

What really drives plant health?

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Turfgrass cultural practices

Primary

- Mowing
- Fertilization
- Irrigation



Turfgrass cultural practices



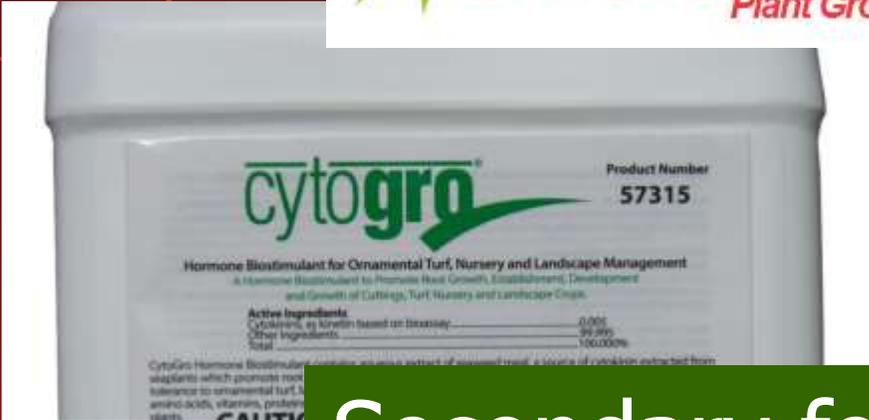
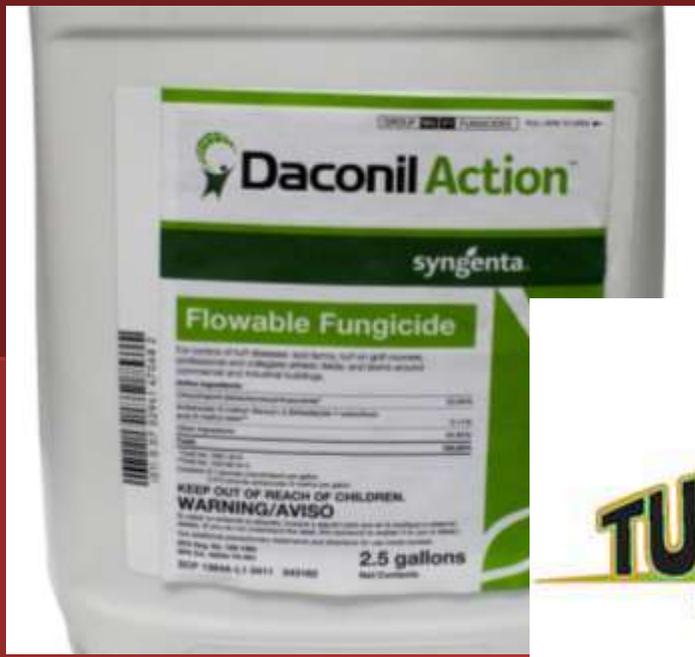
Secondary

- Pesticides
- Biostimulants
- Cultivation
- Surfactants
- Etc.



What are the primary driving forces of “plant health”?

- Water ✓✓✓✓
- Nutrients ✓✓✓✓
- Light ✓✓✓
- Favorable temperatures ✓
- CO₂ – no control over



Secondary forces – plant health products

#1
IN TURF STRESS TOLERANCE

Stress Rx

Significantly increase your turf's stress tolerance, survival and recovery from:

- Heat
- UV Radiation
- Drought
- Salt Stresses

BAYER **Signature XTRA**
Stressgard

Success Story

Honor® Intrinsic™ brand fungicide gives New York superintendent disease control and increased root growth

BASF
The Chemical Company

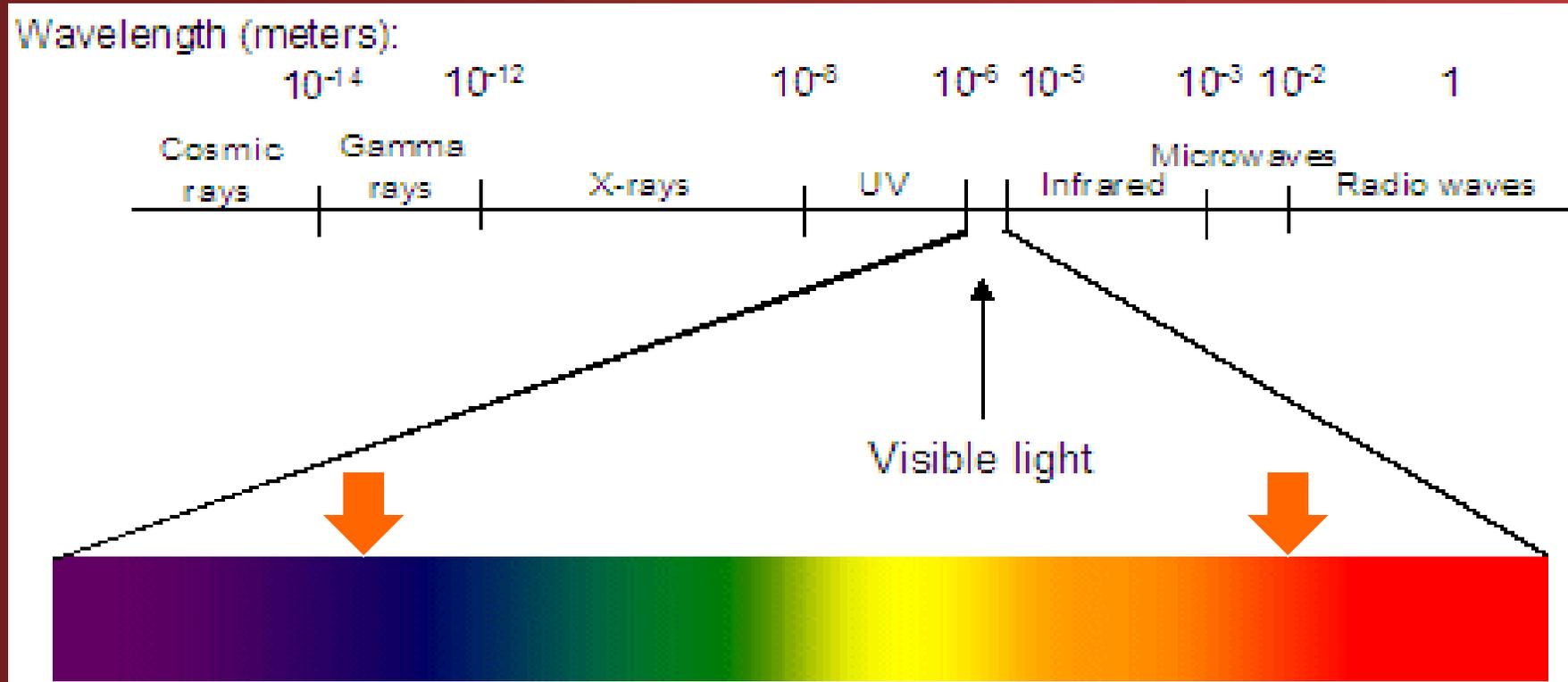
We know light is often a limiting factor for “plant health”?



