

**Evaluation of Weedy Rice Populations from Rice
Fields in Santa Catarina and Rio Grande do Sul
for Sensitivity to ACCase Herbicides**

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Background

- Weedy (red) rice (*Oryza sativa* L.) most economically important weed in rice production
(Andrade et al., 2016)
- Can reduce yields from 5-75% (Sun et al., 2013)
- Herbicide-resistant weeds are a major concern
 - Gene flow
 - Independent selection

Clearfield technology

- Clearfield (CL) rice released in 2002
- Group 2: acetolactate synthase (ALS) inhibitor
 - Inhibit branched-chain amino acids isoleucine, leucine, and valine (WSSA).
- Efficacy
 - Control of grasses and broadleaf weeds
 - 53% reduction in red rice population after the first cycle
 - Up to 77% after third cycle (Burgos et al., 2008)
 - 36% of fields in Arkansas produce CL rice after 5 years of availability (Burgos et al., 2008).

Decreasing Efficacy of CL

- Improper stewardship
 - Timing
 - Wrong application rate
 - Continuous cultivation of CL
- Gene flow rate 0.003%-0.008% can result in 170 resistant plants/ha (Shivrain et al., 2005)
- ALS resistant weedy rice prevalent in all major rice production systems around the world

New Resistant Varieties Needed

- EPAGRI and BASF developed rice lines tolerant to acetyl-CoA carboxylase (ACCase) herbicides (Andrade et al., 2016).
 - Provisia: similar stewardship practices as CL
- ACCase Inhibitors
 - Inhibit acetyl-CoA carboxylase fatty acid production required for cell growth and development
 - Successful control of grasses

Objective

- The objective of the experiment was to evaluate weedy rice (*Oryza sativa* L.) populations from southern Brazil, Santa Catarina and Rio Grande do Sul, for susceptibility to ACCase herbicides and primarily to quizalofop.

Hypothesis and Experimental Design

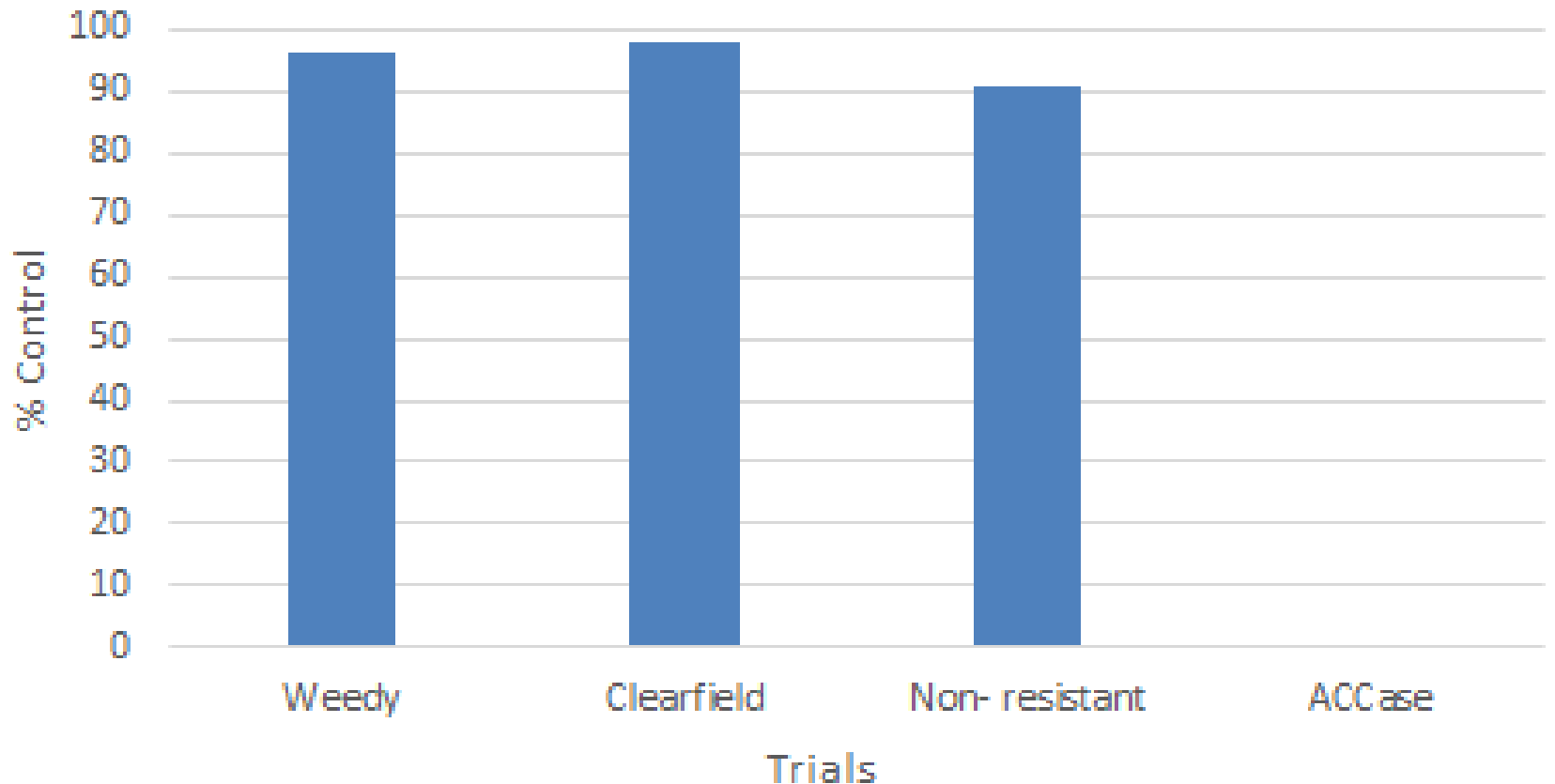
- There is differential tolerance among weedy rice populations in Brazil to quizalofop.
- Split block design
 - Main factor: Quizalofop rate
 - Subfactor: rice variety and weedy rice lines arranged randomly within each herbicide rate

