Alberta Turfgrass Research Foundation

OLDS COLLEGE OF AGRICULTURE & TECHNOLOGY

Research Update Feb. 2026

greenjacket

NTRF National Turfgrass RESEARCH FOUNDATION

BrettYoung™ TOGETHER WE TURF

IRIT Canada Inc.

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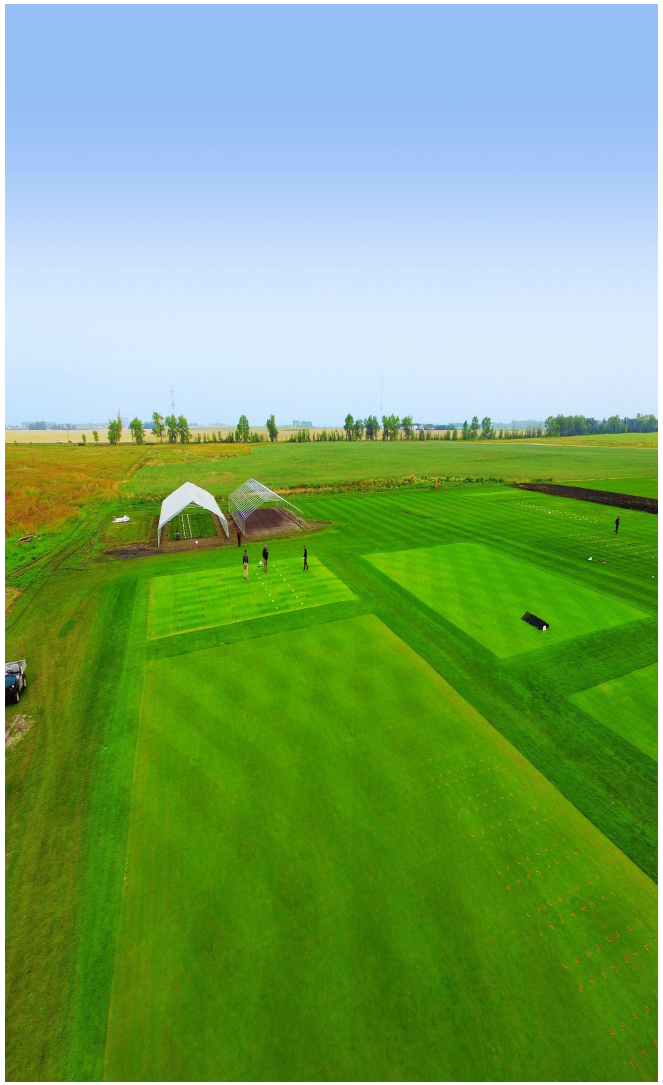
ATRF est. 1983

- 10 Per Board, non-profit
- Revenue by:
  - Club membership
  - Association Membership
  - Service contracts in applied research
- Open Source Research LINK:
  - Fertility
  - Disease
  - Soil Amendment
  - Physiology
  - Varietal Trials
- Dedicated over $8M into turfgrass research since 1983



PTRC
Prairie Turfgrass Research Centre

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- PTRC operates under direction of the ATRF
- Located at Olds College
  - 15,000ft² USGA T1 bent golf green
  - 5,000ft² USGA Poa reptans green
  - 40,000ft²@ 20mm HOC
    - Bentgrass
    - Bluegrass
  - 5ac K.Bluegrass @ 2”
- Conduct Approx $250K in research & service contracts annually