Do I have enough light to grow bermudagrass or zoysiagrass or ???

- I get morning sun and afternoon shade
- This spot gets 3 or 4 hours of sun per day
- It is shade from a tree – probably around 40% shade

Light from the sun comes in different lengths and energy levels



Light that plants need for photosynthesis is in the red and blue parts of the visible spectrum

Light measurement

Daily light integral

- Defined as the total photosynthetically active radiation (PAR) that the plant receives over 1 day
- Measured in mol of PAR radiation
- Will take into account all factors that can reduce light

Irradiation measurement using a PAR sensor



- More cost-effective today (~\$200)
- Measures light in the 400-700 nm range and reports in $\mu\text{mol} / \text{m}^2 / \text{sec}$
- Will give a true reading of the effects of shade on plant productivity

Mini-weather station with PAR sensor (~\$600)

- same technology as the hand-held sensor, but has data logging capabilities
- will record light striking the turf over a full day (or several days) and allow DLI to be calculated from the data.



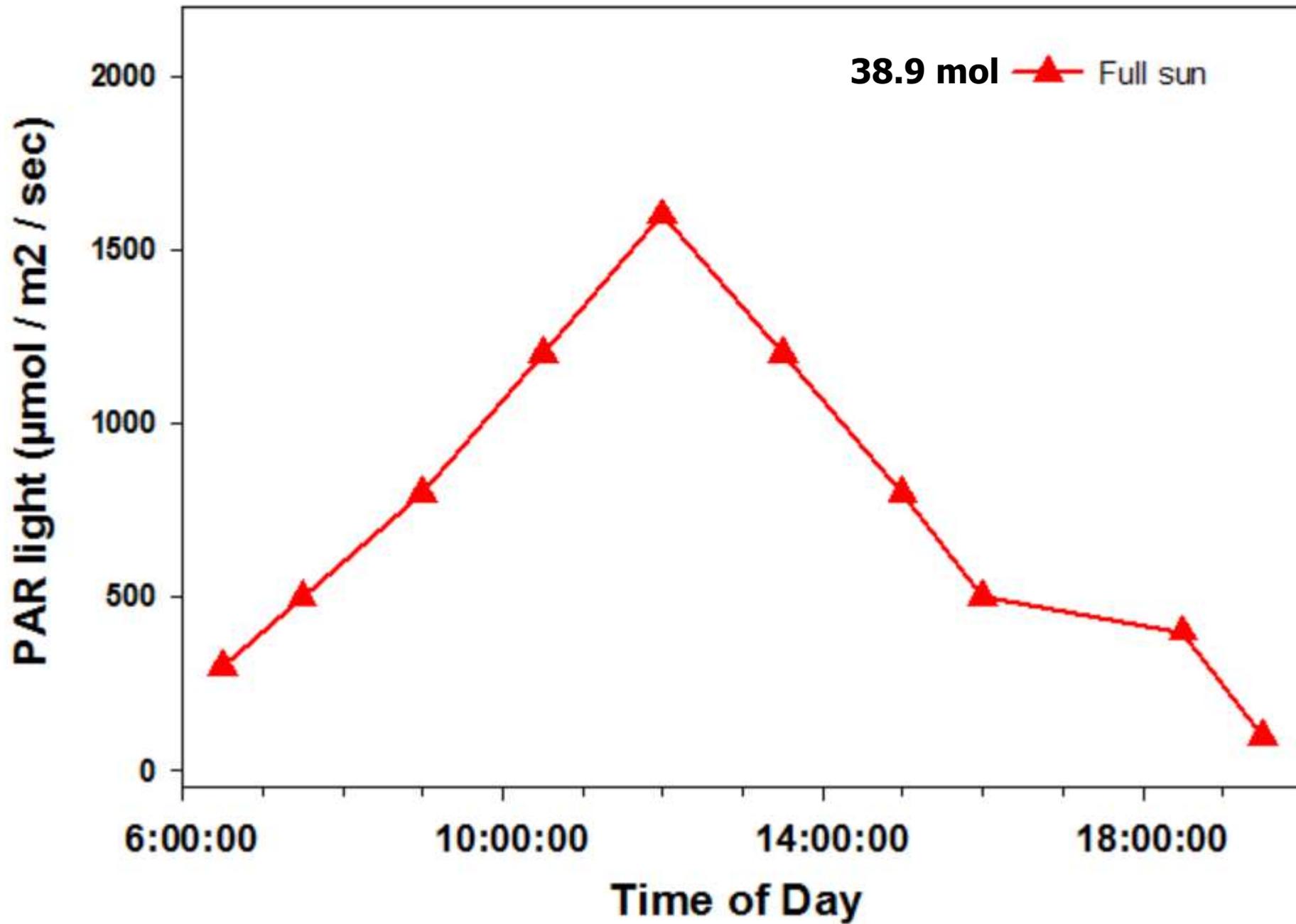
Easiest way to measure daily light integration

