

# **Canola Disease Resistance Stewardship**

**Stephen Strelkov**

**Agronomy Update**

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# **Outline of Presentation**

- **Tension between rotation recommendations and economic realities**
- **Benefits of longer rotations: focus on clubroot & blackleg**
- **How long is long enough?**
- **Achieving a balance**
- **Conclusions**

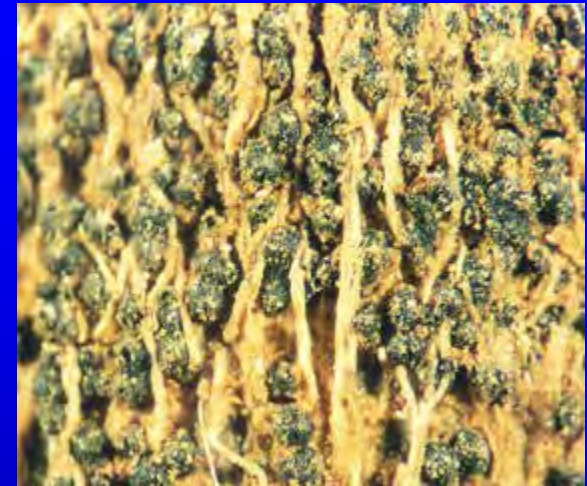
# Crop Rotation vs. Economic Realities

- Pathologists continually advocate long rotations as one of best disease management practices
- Farmers respond that they need to plant based on what pays the bills

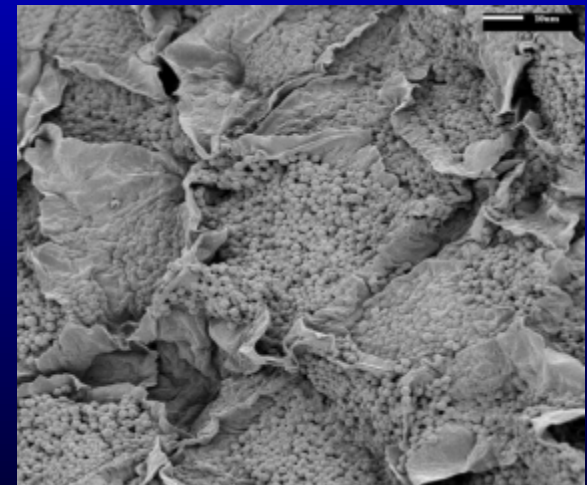
*Is there a balance between realistic rotations and sound disease management?*

# Benefits of Longer Rotations

- From a plant pathology perspective, two main benefits:
  - Prevent build-up of pathogen populations (inoculum)
  - Help to prolong the effectiveness of genetic resistance



Blackleg on stubble (APS)



