



<https://www.environmentalscience.bayer.ca/golf-course/whattocontrol/dollar-spot>

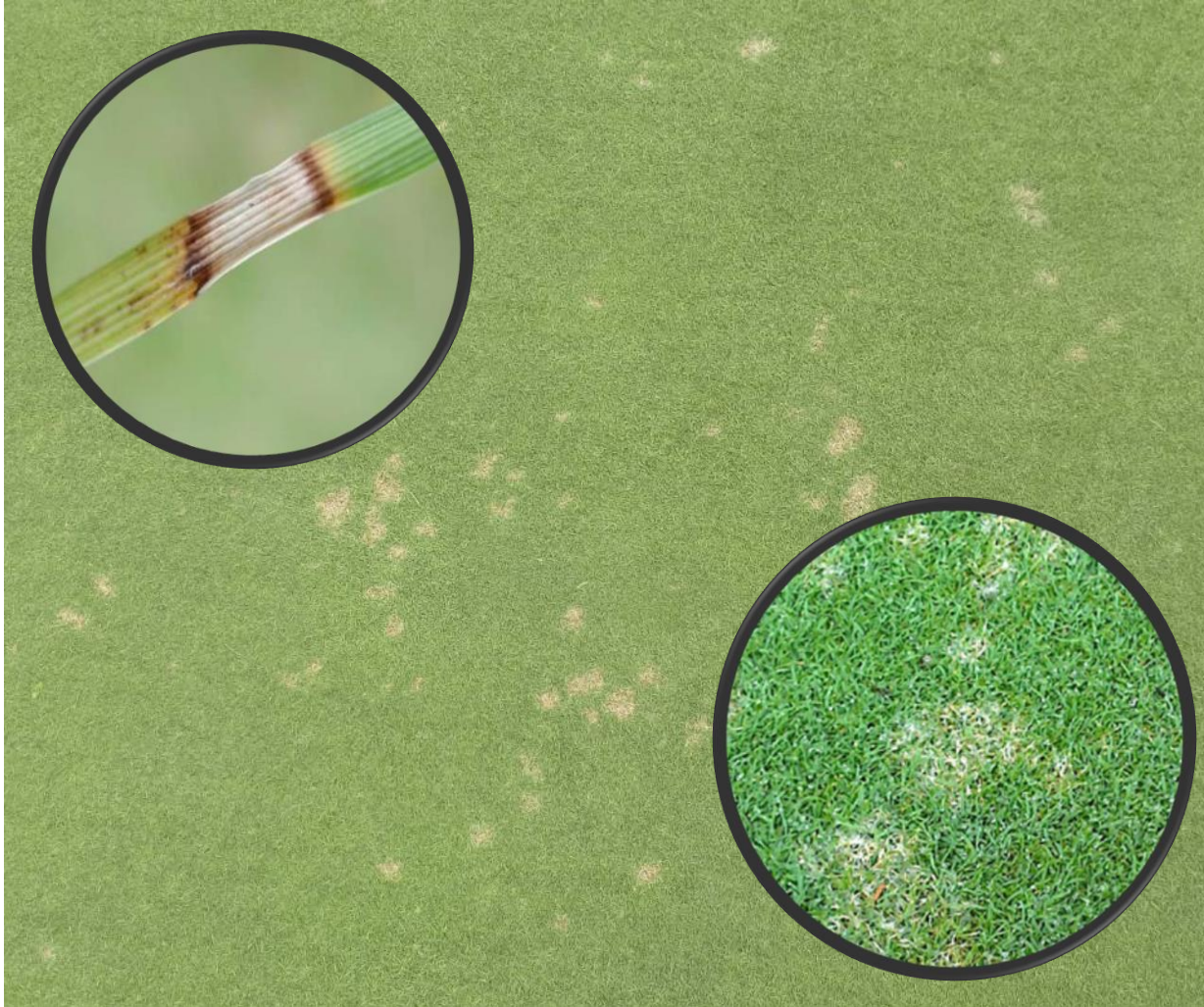
Development of a field kit to detect DMI resistant isolates of *Clariireedia jacksonii*, the cause of dollar spot disease

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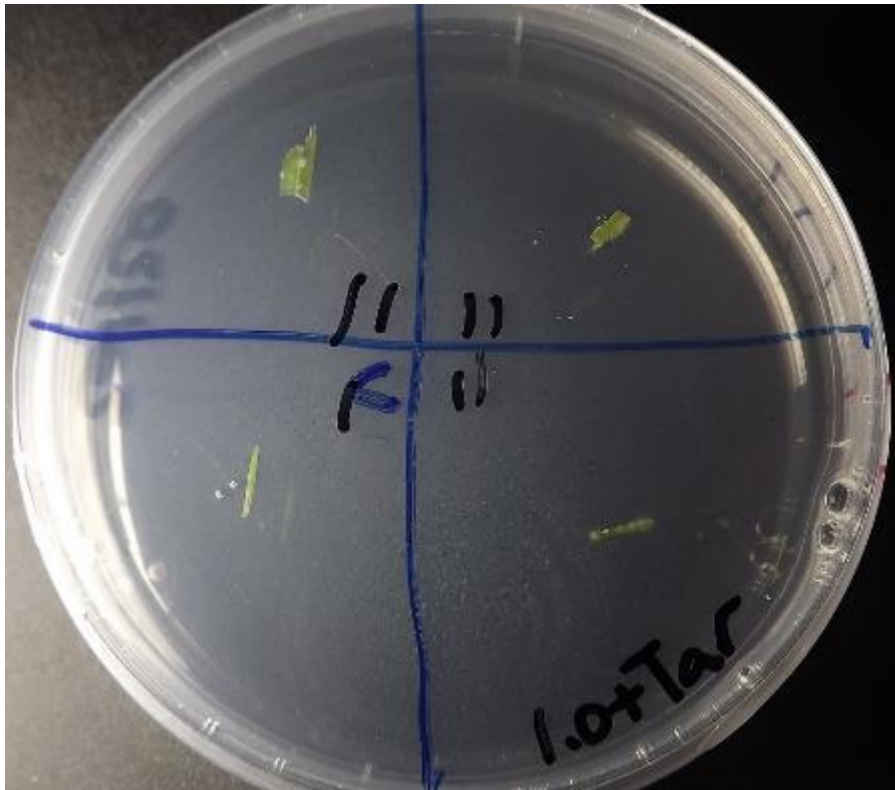
Dollar Spot and Fungicide Resistance