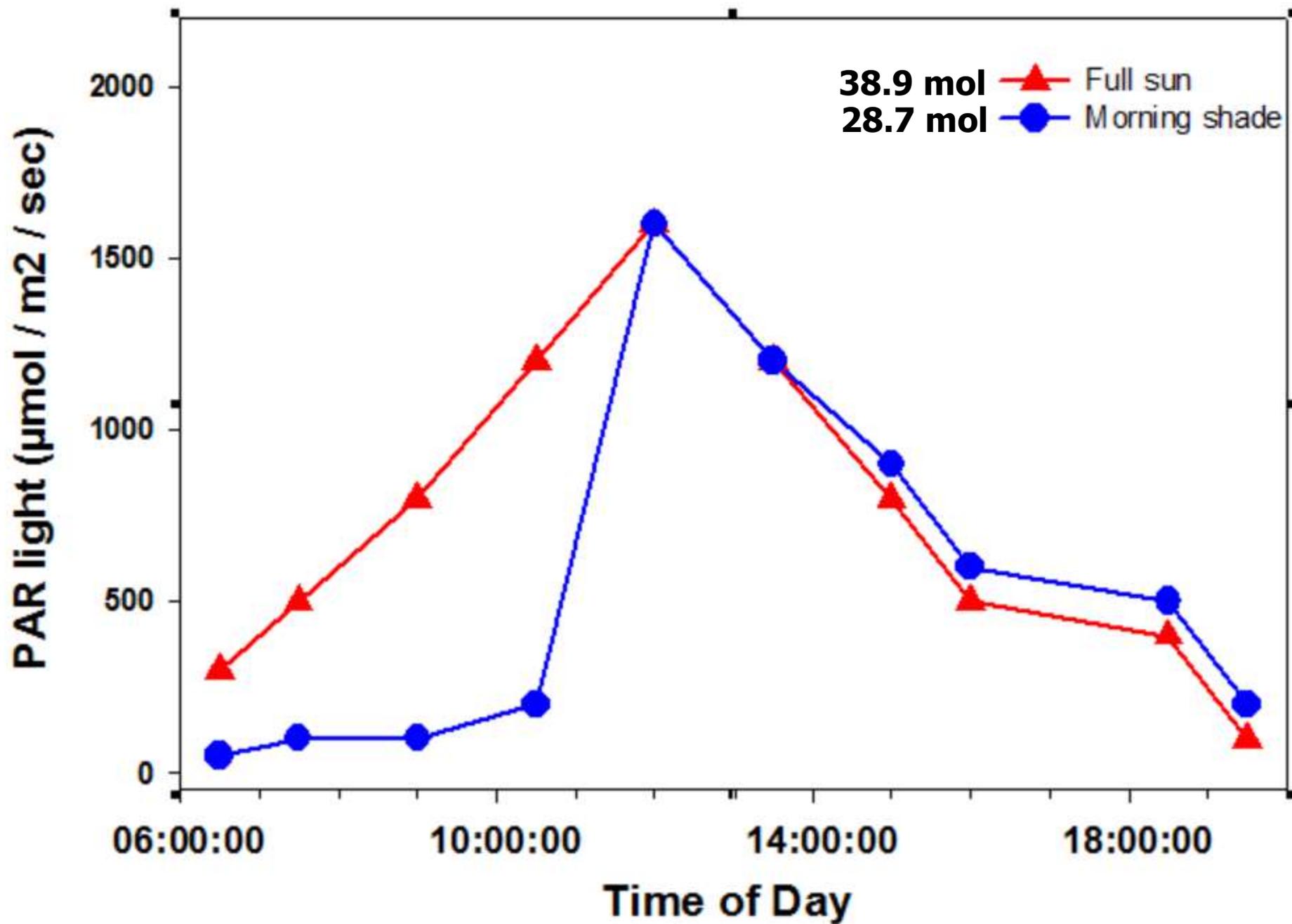


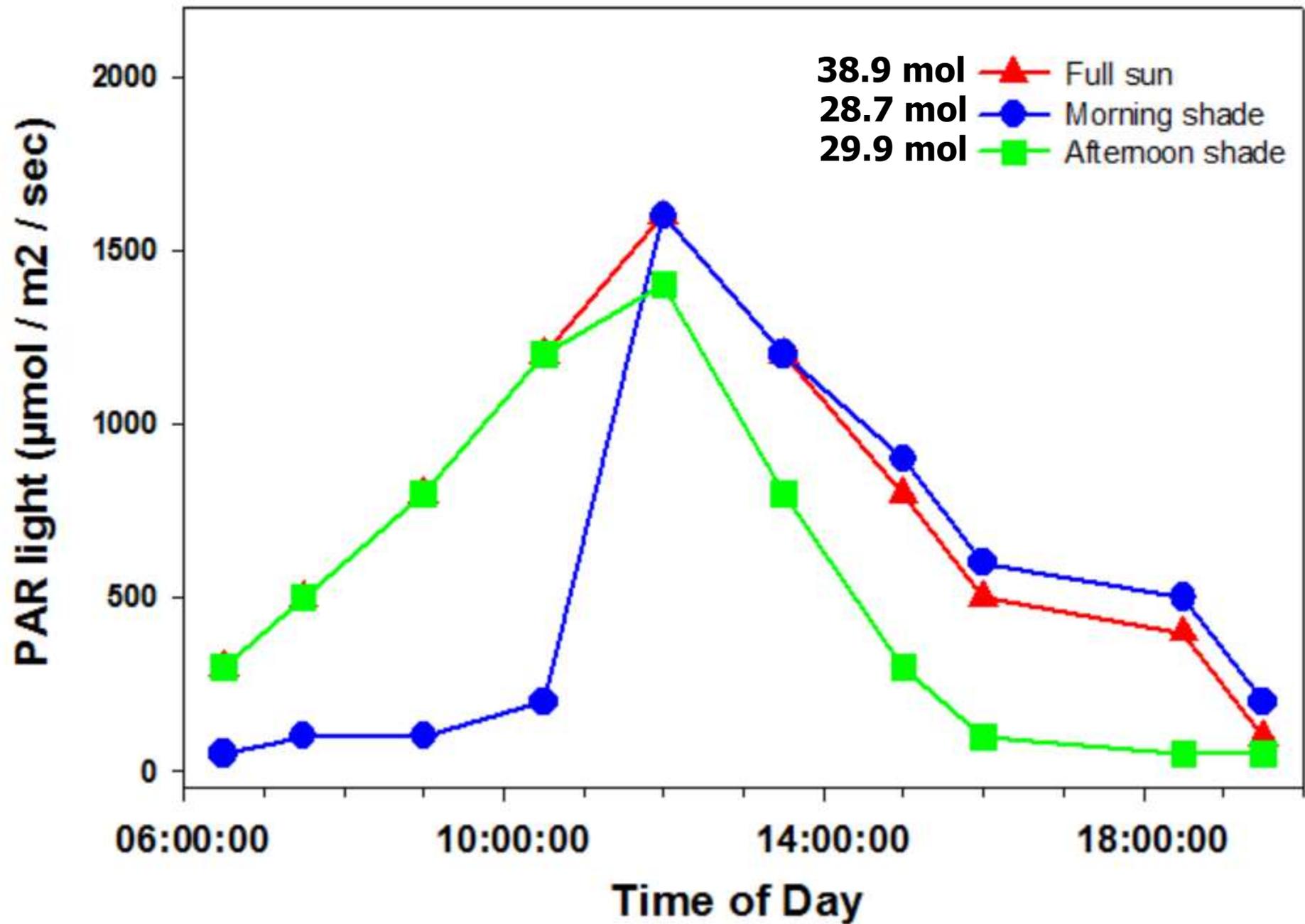
3-pack - \$170

