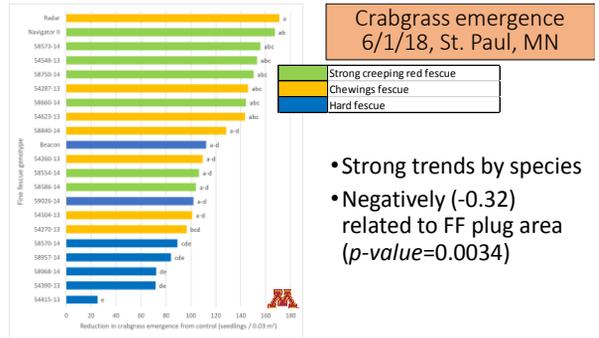


# Identifying and confirming natural weed suppression in fine fescues



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- Strong trends by species
- Negatively (-0.32) related to FF plug area ( $p$ -value=0.0034)

## Background on allelopathy in fine fescues

- Fine fescues have been reported to exhibit natural weed suppression (Bertin et al., 2009; Trappe et al., 2017)
- *L-m-Tyrosine* suspected to contribute to weed suppression (Bertin et al., 2007; Petrella et al., 2018)
- Allelopathy is the injurious effect of one plant on another via the release of chemical compounds into the environment
- Allelopathy has potential in turfgrass breeding for selecting cultivars that require fewer pesticides



Strong creeping red fescues



Chewings fescues

## Field screening experiments – 2018 Results



## Biointerference experiment

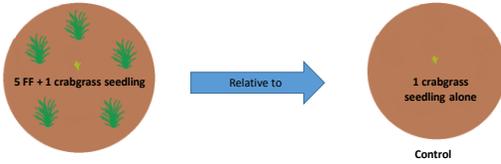
### Objectives:

- Validate our observations of crabgrass suppression in the field
- Examine competitiveness of both crabgrass and select fine fescue accessions in controlled environment

### 6 fine fescue accessions

- Chewings fescue
  - 58440 (high suppression)
  - 54260 and 54270 (low suppression)
  - 'Radar' (high suppression)
  - 'Intrigue' (med suppression)
- strong creeping red fescue
  - 58660 (high suppression)

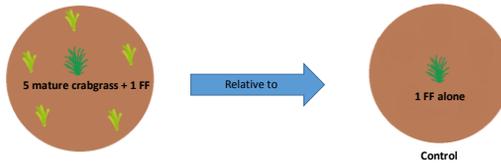
Biointerference experiment



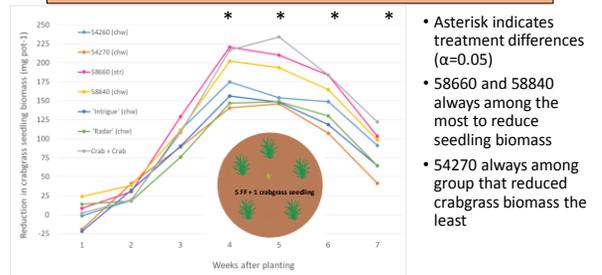
Biointerference experiment

- 11 week experiment
- Response variables (weekly):
  - Biomass reduction compared to control
  - Plant height reduction compared to control
  - Tiller number reduction compared to control
  - Crabgrass seed yield components
  - Chlorophyll content
- RCBD with 5 blocks
- All plants received equal amounts of N and water
- 2 experimental replications completed