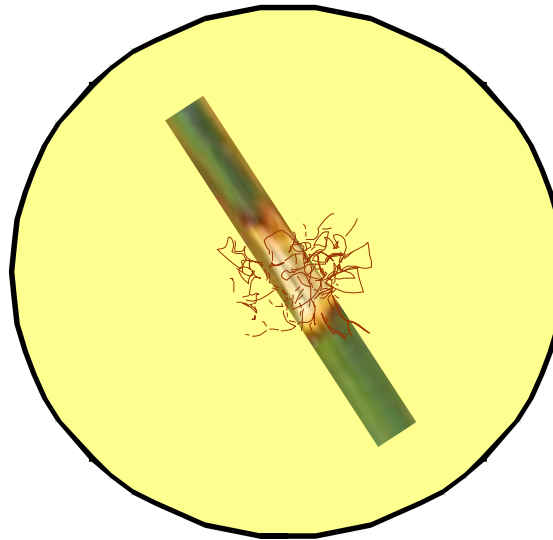
- Repeated fungicide applications select for resistant isolates
 - Benzimidazoles 1970s +
 - Dicarboximides 1980s +
 - DMIs 2000s +
 - SDHIs 2010s +

Introduction: Primary Objective

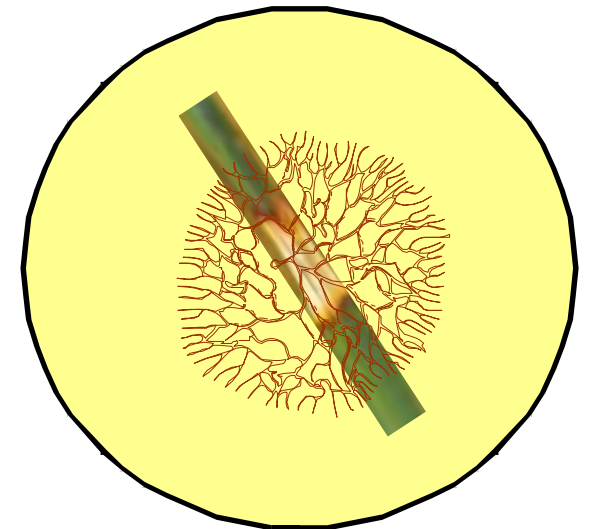
- Develop a selective medium to differentiate between DMI-sensitive and DMI-resistant isolates of *C. jacksonii* from field samples.



Sensitive



Resistant



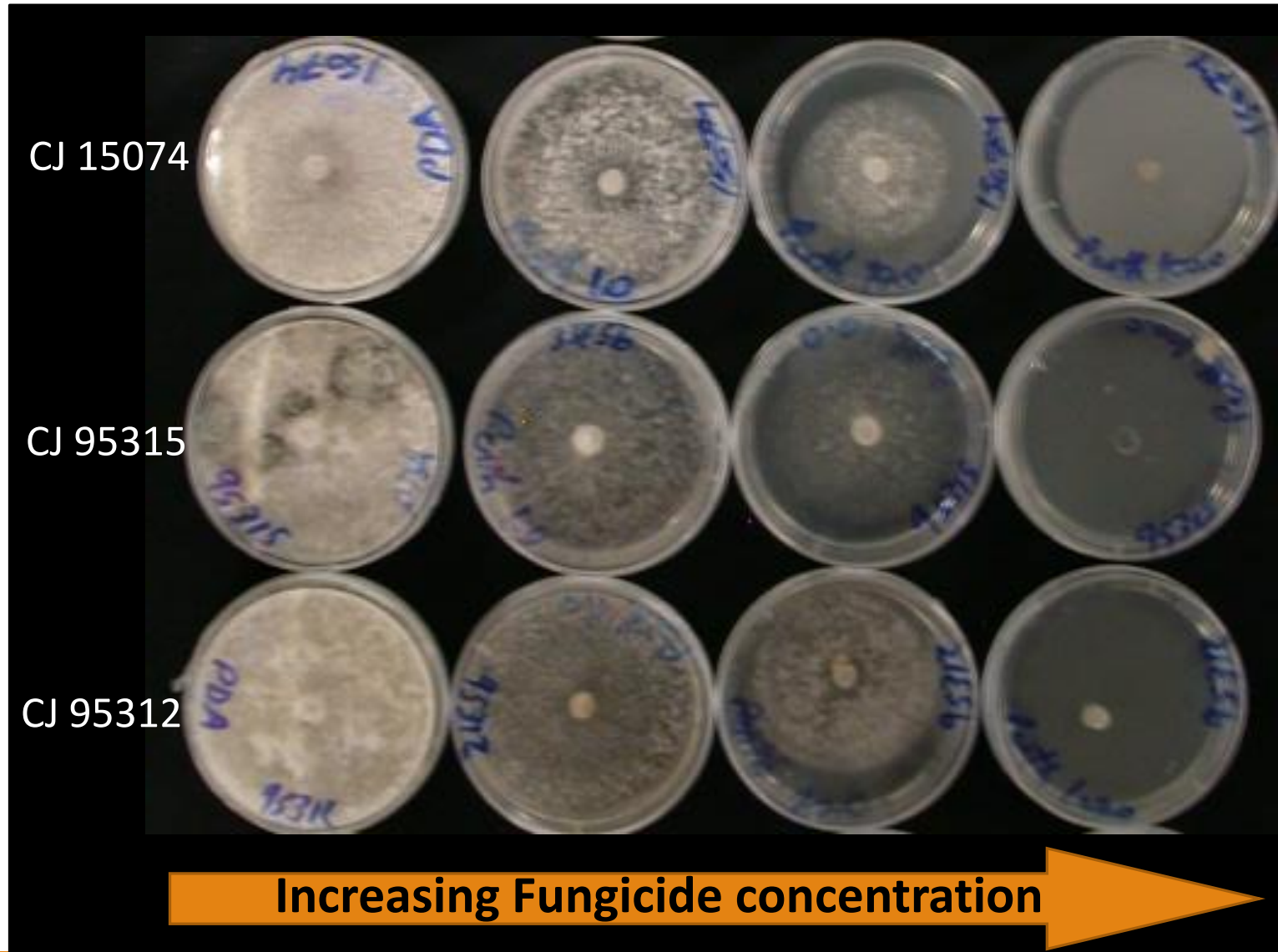
After a few days at 22 °C

Introduction: Objectives

1. Obtain isolates of *C. jacksonii* with varying sensitivity to propiconazole
2. Develop a preliminary discriminatory medium to differentiate between sensitive and resistant isolates.
3. Test discriminatory medium with field samples.
4. Provide field kits for turfgrass managers to test onsite.