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Project Update @ 100 days

Survivability of poa annua subjected to forced hardening: 2025-2027

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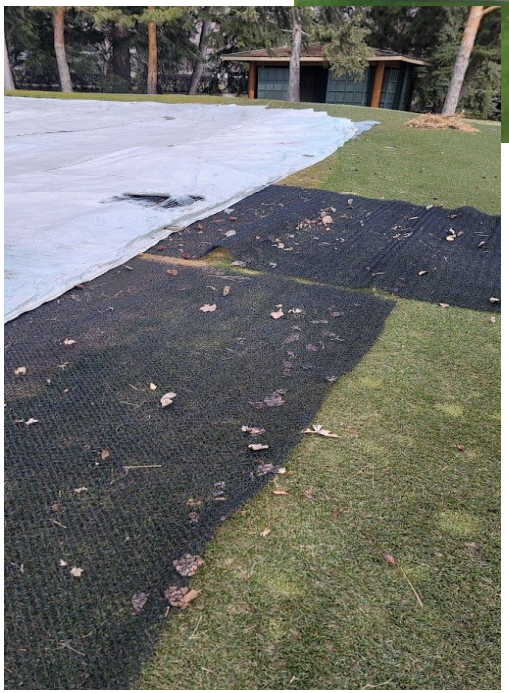
Project inception: Spring 2024

Spring 2024 - Quebec

Changing Canadian Weather Trends

- Warmer fall weather
- Drops from 22’C to -15’C in 7 days
- Variable winters & Chinooks
- Will poorly acclimated turf, resulted in turf loss when tarped
- With few options, research begins



Golf Green survivability: Fall Tarping works…sometimes?

Circumvents:

- Desiccation
- Ice damage
- Cold temp
- Disease
- ~~Fall Anoxia~~

Objective: Eliminate fall anoxia

- Determine feasible tarping options for unhardened turf conditions
- Determine preferred approaches for unpredictable winters
- Create a decision making matrix for action planning

Principle of Fall Anoxia

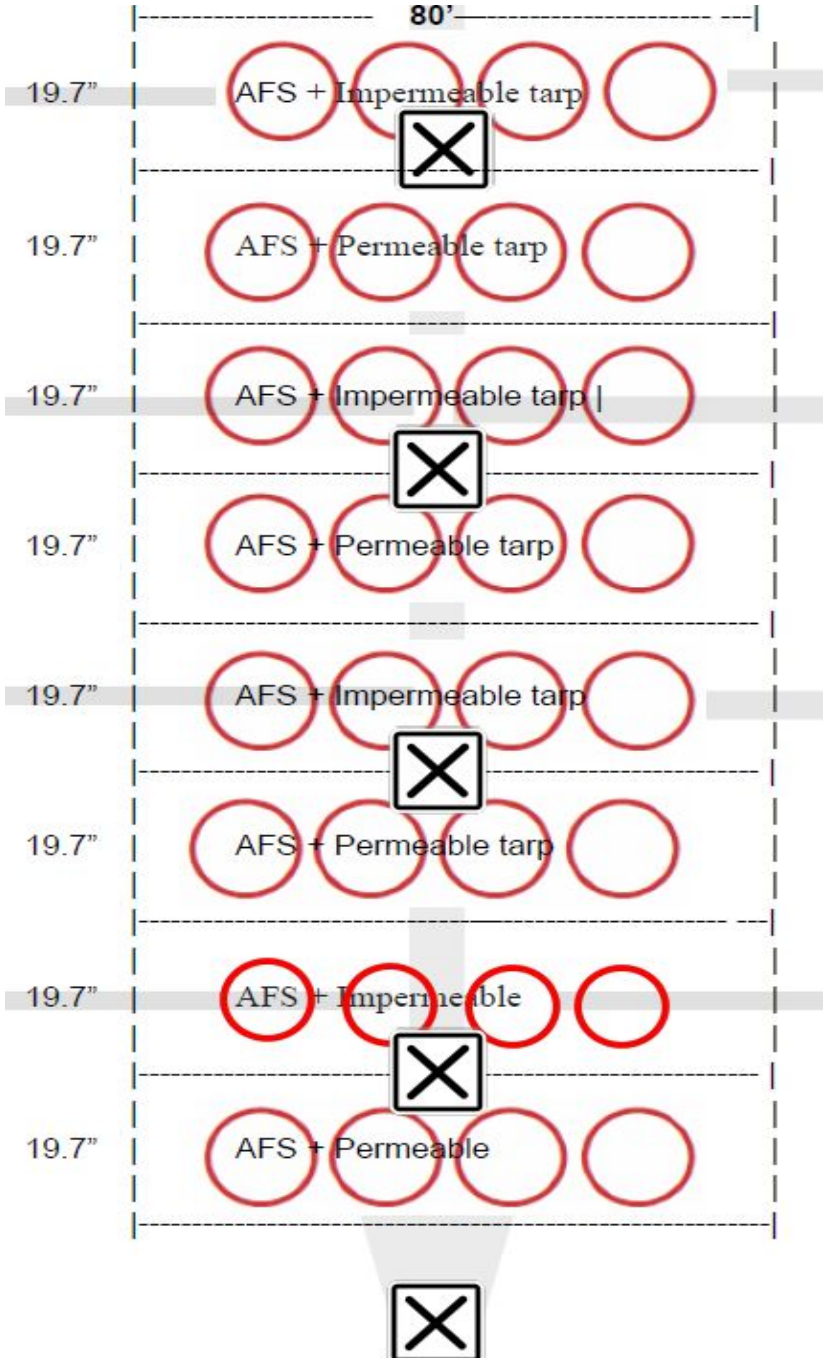
- Poa is sensitive to rapid depletion of stored carbohydrate
- Hardened Poa can survive 45-60 days
- Hardened Bentgrass 120+ days
- Venting is inefficient and $$$
- All options carry risk
- Options for mitigating risk are limited