Materials and Methods

- 44 Weedy rice accessions
 - 2 Non-resistant cultivated rice varieties
 - 2 Clearfield varieties
 - 2 ACCase cultivars
- 3 rates of quizalofop with 4 replications
- 0 g a.i./ ha
 - 25 g a.i./ ha
 - 50 g a.i./ ha
 - Spray at growth stage V_2-V_3
 - 2 evaluations: 11 and 22 days after application

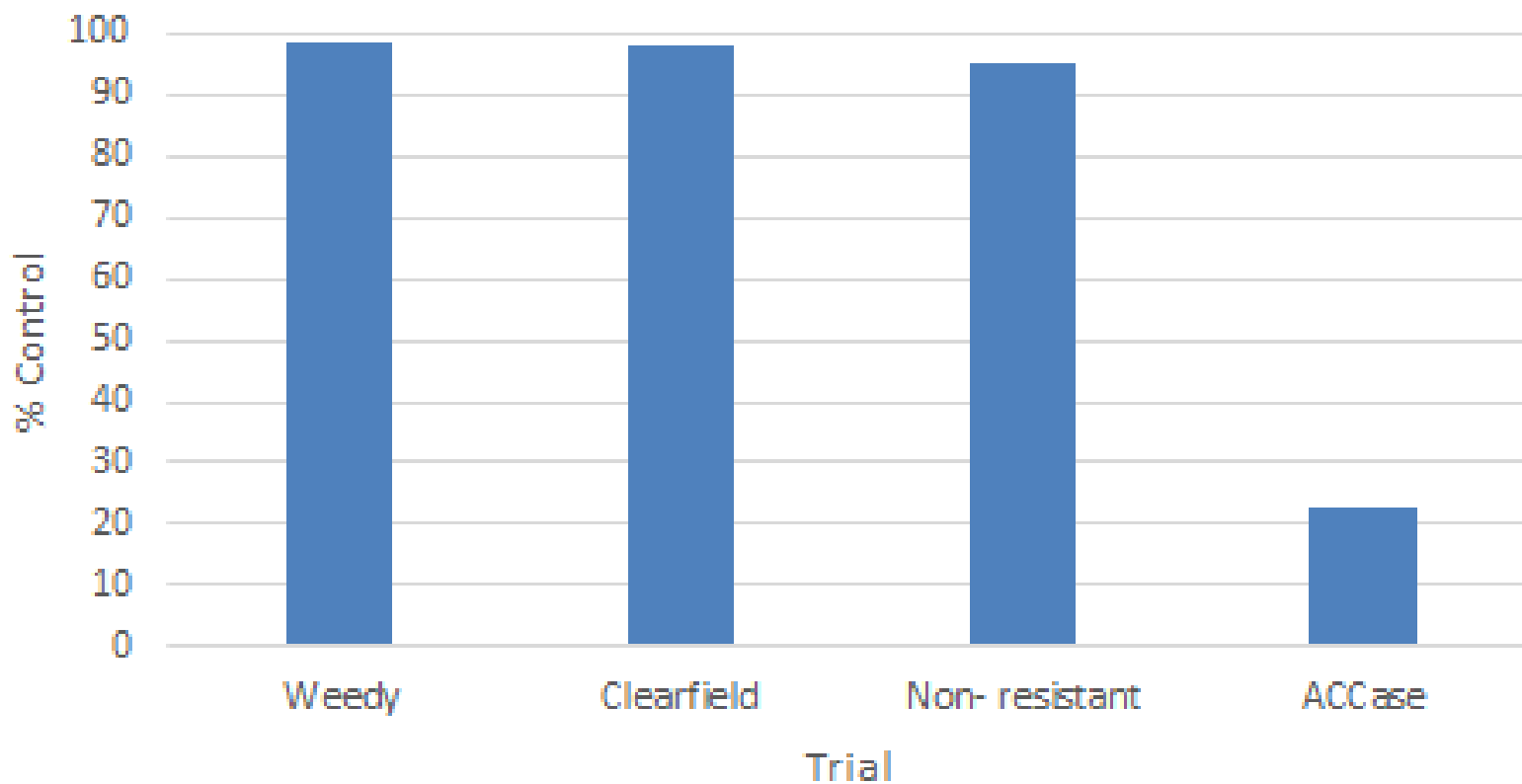
% control 11 Days After Application (DAA)

