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# SARDI

## High throughput phenotyping of wheat spikes to improve understanding of abiotic stress on grain fill



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# X-ray CT Scanner

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- Phenotype cereal head (and root) traits
  - Spike level (weight, length, seed number)
  - Spikelet level (weight, seed number)
  - Grain level (weight, surface area, length)
- Can the automated X-ray CT replace the need for manual Frost Induced Sterility (FIS) scoring?



2022 Field trial at Punthari, SA

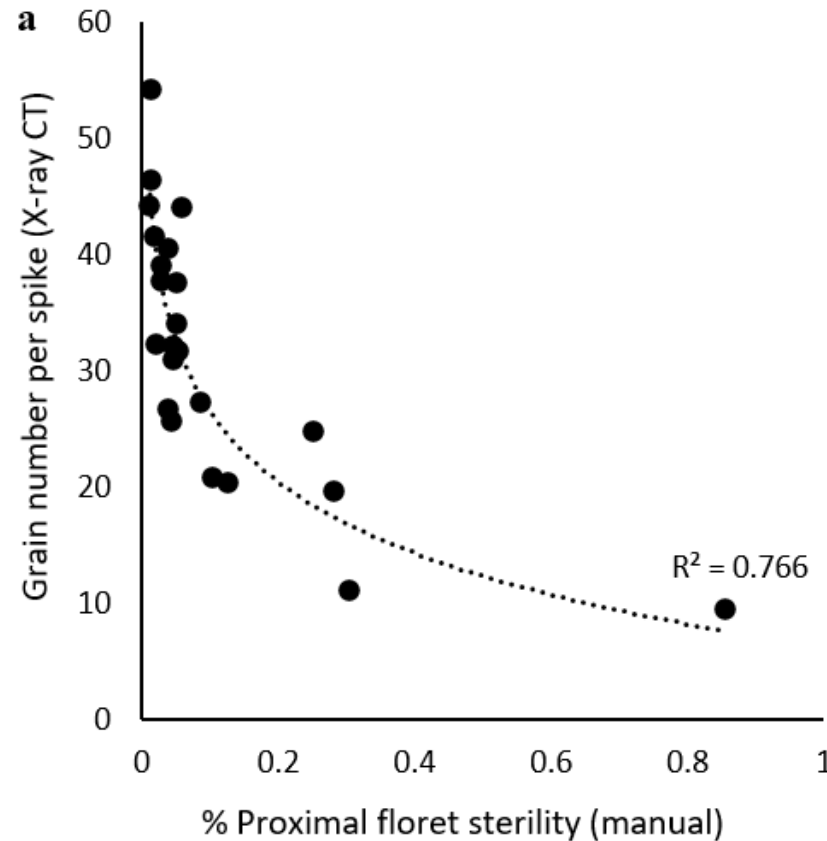
- Variety x time of sowing trial
- 272mm GSR (186mm in spring)
- Numerous frost events including:  $-3.9\text{ }^{\circ}\text{C}$  (9th Aug) and  $-2.4\text{ }^{\circ}\text{C}$  (21st Aug)
- Manual FIS found 85% sterility in Vixen and 25% Scepter TOS 1 (April 12<sup>th</sup> germ)
- Collected 10 spikes per plot



Vixen TOS 1  
frosted

# X-ray CT vs manual FIS

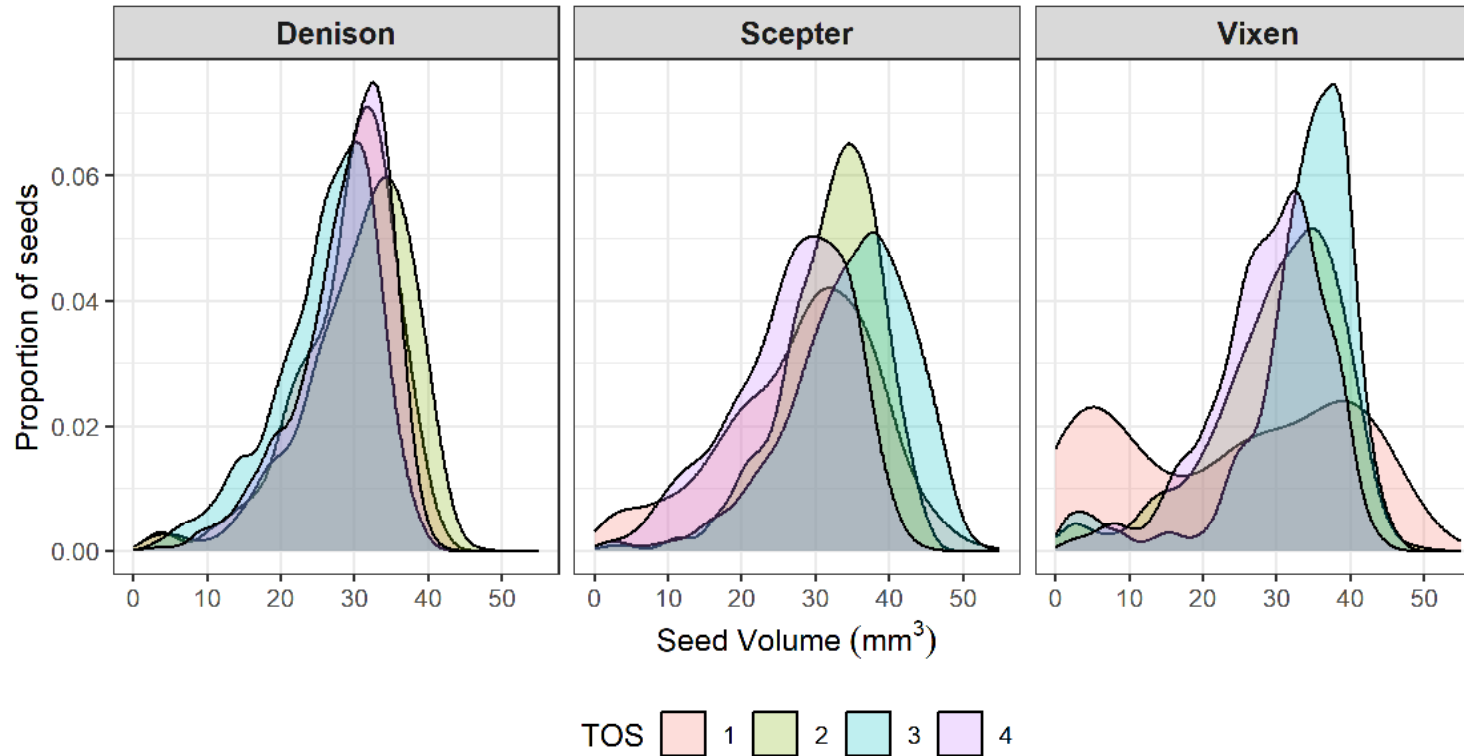
- Only grain number per spike from X-ray CT
- Moderate correlation to manual FIS (only used proximal grain positions)
- Limitation: X-ray CT does not currently count infertile grain positions



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- Led by Greg Rebetzke (CSIRO)
- Machine learning or AI to count infertile positions?

# Seed volume indicating pinched grain?



Other parameters from X-ray CT:

- Grain density
- Grain shape

Both look to correlate with frosted grain (see paper)

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- SARDI Waite Agronomy team for help in field trial management and spike collection
- APPN plant accelerator team for preparation of samples for scanning