1. Obtain isolates of *C. jacksonii* and assess sensitivity to propiconazole

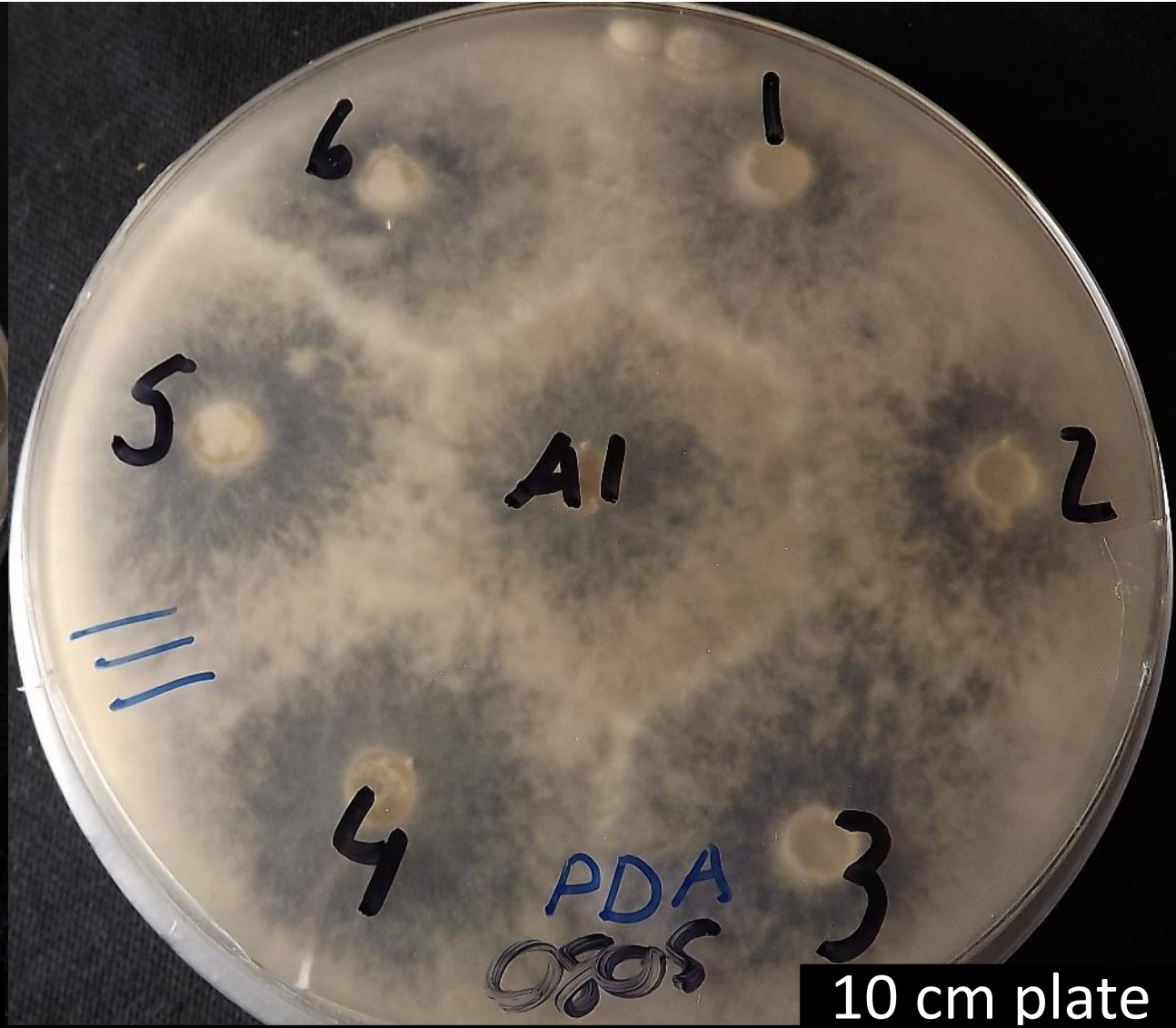
- 25 Isolates revived
 - 13 Sensitive
 - 12 Resistant
- Most showed the same level of sensitivity as previously determined^{1, 2}



3. Van Den Nieuwelaar AM, and Hsiang T (2015) Changes in sensitivity of the dollar spot fungus, *Sclerotinia homoeocarpa*, to the demethylation inhibitor fungicide propiconazole 20 years after first use. *European Journal of Turfgrass Science* 45(2):43-44.