25 g a.i./ha DAA 11



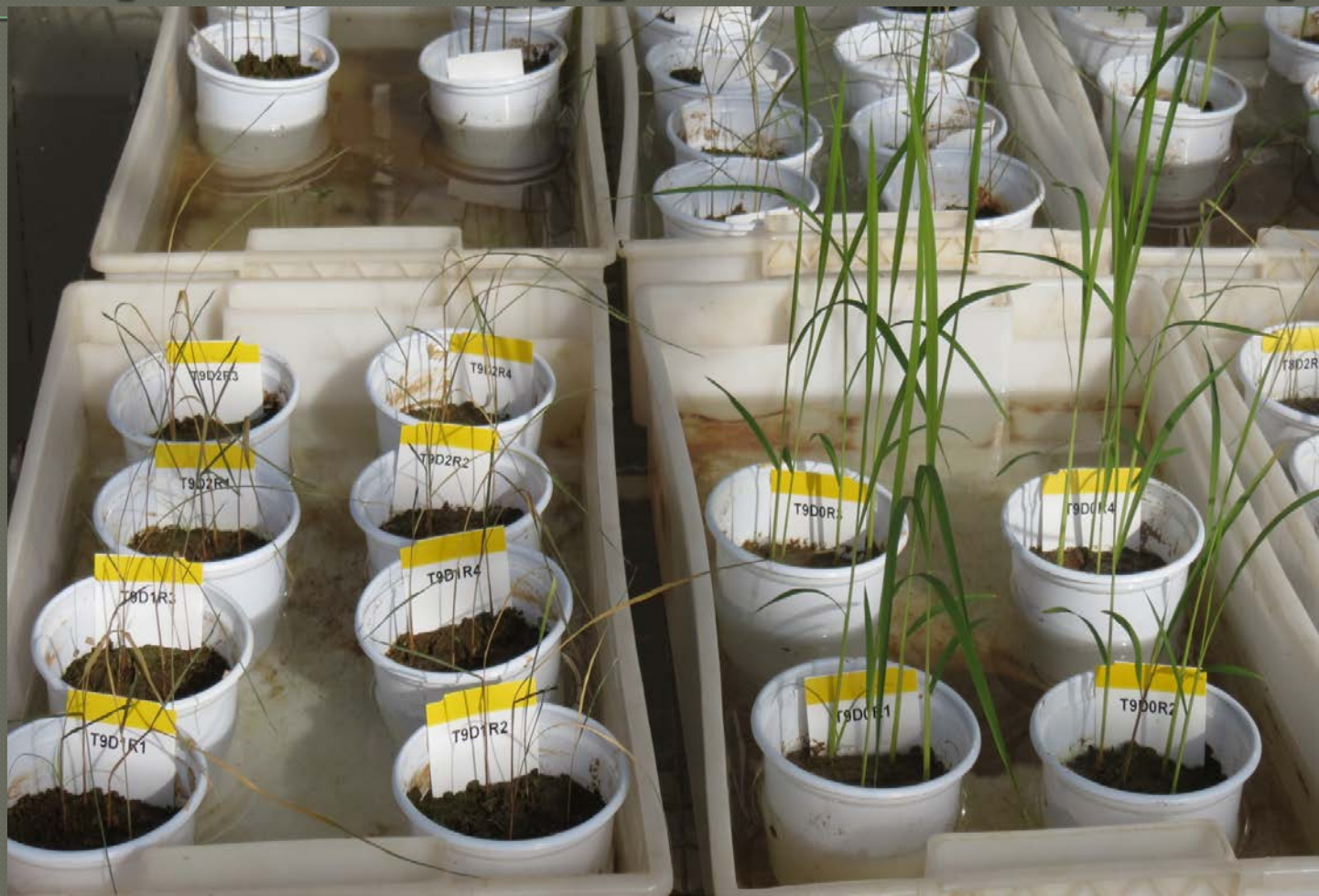
% control 11 Days After Application

50 g a.i./ha DAA 11



11 Days After Application: Weedy

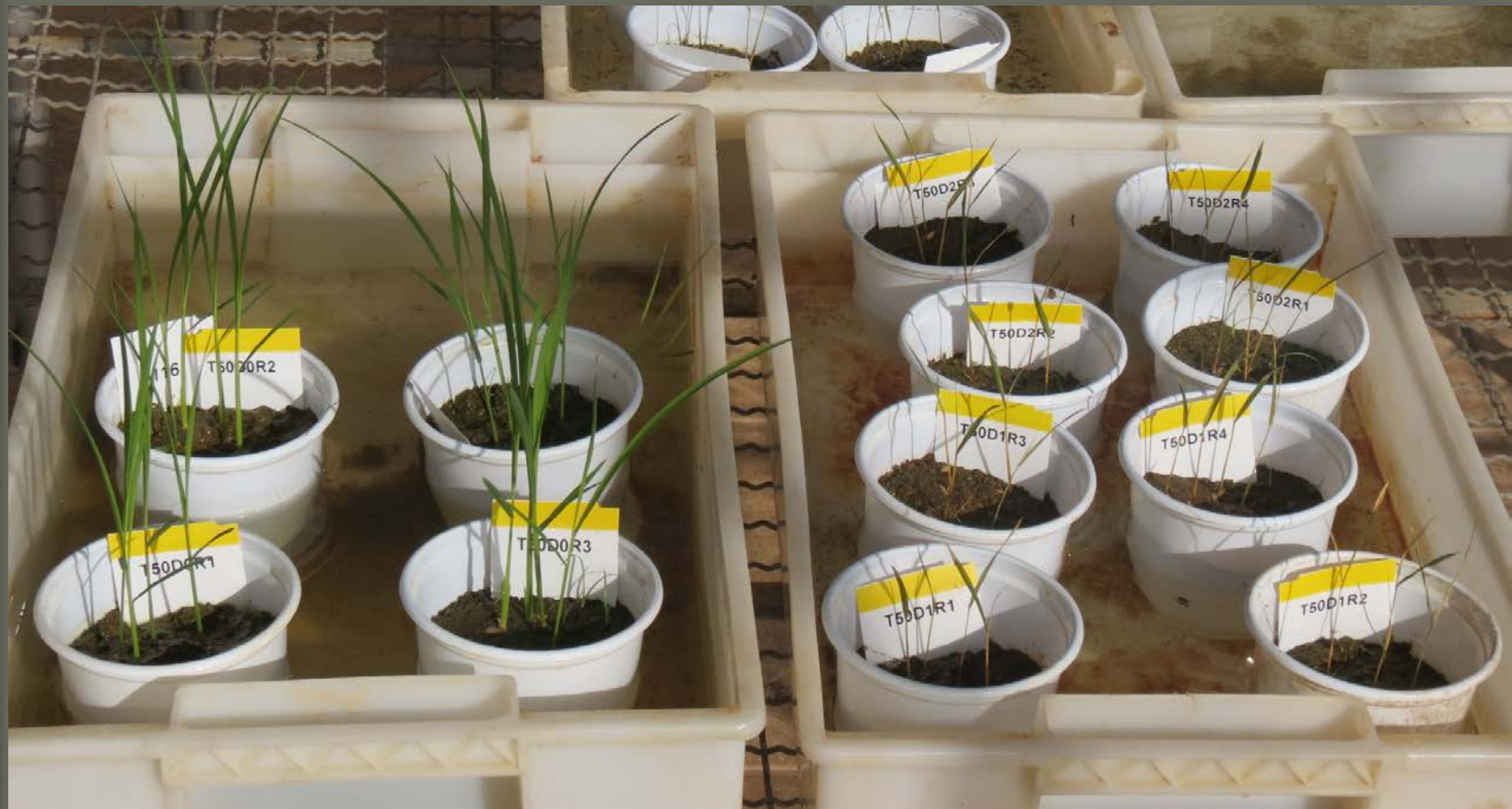
