

Effects of abiotic stresses and interaction with elevated carbon dioxide on turfgrass growth and management

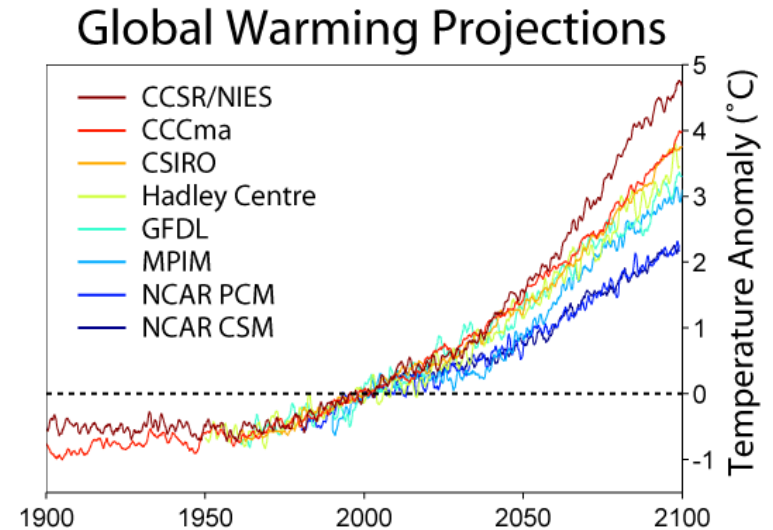
Bingru Huang

Rutgers University

Climate changes

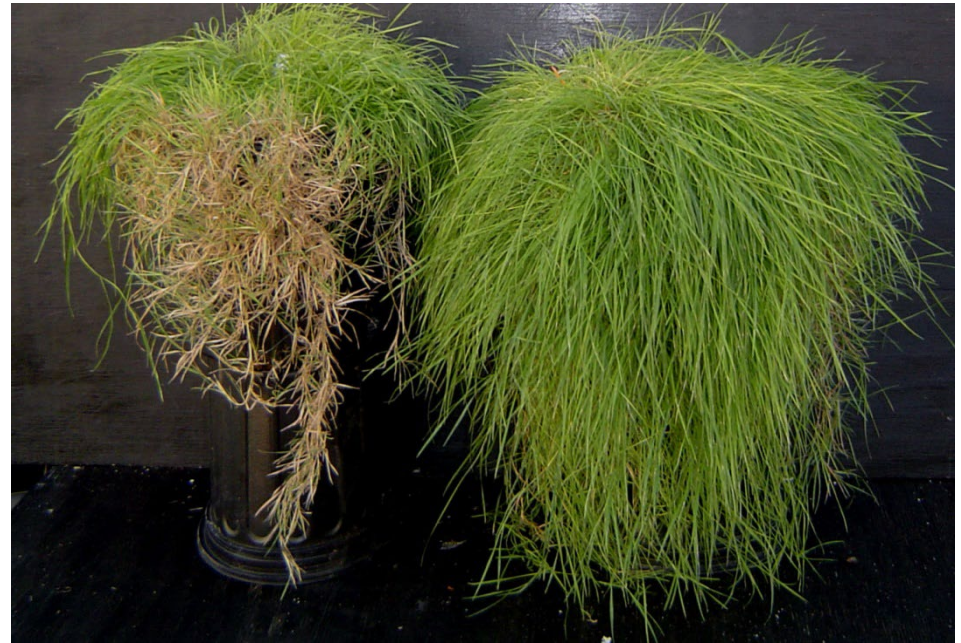
– abiotic stress

- Heat stress
- Decline in water availability
 - Drought stress
 - Salinity stress



Strategies to mitigate abiotic stresses in turfgrass

- Genetic modification and breeding for stress tolerant cultivars



Select heat and drought tolerant turfgrasses through genetic modification

Strategies to mitigate abiotic stresses in turfgrass

- Management practices
 - Water conservation
 - water use efficiency

Irrigation based on ET

Kentucky bluegrass

Zoysiagrass



100% ET



80% ET



60% ET



40% ET



Effects of elevated CO₂ on turfgrass growth: friends or foes?



Elevated CO₂



Ambient CO₂

Elevated CO₂ mitigated heat stress in turfgrass

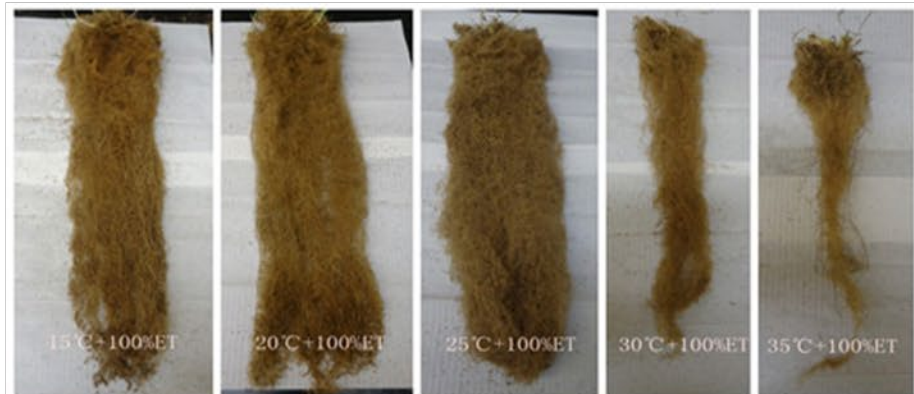
Ambient CO₂

15°C 20°C 25°C 30°C 35°C



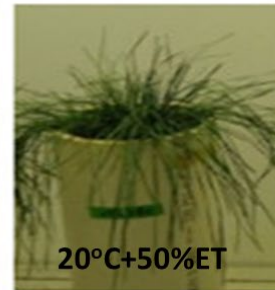
Elevated CO₂

15°C 20°C 25°C 30°C 35°C



Elevated CO₂
mitigated
drought,
heat, and
combined
stress in
turfgrass

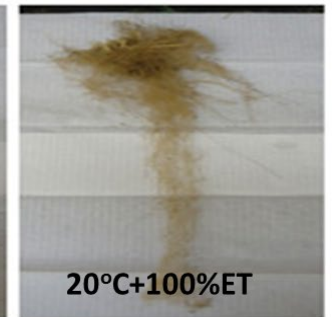
400
ppm



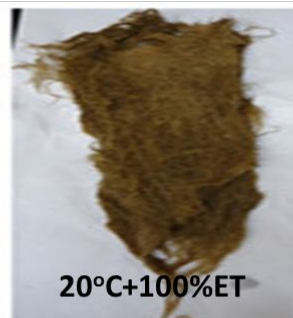
800
ppm



400
ppm



800
ppm



Dealing with climate changes in turfgrass management



Huang's lawn in NJ

Grass can be greener on our side of the fence