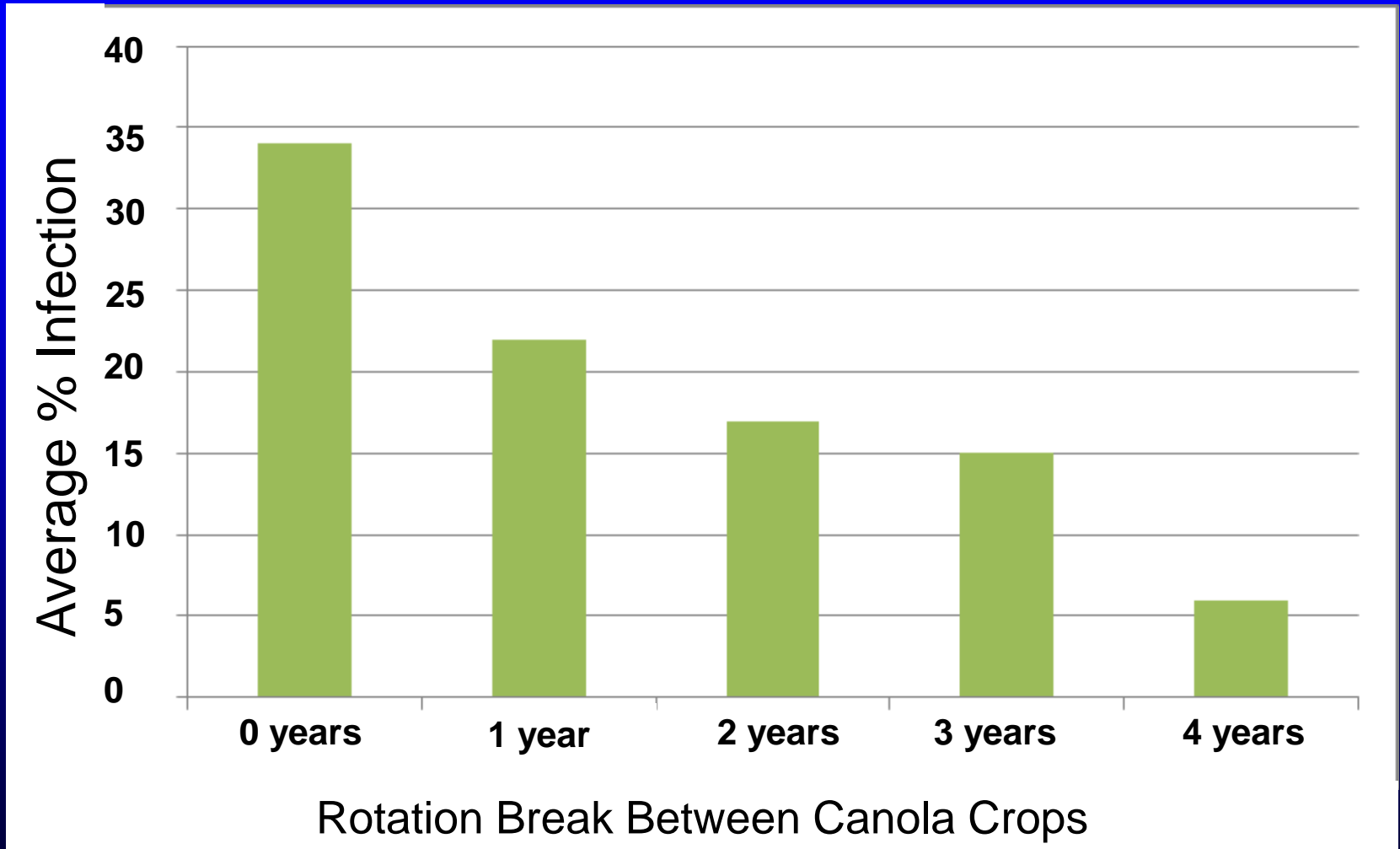
Clubroot resting spores

# Rotation and Disease Severity

- Data clearly indicate that as rotation length decreases, disease severity generally increases
  - Severe clubroot infestations have been identified only in fields with very short rotations