50 g a.i./ ha



25 g a.i./ ha

0 g a.i./ ha

11 Days After Application: Non-resistant variety



50 g
a.i./ ha

25 g a.i./
ha

0 g a.i./ ha

11 Days After Application: Clearfield Variety

50 g a.i./ ha



0 g a.i./ ha

25 g a.i./ ha

11 Days After Application: ACCase SC1527

•50 g a.i./ ha



25 g a.i./ ha

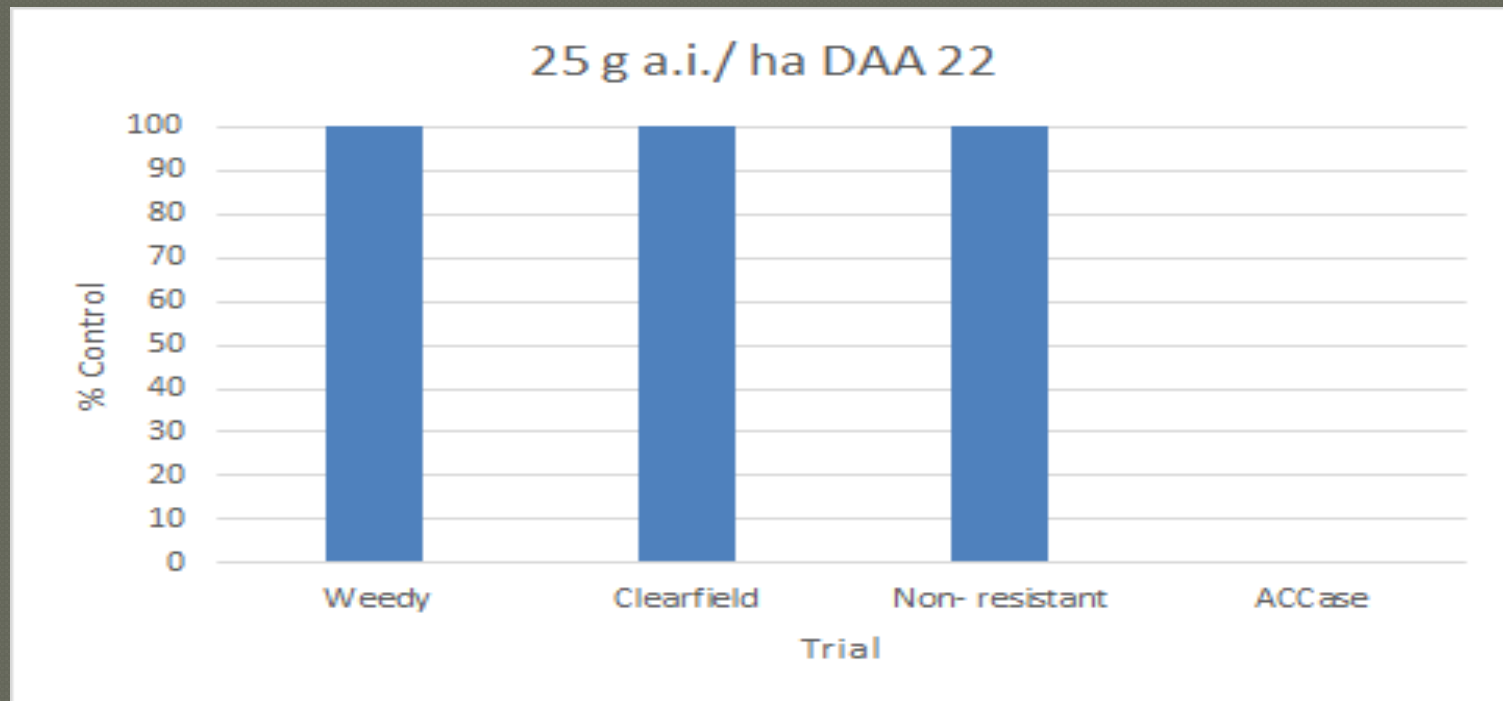
11 Days After Application: ACCase SC 1591