2006/2007 Glendale Study, Ross/Anderson

Project design: Forced hardening

- Strip plot
- Futerra 7020 on all
- Impermeable vented
  - 10’ centers
- Covered as GDD drop
- 4x poa annua replications per exp.unit
- Fall installation staggered
  - +10’C, 5’C, 0’C, -5’C

No passive venting - goal to produce (and track) onset and factors of anoxic conditions



4x Sensors under each tarp

UV/PAR, 02, C02, N/P/K, soil temp & moisture

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Soil Monitoring - N/P/K, Soil 02

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Photosynthetically Active Radiation (PAR) 400-750 nm

Observations PAR and DLI

(light intensity and accumulation)

- Measuring PAR over 24hrs
    - Photosynthetically active radiation (PAR)
- Photosynthetic Photon Flux Density (PPFD) measures total duration of light per day
- Trending the DLI relationship in plant hardening
    - Min µmol/m²/s
        - *(micromoles per square meter, per second)*

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Oxygen & CO2 (surface) & Ambient

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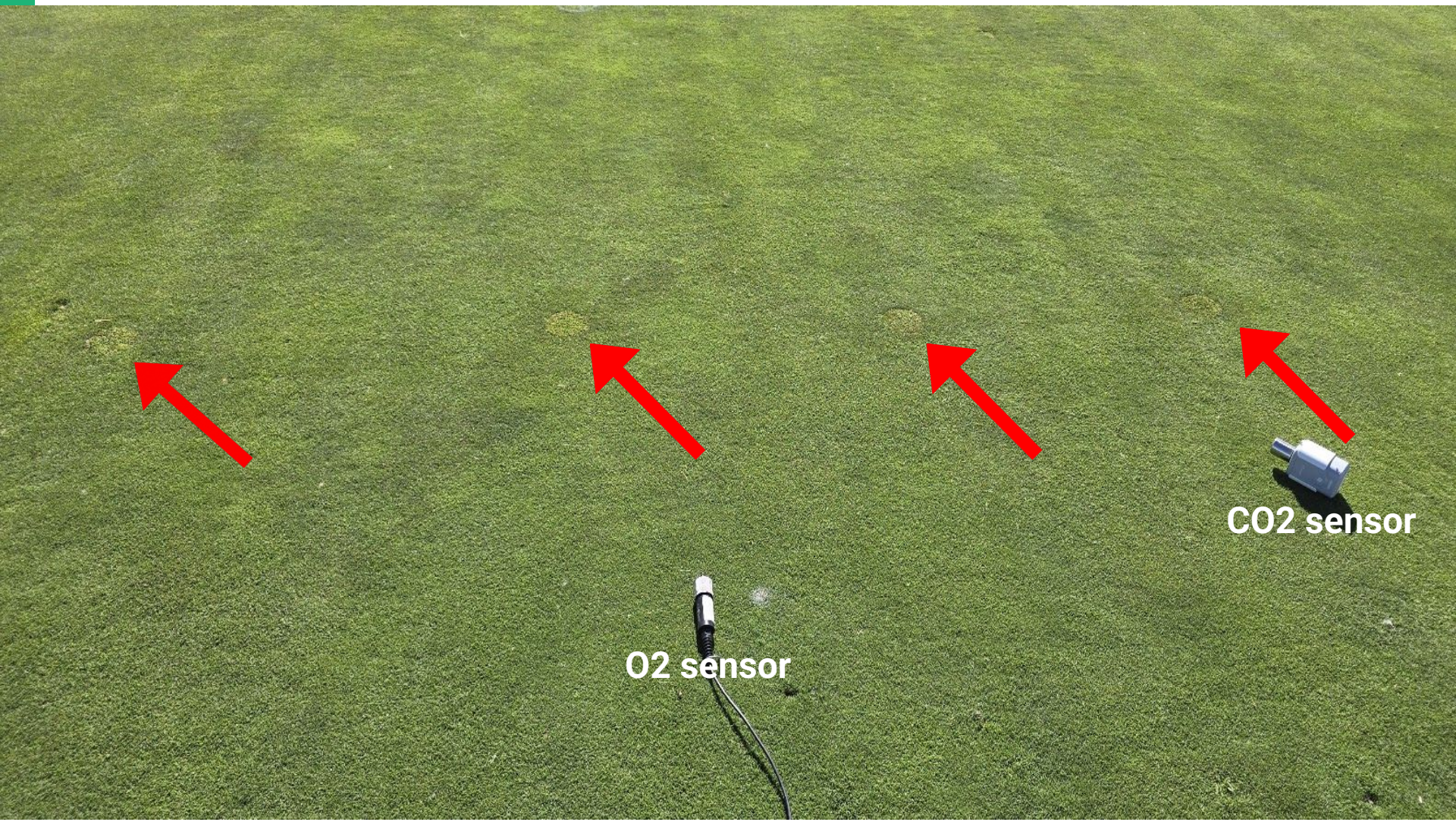
Poa Plugs (anoxia sensitive) x 4per