  - Rotation length one of biggest factors contributing to severity



# Effect of Rotation on Blackleg



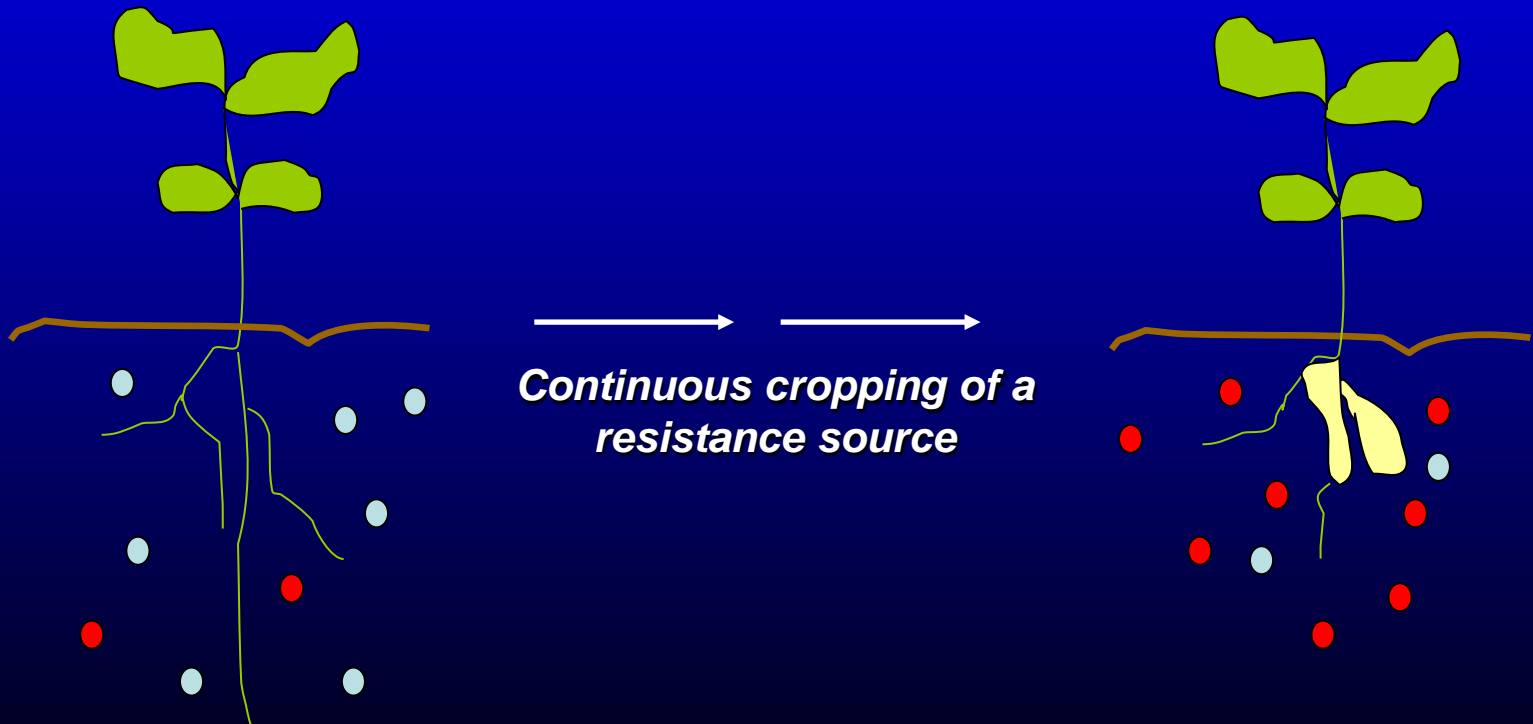
*Adapted from: CCC Canola Grower's Manual (data from D. McLaren)*