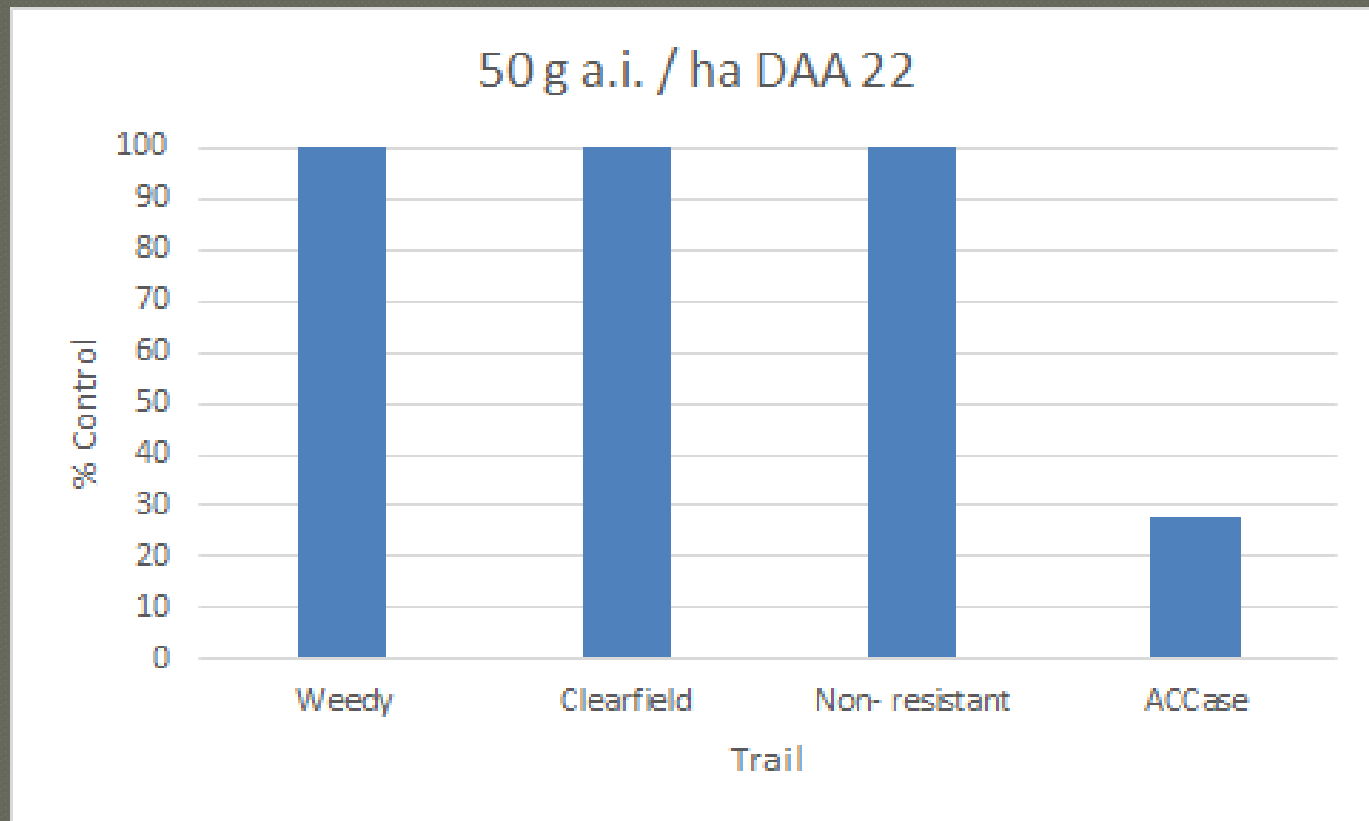
•50 g a.i./ ha

% Control 22 Days After Application

- All weedy rice and commonly planted rice varieties were controlled 100% by quizalofop



% Control 22 Days After Application



% Control 22 Days After Application

0 g a.i./ ha

25 g a.i./ ha

50 g a.i./ ha

- ACCase
- Clearfield
- Non-resistant
- Weedy



Conclusion

- Weedy rice did not show differential tolerance to ACCase herbicides
- Lines 1591 and 1527 showed resistance to the lower dosage and tolerance to the higher dosage of ACCase
- More field trial and breeding needed before an ACCase variety is available for producers

Acknowledgments

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References

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