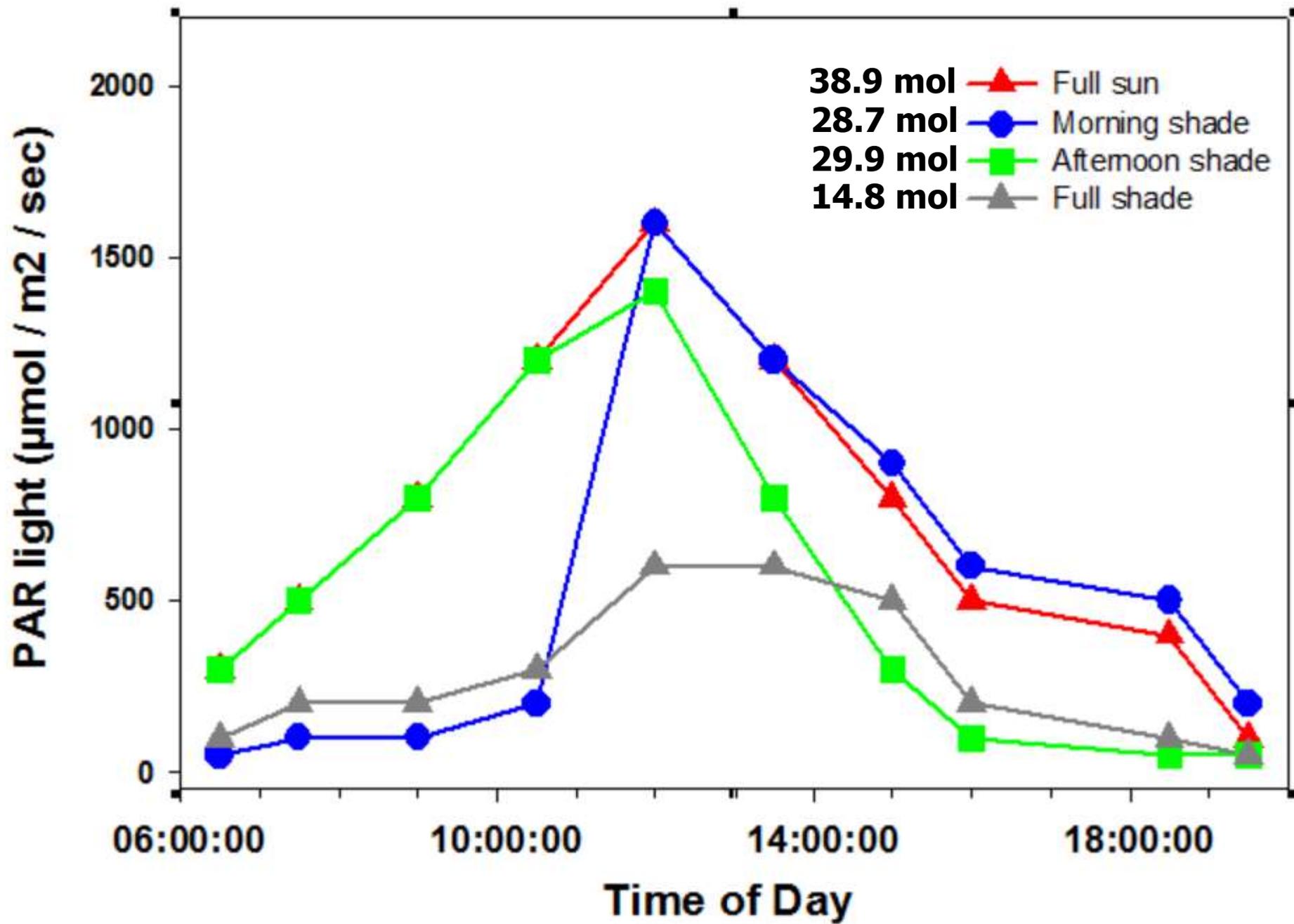
Calculating the DLI using a hand-held sensor