*In addition to preventing a build-up of  
pathogen population levels and  
maintaining lower disease, longer  
rotations can help increase the longevity  
of genetic resistance  
(resistance stewardship)*



# Resistance and Selection Pressure

- Repeated cropping of a resistance source places pressure on the pathogen to overcome that resistance

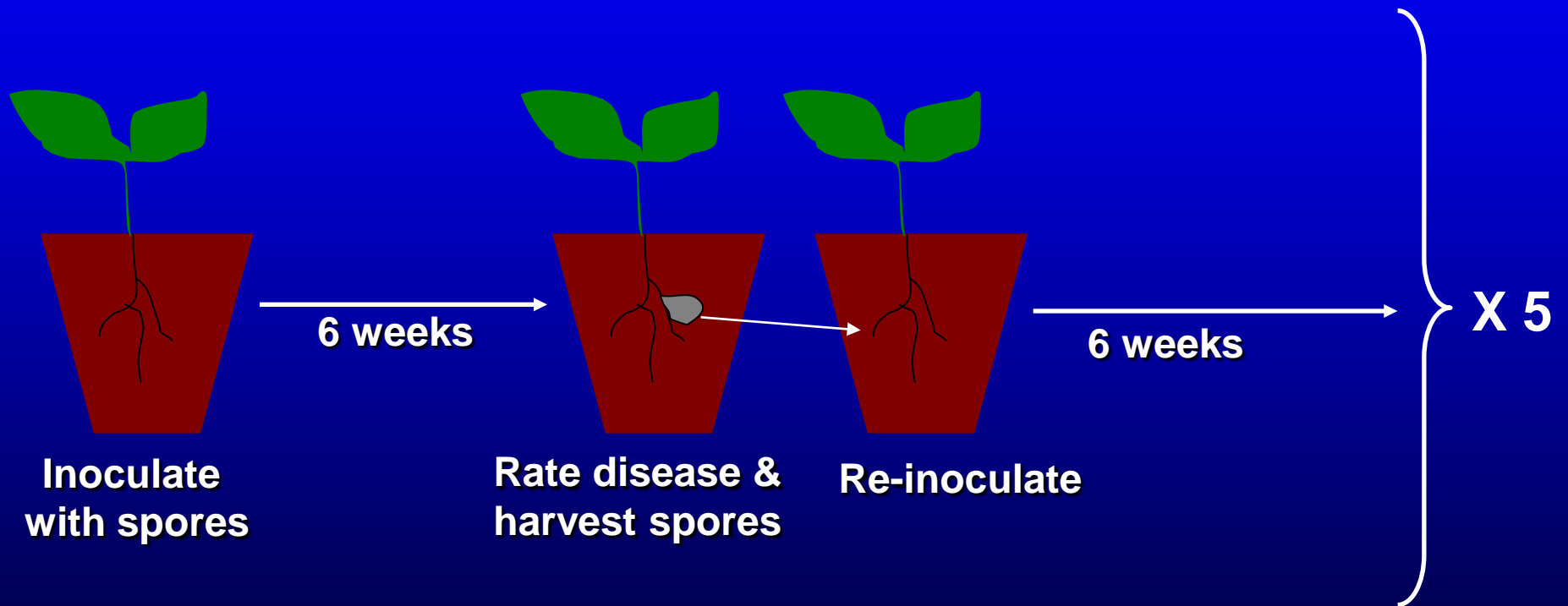




# **Erosion of Genetic Resistance**

- **Simple greenhouse experiments with Brassica varieties that have different levels of clubroot resistance illustrate how quickly pathogen populations can adapt to a host**

# Methodology



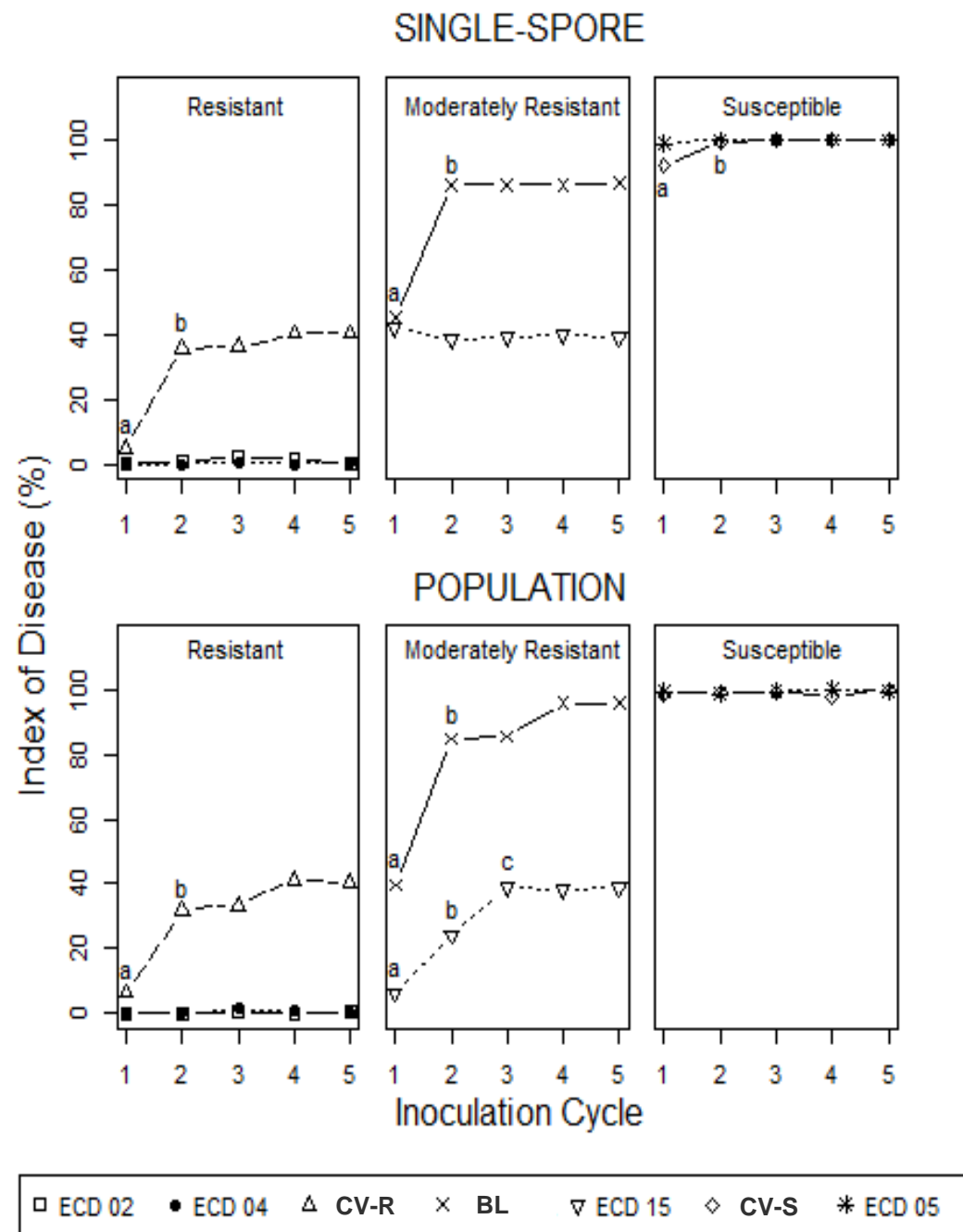
**GREENHOUSE STUDY**

# Erosion of Resistance

Repeated cropping of a resistance source eroded the effectiveness of that resistance

Findings were consistent with reports from winter oilseed rape in the UK and vegetables in the US

Resistance stewardship is important!