Insulators: Futerra 7020

- Provides insulation
  - Low temp protect
- Allows diffusion for 02/C02 equalization
  - (Passively)
- Maximize UV penetration (carb storage)
- Applied 4%N/4%K
  - Per prev. Research to maximize fall carb storage

Tarps - Over the Futerra 7020

Impermeable, non-breathable

Permeable, UV & breathable

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Stage 1: Control

Stage 1 tarps:
Oct 9th (+10’C), Sprayed Instrata A/B

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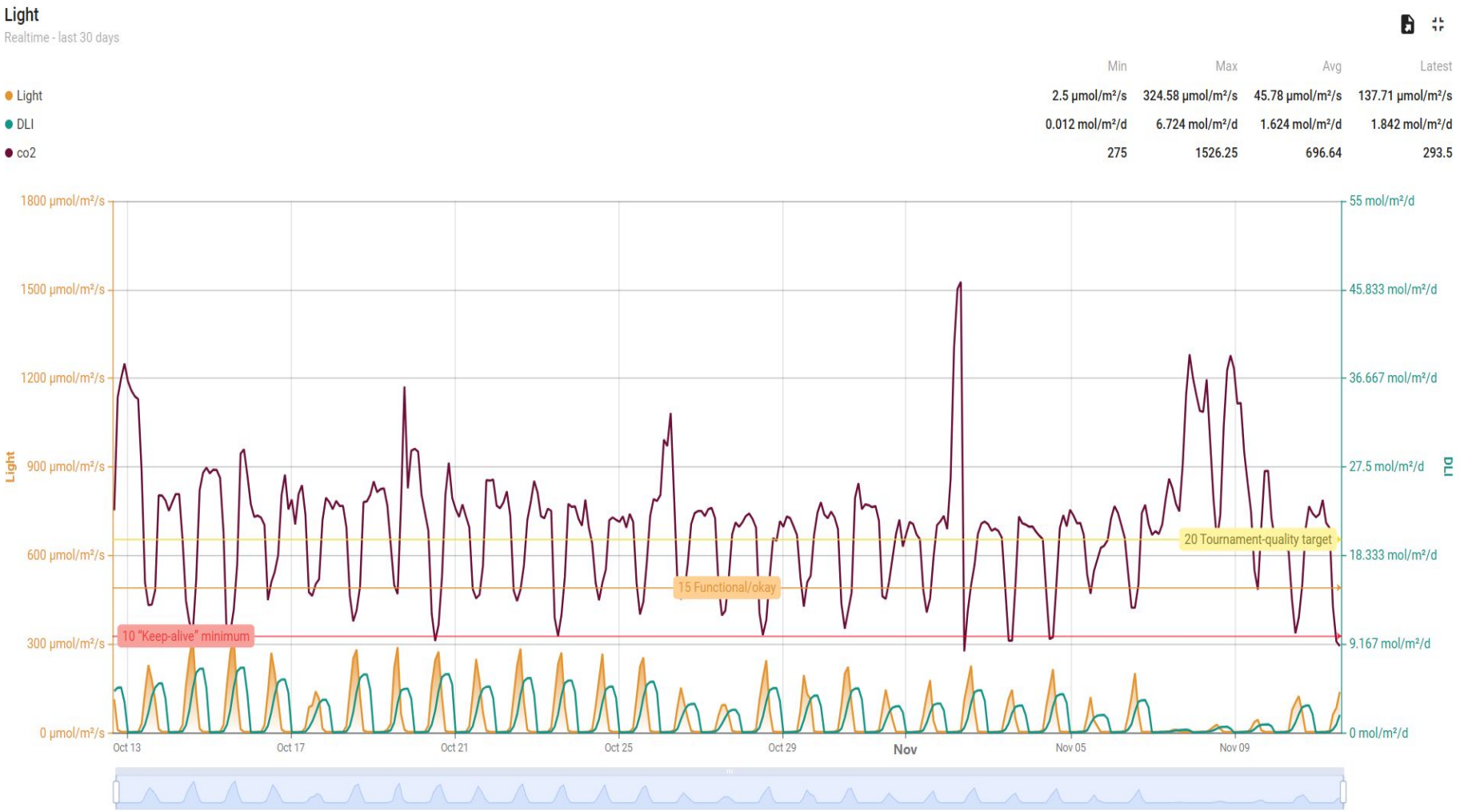
Stage 2 Oct 27 @ 5’C

