

# Stripe rust virulence on *Yr* genes in Saskatchewan



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# Virulence Surveys

- Dr. E.C. Stakman (1914)
- ✓ Variation in degree of incompatibility between host and pathogen
- ✓ Infection types are affected by environmental conditions
- ✓ Sometimes susceptible lines at seedling stage are fairly resistant in field
- ✓ A supposedly resistant variety needs to be evaluated under varying environmental conditions to assess its value of resistance

# Virulence Surveys

- Host lines includes cultivars, near-isogenic lines, supplemental differentials
- Purpose: characterization of isolates into races, frequency and distribution of races
- To serve the needs of wheat breeders and growers!!
- A gene might behave differently in controlled environment at seedling and in field, e.g. *Lr21*, *Sr21*, *Sr45*

## Race characterization-indoor

- Differentials: Avocet near-isogenic lines carrying *YrA*, *Yr1*, *Yr5*, *Yr6*, *Yr7*, *Yr8*, *Yr9*, *Yr10*, *Yr15*, *Yr18*, *Yr24/26*, *Yr25*, *Yr27*, *Yr28*, *Yr29*, *Yr31*, *Yr32*, *YrSP*, and other differentials carrying *YrTye*, *YrSu*, *Yr3a*, *Yr3b*, *Yr4a*, *Yr4b*, *YrTre*, *Yr43*, *Yr44*, *YrExp2*, *YrPa1*, *YrPa2*, *YrPa3*, *YrMor*
- Classification of isolates into virulent/avirulent based on a rating scale
- Are virulence surveys really informative?



# Genetic basis of resistance in Canadian cultivars

- Seedling resistance genes: *Yr7*, *Yr9*, *Yr10*, *Yr17*, *Yr27*
- Adult Plant Resistance (APR) genes: *Yr18/Lr34*, *Yr29/Lr46*, *Yr36 (HTAP)*

# Methodology

- Avocet NILs + wheat varieties (CDC Go, CDC Alsask, AC Barrie, Carberry, Lillian, AC Avonlea, AC Interpid, Produra, Paha, Stephens, Yamhill, Moro + Tritcale varieties: AC Certa, Ultima, Pronghorn, Brevis, Bunker
- Seeded at 6-8 sites fro 2013-2016
- Border of AC Barrie or Avocet S
- Disease rating at early milk to soft dough stage

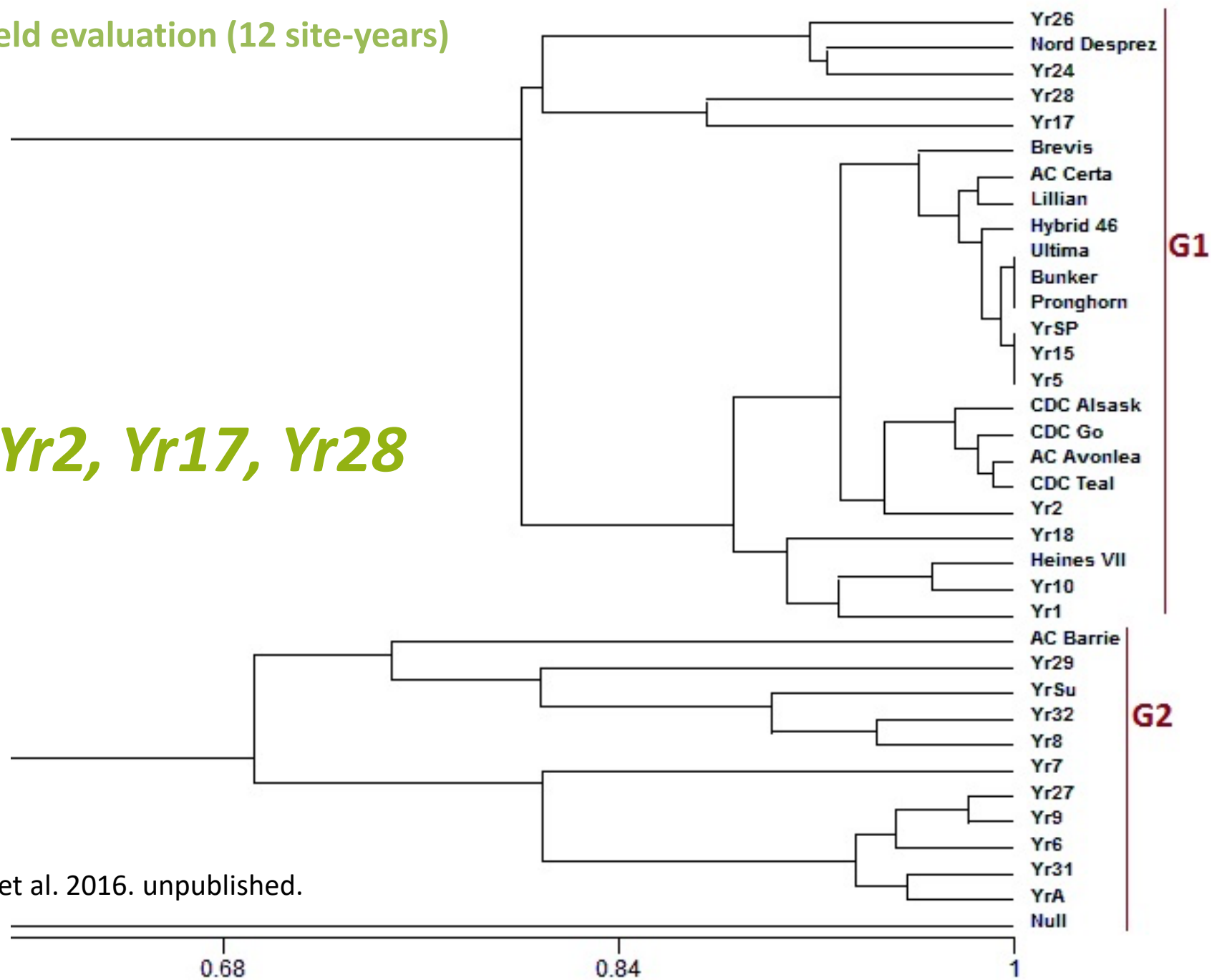
# Results and discussion

- Close association among years
- ✓ Corr. (2013-2014)= 84%
- ✓ Corr. (2014-2016)= 94%
- ✓ Corr. (2013-2016)= 78%
- Triticale varieties: all resistant to immune
- *Yr5, Yr15, YrSP, Yamhill*: Resistant
  
- Virulence fixed for: *YrA, Yr6, Yr7, Yr8, Yr9, Yr27, Yr29, Yr32, YrSu*



Field evaluation (12 site-years)

*Yr2, Yr17, Yr28*



G1

G2

0.68

0.84

1

Brar et al. 2016. unpublished.

## Take home message

- Keep regional cultivars in virulence surveys
- Partial virulence or partial resistance are important
- Indoor experiments should associate with field experiments for virulence surveys
- Successful management: deployment of known effective *Yr* genes in combination (towards achieving durable resistance)

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minor scholarships and tons of love  
from Almighty God, Family, and  
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