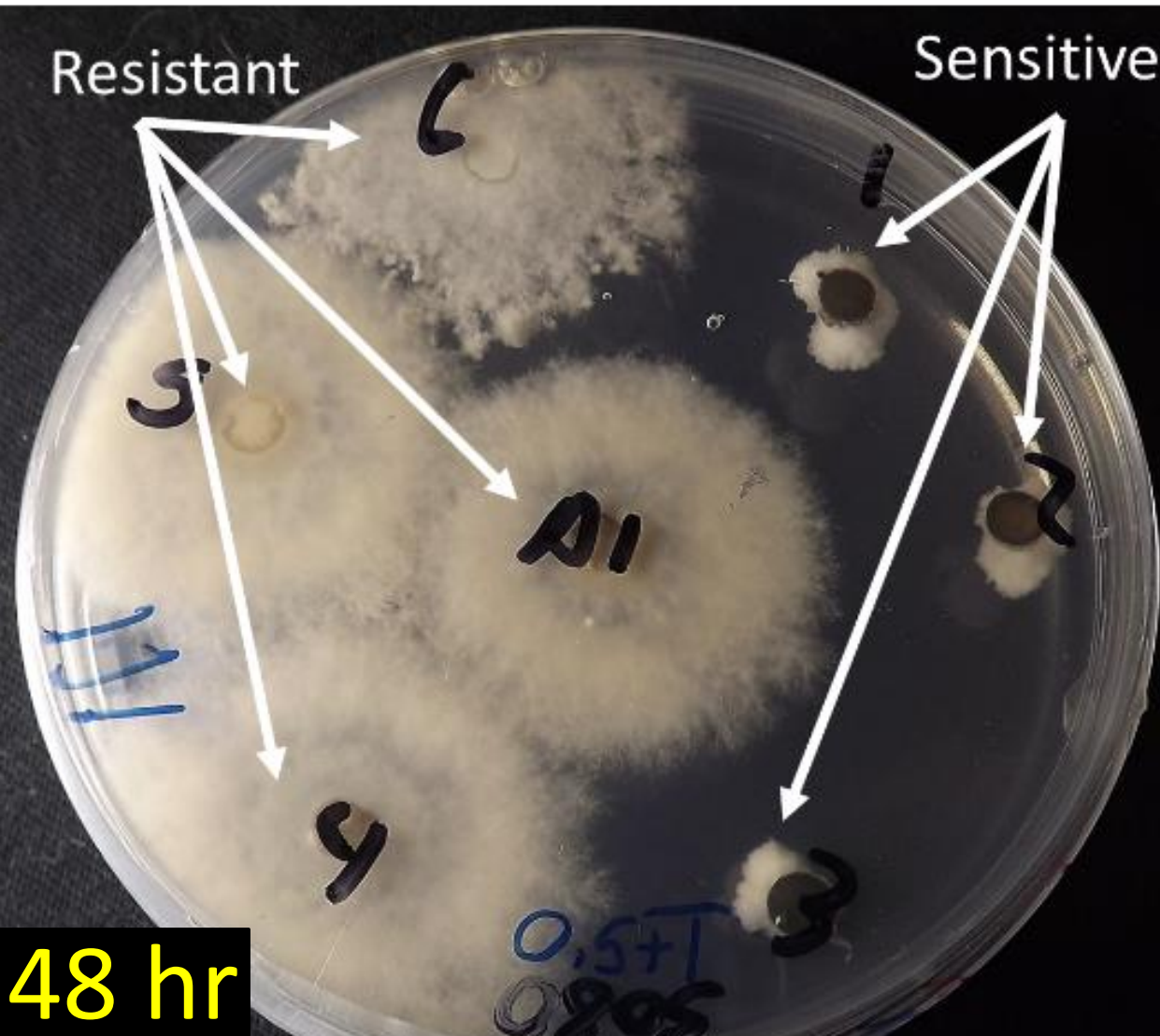
4. Hsiang, T. Liao, A. Benedetto, D. (2007). Sensitivity of *Sclerotinia homoeocarpa* to demethylation-inhibiting fungicides in Ontario, Canada, after a decade of use. *Plant Pathology*. 56: 500-507.