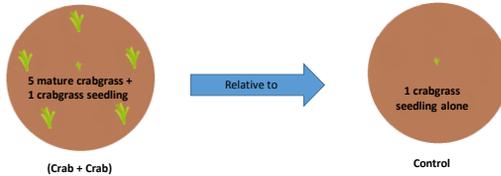
Biointerference experiment



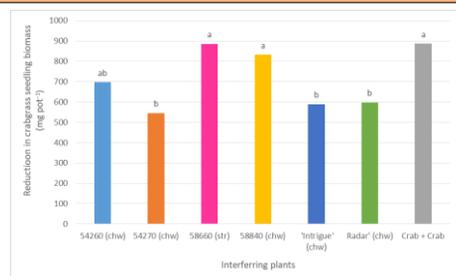
Reduction in seedling crabgrass biomass



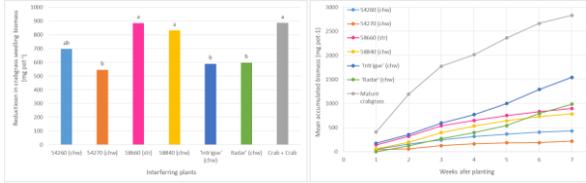
Biointerference experiment



Total reduction in seedling crabgrass biomass 7 WAP



Understanding crabgrass seedling suppression

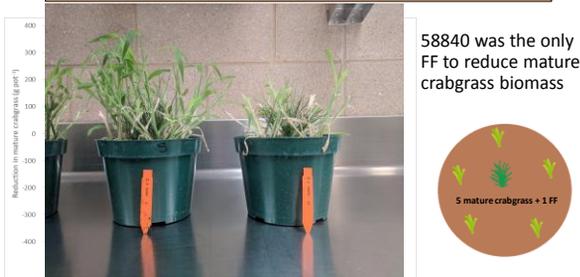


Biointerference experiment – Wrap-up

- Shoot growth alone does not fully explain differences in crabgrass seedling response
- Root biomass may be a better predictor of weed suppression
- *L-m-Tyrosine* is in much higher concentrations in the roots than shoots (Petrella et al., 2018)



Reduction in mature crabgrass plant biomass



Field and growth chamber experiment

- FF genotypes negatively affected crabgrass biomass differently
  - Overall reduction in crabgrass biomass in field and growth chamber
  - Reduced germination and emergence of crabgrass seedlings in field
- Many similarities in crabgrass suppression between field and growth chamber experiments
  - 58660 and 58840 - highly suppressive
  - 54260 and 54270 - somewhat suppressive

Biointerference experiment - Results

- Variation within and across FF species – their effect on crabgrass and vice versa
- 58660 and 58840 are the two FF accessions consistently negatively affecting crabgrass seedlings
  - How they affect and are affected by crabgrass seems to differ
- Total number of crabgrass leaves, tillers, and seedheads affected by FF accession
- Chlorophyll content was not affected by FF treatment



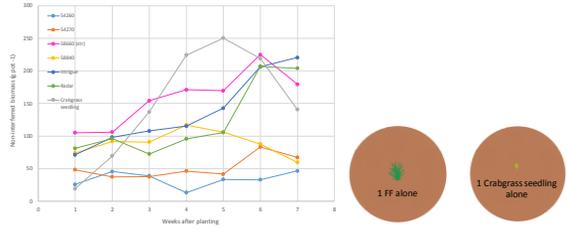
Future work on allelopathy/weed suppression

- More work needs to be done to separate competition for resources from allelopathy
- Improve screening techniques to speed selection of potential allelopathic genotypes
- Next steps?
  - Hydroponics experiment to reduce competition as a factor
  - Confirm its *L-m-Tyrosine* affecting crabgrass plants via FF root exudates
  - Screen weed suppressive fine fescue accessions against multiple weed species

More work on Allelopathy to see in Baltimore

- 308-4, Influence of nitrogen and phosphorus concentrations on the allelopathic effects of *Festuca rubra* ssp. *Communitata*. Wed. 2:20 pm, BCC 325.

Non-interfered biomass of individual plants over time



Acknowledgements

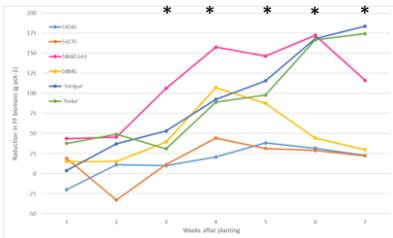
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Reduction in FF plant biomass from 5 mature crabgrass plants



- 58660 was consistently among FFs that had reduced biomass, despite also negatively affecting seedling crabgrass growth in other pots