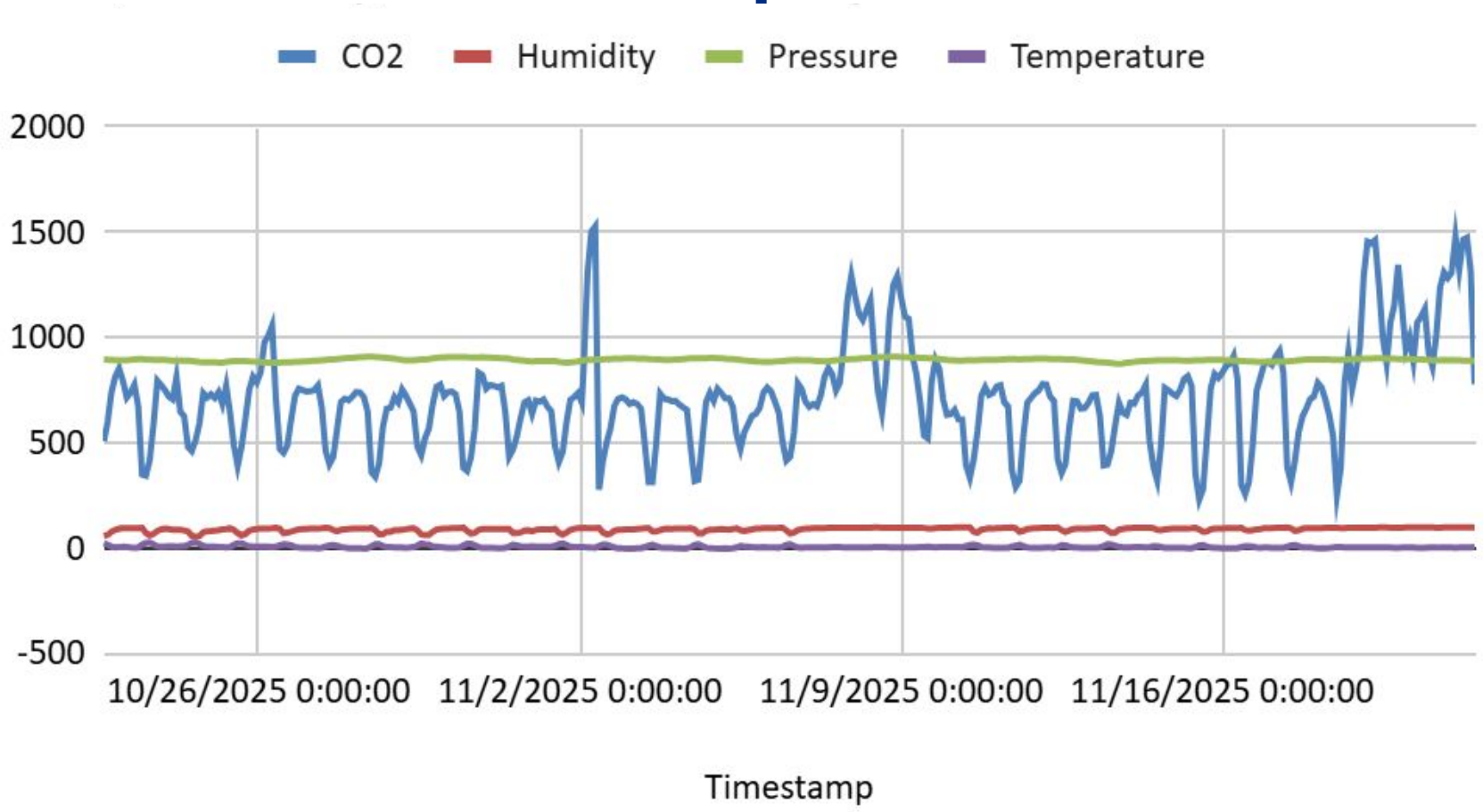
Stage 3: Nov 6th @ 0’C,

Stage 4: Nov 19 @ -5’C

Observations: Light, CO2 (1)