C. Jacksonii Hyphae and Growth Rate

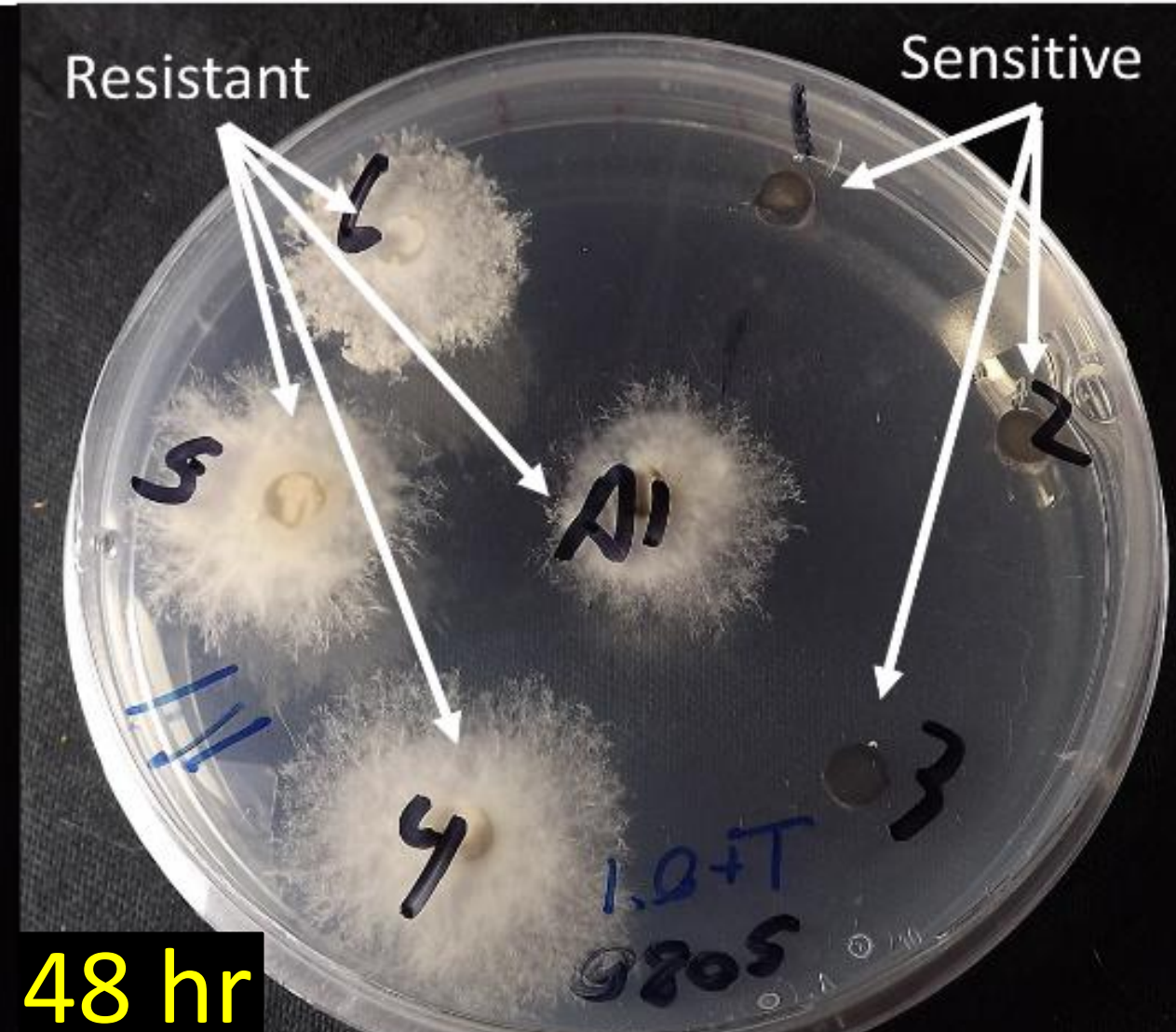


48 hr of incubation at 22 °C on PDA

2. Determine a discriminatory concentration of propiconazole



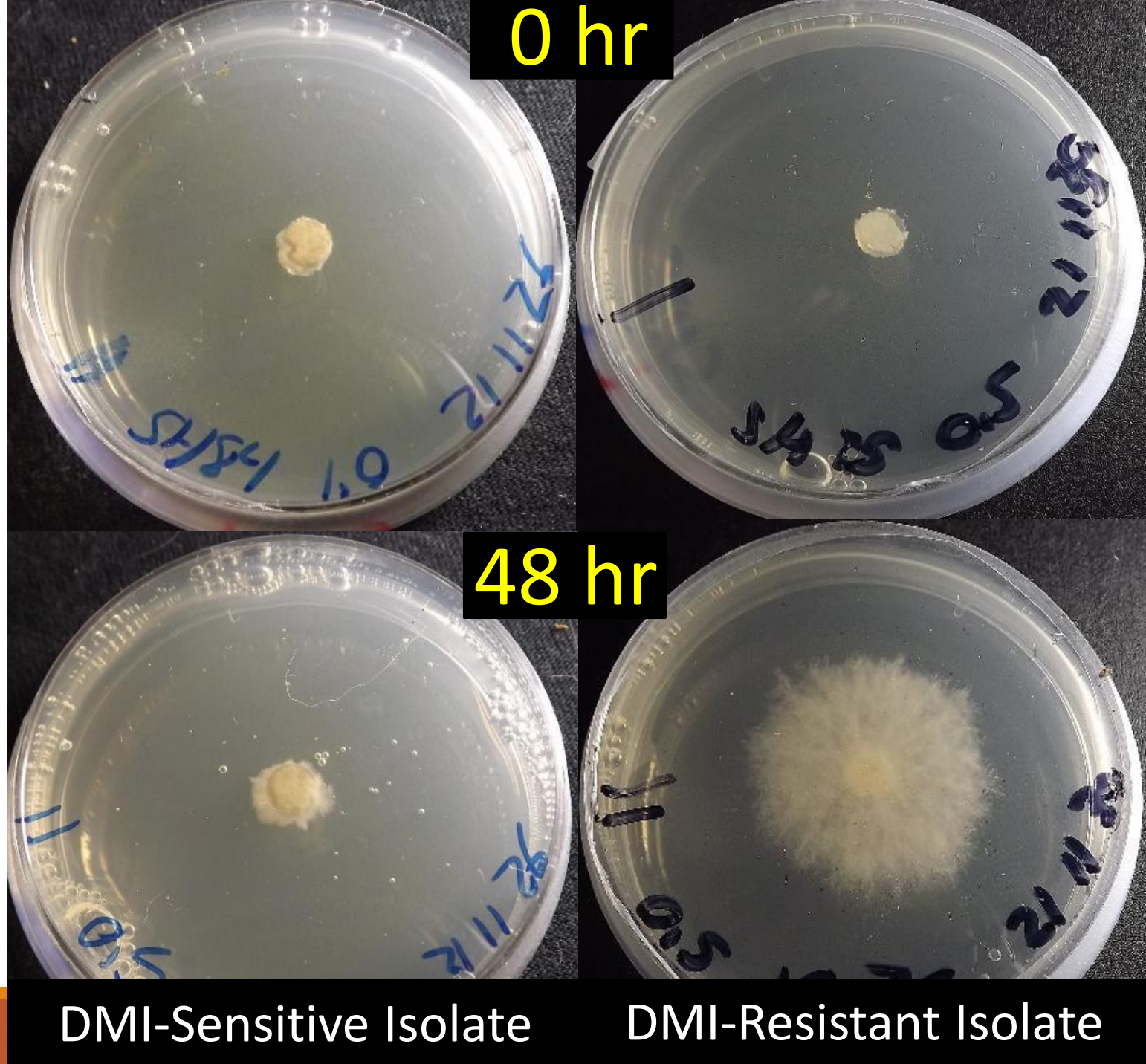
0.1 µg/ml propiconazole



1.0 µg/ml propiconazole

Preliminary Discriminatory Medium

- PDA amended with 1.0 $\mu\text{g/ml}$ propiconazole
- Incubated for 48 hr at room temperature



3. Inoculated managed grass with the discriminatory medium

- Managed grass at the GTI was inoculated with *C. jacksonii*
- Six isolates of *C. jacksonii* were used
 - Three sensitive and three resistant
 - Four replications per isolate



Guelph Turfgrass Institute



The following video was filmed by Sara Stricker



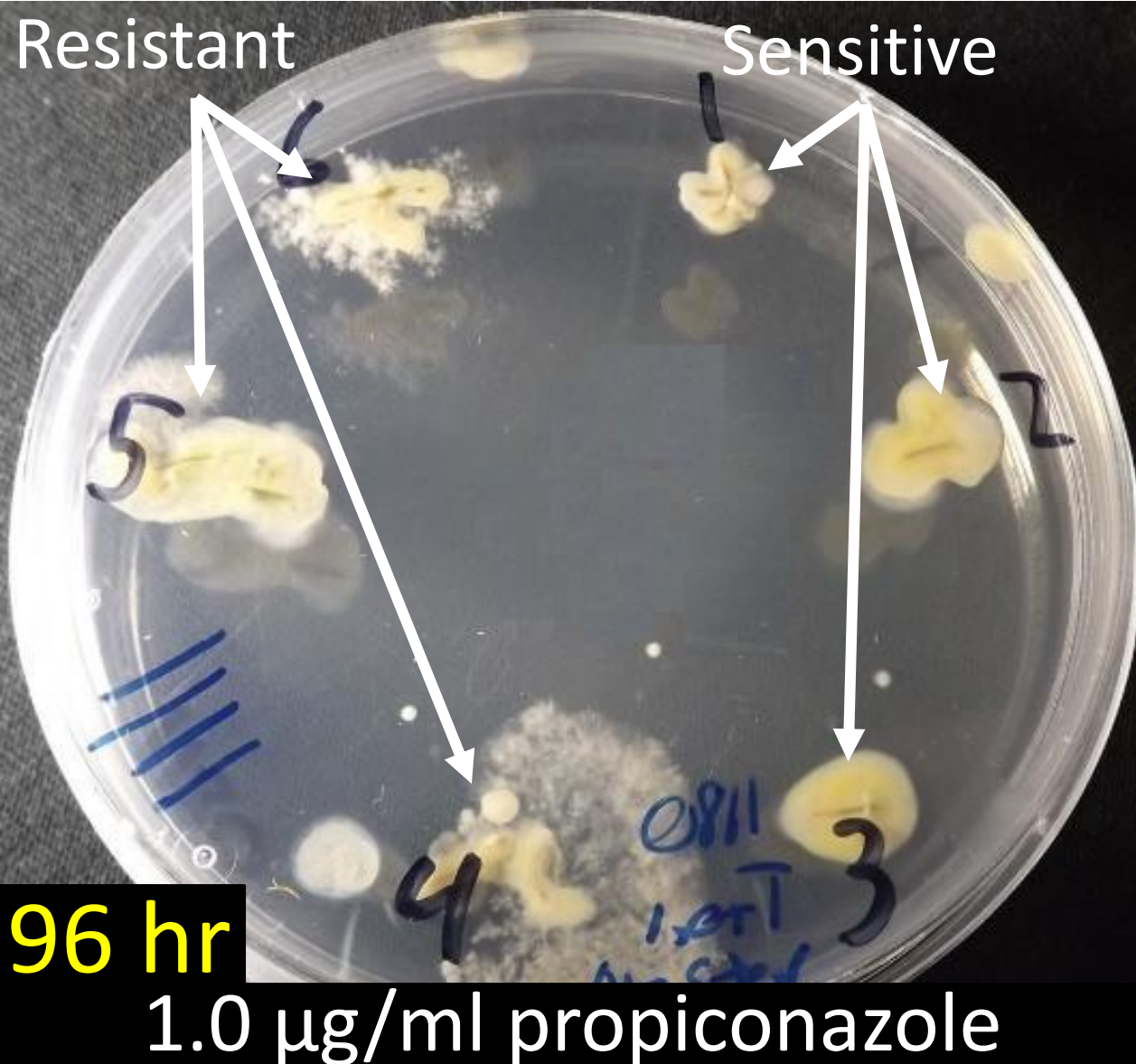
For reference, this is a 45 s time lapse of me setting up and inoculating a field plot