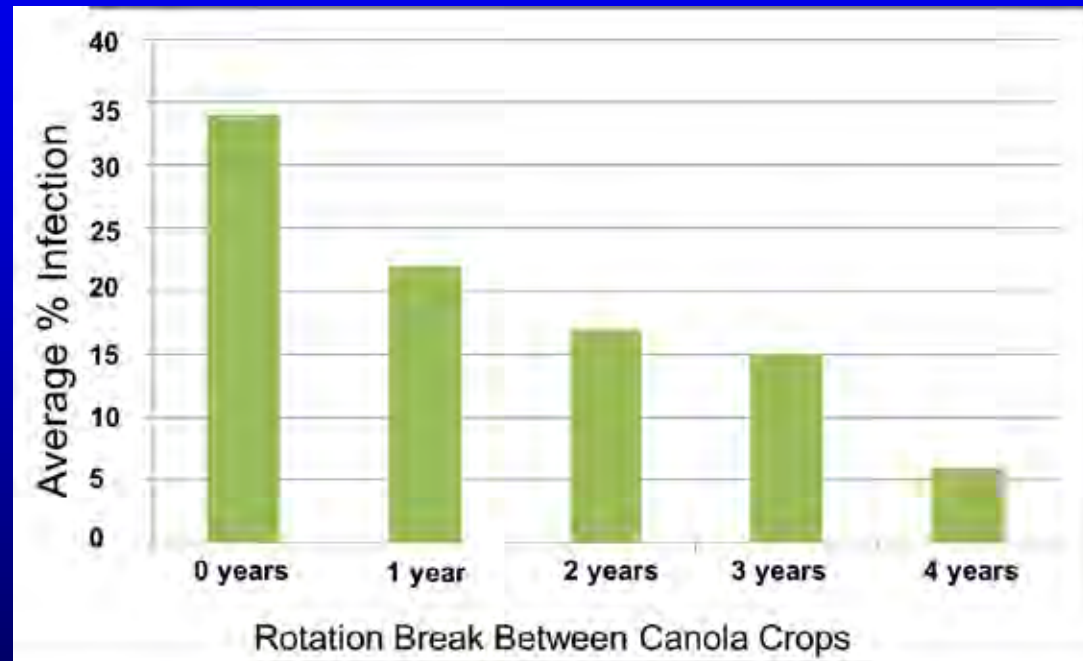


# **How Long is Long Enough?**

- **Depends on the pathogen and field history**
- **If no history of disease or other issues, might be possible to get away with shorter rotations**
  - **Increased vigilance will be required to identify emerging issues!**
- **If disease issues exist, prudent to extend rotations**

# Achieving a Balance

- Even a short break is better than none
- Selective use of longer rotations
- Rotation of resistance sources