- Take light readings from the same spot(s) throughout the day
- Sum those instant readings over a specific time period
- Sum the totals for the entire day









Now that we have measured DLI for a site, what is next?

- Need to know the MINIMUM DLI for a specific grass species or cultivar
- Will management affect the DLI of the grass used?
- Can we replace the grass or do we need to modify the environment?



A photograph of a golf green on a hillside. The green is well-maintained and has a white flag in the center. To the left of the green is a small sand bunker. The background features a steep, rocky embankment with sparse vegetation and a dense forest of trees with autumn foliage in shades of green, yellow, and red. The lighting suggests a bright, sunny day with long shadows cast across the grass.

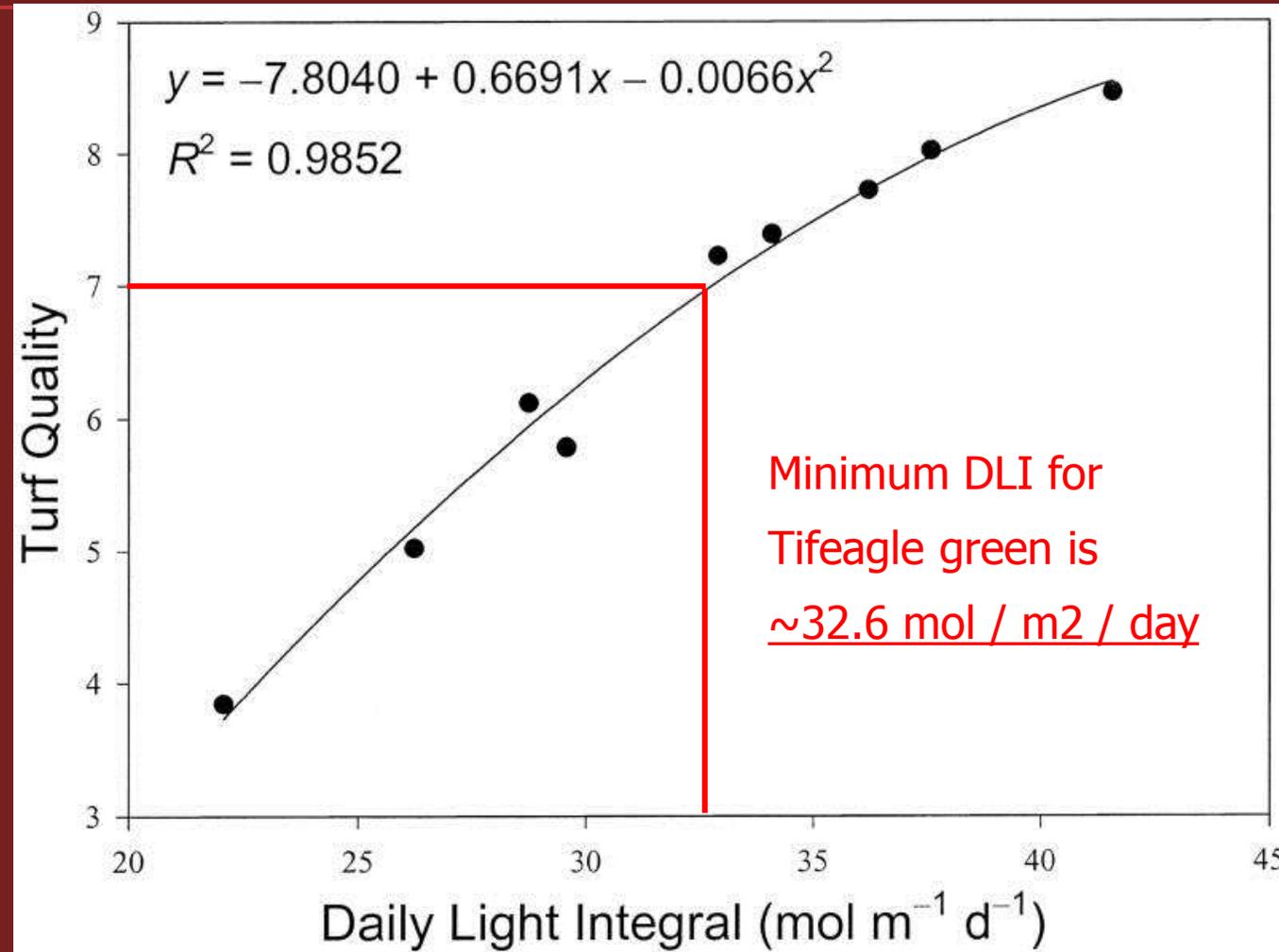
How much light does bermudagrass need each day to perform?