3. Assess inoculated leaves on the preliminary medium

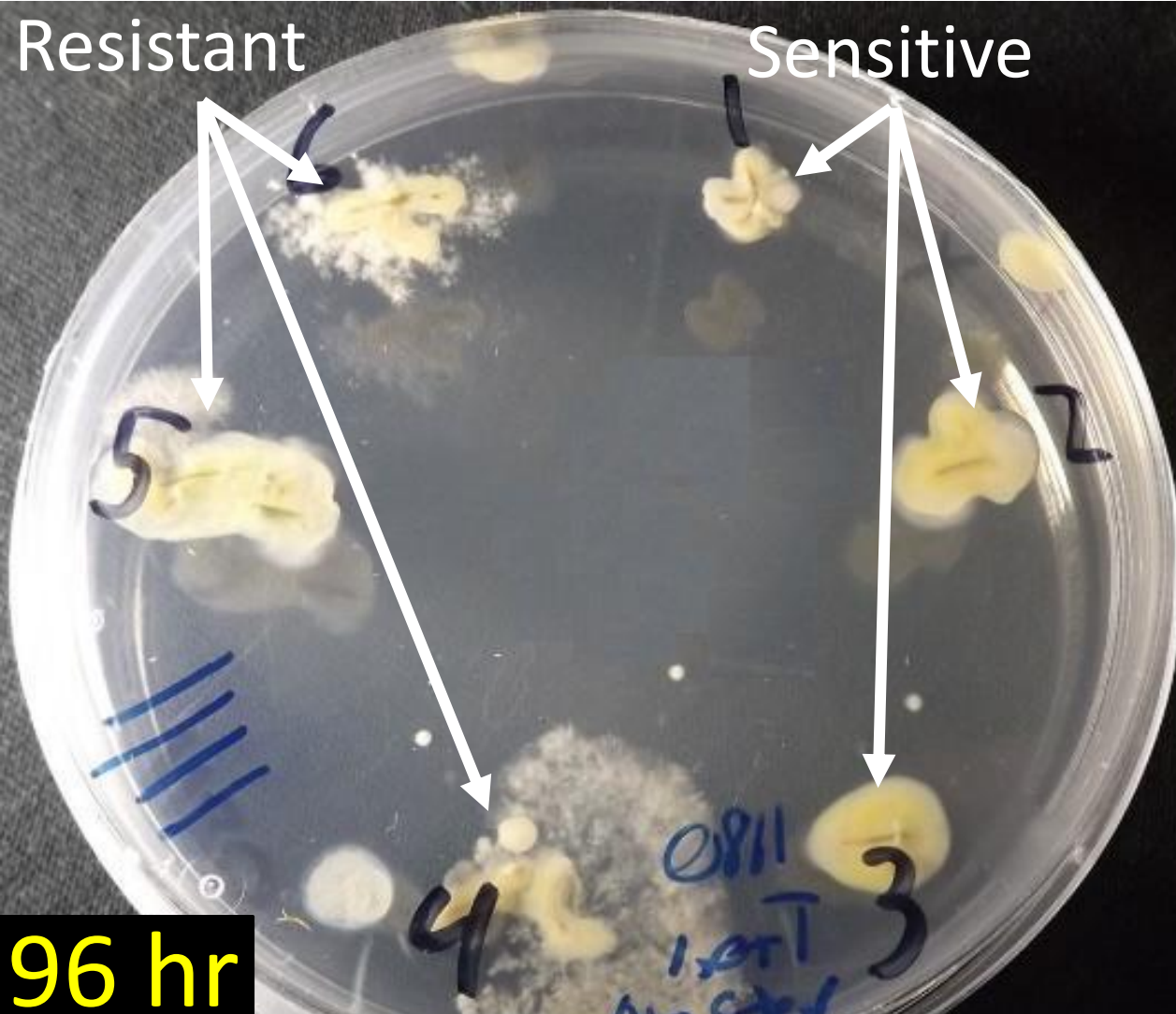
- Five field trials conducted in summer of 2021 and 2022
- 1254 symptomatic leaf blades assessed on the discriminatory medium



