Erosion of Polygenic Resistance

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Background

- Polygenic resistance is thought to be the most durable option for Australian canola
- Anecdotal evidence for erosion of resistance has long been recognised
- Differing environmental conditions from year to year make it difficult to investigate
- Erosion appears to occur in some varieties more than in others

Background

- Crashes of major gene resistance are easier to observe and to understand

Background

- Erosion appears to occur at different rates in different varieties
  - sometimes slowly over time, or in other cases suddenly in a particular region

Aims

- To show that erosion of resistance is occurring in Australian canola varieties
- To determine if erosion is occurring at different rates in different varieties
- To determine if erosion of resistance within varieties varies in rate due to location

Methodology

- 11 years of data from NBGIP blackleg rating disease nurseries
- Survival data for 93 released Australian canola varieties from 70 different sites across NSW, VIC, SA & WA
- Two analyses done:
    1. Over all of Australia – minimum 30 data points over at least 3 years
    2. Within four chosen sites – minimum 20 data points over at least 3 years

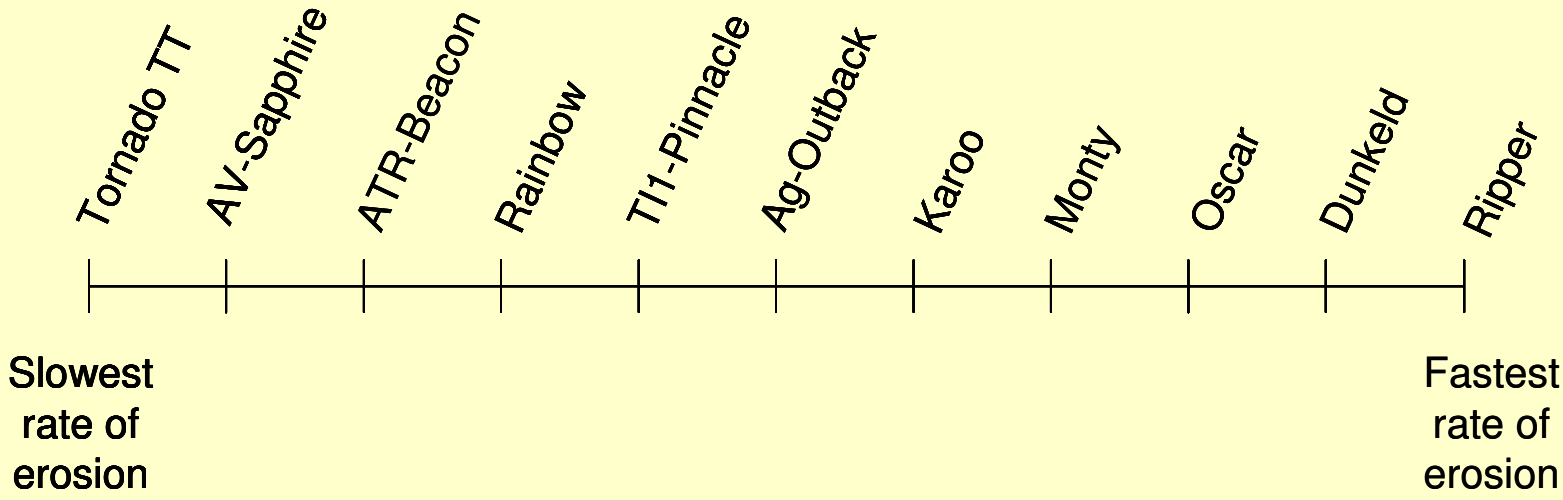
Methodology

- REML analyses completed by Ian Gordon at the Statistical Consulting Centre, the University of Melbourne
- From the first analysis 11 varieties of interest were chosen for two reasons
  - Over their commercial lifetime erosion was believed to have occurred, or
  - The resistance within the variety appeared to have remained stable