DLI for a Tifeagle bermudagrass green - Clemson

Morning shade	Afternoon shade	DLI 2-yr average
		----- mol / m2 / day -----
none	none	41.6
none	low (41% shade)	36.3
none	high (92% shade)	29.6
low (41% shade)	none	37.6
low (41% shade)	low (41% shade)	32.9
low (41% shade)	high (92% shade)	26.2
high (92% shade)	none	34.1
high (92% shade)	low (41% shade)	28.8
high (92% shade)	high (92% shade)	22.1

Bunnell, McCarty et al., 2005

DLI and turf quality of a Tifeagle green - Clemson

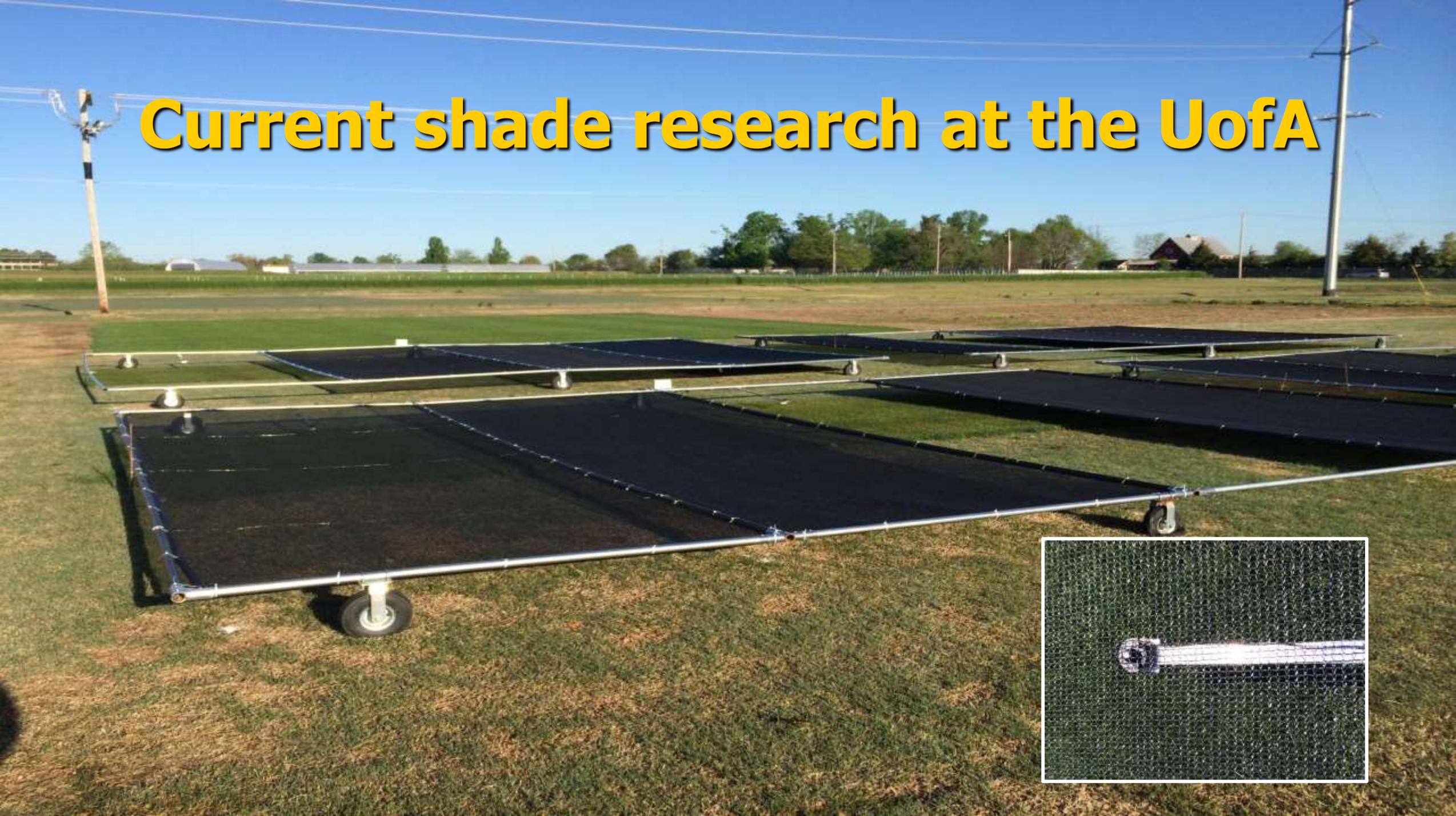


DLI required to maintain acceptable quality (Kruse – Florida)

Cultivar and species	----- mol / m ² / day -----	
'Tifway' hybrid bermudagrass	22.4	
'Celebration' common bermudagrass	19.5	} Shade-tolerant
'Tifgrand' hybrid bermudagrass	18.6	
'Palisades' zoysiagrass (japonica)	11.3	
'Diamond' zoysiagrass (matrella)	11.3	
Perennial ryegrass	10.0	

Maintained at lawn (rough) heights of cut

Current shade research at the UofA



	0% shade	30% shade	60% shade	90% shade
Non-overseeded	42.9 mol / m ² / day	26.8 mol / m ² / day	15.6 mol / m ² / day	4.3 mol / m ² / day
overseeded				