3. Assess inoculated leaves on the preliminary medium

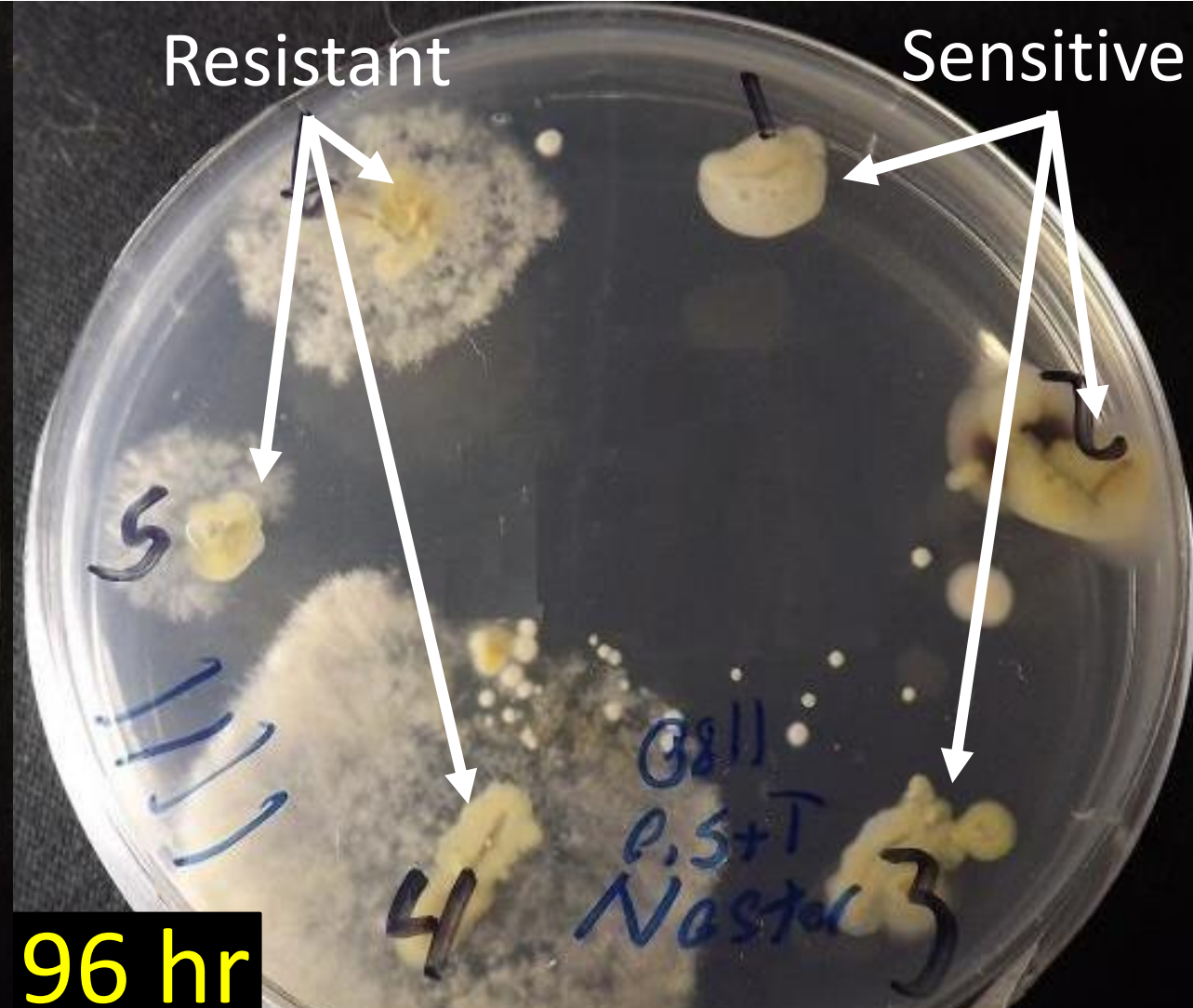


3. Assess inoculated leaves on the preliminary medium



96 hr

1.0 µg/ml propiconazole

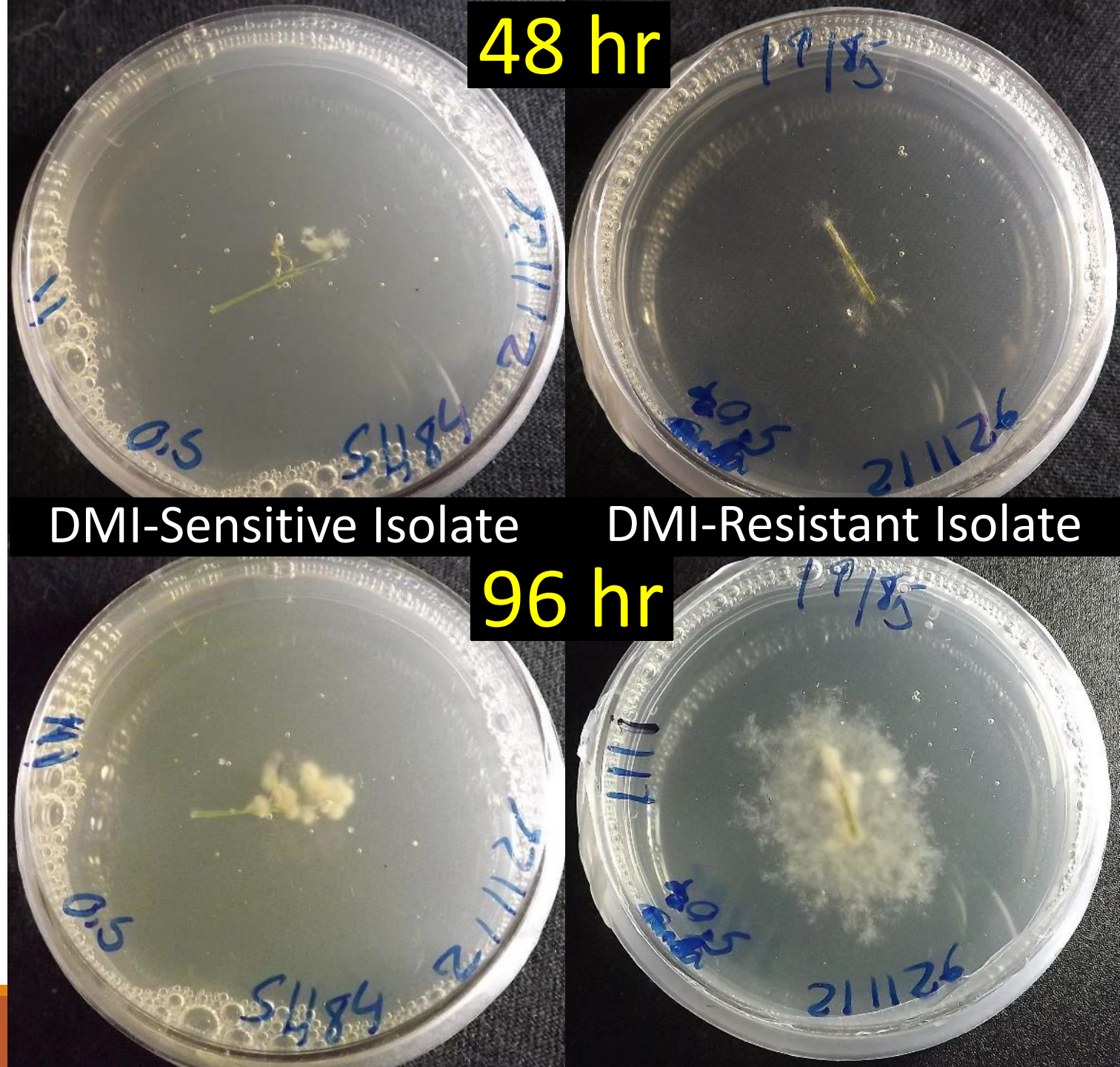


96 hr

0.5 µg/ml propiconazole

Final Discriminatory Medium

- PDA amended with:
 - Propiconazole (0.5 $\mu\text{g/ml}$)
 - Tetracycline (40 $\mu\text{g/ml}$)
 - Streptomycin (100 $\mu\text{g/ml}$)
 - Tartaric acid (0.1% v/v)
- Incubate for 4 days at room temperature

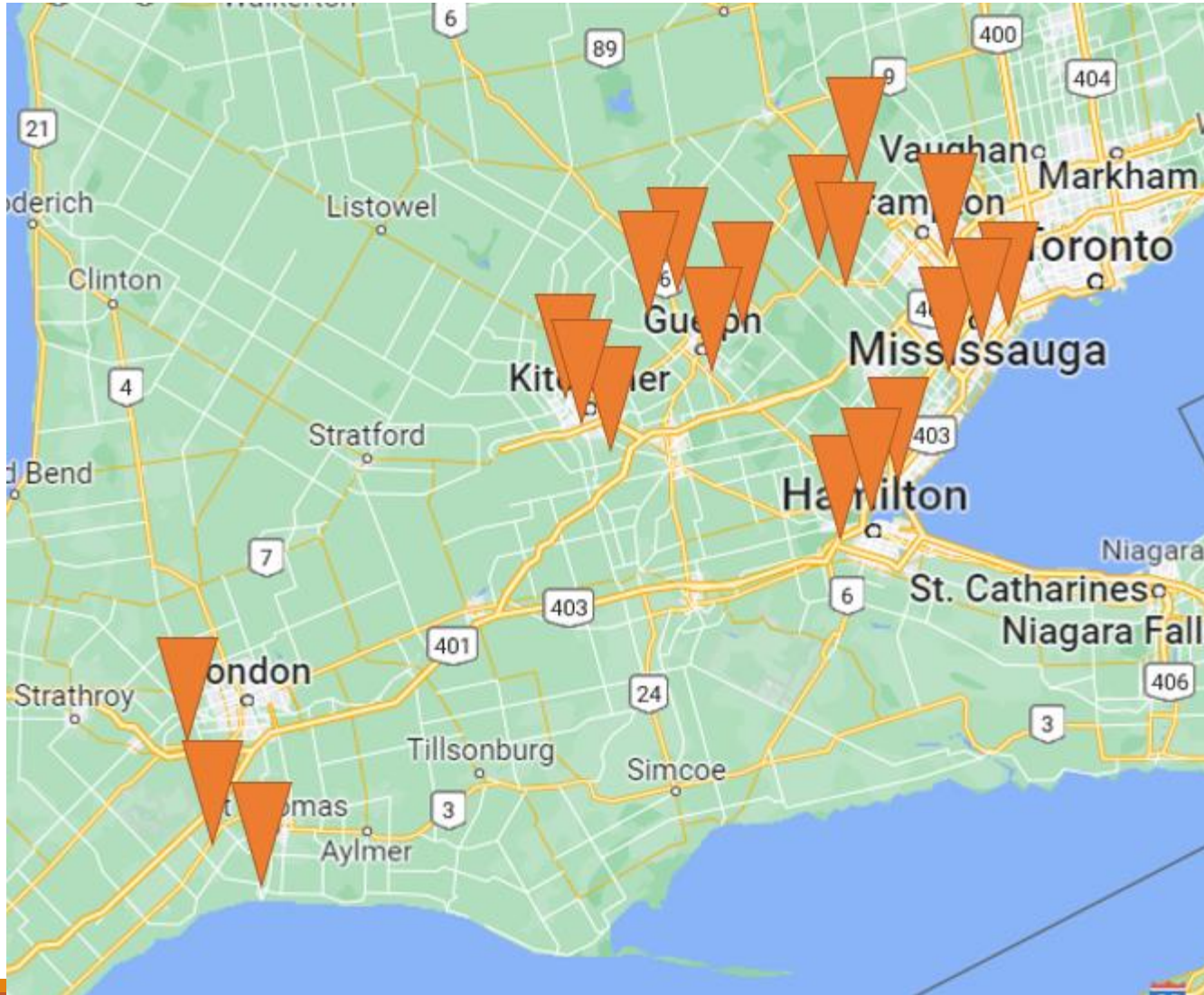


4. Field kit developed for turf managers

- Four plates of the discriminatory medium
- Instructions for use with pictures showing what target growth looks like



End User Testing Results from Summer 2022



- 20 Sites across southern Ontario
- Turfgrass managers collected and assessed symptomatic leaves and monitored the growth
- Duplicate samples collected and assessed in lab

Identification of DMI-resistant isolates was 93% successful



DMI-Sensitive sample



DMI-Resistant sample

0.5 $\mu\text{g/ml}$ propiconazole and antibiotics after 96 hr

Field kits contaminated in < 10% of cases



Mucor nidicola



Mucor hiemalis

Field kit contaminants after 96 hr



Gray Mold

<https://wattersgardencenter.com/insects-and-diseases-common-to-local-gardens/gray-mold-botrytis-on-strawberry/>



Head blight

<https://www.flickr.com/photos/cimmyt/5166538877>

Future Research

- Other fungal pathogens may be assessed with similar field kits
 - Easily identifiable
 - Rapidly growing
 - At risk of developing fungicide resistance

Thank You

This Research is supported by the following:



ONTARIO
AGRICULTURAL COLLEGE
SCHOOL OF ENVIRONMENTAL SCIENCES