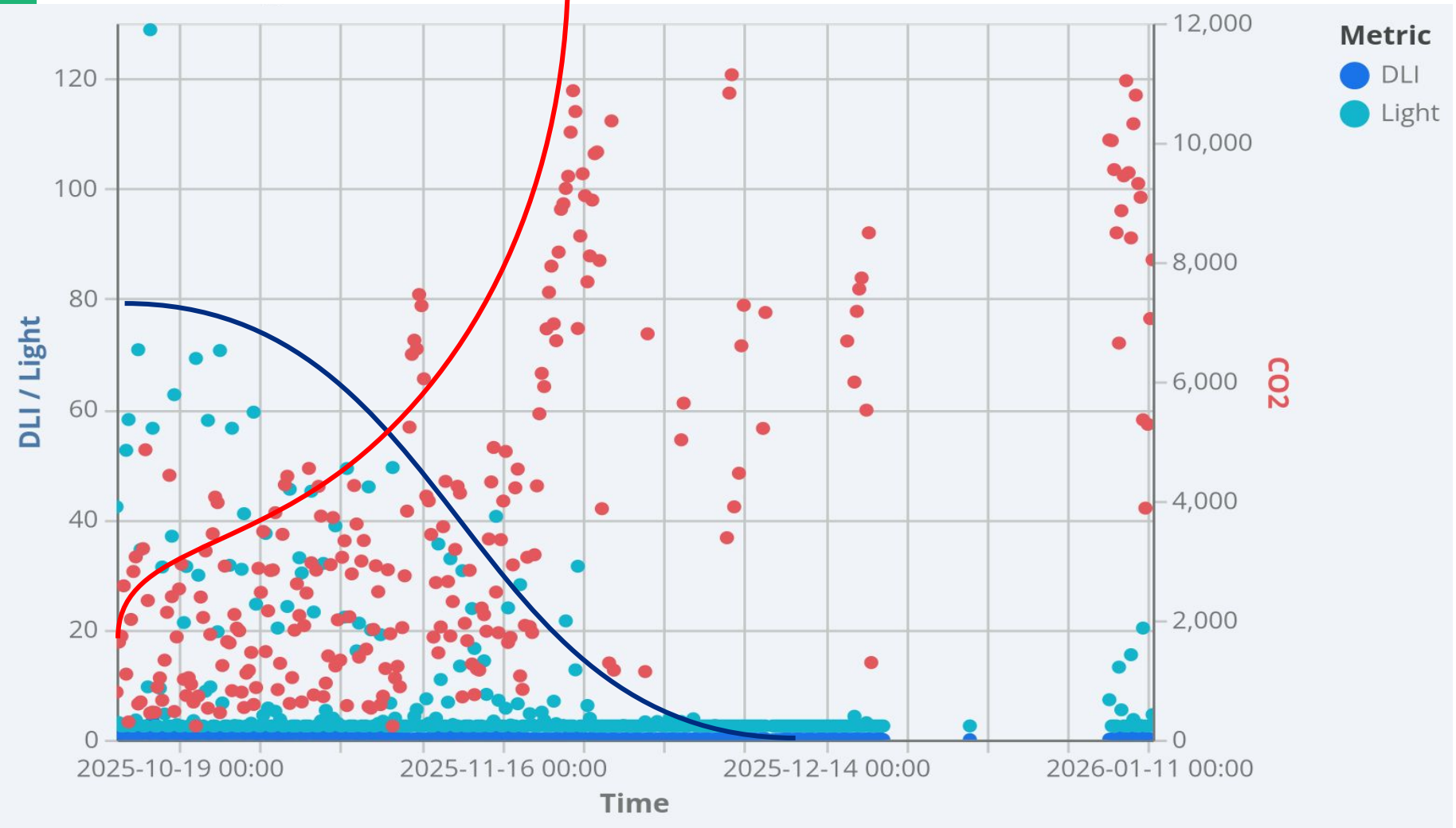
Observations CO2, Humidity, Pressure, Temp.



https://docs.google.com/spreadsheets/d/1NO6mQEyOFCP3PBilc13hbmShjskXP4G4/edit?gid=1499170451#gid=1499170451

Observations PAR and DLI

(light intensity and accumulation)



Early Assessment: Nov 11/2025

- Both tarp types fundamentally alter the turfgrass environment, creating a semi-sealed microclimate.
- The primary cause of high CO2 under tarps are stress from increased cellular respiration.
- Trapped heat and moisture dramatically speed up the plant's metabolic rate and CO2 output, reaction to stress.
- drops in Barometric pressure shown to trigger stress response
  a. amplifies C02 production spike.

The First 100 Days

- Aim to capture a “metabolic momentum”
- Record base and peaks of C02 ppm production under both systems
- Identify a “hardened state” AKA stable 02 depletion rate
- What are the comparative strengths and risks
  - Determine a threshold for risk
    - A baseline for applying tarps, and what types

Findings @ 100 days

- **Permeable System Risk (Moderate & Seasonal):**
  - Anoxia risk is driven by **temperature-driven physiological activity (respiration)** during milder periods.
  - Rising temperature (CO_2 drop) indicates push back into an unhardened state.
  - Cold, high-humidity periods increase Leaf Wetness, potentially increasing secondary disease risk. (TBD)
  - Stable CO_2 floor in sub-zero conditions: 500–1000 ppm.

Findings @ 100 days

- **Impermeable Tarp System**
  - Highly volatile CO2 accumulation with peaks up to **11,145 ppm** occurring consistently at night (vs 500 ppm of permeables).
  - **CO2 toxicity**: the tarp severely inhibits gas exchange.
  - Soil oxygen levels remain stable (18%–22%), contradicting the notion of severe soil-level suffocation.
  - The microclimate under the tarp may be **delaying the hardening process**.

Winter Readiness Index (WRI) Formula

$$WRI = 100 \times \left(1 - \frac{CO_{2(actual)} - C_{base}}{C_{peak} - C_{base}}\right)$$

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Biennial Field day - Aug 2027

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Alberta Turfgrass
Research Foundation

Thank you for your generous support

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