90% shade – 4.3 mol PAR / day



overseeded

non-overseeded

60% shade – 15.6 mol PAR / day



overseeded

non-overseeded

30% shade – 26.8 mol PAR / day



overseeded

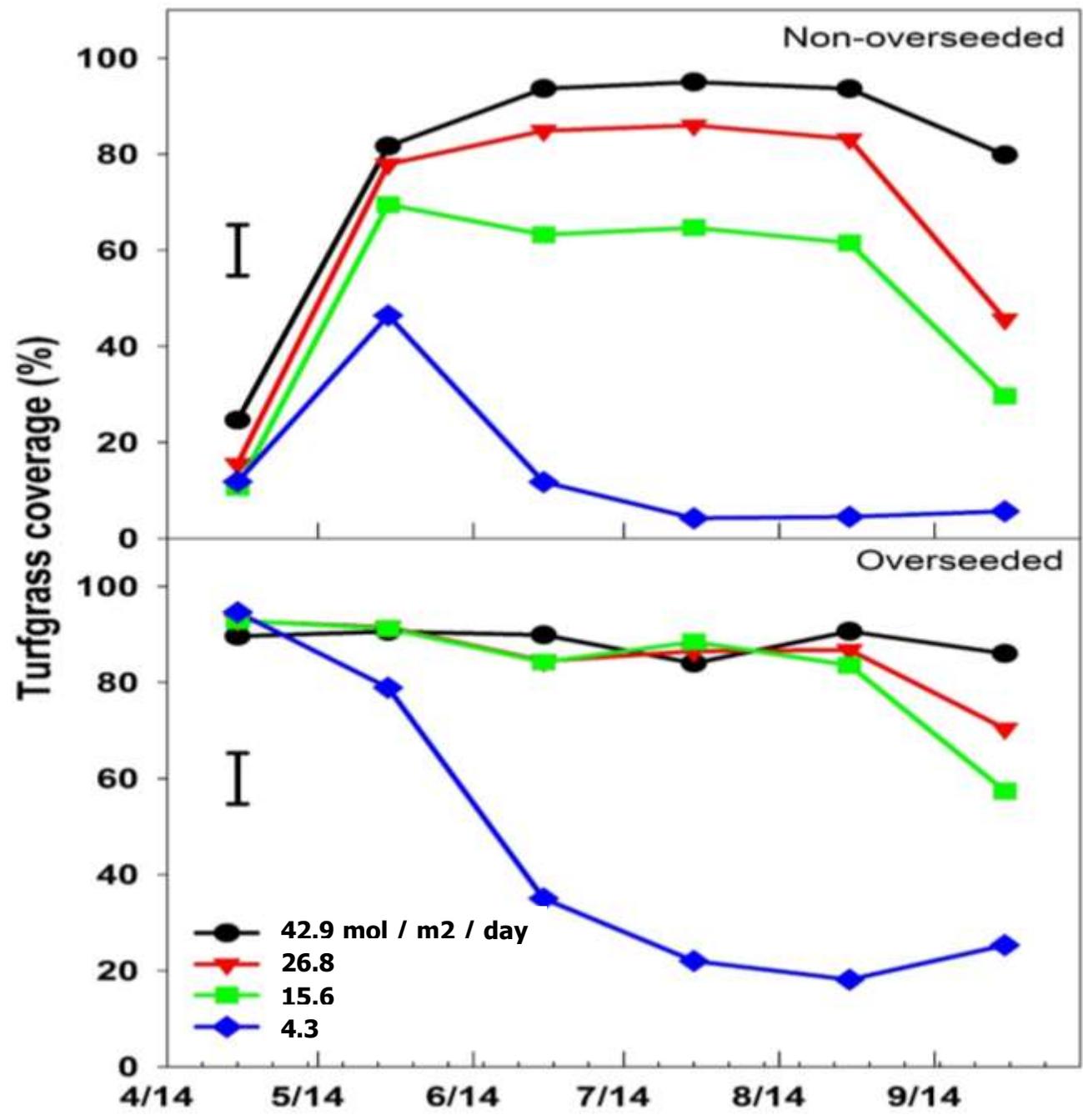
non-overseeded

0% shade – 42.9 mol PAR / day



overseeded

non-overseeded



What is the minimum DLI for bermudagrass?

- **Lawn or rough**
 - 23.0 mol / m² / day
- **Fairway or sports turf**
 - 27.0 mol / m² / day
- **Greens**
 - 33.0 mol / m² / day

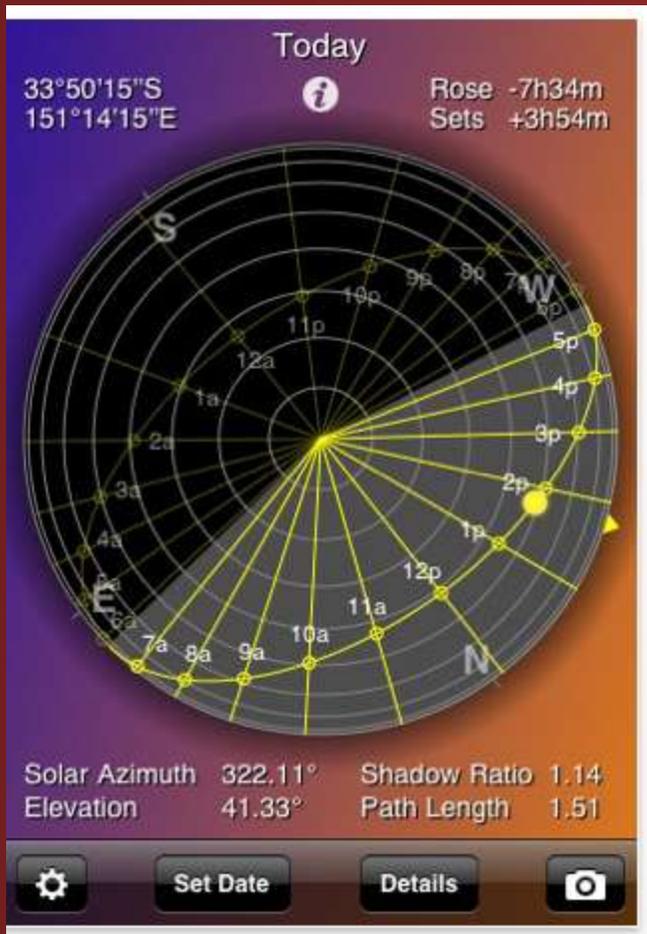
What is the minimum DLI for bentgrass or other cool-season grasses?

