

Closing Presentation

- R.A. McIntosh -





Wheat breeder

- New 'wheat' breeder would benefit from familiarity with computers, ethics, statistics, policy, law
- As well as agronomy, molecular biology, genetics, pathology, physiology, plant nutrition, climate change, and quality
- And wheat plants

A new type of resistance

- **Genetic resistance**
- **Is it really different from resistance?**

Rust highlights of the last decade

- **Discovery of a sexual host for *Puccinia striiformis***
 - Jin *et al.* (2010) *Phytopathology* 100(5): 432-435
- *Puccinia graminis tritici* race Ug99 - virulent for *Sr31* and other resistance genes deployed in mega - and other varieties
- **Borlaug Global Rust Initiative (BGRI) – a boost to cereal rust research**

- **Rapid progress in understanding the molecular basis of host-pathogen genetics**
 - **Host**
 - **Conserved nature of many specific resistance genes – NBS-LRR**
 - **Cloning of some presumed non-specific resistance genes that were not NBS-LRR**
 - **Pathogen**
 - **Effectors, some of which are classical avirulence gene products released into the host cell post-haustorally; in some cases presumably into the inter-cellular spaces. Can also be host-specific toxins**
 - **There may be hundreds of effectors in rust pathogen species**

Extension

- **GRDC Fact Sheet: Green Bridge: January 2010**
- **Stripe rust can be a serious problem on wheat in regions where cool temperatures prevail through the growing season**
- **Barley and some other grasses can also be affected**
- **It survives in the green bridge on volunteer wheat, barley, and triticale, and other cereal grasses, brome grass and phalaris**

My version

- **Stripe rust can be a serious problem on wheat in regions where cool temperatures prevail through the growing season**
- **Wheat stripe rust can be a serious problem of wheat in all wheat growing areas in Australia**
- **Barley and some other grasses can also be affected**
- **A few barley varieties may also be affected**

My version (cont)

- It survives in the green bridge on volunteer wheat, barley, and triticale, and other cereal grasses, brome grass and phalaris
- It survives in the green bridge on volunteer wheat, some triticale varieties, possibly some barleys, and perhaps some grasses
- **Has green bridging of the wheat stripe rust pathogen ever been found on barley or a non-wheat grass in Australia?**

My recent international survey

- What are the current alternative hosts for wheat rust pathogens?
- **Widely circulated**
- Seven replies, three of which referred me to the old literature
- **Two referred to the role of barberry in stem rust survival**
- One told me to get information from another well known person who did not reply to the question
- **Conclusion: are current rust scientists really interested in this important aspect of epidemiology?**

Examples from the literature

- **I Wahl in The Cereal Rusts: ‘Some isolates of the (*Pst*) fungus have a host range embracing 40 species of 17 genera’ (Gerecter-Amitai unpublished)**
- **Stubbs in Cereal Rusts Vol II p64 reviews the different opinions for survival of *Pst* in various countries**
- **Recent manuscript from Eastern Europe, COST-funded leaf rust survey: 2005-2007: about 112 field samples: 3 pustules from each sample = 335 cultures: 128 races, 106 for the first time**
- **Message to our young scientists: do not forget epidemiology – it’s not sexy, but better knowledge could help farmers by permitting accurate advice**

Pathotyping

- **What is high and what is low – in seedling tests and in adult plant tests**
- **Is infection type 3 always low?**
- **Leaf segment assays are not always the same as intact plant assays**
- **Temperature sensitive genes – in standard seedling tests and in the field**

Resistance

- **What level of resistance is adequate? *Lr34* – Is Bezostaya resistant or susceptible to leaf rust?**
- **Disease resistance standards**
- **Mega-varieties and gene deployment**
- **Obtaining genetic diversity – within crop, between crop, between areas and regions**
- **More rapid adoption of new varieties**
- **Non-host resistance**

Acknowledgements

- **BGRI and DRRW – Ronnie and his team**
- **Local organisers**
- **Hotel staff**
- **Presenters of papers and contributors to the discussion**

Which one is resistant?