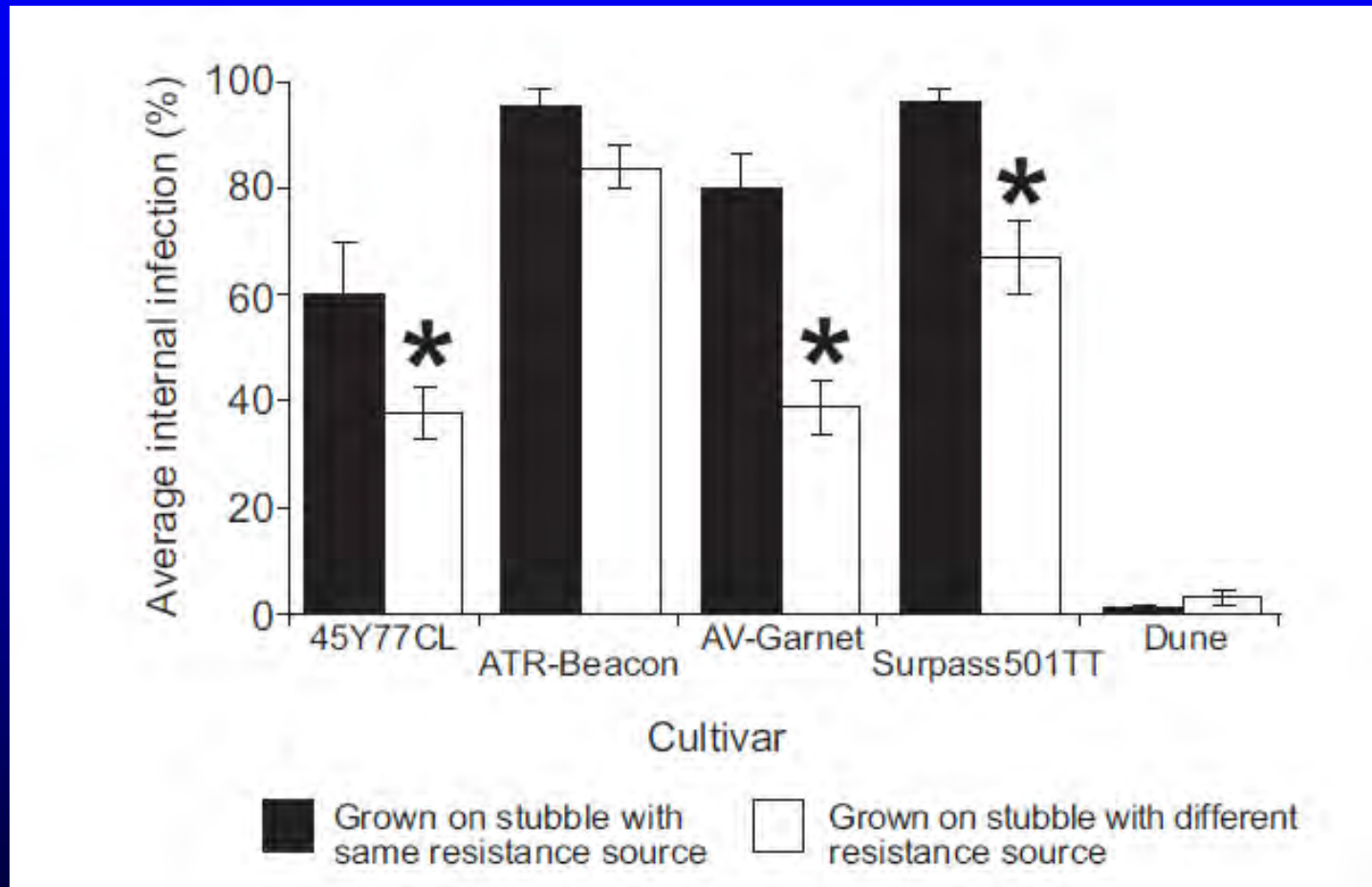


# Clubroot Cross-Infectivity Experiments

**Pathogen populations cycled on one host did not show equivalent increases in virulence on other hosts**

Canola host	Cycled populations			
	CV-R	BL	ECD 05	ECD 15
<b>W</b>	5.5±9.4	1.9±7.7	4.6±8.9	5.5±9.4
<b>X</b>	8.6±2.9	0.0±0.0	0.0±0.0	0.0±0.0
<b>Y</b>	1.9±7.7	0.0±0.0	0.0±0.0	0.0±0.0
<b>Z</b>	11.1±9.5	0.0±0.0	0.0±0.0	0.0±0.0

# Rotation of Blackleg Resistance Sources



Marcroft et al. 2011 (17<sup>th</sup> Australian Research Assembly on Brassicas)



# Rotation of Resistance Sources

- If rotation to a non-canola host is not possible, then rotation to a canola product with a different resistance source may be the next best option
- Tricky part is knowing if resistance in different products is different or the same!
  - This information is often not known or available

# Conclusions

- **Longer rotations preferable from a disease management perspective**
  - Prevent inoculum build-up
  - Prolong effectiveness of resistance
- **Not always feasible or economical**
- **Some rotation break better than none**
  - Length prescribed by situation-specific criteria

# Conclusions

- **Rotation of resistance sources may be a complementary approach**
  - **Basic information (same/different) needed by producers if such an approach is to work**

***We want to maintain the effectiveness of our resistance sources!***

# **Acknowledgements**

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