- **Just not sure at this point**
 - **Kruse – perennial ryegrass rough**
 - 10.0 mol
 - **Richardson – perennial ryegrass (1.0 inch)**
 - 15 mol
 - **Bell – creeping bentgrass (green)**
 - ~20 mol
 - **Steinke and Stier – at ~ 8 mol (0.5 inch mow)**
 - Poa supina > bent > Ky bluegrass



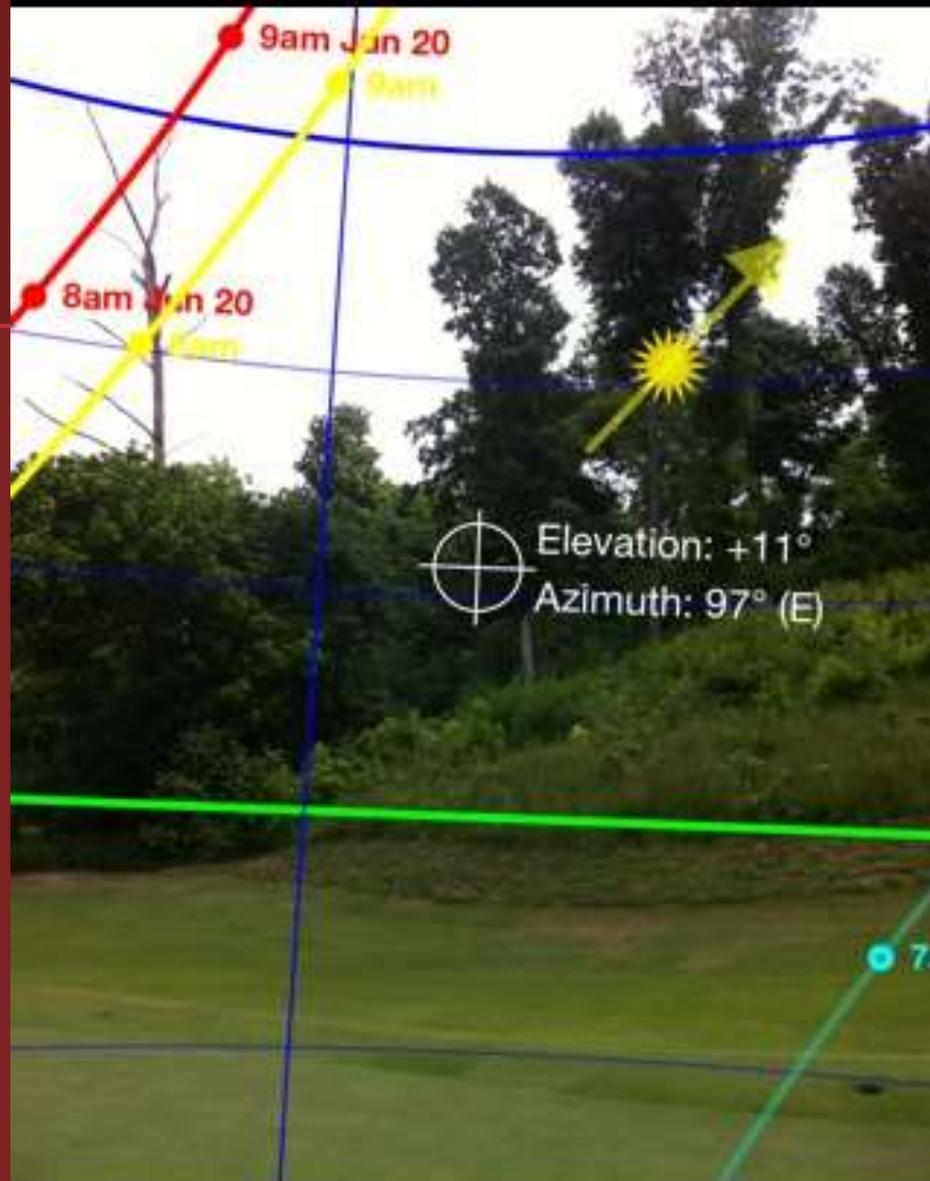
\$2.99 Buy App

Sun Seeker



- Uses the GPS locator of the phone
- Provides a site-specific display of sun patterns for each hour of the day
- Can also generate patterns for future dates

Sun Seeker



Monday 14 May 2012, 12:30 pm
36°08'N 094°11'W

Summary points

- Light is a primary driving force of plant health
- Magic potions may prolong the agony but are not a long-term solution
- Data is your friend!!
- Communication that includes data can lead to positive changes in plant health



**Thanks –
any questions ??**

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