Mapping QTL for Freeze Tolerance in Zoysiagrass

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Zoysia grass

- Desirable characteristics:
  - Texture, growth habit, inputs, general tolerance
- Most freeze-tolerant warm season grass
- Room for improvement
  - Compete with cool-season grasses
  - 1950’s cultivar: Meyer
- Winter survival QTL from field tests
- Goal:
  - Identify genomic regions controlling freeze tolerance through controlled freezing tests
  - Marker-assisted selection
  - Larger pool of freeze tolerant cultivars

(Holloway et al. 2018)
Testing for Freeze Tolerance

- Controlled freezing experiment
  - Cold acclimation = critical in development of freeze tolerance
- Protocol from Patton et al. 2007
- Monitored surviving green tissue (SGT) and regrowth (RG)

![Images of plants and bar graphs showing SGT and RG at different temperatures]
Quantitative Trait Loci Identification

- Freeze data evaluated along high density linkage map
  - Constructed based on field data
  - Putative regions of interest
- Screen for cofactors and establish LOD threshold
  - MQM mapping → narrow down regions of interest
- Co-localization of winter survival QTL (Holloway et al. 2018) vs acclimation and freeze-tolerance QTL

Holloway et al. 2018
QTL Mapping Results

QTL for Winter Survival

Holloway et al. 2018

QTL for Cold Acclimation and Freeze Tolerance

SGTNA-8  SGT-8  SGTgeno  SGTC-8  RG-8  RGNA
Conclusions and Next Steps

- Overlap with previously identified QTL

Next steps:
- Assess similarities
  - Transcriptomic and proteomic data
  - Genes/proteins at major effect regions

Ultimate Goal:
- Marker assisted selection to develop more freeze tolerant cultivars