t-values for each pairwise comparison over all locations across Australia

	Dunkeld	Tl1-Pinnacle	ATR Beacon	Oscar	Ripper	Karoo	Monty	Ag-Outback	Rainbow	AV Sapphire
Tl1- Pinnacle	2.146									
ATR Beacon	1.813	ns								
Oscar	ns	2.255	1.773							
Ripper	ns	2.636	2.385	ns						
Karoo	ns	1.894	ns	ns	2.022					
Monty	ns	ns	ns	ns	ns	ns				
Ag-Outback	ns	ns	ns	ns	1.902	ns	ns			
Rainbow	2.361	ns	ns	2.548	2.783	2.123	ns	ns		
AV Sapphire	2.512	ns	ns	2.591	3.005	2.349	1.925	ns	ns	
Tornado TT	3.447	2.797	2.353	3.429	3.785	3.225	3.179	2.908	2.746	2.243

Significant at p≤0.01
Significant at p≤0.05
Significant at p≤0.10

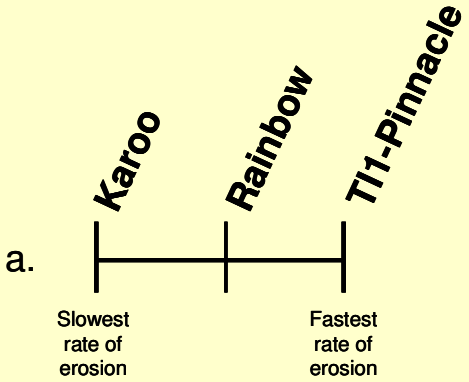


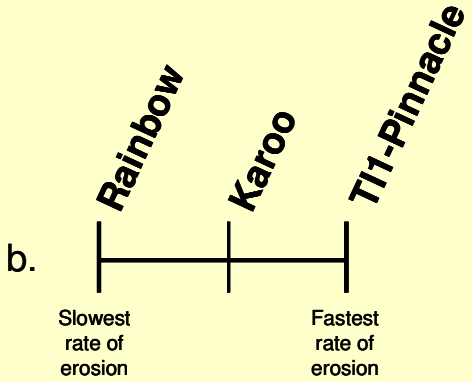
Analysis 2 – 4 chosen locations

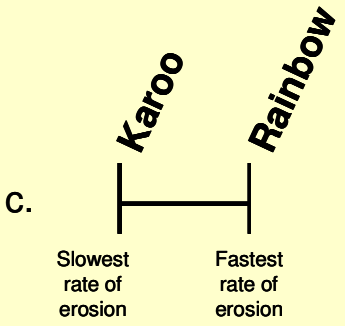
t-values for pairwise comparisons of 3 varieties within 4 locations across Australia

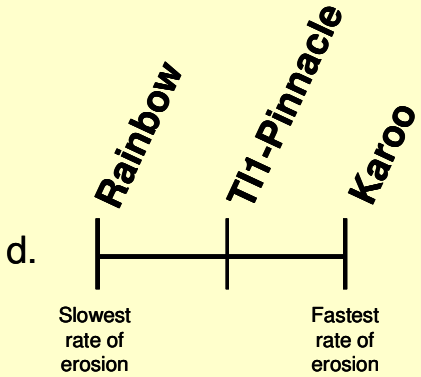
Location	Variety	Karoo	Rainbow
a. Lake Bolac, Vic	Rainbow TI1-Pinnacle	ns 2.713	 ns
b. Wonwondah, Vic	Rainbow TI1-Pinnacle	ns ns	 ns
c. Mt Barker, WA	Rainbow TI1-Pinnacle	ns -	 -
d. Wagga Wagga, NSW	Rainbow TI1-Pinnacle	1.852 1.923	 ns

Significant at p≤0.01
Significant at p≤0.05
Significant at p≤0.10









Conclusions

- Erosion of resistance is occurring within Australian canola varieties
- Erosion is occurring at different rates within different varieties
- Rate of erosion of resistance within some varieties differs due to location
- Disease nurseries are an important tool for recognising erosion of resistance