosslin JM, Upton JE (2007) Association of *Bactericera cockerelli* (Homoptera: Psyllidae) with zebra chip, a new potato disease in Southwestern United States and Mexico. *Journal of Economic Entomology* 100: 656–663.
- Munyaneza JE, Buchman JL, Upton JE, Goolsby JA, Crosslin JM, Bester G, Miles GP, Sengoda VG (2008) Impact of different potato psyllid populations on zebra chip disease incidence, severity, and potato yield. *Subtropical Plant Science* 60: 27–37..

**Key Contacts:** Your local Dept of Agriculture, DAFF, Bio Security Australia. Frank Mulcahy 0419 813 546